HONG KONG JOURNAL

OF

GYNAECOLOGY, OBSTETRICS & MIDWIFERY

January 2017, Volume 17, Number1

EDITORIAL

Would new medical graduates choose obstetrics and gynaecology as their future career anymore? 9
WC Leung

ORIGINAL ARTICLES (OBSTETRICS)

Companionship during Labour Promotes Vaginal Delivery and Enhances Maternal Satisfaction 12
Vivian WH Chung, Jessie WK Chiu, Daniel LW Chan, William WK To

Antenatal Surgical Management for Ovarian Cysts: 13 Years' Experience 18
Suet-Ying Yeung, Jacqueline Ho-Sze Lee

Developing a Pilot Model to Predict Successful Vaginal Birth after Caesarean Section for Hong Kong Chinese women 24
Janet Sui-Man Tang, TK Lo

Mode of Delivery and Pregnancy Outcome in Women with Minor Placenta Previa 30
Sum-Yee Chan, Wai-Lam Lau, Wing-Cheong Leung

Sexuality during Pregnancy among Chinese Couples in Hong Kong: A Prospective Cross-sectional Study 36
Wendy Shu, Chung-Nin Lee, Kwok-Keung Tang

ORIGINAL ARTICLES (GYNAECOLOGY)

Difference in Serum Human Chorionic Gonadotrophin Levels Measured Using the World Health Organization 3rd versus 5th International Standard: A Correlation Study with Reference to Management of Pregnancy of Unknown Location 45
Kwai-Ying Lui, Yun-Ting Lee, Chun-Hong So, Ellen LM Yu

Vaginal Ring Pessary Inserted by a Nurse for Pelvic Organ Prolapse in Chinese Women: A Prospective Study 50
Anny Wai-Mei Tong, Willy Cecilia Cheon, Ka-Pui Chan

REVIEWS

Female Sexual Dysfunction — How Can Gynaecologists Help? 56
Sue ST Lo

A Review of Surgical Treatment for Pelvic Organ Prolapse 62
Symphorosa SC Chan, Rachel YK Cheung

Duratocin®
CARBETOCIN

"Protecting mothers from postpartum haemorrhage[1]"

- Single injection for a long duration of action
- Administer either before or after delivery of the placenta[1]
- Significantly reduced blood loss versus oxytocin[2–3]
- Significantly reduced need for additional uterotonics versus oxytocin and syntometrine[2, 4–6]

References:
1. DURATOCIN Product Insert (Hong Kong) 2. El Behery MM *et al, J Matern Fetal Neonatal Med*. 2016;29(8):1257-60. 3. Borruto F *et al, Arch Gynecol Obstet*, 2009;280:707-12. 4. Razali N *et al, Eur J Obstet Gynecol Reprod Biol*. 2016;198:35-9. 5. Larciprete G *et al, J Prenat Med*. 2013; 7(1):12-8. 6. Mohamed Maged A *et al, Matern Fetal Neonatal Med*. 2016 Jun 8: 1-5. [Epub ahead of print].

Further product information is available upon request.

Ferring Pharmaceuticals Limited
Suites 2604-05, 26/F, AXA Tower, Landmark East,
100 How Ming Street, Kwun Tong, Kowloon, Hong Kong
Tel: +852 2622 8000 Fax: +852 2622 8001 Website: www.ferring.com

FERRING
PHARMACEUTICALS

OG020/16/AUG/HK

1. **Fast action** on symptoms[2]
   - Rapidly stops bleeding
   - Reduces pain and restores women's quality of life
2. **Significant and sustainable** reduction **of fibroids size**[3]
   - Maintained 6 months after treatment cessation
3. **Good safety** profile
4. **A first-in-class** Selective Progesterone Receptor Modulator (SPRM)
   - Direct and tissue specific effect on uterine fibroid cells[1]
5. **Convenient, oral, once-a-day treatment**
   - For up to 6 months

esmya® 5mg

Ulipristal acetate

Esmya 5 mg Tablets – Hong Kong Abbreviated Prescribing Information
Indications: Pre-operative treatment of moderate to severe symptoms of uterine fibroids in adult women of reproductive age.
Dosage: Adults: 1 oral tab daily, started in first week of menstrual cycle for up to 3 months. If required, repeat 3-month treatment course once, starting at the earliest during second menstruation after completing initial course.
Contraindications: Hypersensitivity to active substance or excipients. Genital bleeding of unknown aetiology or not caused by uterine fibroids. Uterine, cervical, ovarian or breast cancer. Pregnancy (to be excluded before starting). Lactation.
Precautions: Non hormonal contraception recommended. Not recommended for patients with severe renal or moderate to severe hepatic impairment. Not recommended for women with severe asthma insufficiently controlled by oral glucocorticoids. Changes in the histology of the endometrium may be observed with Esmya. Warn that reduction in menstrual blood loss or amenorrhoea likely within 10 days and advise to inform doctor if excessive bleeding persists.
Interactions: Progestogens, CYP3A4 inducers and inhibitors, P-gp substrates (e.g. digoxin, dabigatran, fexofenadine).
Side effects: Amenorrhea, endometrial thickening, headache, vertigo, abdominal pain, nausea, acne, hyperhidrosis, musculoskeletal pain, uterine haemorrhage, hot flushes, pelvic pain, ovarian cyst, breast tenderness/pain, oedema, fatigue, raised cholesterol.

References:
1. Yoshida S. Cell-type specific actions of progesterone receptor modulators in the regulation of uterine leiomyoma growth. Semin Reprod Med 2010. 28(3):260-73.
2. Donnez J. and al. Ulipristal Acetate versus Placebo for Uterine Fibroids. N Engl J Med 2012;366:409-20.
3. Donnez J. and al. Ulipristal Acetate versus Leurprolide Acetate for Uterine Fibroids. N Engl J Med 2012;366:421-32.

Full Prescription Information Available Upon Request.

友華股份有限公司
Orient EuroPharma Co., Ltd.
Room 605-6, Prosperity Centre,
25 Chong Yip Street, Kwun Tong, Kowloon, HK.
Tel: (852) 2578 7080 Fax: (852) 2578 1860

HRA Pharma

OEPHKESY/0616/01

HKJGOM

EDITORIAL BOARD

Address for Submission of Manuscripts and Correspondence to Editors:

(Gynaecology and Obstetrics Section)
c/o Department of Obstetrics and Gynaecology
United Christian Hospital, 130 Hip Wo Street, Kwun Tong, Hong Kong SAR, China
Tel: 3939 4851 Fax: 3949 5535 E-mail: towkw@ha.org.hk

(Midwifery Section)
Hong Kong Midwives Association
D1, 13/F, Hyde Centre, 223 Gloucester Road, Wanchai, Hong Kong
Tel: 2893 8800 Fax: 2572 5329 E-mail: midwives@netvigator.com

Address for Advertising & Subscription Enquiries:

The Obstetrical and Gynaecological Society of Hong Kong
Duke of Windsor Social Service Building, 4/F, 15 Hennessy Road, Hong Kong
Dr. KY Leung E-mail: leungky1@ha.org.hk
Dr. Danny TN Leung E-mail: dannytnleung@gmail.com
Dr. Dominic FH Li E-mail: dfhli@hkstar.com

HKJGOM

INSTRUCTIONS TO AUTHORS

The *Hong Kong Journal of Gynaecology, Obstetrics & Midwifery* publishes peer-reviewed articles on all aspects of gynaecology, obstetrics, midwifery and related fields, including original basic and clinical studies, review articles, case reports and abstracts or reports presented at scientific meetings or seminars.

Manuscripts submitted to this Journal must not be under simultaneous considerations by any other publication and should not have been published elsewhere in substantially similar form. A letter confirming the transfer of copyright to the Journal signed by all authors should accompany all submitted papers.

Manuscript Preparation

Manuscripts must be submitted in English or Chinese in an electronic format. This applies to all parts of the manuscript, i.e. reference, legends, figures, illustrations etc. Liberal margins should be left at the top and bottom, as well as the sides. The manuscript should be submitted in the following order: Title Page, Abstract, Text, References, Tables, Legends, and Figures. Each page, beginning with the summary, should also include the senior author's surname typed on the upper, left-hand corner. The author should not make any changes in the proofs except for the corrections of editorial errors, if any, and/or correction of typesetter's errors. A commercial name should not be part of a manuscript title. If a trademark item is named, the name(s) and address(es) of the manufacturer(s) or supplier(s), in addition to the generic name, should be foot-noted. Authors should make no claims of priority in their manuscripts.

Title Page

- Include full name(s), degree(s) and affiliations(s) of author(s): list under file
- Give a running title of 3 to 6 words
- At the bottom of the page, include information about grants, if applicable
- Add "Correspondence to: …", followed by full name, address, telephone and fax numbers, e-mail

Abstract

- Abstract should be after title page and numbered page 1
- It should not exceed 250 words for major articles; case reports should have an abstract of no more than 100 words
- At the end of the abstract, provide a maximum of 6 key words suitable for indexing
- Abbreviations should be kept to a minimum and must be explained when they first appear; after first use, abbreviations alone may be used
- Standard abbreviations should be used for all measurements (SI units)

Text

- The text should follow the abstract and begin on a new page, as should references, tables and legends
- Abbreviations not defined in the abstract should be explained when they first appear in the text
- References should be cited in numerical order, as should tables and figures

References

- Number in the order they appear in the text
- Abbreviate titles of periodicals according to the style of the *Index Medicus*. Follow the format (arrangement, punctuation) shown below:

Periodicals

1. Fuchs AR, Fuchs F, Husslein P, et al. Oxytocin receptors in the human uterus during pregnancy and parturition. *Am J Obstet Gynecol* 1984; 150:734-41.

Books edited by other authors of the article

2. Redwine DB, Perez JJ. Pelvic pain syndrome: endometriosis and mid-line dysmenorrhea. In: Arregui MW, Fitzgibbons RJ, Katkhouda N, McKerman JB, Reich H, editors. Principles of Laparoscopic Surgery – Basic and Advanced Techniques. *New York: Springer Verlag*; 1995: 545-58.

Books edited by author

3. Varney H. Nurse Midwifery. *Boston: Blackwell Scientific Publications*; 1987: 23-32.

Abstract

4. Same as Periodicals and followed by (Abstract)

Tables

- Tables should supplement, but not duplicate, the text
- Tables should be numbered consecutively in their order of appearance in the text
- Each table must be given an Arabic numeral and a title, place at the top of the page
- Abbreviations used in the table should be foot-noted and explained in the order they appear in the table, if they have not been previously used
- Any material which is not self-explanatory should be foot-noted

Legends

- Be sure that legends and figures correspond
- Identify all abbreviations used in a figure at the end of each legend, if the abbreviation has not been used in the text
- Be sure abbreviations used for measurements are standard

Figures

- Submit written permission from publisher(s) for any figure which has been published elsewhere
- Do not send original art-work, X-rays, or CTGs
- Photographs in which a patient or other person is identifiable must have written permission from that person. The consent must state specifically what the person is consenting to and what restrictions, if any, the person has placed upon the publication of the photograph
- All restrictions must be strictly observed
- Colour illustrations are costly and will be charged to the author
- Authors should inquire about cost from the publisher before submitting a colour illustration

Ethics

Published studies on human subjects should indicate the nature of consent and the approval of the institutional ethics committee. In case of animal experiments, ethical approval must be enclosed.

Reprints

Reprints are available at author(s)'s expenses. Ordering information can be obtained from the Publisher.

HealthBaby
生寶臍帶血庫

Most Professional Accreditations
Most Recommended by O&G Doctors[1]
>70% Market Share[2]

HealthBaby's Cord Service Patented Technology

- Global FIRST cord storage service[3]
- Obtained H.K., U.S., Taiwan and China patent
- Exclusively extracts the whole cord tissue
- Unique processing, storage and culturing techniques
- Enhances the cells' quantity and viability after thawing


H.K. Patent


U.S. Patent


Taiwan Patent

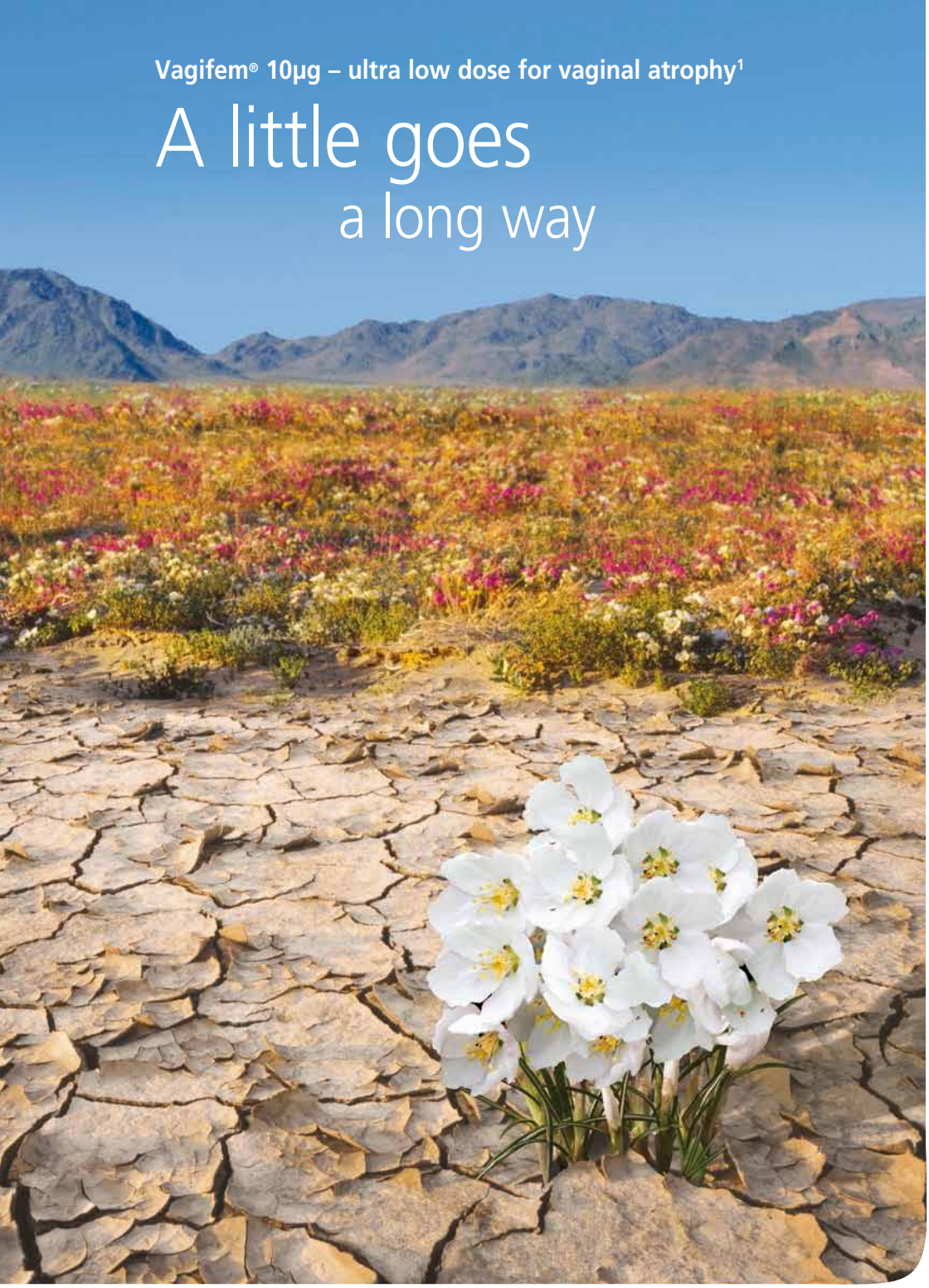

China Patent

Source: 1. IMS 2010 Cord Blood Bank Market Research in Hong Kong (with Private O&G physicians) 2. Ipsos Healthcare 2009-2016 Cord Blood Bank Survey
3. Introduction to the Cord Tissue Market and Cord Tissue-Derived Mesenchymal Stem Cells (CT-MSCs)", BIOINFORMANT, Jun 2015

HK 3188 8899 | Macau 2878 6717 H.K. | MACAU | TAIWAN | THAI | U.S. HealthBaby

Vagifem® 10µg – ultra low dose for vaginal atrophy[1]

A little goes a long way



Abbreviated Prescribing Information
Vagifem® 10 micrograms Vaginal Tablets. Refer to the Summary of Product Characteristics before prescribing. **Qualitative and quantitative composition:** Each tablet contains estradiol hemihydrate equivalent to 10 micrograms of estradiol. **Therapeutic indication:** Treatment of vaginal atrophy due to oestrogen deficiency in postmenopausal women. **Contraindications:** Known, past or suspected breast cancer, known, past or suspected oestrogen dependent malignant tumours (e.g. endometrial cancer), undiagnosed genital bleeding, untreated endometrial hyperplasia, previous or current venous thromboembolism (deep venous thrombosis, pulmonary embolism), known thrombophilic disorders (e.g. protein C, protein S, or antithrombin deficiency), active or recent arterial thromboembolic disease (e.g. angina, myocardial infarction), acute liver disease, or a history of liver disease as long as liver function tests have failed to return to normal, known hypersensitivity to the active substances or to any of the excipients, porphyria. **Special warnings:** The dose of 17β-estradiol is very low and the treatment is local; however, minimal absorption may be seen, especially during the first two weeks of treatment. **Pregnancy and lactation:** Vagifem® 10 micrograms is not indicated during pregnancy and lactation. **Dosage and administration:** Vagifem® 10 micrograms is administered into the vagina, using the applicator. **Initial dose:** One vaginal tablet a day for two weeks. **Maintenance dose:** One vaginal tablet twice a week. Treatment may be started on any convenient day. **Side effects:** The most commonly reported adverse events are headache, abdominal pain, vaginal haemorrhage, vaginal discharge or vaginal discomfort. **Legal category:** Only available on prescription. For further information please contact Novo Nordisk FemCare AG, Thurgauerstrasse 36/38, CH-8050 Zurich, Switzerland or the local Novo Nordisk subsidiary. Vagifem® is a registered trademark of Novo Nordisk FemCare AG.

Date of preparation: September 2012.

Reference:
1. Simon J et al. *Obstet Gynecol* 2008;112(5):1053–1060. **2.** Vagifem® 25µg Summary of Product Characteristics; October 2012. **3.** Vagifem® 10µg Summary of Product Characteristics; January 2012. **4.** Rioux JE et al. *Menopause* 2000;7(3):156–161. **5.** Dugal R et al. *Acta Obstet Gynecol Scand* 2000;79:293–297.

* of local 17β-estradiol

ID 4536, November 2012

- Lowest effective dose* available[2,3]
- Significant long-term improvement in vaginal health[1]
- Precise dose,[3] locally administered,[3] locally effective[1]

novo nordisk®

Effective.[1] Convenient.[4] Clean.[5]

Vagifem® 10
10µg 17ß-estradiol

VAG-D-20150701

Further information is available on request : DKSH Hong Kong Limited Tel : (852) 2895 9668 Fax : (852) 2895 9548

Subscriptions

The *Hong Kong Journal of Gynaecology, Obstetrics & Midwifery* is distributed free to members of the Obstetrical & Gynaecological Society of Hong Kong and the Hong Kong Midwives Association as part of their membership. Local subscription is HK$200/year for Hong Kong delivery and US$50/year for airmail delivery outside Hong Kong.

Editorial

Would new medical graduates choose obstetrics and gynaecology as their future career anymore?

Whether medical graduates choose obstetrics and gynaecology (O&G) as their future career is perhaps the most challenging issue that our profession faces. An article published in the April 2016 issue of the *Hong Kong Medical Journal* is thought provoking[1]. It was a cross-sectional questionnaire study of factors that influence the career interest of medical graduates in O&G in Hong Kong. The coverage was extensive and included more than 70% of medical graduates in 2015 from both The University of Hong Kong and Chinese University of Hong Kong. 53% of them were female. Almost 80% who listed O&G among their first three choices of specialty were female. This reflects the actual scenario in our specialty: in my department 80% of doctors are female, including trainers and trainees. I have no doubt about their working ability and professionalism, but in terms of manpower planning, their possible future need for maternity leave or their wish to work part-time or even leave their job to care for their newborn baby and family must be considered. A more balanced gender ratio has been shown to have a positive impact on career interest in O&G, whereas part-time training with a longer period has a negative impact.

The study confirmed a low level of career interest in O&G among medical graduates and a decreasing popularity of the specialty as a career choice. The median score for the level of career interest in O&G was 3 out of 10. O&G ranked as the 8th most popular career choice. 16% of participants would choose O&G among their first three choices; 6% (13/233) of participants indicated O&G as their first choice. Interestingly the actual number of new trainees recruited to our specialty in July 2016 was 20/323, exactly 6%!

Three key influential factors for career choice and interest in O&G were identified, namely clerkship experience, working style, and career prospects.

Clerkship experience refers to learning in lectures and O&G clerkship including hands-on experience, interaction with O&G interns / trainees / specialists / consultants / professors and midwives / O&G nurses. The question is how much as trainers and role-models have we offered medical students? And what sort of working atmosphere do they observe? Team spirit and mutual respect between the various parties are perhaps the most important to our future trainees.

Working style such as work-life balance, on-call frequency, number of years of on-site call, and level of urgency / stress in clinical work are important considerations. Training in O&G is not easy. Our specialty probably requires the longest number of years of on-site call. The on-call frequency really depends on how many trainees and specialists in a particular unit. Moreover, labour ward clinical duties can be urgent and stressful. It all depends on the trainee's interest in O&G and his or her character. A fair and transparent on-call and duty list can help. Decreasing the on-call frequency and better remuneration have been shown to have a positive impact on career interest. The million-dollar question is how to avoid the vicious cycle of a lack of manpower and increased on-call frequency.

For career prospects including medical indemnity, is O&G still a respectable specialty? What would be the prospect of promotion in the Hospital Authority and in the private sector? What would be the advice from family members, seniors, and peers? All these are important considerations for medical graduates. The risk of litigation and cost of professional indemnity are notoriously high in O&G. This is further aggravated by the recent change from occurrence-based to claim-based indemnity for private obstetricians by Medical Protection Society. This requires indemnity protection at all times (with corresponding insurance fees) while practising and even following retirement as claims can be made against an individual for incidents that occurred during practice. This has created uncertainty and anxiety among practising obstetricians in the private sector and those who plan to enter private practice. The Hospital Authority does offer crown indemnity for all trainees and specialists, but the risk of litigation and cost of professional indemnity are important factors for specialty choice. The good news is that we now have a new alternative for medical indemnity with much better terms. Whatever the choice is, risk management and credentialing can minimise the risk of litigation. Interestingly, the new MRCOG Part 3 examination (that our College plans to offer in Hong Kong from end of 2017) emphasises communication between patients and their

family members as well as among colleagues. This is an important part of risk management.

The answer to the question "Would new medical graduates choose O&G as their future career anymore?" will be the actual number of trainees that we can recruit in July 2017 for the current vacancies of around 15. In the long term, the Hospital Authority should increase the manpower for O&G. It would be interesting to repeat the study periodically for manpower planning.

WC LEUNG
President, Hong Kong College of Obstetricians and Gynaecologists

Reference

1. Lam CY, Cheung CS, Hui AS. Factors influencing the career interest of medical graduates in obstetrics and gynaecology in Hong Kong: a cross-sectional questionnaire survey. *Hong Kong Med J* 2016;22:138-43.

MSD

美國默沙東藥廠有限公司

hpvhongkong

已婚未婚
同樣重要

保護就係愛
即刻
TAKE ACTION!

全新9合1 HPV 預防方案

覆蓋更多 防禦更強#

預防9種HPV

6 11 16 18 31 33 45 52 58

9種HPV(型號)[1]
能導致90%[1]的子宮頸癌

及早預防
有助避免感染
HPV相關疾病

女[2]
- 子宮頸癌
- 肛門癌
- 外陰癌
- 陰道癌
- 外陰及陰道癌前病變
- 生殖器官濕疣(椰菜花)
- 子宮頸癌前病變

男
- 肛門癌
- 生殖器官濕疣(椰菜花)
- 亦有機會令伴侶因感染HPV而患上癌症及濕疣[3](椰菜花)

適用於9歲以上男女^

www.hpv.com.hk

請向醫生查詢

請向醫生查詢你是否需要定期作子宮頸抹片檢查。

此海報只提供醫生參考。

VACC-1170702-0082 08/16

唯一經FDA、歐盟及香港衞生署認可的9合1預防方法 #與HPV『4合1』預防疫苗比較。 重要信息：• 若你對HPV『9合1』疫苗的任何成份過敏，請勿接種 • 若你曾經接種HPV『4合1』或HPV『9合1』疫苗並且出現過敏症狀，請勿接種 • 接種HPV『9合1』疫苗的決定應取決於疫苗的潛在益處及曾經感染的HPV，並且應在適當的醫療情況下進行，以應付罕見的過敏反應 • 與所有疫苗一樣，接種HPV『9合1』疫苗後未必能為所有接種者提供保護。此疫苗不能用作治療或預防已感染的濕疣(椰菜花)、子宮頸癌、外陰及陰道癌前病變 (CIN、VIN或VaIN)，疫苗亦不能預防非HPV所引起的疾病。接種HPV『9合1』疫苗期間應避免懷孕，懷孕婦女應避免接種。一般建議接種後逗留診所約十五分鐘接受觀察。此外，接種疫苗後仍須定期進行子宮頸細胞檢驗(柏氏抹片) • HPV『9合1』疫苗只能預防部分由疫苗概括的 HPV引起的疾病。因此，適當的預防相關疾病措施應該繼續使用 • 若你正在使用強效免疫抑制治療、遺傳缺陷，人類免疫缺陷病毒或其他原因有受損的自身免疫系統，可能不會對疫苗有反應。血小板減少或凝血障礙的人應謹慎使用這種疫苗 • 現時沒有數據來支持HPV『9合1』疫苗與HPV『2合1』或HPV『4合1』疫苗的互換性 • 在臨床研究中，最常見的副作用為注射部位的不良反應和頭痛，這些不良反應通常為輕度或中度。其他常見的副作用包括注射部位疼痛，腫脹或紅斑，頭暈，噁心，發熱，疲勞，注射部位瘙癢或瘀傷等。請向醫生查詢詳盡的副作用資料。

請向醫生查詢有關藥物的詳盡資料。

HPV是常見的，幾乎每個人一生中都會有機會感染。雖然大多數感染會自行清除，但持續感染某些HPV類型可導致癌症或其他疾病。[2] ^ 9合1預防方法適用於九歲以上人士。暫未有研究在26歲以上女性進行。9合1預防方法在27至45歲女性的預期成效是建基於4合1預防方法在16至45歲女性的高效能，以及兩種預防方法於9至26歲女性有著相若高的抗體產生力。

Reference: 1. Hong Kong Product circular (MSD) 2. Weekly epidemiological record, WHO, No, 15, 2009, 84, 117-132 3. MMWR, ACIP 2011, CDC, Dec 23, 2011/ Vol,60/ No,50, 1705-1708

GARDASIL®9 加衛苗®9
Human Papillomavirus 9-valent Vaccine (Recombinant)

Companionship during Labour Promotes Vaginal Delivery and Enhances Maternal Satisfaction

Vivian WH CHUNG MBChB, MRCOG, FHKCOG, FHKAM(O&G)
Jessie WK CHIU MBChB, MRCOG
Daniel LW CHAN MBChB, FHKAM(O&G), FRCOG
William WK TO MBBS, MPH(CUHK), M Phil (CUHK), MD (HK), DipMed, FHKAM(O&G), FRCOG
Department of Obstetrics and Gynaecology, United Christian Hospital, Hong Kong

Objective: To compare women in labour with or without a companion in terms of obstetric and neonatal outcomes and maternal satisfaction.
Methods: A total of 450 Hong Kong Chinese women carrying a singleton pregnancy in cephalic presentation at term were prospectively recruited from February to July 2013. Their wish for companionship was verified upon active labour, and the companion was invited to the delivery suite. Obstetric and neonatal outcomes, breastfeeding practice, and maternal satisfaction were evaluated.
Results: Of the recruited women, 416 (92%) delivered at our hospital, and 269 of them opted for companionship. More nulliparous than multiparous women opted for companionship ($p<0.001$). Among multiparous women, those with a companion resulted in more vaginal and instrumental deliveries and fewer Caesarean sections than those without ($p=0.05$). Women with or without a companion were comparable in terms of the duration of first or second stage of labour, time from analgesics to birth, need for analgesics, volume of syntocinon infusion, maternal complications, and fetal outcome. 315 (76%) women completed the postnatal questionnaire on maternal satisfaction; the companion group was more satisfied with the compassionate care and emotional support during their childbirth experience ($p=0.04$).
Conclusion: A companion of choice during labour had a positive influence on the vaginal delivery rate and maternal satisfaction. Women should be informed about the benefits and offered the option of companion support during labour.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):12-7

Keywords: Friends; Parturition; Pregnancy outcome; Social support; Spouses

Introduction

Childbirth is a stressful physical and psychological experience. According to the fear-tension-pain cycle[1], excessive anxiety increases endogenous release of catecholamine and thus reduces blood flow to and from the placenta, restricts fetal oxygen supply, reduces the effectiveness of uterine contractions, and slows labour progress[2]. We hypothesised that adequate support to labouring women is related to a shorter duration of labour and a higher level of maternal satisfaction.

There are cultural differences in the provision of support during childbirth. In the US and the UK, husbands, partners or close relatives are the main supporters during labour. In addition, a doula, a labour companion specialist, is advocated to guide effective support. In many other countries, they are excluded from the delivery room, and companionship during labour (CDL) is uncommon. In Hong Kong, CDL has been advocated for the past decade[3]. This study aimed to assess its efficacy in terms of obstetric and neonatal outcomes and maternal satisfaction by comparing women with or without a companion during labour.

Methods

Participants

A prospective cohort of Chinese women carrying a singleton pregnancy in cephalic presentation at term was recruited at a Hong Kong regional hospital between February 2013 and July 2013. Women were excluded if they had a fetus in non-cephalic presentation, multiple birth, were scheduled for elective Caesarean section or of non-Chinese ethnic origin. Women were approached for recruitment when attending the antenatal clinic or when admitted to the hospital for delivery.

When the women commenced active labour, their wish for companionship was verified and the chosen person

Correspondence to: Dr Vivian WH Chung
Email: vivianchung1228@hotmail.com

was invited into the delivery suite. The companion could be her partner, mother or sibling. Companionship was allowed throughout the first, second, and third stage of labour. The companion might be required to leave the suite briefly during vaginal examinations; or companionship might be terminated when instrumental delivery or Caesarean section became necessary, or when unexpected complications occurred. In both groups, standardised medical care was provided during labour as per protocol, including active management of labour, early amniotomy, use of oxytocin, continuous fetal heart monitoring, and options for analgesia.

Sample Size Calculation

Based on the Cochrane database of systematic reviews, supported women are more likely to have a shorter duration of labour, with a mean difference of -0.58 (95% CI, -0.85 to -0.31) hours. To detect the lowest possible difference, we assumed 0.3 ± 1.0 as our anticipated difference in the duration of labour, with an alpha value of 0.95 and a power of 80%. The calculated sample size required was 176 cases per group.

Data Collection

Demographic data were collected upon enrolment. Obstetric and neonatal outcomes were recorded during labour. The primary outcome was duration of labour, defined as total minutes from start of active labour, i.e. cervical dilatation ≥3 cm, to delivery of the baby. The secondary outcomes included mode of delivery, duration of second stage of labour, time from analgesics to birth, additional analgesics used, volume of syntocinon used, and maternal complications including fetal distress, primary postpartum haemorrhage (blood loss >500 ml), and severe perineal injury (third or fourth degree perineal tears). Neonatal outcomes included Apgar score at first and fifth minute, duration of infant hospitalization, and breastfeeding practice upon maternal discharge.

Maternal satisfaction was assessed using a self-administered questionnaire at around 48 hours post-delivery in the postnatal ward. The questionnaire was translated and developed based on six simple questions with good internal consistency[4]. The modified questionnaire contained nine questions using ratings of agreement or disagreement on a 10-point scale to assess multidimensional aspects of satisfaction, including adequacy of information, ability to express own needs, involvement in decision making, compassionate care, attention to needs, emotional support, level of pain, maternal newborn bonding, and an overall satisfaction score.

Ethical Consideration

This study was approved by the hospital research ethics committee prior to recruitment. Written informed consent was obtained from each participant.

Data Analysis

Statistical analysis was performed with the Statistical Package for the Social Sciences Windows version 15.0 (SPSS, Chicago [IL], US). Means and standard deviations were calculated for continuous variables. Student's *t* test was used to compare means between groups, and Chi-square test or Fishers exact test was used to compare proportions between groups. A p value of <0.05 was considered statistically significant.

Results

A total of 450 eligible women were invited to participate. 416 (92%) of them delivered at our hospital and their obstetric and neonatal outcomes were recorded. Of them, 269 opted for CDL; 98% chose their husband/partner to be their companion, and the rest chose their mother, mother-in-law, or sister. 34 women who delivered elsewhere had no perinatal data available for analysis. 14 women who opted for CDL but eventually had no companionship were allocated to the no companion group. The most common reason was rapid labour such that the partner could not arrive in time.

Demographic and obstetric characteristics are shown in Table 1. The overall mean maternal age was 30.5 years old. Over 95% of women were married and completed secondary school or above. Women with or without a companion were comparable in terms of maternal age, marital status, education level, gestational weeks, type of onset of labour, and birth weight. More nulliparous than multiparous women opted for companionship ($p<0.001$). Overall, three-quarters of women had spontaneous onset of labour; the remaining had induced labour owing to post-term, gestational diabetes, pregnancy induced hypertension, or fetal growth restriction. The overall mean birth weight was 3295 grams.

Regarding obstetric outcomes, women with or without a companion were comparable in the duration of the first and second stage of labour and the time from analgesics to birth (Table 2). Among multiparous women, those with a companion resulted in more vaginal and instrumental deliveries and fewer Caesarean sections than those without ($p=0.05$). The indications for Caesarean section included cephalopelvic disproportion, prolonged latent phase, and fetal distress. Women with or without

Table 1. Baseline demographics and clinical characteristics*

Characteristic	Companionship during labour		
	Yes (n=269)	No (n=147)	p Value
Age (years)	30.3 ± 5.2	31.0 ± 5.9	0.2
Marital status			0.173
Married	255 (94.8)	145 (98.6)	
Never married	11 (4.1)	2 (1.4)	
Divorced / separated	3 (1.1)	0	
Education level			0.16
Primary	5 (1.8)	6 (4.1)	
Secondary	192 (71.4)	105 (71.4)	
Tertiary	72 (26.8)	36 (24.5)	
Parity			<0.001
Nulliparous	181 (67.3)	65 (44.2)	
Multiparous	88 (32.7)	82 (55.8)	
Gestational age (weeks)			0.78
37 to 39+6	137 (50.9)	72 (49.0)	
40 to 41+6	132 (49.1)	75 (51.0)	
Onset of labour			0.49
Spontaneous	199 (74.0)	114 (77.6)	
Induced	70 (26.0)	33 (22.4)	
Neonatal birth weight (g)	3322 ± 396	3246 ± 416	0.07

* Data are shown as mean ± standard deviation or No. (%) of subjects, unless otherwise specified

a companion were comparable in the need for pethidine, epidural anaesthesia, and total dose of syntocinon infusion, as well as the estimated blood loss and complications such as primary postpartum haemorrhage, fetal distress, and severe perineal injury.

Overall, few neonates had an Apgar score ≤7 at first minute (Table 3), and all neonates had an Apgar score >7 at fifth minutes. Most neonates were discharged within 5 days of delivery. The main reason for a longer stay was clinical sepsis that required a full course of intravenous antibiotics. Four babies stayed over 10 days, owing to low birth weight (1.8 kg) in two, poor feeding secondary to laryngomalacia in one, and neonatal narcotic withdrawal syndrome in one. The companion group had a slightly higher breastfeeding rate upon discharge (88.1% vs. 82.3%, p=0.11).

315 women completed the postnatal questionnaire on maternal satisfaction; the response rate was 76%. The companion group scored higher in domains of compassionate care and emotional support (p=0.04, Table 4). Among the 214 women who had CDL, 204 (95%) opted to have CDL in their subsequent labour in future. Among the remaining 14 women, the mean duration of labour was 288 (range, 85-618) minutes. One woman underwent Caesarean section for cephalopelvic disproportion, two had low forceps delivery for prolonged second stage, and the remaining 11 had a normal vaginal delivery. Two women had postpartum haemorrhage; their infants had a hospital stay >5 days due to neonatal fever.

Discussion

In 2013, the Cochrane review summarized the results of 22 randomized controlled trials that included 15288 women with labour support or routine care[5], but no study included a dominant Chinese population. Our study aimed to determine Hong Kong Chinese women's perception of CDL and its effects on perinatal outcomes and maternal satisfaction. Around two-thirds of women opted for CDL; more nulliparous than multiparous women opted for companionship (p<0.001). Without prior delivery experience, nulliparous women might be more anxious. According to our previous study on attitudes and expectations in CDL, 96% of women considered emotional

Table 2. Comparison of obstetric outcomes between groups*

Obstetric outcome	Nulliparous women			Multiparous women		
	Companion (n=181)	No companion (n=65)	p Value	Companion (n=88)	No companion (n=82)	p Value
Duration (mins)						
First stage	395 ± 156	360 ± 197	0.10	201 ± 106	190 ± 106	0.60
Second stage	48 ± 59	39 ± 42	0.33	10.8 ± 9.4	10.7 ± 10.7	0.98
First and second stage	437 ± 174	410 ± 225	0.24	212 ± 109	201 ± 109	0.62
Analgesics to birth	335 ± 208	283 ± 234	0.13	113 ± 110	108 ± 122	0.84
Mode of delivery						
Vaginal	107 (59)	43 (66)	0.14	82 (93)	73 (89)	0.05
Instrumental	44 (24)	16 (25)		6 (7)	4 (5)	
Caesarean	30 (16)	6 (9)		0	5 (6)	
Interventions						
Use of pethidine	58 (32)	16 (25)	0.26	9 (10)	4 (5)	0.19
Epidural anaesthesia	17 (9)	3 (5)	0.23	0	2 (2)	0.23
Sytocinon (ml)	61 ± 81	52 ± 76	0.42	12 ± 25	15 ± 35	0.51
Complication						
Blood loss (ml)	289 ± 219	262 ± 189	0.37	186 ± 131	185 ± 142	0.95
Postpartum haemorrhage	24 (13)	8 (12)	0.84	3 (3)	4 (5)	0.71
Fetal distress	20 (11)	7 (11)	1	5 (6)	3 (4)	0.72
Severe perineal injury	0	1 (2)	0.26	2 (2)	0	0.50

* Data are shown as mean ± standard deviation or No. (%) of subjects, unless otherwise specified

Table 3. Comparison of neonatal outcomes and breastfeeding between groups*

Neonatal and breastfeeding outcome	Companion (n=269)	No companion (n=147)	p Value
Apgar score at first minute			0.51
8-10	261 (97.0)	145 (98.6)	
≤7	8 (3.0)	2 (1.4)	
Infant stay			0.48
<5 Days	225 (83.6)	127 (86.4)	
≥5 Days	44 (16.4)	20 (13.6)	
Feeding upon discharge			0.11
Full breastfeeding	237 (88.1)	121 (82.3)	
Artificial alone	32 (11.9)	26 (17.8)	

* Data are shown as No. (%) of subjects, unless otherwise specified

support as the major element, whereas other elements of CDL included decision making together (52%) and physical support (31%)[6].

The duration of labour was our primary outcome. In the Cochrane review, a shorter labour was demonstrated in supported women[5]. In our study, the duration of labour did not differ significantly between the two groups. This discrepancy may have been due to a difference in the identity of the supporting person. The Cochrane review included hospital staff and trained doula; trained personnel were more knowledgeable of delivery routine and may contribute to a more effective labour process. Although some companions in our study had attended childbirth

Table 4. Comparison of maternal satisfaction score between groups

Maternal satisfaction	Companion (n=214)	No companion (n=101)	p Value (2-tailed)
Information received	8.25	7.98	0.22
Ability to express needs	8.24	7.89	0.12
Involvement in decision making	8.05	7.74	0.22
Compassionate care	8.34	8.22	0.04
Needs addressed	8.35	7.99	0.11
Overall satisfaction score	8.14	7.86	0.22
Emotional support	8.11	7.61	0.04
Level of pain	6.42	6.25	0.62
Maternal newborn bonding	8.70	8.62	0.67

education classes, they typically had little or no experience of labour and delivery. In addition, male companions spend significantly less time and are physically farther away from the labouring women than doulas[7]. When the labour pain increases, companions can become more anxious, uncomfortable, exhausted and even wish to leave the delivery suite. Advice should be given to the companions about delivery suite routines, effective actions that most women consider supportive during labour, appropriate activities and behaviours that may shorten the duration of labour.

The Cochrane review also observed that women who received continuous support were more likely to have a spontaneous vaginal birth (relative risk [RR]=1.08, 95% confidence interval [CI]=1.04-1.12), and less likely to have a Caesarean section (RR=0.78, 95% CI=0.67-0.91) or instrumental vaginal birth (RR=0.90, 95% CI=0.85-0.96)[5]. This was concordant with the Millennium Cohort study that supported mothers were less likely to require an emergency Caesarean section (12.6% vs. 27.6%, p<0.001)[8]. In our study, multiparous women with a companion had a significantly higher rate of vaginal delivery and a lower rate of Caesarean section than those without a companion. It has been postulated that a reduced level of endogenous catecholamine may lead to increased uterine blood flow and effective uterine contractions promoting spontaneous vaginal delivery[2].

CDL may limit the 'cascade of interventions'; the reduced use of epidural analgesia, synthetic oxytocin, and instrumental delivery may reduce associated morbidities[9]. In the Cochrane review, CDL had no apparent impact on maternal intrapartum interventions or neonatal complications[5]. In our cohort, the total dose of syntocinon infused, estimated blood loss, and maternal complications were similar between the two groups, as was the neonate outcome.

Psychosocial support during labour has a positive effect on the start and continuation of breastfeeding[10]. Frequency of exclusive breastfeeding 1 month after birth is significantly higher in supported women (RR=1.64, 95% CI=1.01-2.64)[11]. Our cohort demonstrated a tendency for full breastfeeding upon discharge in the supported group (88.1% vs. 82.3%, p=0.11), but the sample size was too small to detect this small difference. If we were to detect a difference of 5.8%, using standard deviation of 1.0, an alpha of 0.95 and a power of 80%, the sample size required would be 4668 per group. Better psychosocial support might speed up a mother's recovery, increase maternal-newborn bonding, and facilitate breastfeeding.

In keeping with various studies[5,12,13], a positive effect of companionship on maternal satisfaction was demonstrated in our study. The supported group perceived a higher level of emotional support and compassionate care. The presence of a companion has a positive effect in maternal self-confidence and self-control during labour and birth.

There were some limitations to this study. The sample size calculated was 176 cases per group, but only 147 women without a companion were recruited. Around two-thirds of women chose CDL; although the sample size was expanded to 450, the intended number of women without a companion still could not be reached. Randomised controlled trials may allocate sufficient women to each group, but this fails to consider the preference of women for companionship. Future studies may investigate the

women's prior delivery experience, characteristics of the companionship, the nature of the supportive role by the companion, and the duration of companionship in relation to the duration of labour.

Conclusion

Companionship during labour was associated with enhanced maternal satisfaction with the childbirth experience and more vaginal deliveries and fewer Caesarean sections in multiparous women. These findings support the practice of CDL in local Chinese women. Women should be informed about the benefits and offered the option of CDL.

Declaration

The authors have declared no conflicts of interest in this study.

References

1. Dick-Read G. Childbirth without fear: The principles and practice of natural childbirth. *UK: Pinter & Martin Ltd*.; 2004.
2. Johnson RC, Slade P. Obstetric complications and anxiety during pregnancy: is there a relationship? *J Psychosom Obstet Gynaecol* 2003; 24:1-14.
3. Ip WY. Relationships between partner's support during labour and maternal outcomes. *J Clin Nurs* 2000; 9:265-72.
4. Harvey S, Rach D, Stainton MC, Jarrell J, Brant R. Evaluation of satisfaction with midwifery care. *Midwifery* 2002; 18:260-7.
5. Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. *Cochrane Database Syst Rev* 2003; (7):CD003766.
6. Chiu WK, Chung WH, Chan LW, To WK. Companionship during labour: attitudes, expectations in Hong Kong Chinese. *HKJGOM* 2015; 15:124-30.
7. Bertsch TD, Nagashima-Whalcn L, Dykcman S, Kennell JH, McGrath S. Labor support by first-time fathers: direct observations with a comparison to experienced doulas. *J Psychosom Obstet Gynaecol* 1990; 11:251-60.
8. Essex HN, Pickett KE. Mothers without companionship during childbirth: an analysis within the Millennium Cohort Study. *Birth* 2008; 35:266-76.
9. Caton D, Corry MP, Frigoletto FD, et al. The nature and management of labor pain: executive summary. *Am J Obstet Gynecol* 2002; 186(5 Suppl Nature):S1-15.
10. Hofmeyr GJ, Nikodem VC, Wolman WL, Chalmers BE, Kramer T. Companionship to modify the clinical birth environment: effects on progress and perceptions of labour, and breastfeeding. *Br J Obstet Gynaecol* 1991; 98:756-64.
11. Langer A, Campero L, Garcia C, Reynoso S. Effects of psychosocial support during labour and childbirth on breastfeeding, medical interventions, and mothers' wellbeing in a Mexican public hospital: a randomised clinical trial. *Br J Obstet Gynaecol* 1998; 105:1056-63.
12. Bruggemann OM, Parpinelli MA, Osis MJ, Cecatti JG, Neto AS. Support to woman by a companion of her choice during childbirth: a randomized controlled trial. *Reprod Health* 2007; 4:5.
13. Yuenyong S, O'Brien B, Jirapeet V. Effects of labor support from close female relative on labor and maternal satisfaction in a Thai setting. *J Obstet Gynecol Neonatal Nurs* 2012; 41:45-56.

Antenatal Surgical Management for Ovarian Cysts: 13 Years' Experience

Suet-Ying YEUNG MBChB, MRCOG
Jacqueline Ho-Sze LEE MBChB, MRCOG, FHKCOG, FHKAM(O&G)
Department of Obstetrics and Gynaecology, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

Objective: To evaluate the outcome of surgically treated ovarian cysts during the antenatal period in 51 women.
Methods: The outcome of pregnant women who underwent surgery during the antenatal period for ovarian cyst from January 2003 to December 2015 at a university hospital in Hong Kong was retrospectively reviewed. Operative details, histopathology of the ovarian cyst, pregnancy complications, and neonatal outcome were assessed.
Results: Of 51 women surgically treated for ovarian cyst during pregnancy, 29 were operated electively in the late first or early second trimester (mean [range] gestational age, 14 [8-22] weeks) and 22 were emergency operations (mean [range] gestational age, 13 [4-32] weeks). There were no intra-operative complications or adverse neonatal outcome. The most common pathology was mature cystic teratoma (22/54, 40.7%). Most ovarian cyst complications occurred between 7 and 13 weeks of gestation (72.7%) and when the size of the cyst was >6 cm (81.8%).
Conclusion: Elective surgery for ovarian cyst in the late first or second trimester can be achieved safely with a laparoscopic approach. Ovarian cysts >6 cm are at risk of complications and warrant elective surgery. Accurate diagnosis of ovarian cyst complications during pregnancy can be made clinically based on symptoms and ultrasonographic findings.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):18-23

Keywords: Laparoscopy; Ovarian cysts; Pregnancy; Treatment outcome

Introduction

Detection of an adnexal mass during pregnancy has increased with the use of routine ultrasound scans to assess fetal viability, growth and morphology. The prevalence of adnexal mass in pregnancy ranges from 1/76 to 1/2328 deliveries[1]. Most of the ovarian cysts detected in early pregnancy are functional cysts that resolve with increasing gestation and can be managed conservatively[2]. Nonetheless, some may persist and become clinically significant with a risk of cyst complications. Malignancy is rare; the incidence of ovarian malignancy in pregnancy ranges from 0.073 to 0.11 case per 1000 deliveries[1].

Although antepartum surgery is generally safe, adverse maternal and fetal outcomes such as miscarriage, intrauterine fetal death, and preterm delivery have been reported[3]. The optimal treatment for a growing adnexal mass during pregnancy remains controversial.

This study aimed to review the maternal and fetal outcomes in 51 pregnant women who underwent surgical treatment for ovarian cysts.

Methods

We retrospectively reviewed records of all pregnant women who underwent elective or emergency surgery for removal of an ovarian mass from January 2003 to December 2015 in our university hospital. Patients' baseline characteristics, ultrasound findings, histological findings, presenting symptoms, indications for surgery, operative details, pregnancy complications and neonatal outcome were retrived. The mean diameter of the ovarian mass was calculated as the sum of three dimensions of the mass divided by three. Term delivery was defined as delivery after 37 weeks of gestation.

The decision to proceed to elective surgery was based on the department protocol and patient choice (Table 1). The decision to proceed to emergency surgery was based on the attending surgeon's clinical and ultrasound suspicion of complications arising from the ovarian mass.

Statistical analysis was performed using the Statistical Package for the Social Sciences version 22.0 (SPSS Inc., Chicago [IL], US). Chi square test was used to analyse categorical variables and *t* test was used for continuous variables. The significance level was set at $p<0.05$.

Correspondence to: Dr Suet-Ying Yeung
Email: carol.s.y.yeung@gmail.com

Results

A total of 51 pregnant women who underwent elective (n=29) or emergency (n=22) ovarian cystectomy were identified (Table 2). The mean maternal age and parity was 30.1 years and 0.98, respectively. The mean body mass index was 21.6 kg/m^2.

Ultrasonography was performed before the operation in all patients. Suspicious features were detected in 6 patients, one of whom had ovarian malignancy. All patients with benign features on ultrasonography were confirmed to be benign on final pathology.

The mean gestational age at initial diagnosis was 10 (range, 4-26) weeks. The mean gestational age at the time of operation was 13.7 (range, 4-32) weeks; 14.1 weeks for

Table 1. Management protocol for ovarian cysts complicating pregnancy

Ovarian cyst	Management protocol
Simple unilocular cyst	
Before 16 weeks and size ≤6 cm	Conservative management unless complications develop
Before 16 weeks and size >6 cm, or cyst persisting beyond 16 weeks (before 20 weeks)	Counsel patients about pros and cons of surgery during pregnancy and arrange surgery in the second trimester if patient agrees
After 20 weeks	Conservative management unless patient is symptomatic
Suspicious ovarian cyst	Consult gynaeoncologist for opinion

Table 2. Maternal demographics*

Maternal demographic	Elective (n=29)	Emergency (n=22)	All cases (n=51)
Maternal age (years)	29.5 (20-39)	30.9 (24-40)	30.1 (20-40)
Gravity	0.97 (0-4)	0.45 (0-2)	0.98 (0-4)
Parity	0.31 (0-2)	0.54 (0-2)	0.37 (0-2)
Multiple pregnancy	0	2 (9)	2 (3.8)
Body mass index (kg/m^2)	22.1 (16.9-39.6)	21.0 (16.7-27.5)	21.6 (16.7-39.6)
Gestation at diagnosis (weeks)	10 (5-14)	10.0 (4-26)	10.0 (4-26)
Gestation at operation (weeks)	14.1 (8-20)	13.1 (4-32)	13.7 (4-32)
Time from diagnosis to operation (weeks)	4.1 (0-15)	3.2 (0-20)	3.7 (0-20)

* Data are shown as mean (range) or No. (%) of subjects

Table 3. Histological diagnosis of adnexal masses

	Elective (n=33)*	Emergency (n=21)†	Total
Mature cystic teratoma	17	5	22
Corpus luteal cyst	1	6	7
Serous cystadenoma	4	3	7
Endometrioma	5	1	6
Mucinous cystadenoma	5	1	6
Struma ovarii	0	2	2
Fimbrial cyst	0	1	1
Fibrothecoma	1	0	1
Dysgerminoma	0	1	1
Serous adenocarcinoma	0	1	1

* Four out of 29 cases had bilateral ovarian cysts

† Histology not available in 1 case as only de-torsion was performed

elective cases and 13.1 weeks for emergency cases) The mean time from initial diagnosis to operation was 3.7 weeks.

A total of 54 ovarian cysts were excised because four patients had bilateral involvement (Table 3). One patient underwent de-torsion of the ovary only. The most common histology was mature cystic teratoma (n=22, 40.7%). Two (3.8%) were ovarian malignancy (one high-grade serous adenocarcinoma and one dysgerminoma).

Table 4. Cyst types by ultrasonographic appearance

Type	No. of cysts (n=54)
Benign	
Simple	
Corpus luteum	7
Serous cystadenoma	5
Mucinous cystadenoma	4
Struma ovarii	2
Fimbrial cyst	1
Teratoma	
Mature cystic teratoma	22
Endometrioma	2
Mucinous cystadenoma	1
Endometrioma	
Endometrioma	2
Serous cystadenoma	1
Mucinous cystadenoma	1
Suspicious	
Endometrioma	2
Serous adenocarcinoma	1
Dysgerminoma	1
Fibrothecoma	1
Serous cystadenoma	1

All elective surgeries were performed via a laparoscopic approach during the first or second trimester, except that elective laparotomy was performed for one patient suspected of ovarian malignancy (Table 5). The patient presented at 8 weeks of gestation with right-side abdominal pain; preoperative ultrasonography revealed a 9-cm right unilocular ovarian cyst with irregular border and multiple papillary projections. Owing to suspected ovarian malignancy, laparotomy with right salpingo-ophorectomy and peritoneal and omental biopsy were performed. The operation lasted for 60 minutes. No tocolysis was required. The final pathology was endometrioma. For the 28 elective laparoscopies, the primary entry was made using the Hasson technique via an intraumbilical incision. Ovarian cystectomy was performed in 26 cases and salpingo-ophorectomy in two. The cyst ruptured during the operation in 23 cases.

For the 22 emergency surgeries, 13 were laparoscopy and nine were laparotomy (Table 5). All were performed for patients suspected of ovarian cyst complications. For the 13 emergency laparoscopy, the primary entry was made using the Veress needle at 4 weeks and 9 weeks of gestation in two cases, and using the Hasson technique through an intraumbilical incision in 11 cases. Ovarian cystectomy was performed in 10 cases, and haemostasis of bleeding ovarian cyst, salpingo-ophorectomy and de-torsion and drainage of the ovary in three cases. Only one patient had postoperative urinary tract infection.

For the nine cases of emergency laparotomy, three cases with large cyst size (10-20 cm) were performed in the first trimester, and 6 in the late second or third trimester (17-

Table 5. Operative and postoperative details of elective and emergency operations*

	Elective laparoscopy (n=28)	Elective laparotomy (n=1)	Emergency laparoscopy (n=13)	Emergency laparotomy (n=9)
Operating time (mins)	90.25 (33-166)	60	69.8 (20-170)	68.8 (30-175)
Blood loss (ml)	50 (5-200)	50	19.2 (0-50)	60 (5-400)
Intra-operative complications	0	0	0	0
Postoperative complications	0	0	1 Urinary tract infection	1 Fever, 1 wound gaping
Hospital stay (days)	3.7 (2-7)	13	3.6 (2-6)	5.6 (4-6)
Tocolysis in peri-operative period	0	0	0	Tocolysis in 3 third trimester case
Conversion to laparotomy	0	-	0	-

* Data are shown as mean (range), unless otherwise specified

32 weeks). Salpingo-ophorectomy was performed in five cases and ovarian cystectomy in four (Table 5). One patient developed fever postoperatively and another had a gaping wound. Tocolytics were given in three cases with surgery in the third trimester; one received Adalat prophylactically for 3 days, and the other two developed preterm labour and received nifedipine and atosiban.

Pregnancy and neonatal outcomes were reviewed. For patients with elective surgery, no information was available in four patients who returned to their referring obstetrician for subsequent care. Two patients had termination of pregnancy at the same operation: one at 10 weeks of gestation because of maternal anxiety and another at 20 weeks of gestation because of intrauterine growth restriction secondary to chronic hypertension with superimposed severe pre-eclampsia. In the remaining 23 patients, two developed gestational diabetes and one placenta praevia type 1. All delivered a live fetus at term with a mean gestational age of 39.0 (range, 37-41) weeks. Four patients delivered by Caesarean section, two by vacuum extraction, and 17 were a normal vaginal delivery. The mean birth weight was 3161 (range, 2310-4080) g. Only one baby developed neonatal jaundice. No other neonatal complications were reported.

For patients with emergency surgery, one underwent termination of pregnancy (because of dysgerminoma) and three returned to their referring obstetrician so no information was available. One patient had severe pre-eclampsia and one had oligohydramnios. All patients delivered at term, except for the patient with severe pre-eclampsia who delivered at 30 weeks of gestation. The mean gestation at delivery was 38.7 (range, 30-41) weeks. Among the 22 patients, 10 had a normal vaginal delivery, three required vacuum extraction, and five required Caesarean section. The mean birth weight was 2627 (range, 1425-3515) g. No neonatal complications were reported.

Surgery at first or second trimester was comparable in terms of length of hospital stay, blood loss, operating time, gestational age at time of delivery, and birth weight (Table 6).

The most common histological diagnosis that caused complications in the first trimester was corpus luteal cyst (6/15, 40%), and in the second trimester was mature cystic teratoma (3/7, 42.9%). The most common ovarian cyst complication was torsion (20/22, 90.9%). Preoperative clinical diagnosis of ovarian torsion was made in 16 patients. The type of ovarian cyst complication remained unspecified in four. The remaining two patients were diagnosed with ovarian cyst rupture (both were confirmed intra-operatively). Most complications occurred between 7 and 13 weeks of gestation (72.7%) and when the cyst size was ≥6 cm (81.8%). All patients with acute complication presented with pain and 40.9% presented with nausea or vomiting (Figure).

Discussion

Detection of ovarian mass during pregnancy has increased with the routine use of ultrasonography. In a local study, ovarian cysts are found in 6% of pregnancies with routine ultrasound scaning performed before 16 weeks of gestation[4]. Most ovarian masses detected during pregnancy are benign, and up to 70% resolve spontaneously, with only a few developing complications[1]. Most obstetricians now adopt a more conservative approach when managing this condition. The advance of laparoscopic techniques enable laparoscopic surgery for most cases.

Whether to proceed to operative management

Table 6. Comparison of operative, pregnancy, and neonatal outcomes in the first and second trimester*

	First trimester	Second trimester	p Value
Route of operation (laparoscopy)	16/20	25/28	0.429
Emergency case	15/20	4/28	0.001
Length of stay (days)	4.25 ± 2.27	3.71 ± 1.27	0.348
Blood loss (ml)	30 ± 29.33	43.49 ± 60.65	0.316
Operation time (mins)	77.25 ± 44.65	81.25 ± 35.03	0.73
Need of tocolysis	0	0	-
Birth weight (g)	3182.14 ± 407.42	3142.33 ± 397.15	0.775
Gestation at delivery (weeks)	37.125 ± 7.35	38.435 ± 4.21	0.484

* Data are shown as No. of subjects or mean ± standard deviation, unless otherwise specified

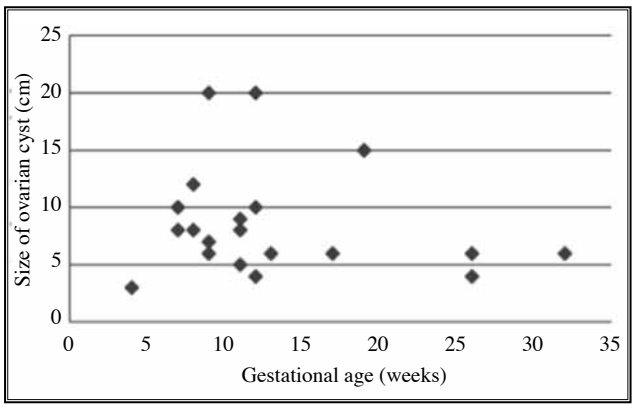


Figure. Scatter plot of ovarian cyst diameter and gestational age of ovarian cyst complication (n=22)

depends on accurate diagnosis of the nature of the ovarian cyst. Ultrasonography is recommended as the first-line diagnostic tool to differentiate a benign from malignant lesion[5]. During pregnancy, diagnosis by ultrasonography can be technically difficult, especially in the third trimester. In our series, ultrasonography was utilised to classify the ovarian cyst as benign or suspicious before surgery. All cysts classified as benign were subsequently confirmed to be benign after removal. Among the six cysts that were classified as suspicious, one high-grade serous adenocarcinoma and one dysgerminoma were subsequently confirmed, whereas the remaining four were benign lesions. Our data support the usefulness of ultrasound in differentiating a benign from a malignant cyst during pregnancy. Colour Doppler findings may change during pregnancy and thus are not consistently reported in the literature[6]. Magnetic resonance imaging has been used for diagnosis of ovarian malignancy with high accuracy[7] and has been shown to be safe in the second and third trimester with avoidance of radiation exposure. During pregnancy, gadolinium-based contrast material should be avoided because of concerns about fetal safety. Magnetic resonance imaging may play a role in cases where diagnosis is in doubt to improve the diagnostic accuracy and to provide information on the extent of disease in highly suspicious cases of ovarian malignancy. Tumour markers such as CA125 or HCG are not useful as they are known to rise during pregnancy[8].

The difficulties in performing laparoscopic surgery in pregnancy include the potential risk of injuring or irritating the gravid uterus and decreased visibility of the lateral and retro-uterine surgical field due to the enlarged uterus. To avoid injury to the gravid uterus, the open Hasson technique is preferred to the Veress needle[9], as pneumoamnion with pregnancy loss has been reported due to inadvertent injury at the time of Veress needle entry[10]. Umbilical entry is considered safe in the first trimester, whereas in later pregnancy a supraumbilical entry at least 6 cm above the fundus or entry at the left upper quadrant is recommended[9]. Performing the operation in the first trimester with a smaller uterine size may potentially reduce the chance of uterine injury or irritation and allow easier operation. Previous studies have shown that up to 1/3 of all surgeries performed in the first trimester end in spontaneous miscarriage[11]. In contrast, our results showed that surgery performed in the first trimester did not result in intra-operative or pregnancy complications. This could be explained by the advancement in current anaesthetic and surgical techniques, and utilisation of laparoscopy instead of laparotomy. Nonetheless, most cysts detected in the first trimester are corpus luteum that will disappear by the end of the first trimester[1] and that elective laparoscopic ovarian surgery in the second trimester is safe with minimal complications[12]. Therefore, delaying the decision for elective surgery to the second trimester can avoid unnecessary operation.

Our findings are consistent with the existing literature that the most frequent complication of ovarian mass in pregnancy is torsion[13,14]. Adnexal masses of 6 to 8 cm are at significantly higher risk of torsion, compared with other sizes[15]. Of 49 presumed dermoid cysts detected during pregnancy, no complications developed in teratoma <6 cm[16]. In our series, most complications occurred in cysts ≥6 cm. Therefore, elective surgery during pregnancy should be considered for adnexal masses ≥6 cm.

Accurate diagnosis of complications based on ultrasonography and clinical features is important in order to avoid unnecessary surgery during pregnancy. One needs to be vigilant when a patient presents with pain and a history of known ovarian cyst, as only 40% of patients who develop torsion of ovarian cyst have classic symptoms of nausea and vomiting in addition to pain. Ultrasonographic features of ovarian torsion are highly variable and include ovarian enlargement and oedema, and features suggestive of haemorrhage and necrosis such as a solid mass with mixed echoes, and occasionally a twisted pedicle that may appear as a whirlpool, visible with both grey scale and colour Doppler[17]. Our findings showed that accurate diagnosis of ovarian cyst complications can be achieved clinically based on symptoms, physical examination and ultrasound scanning with all clinically suspected ovarian cyst complications confirmed during laparoscopy or laparotomy.

The major drawback of our series is that it was a retrospective study with a small sample size. Furthermore, pregnancy outcome and neonatal outcome was not available for all patients. Due to the rarity of ovarian cyst complications during pregnancy and the preferred conservative approach, large scale randomized controlled trials on surgical management is deemed very difficult. Nevertheless, our study showed that ovarian cyst surgery during pregnancy is safe. Our study reviewed only patients who underwent surgery, not those who was managed conservatively. Surgery is not without risk; it is important to predict the chance of ovarian cyst complications during pregnancy and in the immediate postpartum period in order to select patients for elective surgery.

Conclusion

Elective surgery for ovarian cyst in the late first and second trimester can be achieved safely with laparoscopy. Ovarian cysts of >6 cm are at risk of complications and thus warrant elective surgery. Accurate diagnosis of ovarian cyst complications during pregnancy can be made clinically based on symptoms and ultrasonographic findings.

Declaration

The authors have declared no conflicts of interest in this study.

References

1. Aggarwal P, Kehoe S. Ovarian tumours in pregnancy: a literature review. *Eur J Obstet Gynecol Reprod Biol* 2011; 155:119-24.
2. Bernhard LM, Klebba PK, Gray DL, Mutch DG. Predictors of persistence of adnexal masses in pregnancy. *Obstet Gynecol* 1999; 93:585-9.
3. Whitecar MP, Turner S, Higby MK. Adnexal masses in pregnancy: a review of 130 cases undergoing surgical treatment. *Am J Obstet Gynecol* 1999; 181:19-24.
4. Lam WK, Cheung KB. Outcomes of asymptomatic adnexal masses in pregnancy. *HKJGOM* 2010; 10:69-74.
5. RCOG ovarian cysts in postmenopausal women (Green-top Guideline No. 34). *UK: Royal College of Obstetricians and Gynaecologists*; 2003.
6. Wheeler TC, Fleischer AC. Complex adnexal mass in pregnancy: predictive value of color Doppler sonography. *J Ultrasound Med* 1997; 16:425-8.
7. Togashi K. Ovarian cancer: the clinical role of US, CT and MRI. *Eur Radiol* 2003; 13 Suppl 4:L87-104.
8. Aslam N, Ong C, Woelfer B, Nicolaides K, Jurkovic D. Serum CA125 at 11-14 weeks of gestation in women with morphologically normal ovaries. *BJOG* 2000; 107:689-90.
9. Guidelines Committee of the Society of American Gastrointestinal and Endoscopic Surgeons, Yumi H. Guidelines for diagnosis, treatment, and use of laparoscopy surgical problems during pregnancy. *Surg Endosc* 2008; 22:849-61.
10. Friedman JD, Ramsey PS, Ramin KD, Berry C. Pneumoamnion and pregnancy loss after second-trimester laparoscopic surgery. *Obstet Gynecol* 2002; 99:512-3.
11. Novak ER, Lambrou CD, Woodruff JD. Ovarian tumors in pregnancy. An ovarian tumor registry review. *Obstet Gynecol* 1975; 46:401-6.
12. Yuen PM, Ng PS, Leung PL, Rogers MS. Outcome in laparoscopic management of persistent adnexal mass during the second trimester of pregnancy. *Surg Endosc* 2004; 18:1354-7.
13. Kumari I, Kaur S, Mohan H, Huria A. Adnexal masses in pregnancy: a 5-year review. *Aust N Z J Obstet Gynaecol* 2006; 46:52-4.
14. Peterson WF, Prevost EC, Edmunds FT, Hundley JM Jr, Morris FK. Benign cystic teratomas of the ovary; a clinico-statistical study of 1,007 cases with a review of the literature. *Am J Obstet Gynecol* 1955; 70:368-82.
15. Yen CF, Lin SL, Murk W, et al. Risk analysis of torsion and malignancy for adnexal masses during pregnancy. *Fertil Steril* 2009; 91:1895-902.
16. Caspi B, Levi R, Appelman Z, Rabinerson D, Goldman G, Hagay Z. Conservative management of ovarian cystic teratoma during pregnancy and labor. *Am J Obstet Gynecol* 2000; 182:503-5.
17. Damigos E, Johns J, Ross J. An update on the diagnosis and management of ovarian torsion. 2012; 14:229-36.

Developing a Pilot Model to Predict Successful Vaginal Birth after Caesarean Section for Hong Kong Chinese women

Janet Sui-Man TANG MBChB, MRCOG
TK LO MBBS, MRCOG, FHKCOG, FHKAM(O&G)
Department of Obstetrics and Gynaecology, Princess Margaret Hospital, Hong Kong

Objectives: To determine the success rate of vaginal birth after Caesarean section (VBAC) and its associated factors in local Chinese women with one previous Caesarean delivery and to develop nomograms to quantify the probability of a successful VBAC in an individual woman.
Methods: All women with a history of a single previous uncomplicated lower segment Caesarean section who underwent a trial of labour at Princess Margaret Hospital between 1 January 2013 and 30 June 2015 were identified. Their demographic data, obstetrics and medical history, as well as intrapartum events were obtained. Univariate analyses and multivariate logistic regression were performed to identify significant predictors of a successful VBAC.
Results: Of 507 women attempted a VBAC, 406 (80.1%) succeeded. Women who had a successful VBAC were more likely to be younger, taller, and have a history of vaginal delivery or previous VBAC. Women with a previous emergency Caesarean delivery, a non-progressive labour as the indication for previous Caesarean delivery (odds ratio [OR]=0.453, 95% confidence interval [CI], 0.271-0.756), a significantly longer labour in the present pregnancy (OR =0.997, 95% CI, 0.996-0.998), the use of Syntocinon (OR =0.227, 95% CI=0.130-0.395), and epidural analgesia were more likely to have a failed VBAC. Based on these factors, two nomograms (one for antepartum and another for intrapartum) were developed to quantify the probability of a successful VBAC in an individual woman.
Conclusion: The success rate of VBAC in this local Chinese cohort was 80.1%. Non-progressive labour as the indication for previous Caesarean delivery was the most significant antepartum predictor for a failed VBAC, whereas the use of Syntocinon was the most significant intrapartum predictor.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):24-9

Keywords: Oxytocin; Pregnancy outcome; Vaginal birth after Cesarean

Introduction

In Princess Margaret Hospital (PMH), the rate of delivery by Caesarean section has increased from 21.5% in 2002 to 26% in 2012. Women with uncomplicated pregnancy who have one previous uncomplicated Caesarean section can be offered either a planned vaginal birth after Caesarean section (VBAC) or an elective repeat Caesarean section (ERCS). The decision to attempt a trial of labour depends on the likelihood of a successful VBAC as the greatest risk of adverse outcome occurs in a trial of VBAC resulted in emergency Caesarean delivery[1].

In the UK, the overall success rate for a planned VBAC is 72 to 75%. Factors associated with a failed VBAC include induced labour, no previous vaginal delivery, body mass index (BMI) >30, and previous Caesarean section for labour dystocia[2-4]. Various predictive models and nomograms have been developed to predict the chance of a successful VBAC according to individual risk assessment[5-7]. The VBAC success rates vary between different studies, and women of white ethnicity have a higher success rate than those of Asian ethnicity[2,4]. In a local cohort study, previous Caesarean section for failure to progress is associated with unsuccessful VBAC among women in whom a double balloon catheter was used for induction of labour[8]. A larger study is required to derive a local VBAC success rate and evaluate various factors that affect the success of VBAC and to predict the likelihood of success.

We aimed to determine the success rate of VBAC and the obstetric and maternal factors associated with the success of VBAC in local Chinese women with one previous Caesarean delivery, and to incorporate these factors into predictive nomograms for easy clinical use. Predictive nomograms can enable obstetricians to quantify VBAC success based on multiple clinical parameters of the pregnant woman.

Methods

The Obstetrics and Gynaecology Specialty Clinical

Correspondence to: Dr Janet Sui-Man Tang
Emails: tsm742@ha.org.hk, janetsmtang@gmail.com

Information System was used to identify births that took place at the Princess Margaret Hospital of Hong Kong (PMH) throughout the study period. The system contains patient demographics, clinical information including antenatal records, obstetric history, labour information, baby information, and diagnosis and procedure for each delivery.

Women who had delivered at PMH between 1 January 2013 and 30 June 2015 with a coding of 'previous Caesarean section' or 'previous uterine scar' were identified. The maternal antenatal records, hospital electronic records (e-PR), written records throughout the whole antepartum, intrapartum, and postpartum periods, neonatal birth records and neonatal e-PR were reviewed by the main investigator. Women who had a vertex singleton pregnancy with a gestational age of 24 weeks or above and a history of one previous uncomplicated lower segment Caesarean section were included. Those who had contraindications for VBAC including a history of more than one previous lower segment Caesarean section, previous classical Caesarean section, previous uterine rupture, previous complicated uterine scar, or previous non-Caesarean section scar were excluded. Women with indications for an ERCS or emergency Caesarean section before the onset of labour, women who refused a VBAC, or those who were non-Chinese were also excluded.

A successful VBAC was defined as vaginal delivery following an attempted VBAC including normal spontaneous delivery and instrumental delivery. Demographic data, obstetrics and medical history, as well as intrapartum events were obtained. Maternal demographics included age, maternal height, pre-pregnancy or first visit body mass index (BMI) and parity. Obstetric history included the indication for previous Caesarean section, type of previous Caesarean section (elective or emergency), birth weight of previous baby delivered by Caesarean, time since last Caesarean delivery, and history of previous vaginal delivery. Medical history and intrapartum information included birth weight of the current delivery, sex of the baby, gestational age at delivery, duration of the first stage of labour, maternal pre-existing conditions (asthma, autoimmune disease, chronic hypertension, diabetes, renal disease, seizure disorder), conditions of current pregnancy (gestational diabetes, gestational hypertension, pre-eclampsia or eclampsia), use of Syntocinon for induction or augmentation, and use of epidural analgesia. Previous non-progressive labour was defined as labour dystocia, failed induction of labour or cephalopelvic disproportion as the indication for previous Caesarean delivery.

The labour of women who underwent VBAC was managed according to the department protocol with continuous fetal heart monitoring and regular maternal monitoring. There was no restriction in choice of labour pain relief methods unless otherwise contra-indicated. Assessment of labour progress and intrapartum management was the same as for normal vaginal delivery. The decision to use Syntocinon for augmentation or induction was made by a senior obstetrician with adequate counselling to the patient about the associated risks, including scar rupture.

Statistical analyses were performed using PASW Statistics 18, Release Version 18.0.0 (SPSS, Inc., Chicago [IL], US). For categorical data, Chi-square test and Fisher's exact test were used. For continuous data with a highly skewed distribution, a non-parametric test (i.e. Mann-Whitney *U* test) was used. The level of statistical significance was set at 0.05.

Significant variables as potential predictors were entered into a logistic regression model to determine the predictors for the success of VBAC. Multivariate logistic regression analysis (forward elimination procedure) was performed by including variables with a significance level of $p<0.2$ using univariate analysis. Various significant antepartum and intrapartum factors were used to develop

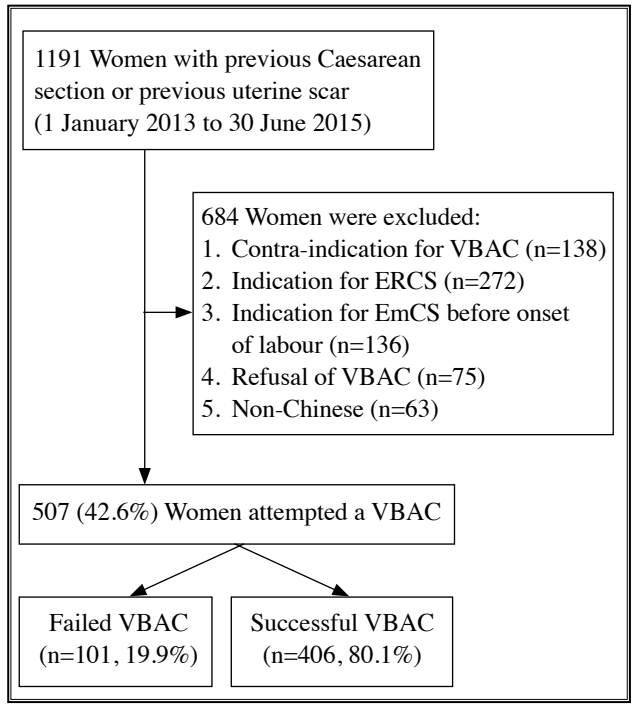


Figure 1. Selection of cohort
Abbreviations: EmCS = emergency Caesarean section; ERCS = elective repeated Caesarean section; VBAC = vaginal birth after Caesarean section

predictive models, and nomograms were generated to represent the models. Nomograms were developed using R 3.0.3 (Package "rms"; https://www.r-project.org/).

This study was approved by the Kowloon West Cluster Research Ethics Committee.

Results

A total of 1191 women delivered at PMH between 1 January 2010 and 30 June 2015 with a coding of 'previous Caesarean section' or 'previous uterine scar' (Figure 1). Among them, 684 women were excluded due to contra-indication for VBAC (n=138), indication for an ERCS (n=272), indication for an emergency Caesarean section before the onset of labour (n=136), refusal of VBAC (n=75), and non-Chinese ethnicity (n=63). The remaining 507 (42.6%) women underwent a VBAC and were included. Among them, 406 (80.1%) achieved a successful VBAC, whereas 101 (19.9%) failed a trial of labour. Of the 406 women, 338 (83.3%) had normal vaginal delivery and 68 (16.7%) required instrumental delivery (vacuum extraction or forceps delivery). The indications for instrumental delivery were prolonged second stage of labour (36.8%), fetal distress (60.3%), and others (2.9%). Of the 101 women who failed a trial of labour, 59 (58.4%) had a repeat Caesarean section for failure to progress, 17 (16.8%) for failed induction of labour, 19 (18.8%) for fetal distress, and six (6%) for other indications.

Table 1. Maternal characteristics of women undergoing vaginal birth after Caesarean section (VBAC)*

	Failed VBAC (n=101)	Successful VBAC (n=406)	OR (95% CI)	p Value
Age at delivery (years)	34.0 (31.0-36.0)	33.0 (30.0-36.0)	0.938 (0.891-0.987)	0.019
Maternal height (cm)	156.0 (153.0-160.0)	158.0 (155.0-162.0)	1.065 (1.021-1.112)	0.007
Body mass index (pre-pregnancy or first visit) [kg/m^2]	21.4 (20.0-23.7)	21.1 (19.3-23.1)	0.952 (0.89-1.019)	0.209
Pre-existing disease†				0.662
No	99 (98)	400 (98.5)	1	
Yes	2 (2)	6 (1.5)	0.743 (0.148-3.735)	
Birth interval (years)	4.0 (3.0-7.0)	4.0 (2.0-6.0)	0.961 (0.903-1.024)	0.24
Type of previous LSCS				0.006
Emergency	80 (83.3)	252 (69.2)	0.45 (0.252-0.805)	
Elective	16 (16.7)	112 (30.8)	1	
Indication for previous Caesarean				0.008
Previous non-progressive labour‡	50 (49.5)	123 (30.8)	0.417 (0.198-0.88)	
Fetal distress	10 (9.9)	59 (14.8)	1	
Malpresentation	13 (12.9)	90 (22.5)	1.173 (0.483-2.85)	
Placenta praevia / abruption	4 (4.0)	20 (5.0)	0.847 (0.239-3.004)	
Others	24 (23.8)	108 (27.0)	0.763 (0.342-1.703)	
Previous preterm Caesarean				0.515
No	91 (90.1)	373 (92.1)	1	
Yes	10 (9.9)	32 (7.9)	0.781 (0.37-1.646)	
Previous vaginal delivery				0.013
No	94 (93.1)	338 (83.3)	1	
Yes	7 (6.9)	68 (16.7)	2.702 (1.201-6.078)	
Previous VBAC				0.026
No	98 (97.0)	366 (90.1)	1	
Yes	3 (3.0)	40 (9.9)	2.702 (1.201-6.078)	
Antenatal characteristics				0.699
Gestational hypertension / pre-eclampsia / eclampsia	3 (3.0)	8 (2.0)	0.64 (0.166-2.464)	
Gestational diabetes	15 (14.9)	52 (12.8)	0.832 (0.446-1.55)	
Uneventful	83 (82.2)	346 (85.2)	1	

* Data are shown as median (range) or No. (%) of subjects

† Including asthma, autoimmune disease, chronic hypertension, diabetes, renal disease, and seizure disorder

‡ Including failed induction of labour, labour dystocia, and cephalopelvic disproportion

Women who had a successful VBAC were more likely to be younger and taller than those who failed ($p<0.05$, Table 1). Women with a history of vaginal delivery and previous VBAC were also more likely to have a successful VBAC ($p<0.05$). However, women with a previous emergency Caesarean delivery or with non-progressive labour as the indication for previous Caesarean delivery were more likely to have a failed VBAC ($p<0.05$).

Women who failed VBAC experienced a longer labour ($p<0.001$, Table 2). The use of Syntocinon for induction or augmentation of labour, as well as the use of epidural analgesia reduced the likelihood of a successful VBAC (all $p<0.001$). The success rate of VBAC in women requiring combined induction (artificial rupture of membrane and Syntocinon) and augmentation with Syntocinon was 58.9% and 64.7%, respectively. Two (0.39%) women had scar rupture. None reported maternal or fetal mortality. One woman had an emergency second-stage LSCS for prolonged second stage without instrumental delivery. The remaining 49 women with a prolonged second stage of labour resulted in a successful VBAC.

Multivariate logistic regression models were used to evaluate the independent effect of significant variables drawn from univariate analyses on the likelihood of a successful VBAC (Table 3). The type of previous Caesarean delivery was excluded from analysis, as such data were missing in 9% of the cases. Factors remained predictive of the success of VBAC were maternal age, height, indication for previous Caesarean delivery, duration of labour, and the use of Syntocinon. Having a non-progressive labour as the indication for previous Caesarean delivery was the most significant antepartum predictor for a failed VBAC (odds ratio [OR]=0.453; 95% confidence interval [CI]=0.271-0.756), whereas the use of Syntocinon for induction or augmentation was the most significant intrapartum predictor (OR=0.227; 95% CI=0.130-0.395).

Two nomograms (one for antepartum and another for intrapartum) derived from significant variables from univariate analyses are presented in Figures 2 and 3.

Discussion

This is the first cohort study of VBAC success and its associated factors in Hong Kong Chinese women. The overall success rate of VBAC was 80.1%, which is slightly higher than that reported in overseas studies (72-75%)[1-3,5]. Different populations might carry different maternal and obstetric risk profiles. Examples are the lower rate and less severe degree of obesity in local Chinese women[2,3,5-7], and the lower birth weight of Chinese babies[2,4,6].

Various demographic, maternal, and obstetric factors have been reported as predictive of the success of VBAC[1-5]. Using multivariate analysis, our study confirmed that a previous indication of non-progressive labour and the use of Syntocinon for induction or augmentation of labour were respectively the most significant antepartum and intrapartum factors associated with an unsuccessful VBAC.

Table 2. Intrapartum factors of women undergoing vaginal birth after Caesarean section (VBAC)*

	Failed VBAC (n=101)	Successful VBAC (n=406)	OR (95% CI)	p Value
Gestation at delivery (weeks)	39.4 (38.4-40.0)	39.4 (38.4-40.1)	0.979 (0.862-1.111)	0.998
Birth weight (g)	3200.0 (2915.0-3580.0)	3180.0 (2930.0-3462.5)	1 (0.999-1)	0.53
Gender of baby				0.563
Female	46 (45.5)	172 (42.4)	1	
Male	55 (54.5)	234 (57.6)	1.138 (0.734-1.764)	
Duration of first stage of labour (mins)	435.0 (274.0-603.5)	223.0 (135.0-382.5)	0.996 (0.995-0.997)	<0.001
Onset of labour				<0.001
Spontaneous	61 (60.4)	350 (86.2)	1	
Induced / augmented	40 (39.6)	56 (13.8)	0.244 (0.15-0.398)	
Use of Syntocinon				<0.001
No	64 (63.4)	352 (86.7)	1	
Yes	37 (36.6)	54 (13.3)	0.265 (0.162-0.436)	
Use of epidural analgesia				<0.001
No	86 (85.1)	389 (95.8)	1	
Yes	15 (14.9)	17 (4.2)	0.251 (0.12-0.521)	

* Data are shown as median (range) or No. (%) of subjects

Table 3. Logistic regression analysis of factors associated with a successful vaginal birth after Caesarean section*

Risk factor	Unadjusted OR (95% CI)	p Value
Age at delivery	0.939 (0.886-0.995)	0.032
Maternal height (cm)	1.051 (1.001-1.102)	0.044
Previous Caesarean for non-progressive labour	0.453 (0.271-0.756)	0.002
Duration of first stage (mins)	0.997 (0.996-0.998)	<0.001
Use of Syntocinon	0.227 (0.130-0.395)	<0.001

* Hosmer-Lemeshow goodness-of-fit test, Chi-square statistics=4.827, degrees of freedom=8, p=0.776

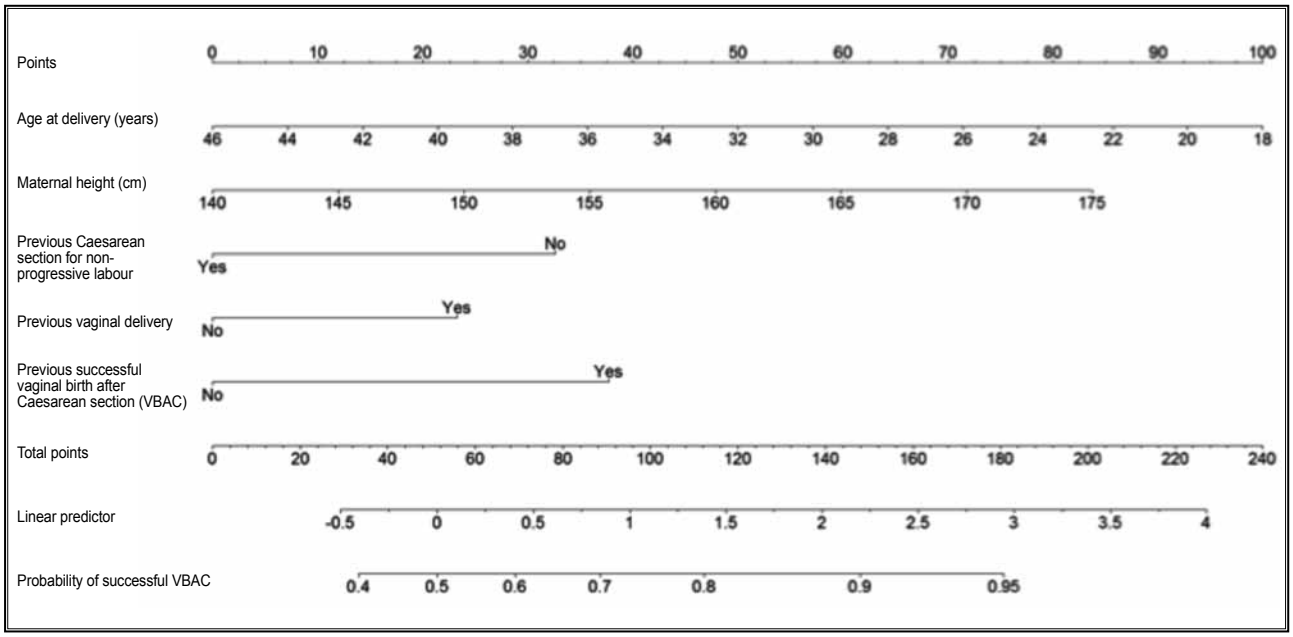


Figure 2. Nomogram with antepartum factors

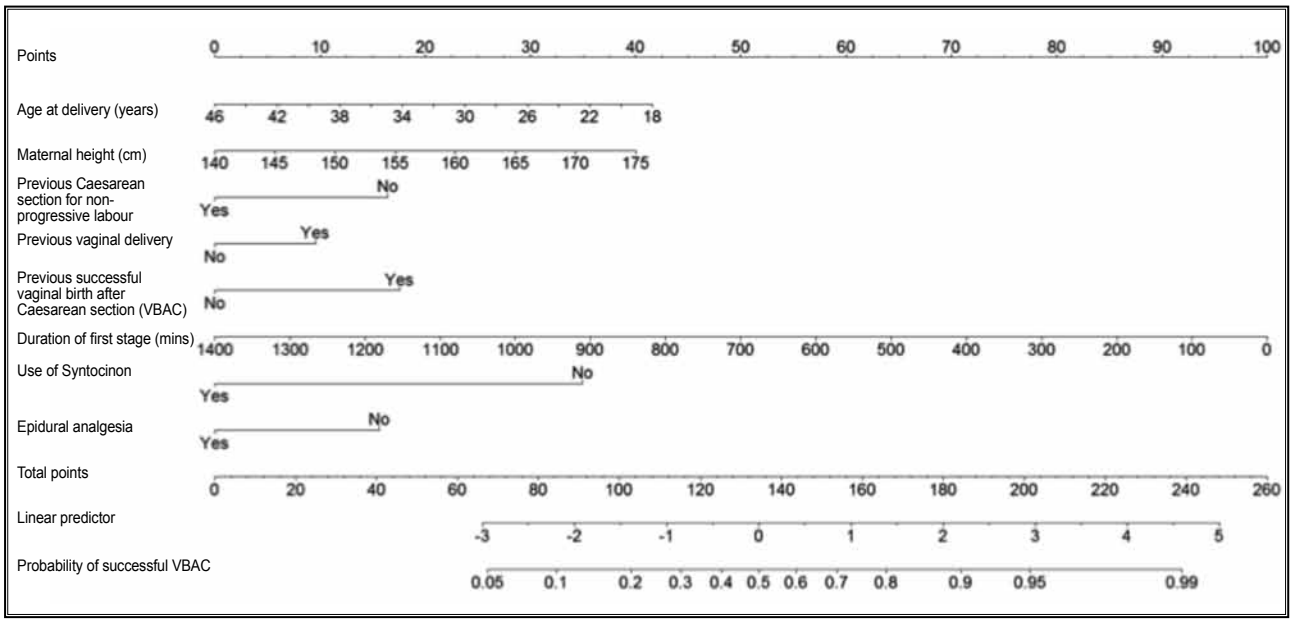


Figure 3. Nomogram with antepartum and intrapartum factors

Taller and younger mothers had an increased likelihood of VBAC success; these findings are in line with others[9]. Nonetheless, the sample size of our study was insufficient to determine a cut-off value for height and age.

In our study, 75 (14.8%) women who achieved VBAC had a history of vaginal delivery including previous VBAC. The success rate was 90.7% in those with a history of vaginal delivery and 93% in those with previous VBAC. Despite this, they were not the most significant predictors in our cohort following multivariate analysis. This is probably because of the high baseline VABC success rate in the comparison group (78% for those without a history of vaginal delivery and 78.9% for those without previous VBAC) that in turn contributed to the favourable risk profile for VBAC success.

We were unable to demonstrate significant effects of maternal BMI and fetal birth weight on VBAC success. This may be related to the intrinsic characteristics of our Chinese population wherein 98.4% of women had a pre-pregnancy or first visit BMI <30 and 97.8% of babies had a birth weight <4 kg.

Two nomograms are created for clinical use. As both antepartum and intrapartum factors influence the likelihood of VBAC, staged predictive tools enable obstetricians to evaluate the likelihood of VBAC success for an individual patient at different stages of care. A predicted probability of a successful VBAC corresponds to the summed points of patient characteristics. The nomograms provide a handy tool to facilitate patient counselling and clinical decision making about the mode of delivery. As a woman with an increased risk of a failed VBAC is also at increased risk of scar rupture[10], this risk should be included in counselling when the risk of failed VBAC is predicted to be high.

The main limitation of our study was its retrospective nature. In addition, 9% of data for the type of previous Caesarean section were missing. Nonetheless, the overall missing data for other variables was <1%. Our cohort was from a single tertiary centre in Hong Kong; further internal validation with another dataset and external validation of the prediction models with a territory-wide population are needed to determine its generalisability.

Conclusions

The success rate of VBAC in local Chinese women appears high (80.1%). A previous Caesarean delivery for non-progressive labour is the most significant antepartum predictor for VBAC failure, whereas the most significant intrapartum predictor is the need for Syntocinon.

Declaration

The authors have declared no conflict of interests in this study.

References

1. Birth after previous caesarean birth (Green-top Guideline No. 45). *London: Royal College of Obstetricians and Gynaecologists*; 2015.
2. Landon MB, Leindecker S, Spong CY, et al. The MFMU Cesarean Registry: factors affecting the success of trial of labor after previous cesarean delivery. *Am J Obstet Gynecol* 2005; 193(3 Pt 2):1016-23.
3. van der Merwe AM, Thompson JM, Ekeroma AJ. Factors affecting vaginal birth after caesarean section at Middlemore Hospital, Auckland, New Zealand. *N Z Med J* 2013; 126:49-57.
4. Knight HE, Gurol-Urganci I, van der Meulen JH, et al. Vaginal birth after caesarean section: a cohort study investigating factors associated with its uptake and success. *BJOG* 2014; 121:183-92.
5. Grobman WA, Lai Y, Landon MB, et al. Development of a nomogram for prediction of vaginal birth after cesarean delivery. *Obstet Gynecol* 2007; 109:806-12.
6. Metz TD, Stoddard GJ, Henry E, Jackson M, Holmgren C, Esplin S. Simple validated vaginal birth after cesarean delivery prediction model for use at the time of admission. *Obstet Gynecol* 2013; 122:571-8.
7. Schoorel EN, van Kuijk SM, Melman S, et al. Vaginal birth after a caesarean section: the development of a Western European population-based prediction model for deliveries at term. *BJOG* 2014; 121:194-201.
8. Cheuk QK, Lo TK, Lee CP, Yeung AP. Double balloon catheter for induction of labour in Chinese women with previous caesarean section: one-year experience and literature review. *Hong Kong Med J* 2015; 21:243-50.
9. Chaillet N, Bujold E, Dubé E, Grobman WA. Validation of a prediction model for vaginal birth after caesarean. *J Obstet Gynaecol Can* 2013; 35:119-24.
10. Smith GC, White IR, Pell JP, Dobbie R. Predicting cesarean section and uterine rupture among women attempting vaginal birth after prior cesarean section. *PLoS Med* 2005; 2:e252.

Mode of Delivery and Pregnancy Outcome in Women with Minor Placenta Previa

Sum-Yee CHAN MBBS, MRCOG
Wai-Lam LAU MBBS, FRCOG, FHKAM(O&G)
Wing-Cheong LEUNG MD, FRCOG, FHKAM(O&G), Cert RCOG (Maternal & Fetal Med)
Department of Obstetrics and Gynaecology, Kwong Wah Hospital, Hong Kong

Introduction: Severity of placenta previa is classified according to the distance between the placental edge and internal cervical os (PD). This study aimed to evaluate local women with placenta previa in terms of successful vaginal delivery following a trial of labour. Bleeding comorbidities were also investigated.
Methods: We retrospective reviewed a cohort of women with singleton pregnancy and minor placenta previa who delivered in a single unit between January 2012 and December 2015. PD, demographic data, obstetric, antenatal, and delivery outcome were analysed.
Results: Of 54 women included, 26 had PD ≤2 cm, and all except one delivered by Caesarean section. Subgroup analysis of 28 women with PD >2 cm was performed. Of them, 20 opted for trial of labour, and vaginal delivery was successful in 16 (80%). Vaginal delivery, especially vacuum extraction delivery, was associated with a greater decrease in haemoglobin, compared with Caesarean section ($p<0.04$).
Conclusion: In women with minor placenta praevia, the successful vaginal delivery rate was 80%, which is higher than that reported in previous studies. This encouraging results can aid clinicians in counselling women with minor placenta previa of PD >2 cm about the mode of delivery and chance of a successful vaginal delivery.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):30-5

Keywords: Delivery, obstetric/methods; Hemorrhage; Placenta previa; Ultrasonography

Introduction

Placenta previa is a fairly common condition among Asian women, affecting 12.2 per 1000 deliveries a year[1]. It is conventionally classified as types I to IV; higher types indicate more severity. With the widespread use of obstetric ultrasonography, many current guidelines or protocols classify placenta previa as major or minor only. According to the Royal College of Obstetricians and Gynaecologists (RCOG) Green-top guideline no. 27, placenta previa is considered major when the placenta lies over the internal cervical os, and minor when the leading edge of the placenta is in the lower uterine segment but does not cover the cervical os[2]. Caesarean section is necessary in women with placenta that overlaps the internal os, whereas vaginal delivery is possible for minor placenta previa.

It is controversial about the factors associated with an increased chance of successful vaginal delivery in this group of women, particularly the distance between placental edge and internal cervical os (PD)[2-8]. In women with a PD of ≤2 and >2 cm, the Caesarean section rate is up to 87.5% and 28%, respectively[3]. A woman with a placental edge of ≤2 cm from the internal os in the third trimester is likely to require delivery by Caesarean section[2].

In 2009, Oppenheimer and Farine[4] proposed a new classification according to the PD measured with transvaginal scan within 28 days of term, as this better correlates with the likelihood of bleeding and need for Caesarean section. Placenta previa is classified as group 1 (PD >2.0 cm), group 2 (PD 1.1-2.0 cm), group 3 (PD 0-1.0 cm), and group 4 (placenta overlapping internal os)[4]. Caesarean section is unnecessary for group 1, but necessary for groups 2, 3, and 4[4]. Some studies proposed that women in group 2 can be offered vaginal delivery as well[6-8]. In our unit, for women with placenta previa of PD ≤2 cm, Caesarean section is recommended and a trial of labor (TOL) is not routinely offered; if PD is >2 cm, a TOL will be discussed. Nevertheless, some of patients with PD 1.1 to 2.0 cm were offered a TOL because of clinical considerations, e.g. patient's preference, clinically engaged head. There is no local study to address this issue on minor placenta previa and the evidence to support such recommendation is inadequate[1].

Correspondence to: Dr Sum-Yee Chan
Email: csy189@ha.org.hk

We aimed to evaluate the percentage of successful vaginal delivery in women who opted for TOL with respect to their PD measured with transvaginal ultrasonography (TVS) within 28 days of delivery. Secondary outcomes included bleeding co-morbidities (blood loss, haemoglobin change, need for transfusion) and association with different planned mode of delivery and final mode of delivery.

Methods

Ethics approval was obtained from the Kowloon West cluster Research Ethics Committee. This study retrospectively reviewed a cohort of women with singleton pregnancy who were diagnosed at delivery of minor placenta previa at a single unit between January 2012 and December 2015. Women with malpresentation, preterm delivery, or adherent placenta, or those with only transabdominal ultrasonography or TVS performed >28 days before delivery were excluded. Management was standardised and according to the departmental protocol. The details of the latest TVS were analysed. Indications for ultrasonography included follow-up scans for women with a low lying placenta on routine scan (around 20 -22 weeks), and those with antepartum haemorrhage or abnormal presentation in the third trimester. Most women with PD ≤2 cm (groups 2 and 3) were advised for elective Caesarean section, and those with PD >2 cm (group1) were offered options of TOL and elective Caesarean section according to the RCOG guideline.

Women who presented with antepartum haemorrhage were admitted for monitoring. TVS was repeated to determine PD, presence of retroplacental clot and fetal growth. Emergency Caesarean section was performed in the presence of significant antepartum haemorrhage, regardless of PD. Obstetric conditions that required earlier delivery were managed accordingly, e.g. pre-eclampsia, intrauterine growth restriction. For uncomplicated cases, elective Caesarean section was arranged between 38 and 40 weeks of gestation for women with PD ≤2 cm (groups 2 and 3) and those with PD >2 cm (group 1) who opted for elective Caesarean section.

Obstetric outcome was recorded from the antenatal and delivery records including demographic factors, antenatal medical or obstetric complications, occurrence of antepartum, intrapartum or postpartum haemorrhage, mode of delivery, types of intrapartum intervention, blood loss, change in haemoglobin, need for blood transfusion, and maternal and neonatal complications. Haemoglobin was checked after delivery. Change in haemoglobin was defined as the difference between the lowest haemoglobin measured postnatally and the most recent pre-delivery haemoglobin.

Statistical analysis was performed using SPSS software, version 22 (SPSS Inc., Chicago [IL], US). Differences between continuous variables were analysed by Student's *t* tests and analysis of variance (ANOVA), and those between categorical variables by Chi-square tests and 2 x 4 contingency tables as appropriate. A p value of <0.05 was considered statistically significant.

Results

Of 85 women diagnosed with minor placenta previa, 31 women were excluded and 54 women were included for analysis (Figures 1 and 2). TVS was performed in all 54 women within 28 days of delivery, with a mean of 13 (range, 0-27) days. The mean gestation during examination was 37 (range, 35-40) weeks. PD was measured by TVS; PD >2 cm was group 1 (n=28), PD 1.1-2.0 cm group 2 (n=23), and PD 0-1.0 cm group 3 (n=3).

Of 28 women in group 1, 4 were offered elective Caesarean section without discussion of TOL because of a clinically high head or presence of unstable lie. The remaining 24 women were offered TOL. Of whom 20 opted for TOL and 16 (80%) of them had a successful vaginal delivery. This group of women were subdivided according to their PD, i.e. 2-2.99 cm, 3-3.99 cm, and 4-5 cm; the rate of successful vaginal delivery between subgroups was comparable (Table 1). The remaining 4 women required emergency Caesarean section, because of antepartum haemorrhage (n=1) or failed induction (n=3, one for prelabour rupture of membrane and 2 for post-term).

Of 23 women in group 2, 15 were offered elective Caesarean section and 8 were discussed with TOL because of a clinically engaged head and/or the woman's preference and. For the 8 women, 6 opted for elective Caesarean section and 2 opted for TOL: one had normal spontaneous delivery (PD 2 cm) and the other (PD 1.5 cm) had induction of labour for prelabour rupture of membranes and ultimately required emergency lower segment Caesarean section because of poor progress. All 3 women in group 3 were offered elective lower segment Caesarean section.

Bleeding co-morbidities in women in group 1 was a secondary outcome. Women who opted for TOL and those who opted for elective Caesarean section were comparable in terms of blood loss, change in haemoglobin, and need for packed cell transfusion. Background characteristics of the two groups of women are similar except that women who

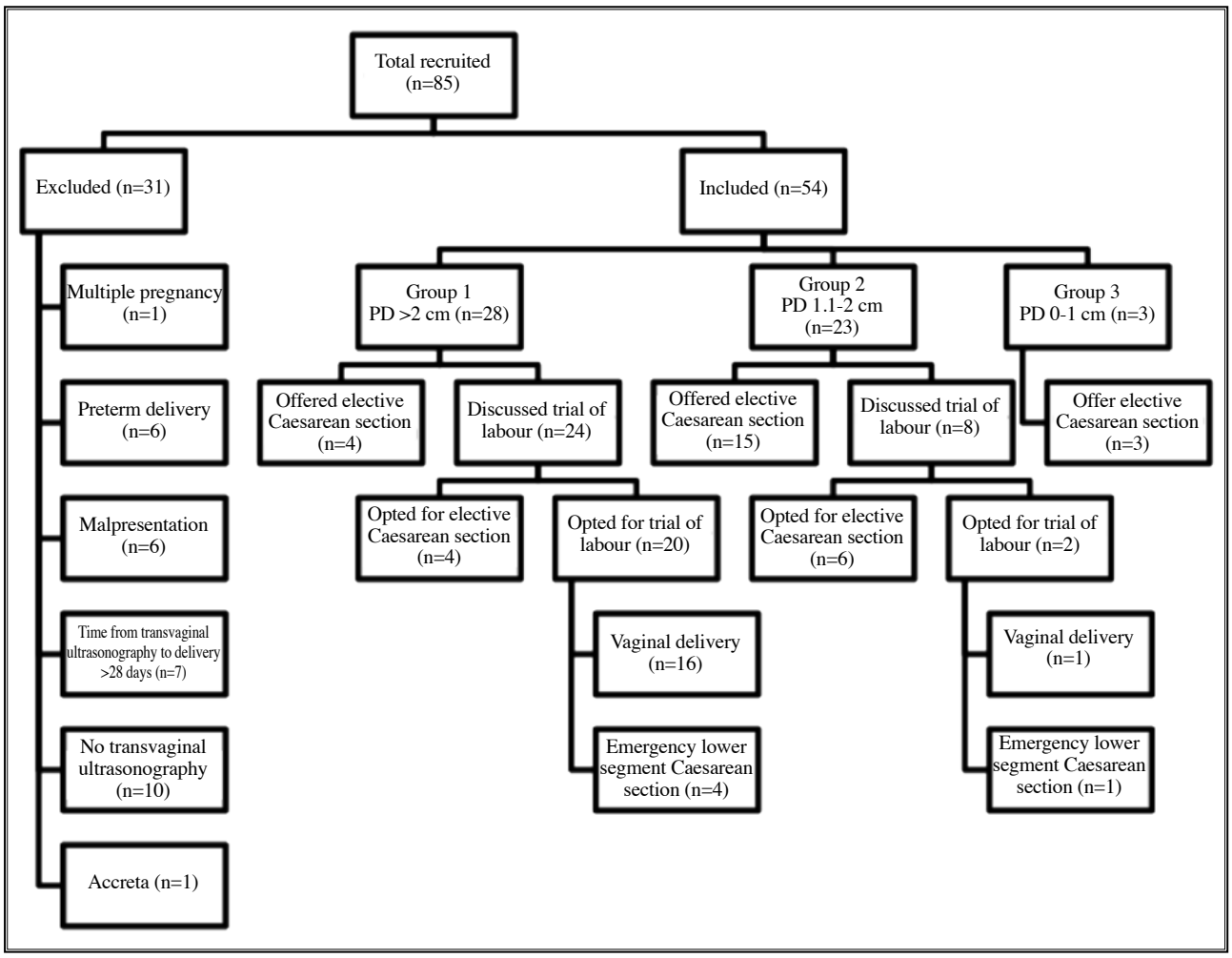


Figure 1. Flowchart of case inclusion and exclusion and outcome
Abbreviation: PD = distance from the leading placental edge to the cervical os

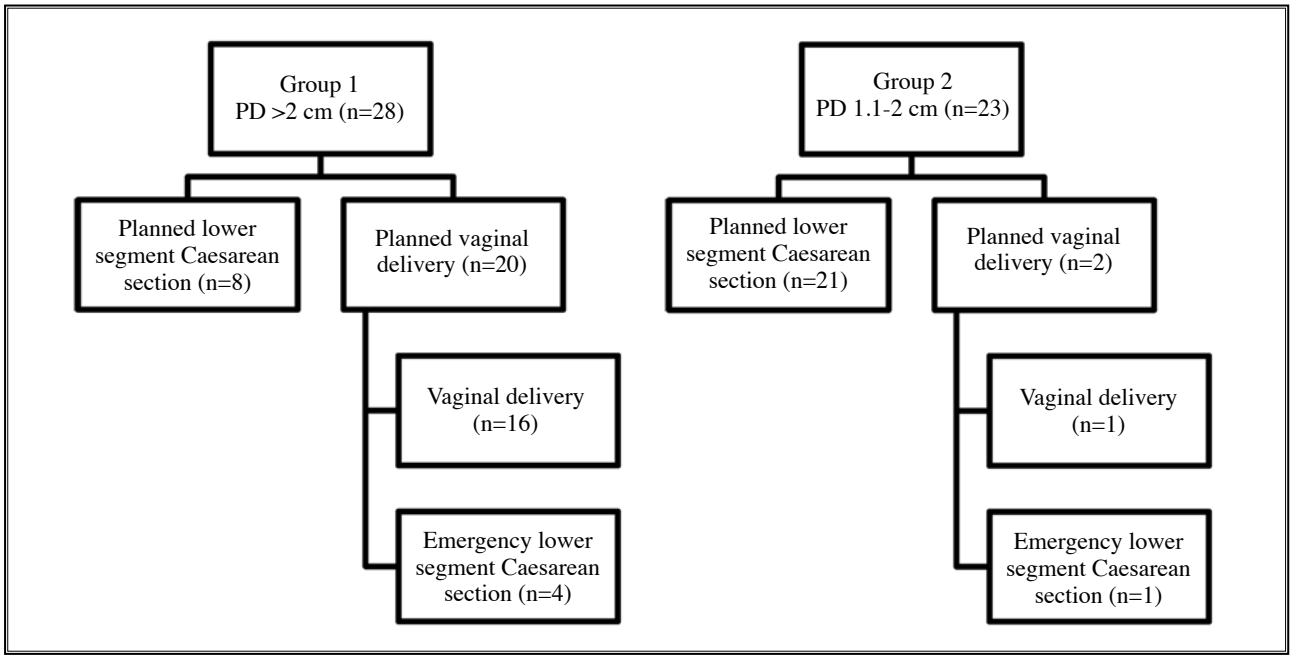


Figure 2. Flowchart of planned mode of delivery and outcome in groups 1 and 2
Abbreviation: PD = distance from the leading placental edge to the cervical os

Table 1. Successful rate of vaginal delivery in different subgroups of group 1 in women who opted for trial of labour

Characteristic	Distance from the leading placental edge to the cervical os			p Value
	2.01-3 cm	3.01-4 cm	4.01-5 cm	
No. of women	12	5	3	0.673
No. (%) of successful vaginal deliveries	9 (75)	5 (100)	2 (66.6)	

Table 2. Demographics of women in group 1 with respect to planned mode of delivery*

	Planned vaginal delivery	Planned Caesarean section	p Value
No. of women	20	8	
Age (years)	33.9 ± 4.1	33.8 ± 5.3	0.937
Gestation at delivery (weeks)	39.7 ± 1.2	39.3 ± 0.5	0.351
Time from transvaginal ultrasonography to delivery (days)	14 ± 8.4	11.9 ± 7.7	0.669
Distance from the leading placental edge to the cervical os (cm)	3.04 ± 0.79	3.0 ± 0.6	0.905
Placenta location			
Anterior	1 (5)	1 (12.5)	0.486
Posterior	19 (95)	7 (87.5)	
Parity			
Nulliparous	8 (40)	5 (62.5)	0.281
Multiparous	12 (60)	3 (37.5)	
Previous vaginal delivery	8 (40)	1 (12.5)	0.072
Previous Caesarean section	0	2 (25)	0.020
Gestational diabetes mellitus	2 (10)	1 (12.5)	0.306
Antepartum haemorrhage	2 (10)	2 (20)	0.847
Birth weight (kg)	3.3 ± 0.4	3.2 ± 0.4	0.642

* Data are shown as mean ± standard deviation or No. (%) of women, unless otherwise specified

Table 3. Comparison of blood loss, change in haemoglobin, need for packed cell transfusion with respect to planned mode of delivery in women in group 1*

	Planned vaginal delivery	Planned Caesarean section	p Value
No. of women	20	8	
Estimated blood loss (ml)	465.0 ± 250.8	393.8 ± 214.5	0.487
Haemoglobin drop (g/dL)	1.6 ± 1.9	1.1 ± 0.9	0.519
Unit of pack cell transfusion	0.3 ± 1.0	0.0 ± 0.0	0.399

* Data are shown as mean ± standard deviation, unless otherwise specified

opted for TOL were more likely to have had a previous vaginal delivery (Tables 2 and 3). Regarding the final mode of delivery, vaginal delivery, especially vacuum extraction delivery, was associated with greater drop in haemoglobin, compared with Caesarean section ($p<0.04$) [Tables 4 and 5].

Discussion

Women with PD ≤2 cm are likely to need delivery by Caesarean section (98%[3] and 87.5%[5]). PD of 2 cm is considered the minimum distance required for a TOL. In a retrospective analysis of 52 women, ultrasonographic examination was performed at a mean of 5 weeks prior to

Table 4. Demographics of women in group 1 with respect to final mode of delivery*

	Normal vaginal delivery	Vacuum extraction delivery	Lower segment Caesarean section		p Value
			Elective	Emergency	
No. of women	14	2	8	4	
Age (years)	33.8 ± 3.7	30.0 ± 2.8	33.8 ± 5.3	36.3 ± 5.1	0.451
Gestation at delivery (weeks)	39.5 ± 1.1	40.6 ± 1.4	39.3 ± 5.1	39.9 ± 1.7	0.453
Time from transvaginal ultrasonography to delivery (days)	14.1 ± 8.8	14.0 ± 2.0	12.2 ± 7.9	12.0 ± 8.12	0.943
Distance from the leading placental edge to the cervical os (cm)	3.1 ± 0.8	3.0 ± 1.4	3.0 ± 0.6	3.00 ± 0.8	0.998
Placenta location					0.848
Anterior	1 (7.1)	0	1 (12.5)	0	
Posterior	13 (92.9)	2 (100)	7 (87.5)	4 (100)	
Parity					0.175
Nulliparous	4 (11.4)	2 (100)	5 (62.5)	2 (50)	
Multiparous	10 (88.6)	0	3 (37.5)	2 (50)	
Previous vaginal delivery	10 (88.6)	0	1 (12.5)	2 (50)	0.139
Previous Caesarean section	0	0	2 (25)	0	0.146
Gestational diabetes mellitus	2 (14.2)	0	2 (25)	0	0.626
Antepartum haemorrhage	1 (7.1)	0	1 (12.5)	1 (25)	0.728
Birth weight (kg)	3.3 ± 0.4	3.0± 0.0	3.2 ± 0.4	3.5 ± 0.3	0.555

* Data are shown as mean ± standard deviation or No. (%) of women, unless otherwise specified

Table 5. Comparison of blood loss, change in haemoglobin, and need for packed cell transfusion with respect to final mode of delivery in women with group 1*

	Normal vaginal delivery	Vacuum extraction delivery	Lower segment Caesarean section		p Value
			Elective	Emergency	
No. of women	14	2	8	4	
Estimated blood loss (ml)	392.9 ± 218.2	750.0 ± 70.7	393.8 ± 214.5	575.0 ± 309.6	0.137
Haemoglobin drop (g/dL)	1.657 ± 1.8	4.0 ± 1.1	1.125 ± 0.9	0.1 ± 1.2	0.034
Unit of pack cell transfusion	0.3 ± 1.1	1.0 ± 1.4	0.0 ± 0.0	0.0 ± 0.0	0.465

* Data are shown as mean ± standard deviation, unless otherwise specified

delivery[3], whereas the mean time interval was 2 weeks (but the range was not stated) in another study[5]. As the placenta continues to migrate throughout the third trimester[9], the time interval between ultrasonography and delivery can influence PD measurement and clinical decision making on planning mode of delivery. In our cohort, all 54 women underwent TVS within 28 days of delivery at term (mean, 12.91 days) to ensure an accurate PD. 80% of women could deliver vaginally if their PD was >2 cm when they opted for TOL. This was higher than the 72%[3] and 63%[5] reported in other studies. This encouraging result may aid clinicians in counselling women with minor placenta previa of PD >2 cm about the mode of delivery.

Caesarean section was offered to 4 women in group 1 and TOL was offered in women in group 2 based on clinical considerations. Such clinical selection might have introduced selection bias to our study. Nonetheless, PD alone should not replace clinical judgement[4], and TOL can also be an option for women in group 2, as reported in other studies[6-8]. Safety is the most important concern before offering TOL to women with PD ≤2 cm. It was reported that the percentage of massive intrapartum haemorrhage is similar between planned vaginal delivery and planned Caesarean delivery, but the intrapartum blood loss is significantly lower in the planned vaginal delivery group[7]. On the contrary, it was suggested that postpartum

haemorrhage can occur in 43% of women with minor placenta previa, but TOL is not contraindicated as the postpartum haemorrhage has no significant association with PD or mode of delivery[10]. In our study, both blood loss and more objective assessment of bleeding comorbidities (haemoglobin change and need for packed cell transfusion) were analysed; there was no significant difference in women with PD >2 cm who opted for vaginal delivery or Caesarean section. This is in agreement with findings from other studies[7,10] that TOL should be safe for women with minor praevia. Concerning the final mode of delivery, vaginal delivery, especially vacuum extraction delivery, was associated with a greater decrease in haemoglobin, compared with Caesarean section ($p<0.04$). We advise clinicians to take note of the potential risk of bleeding in this subgroup of women and to institute prompt management whenever there is a slight suspicion of postpartum haemorrhage. Nonetheless, the strength of this finding may be limited by the small sample size in each subgroup.

There are studies focusing on a subgroup of women with PD 1.1 to 2 cm (group 2)[6,8]. In a study of 14 such women who opted for TOL, 13 (92.9%) had a successful vaginal delivery, and 2 (14.3%) were complicated by postpartum haemorrhage[6]. In another study of 29 women, 69% delivered vaginally and 10% developed postpartum haemorrhage[8]. The high success rate of vaginal delivery suggests that TOL might be offered to women with PD 1.1 to 2cm. Nonetheless these studies were small and the obstetric and neonatal outcomes were not adequately assessed. In our study, we were unable to address this point owing to the small subgroup sample. A large-scale prospective study is needed to evaluate the successful vaginal delivery rate, and maternal and neonatal outcome in women with PD of 1.1 to 2 cm and PD >2 cm measured by TVS close to delivery at term.

Declaration

The authors have declared no conflict of interests in this study.

References

1. Cresswell JA, Ronsmans C, Calvert C, Filippi V. Prevalence of placenta praevia by world region: a systematic review and meta-analysis. *Trop Med Int Health* 2013; 18:712-24.
2. Royal College of Obstetricians and Gynaecologists. Placenta praevia, placenta praevia accreta and vasa praevia: diagnosis and management. Green-top Guideline No. 27, January 2011.
3. Oppenheimer LW, Farine D, Ritchie JW, Lewinsky RM, Telford J, Fairbanks LA. What is a low-lying placenta? *Am J Obstet Gynecol* 1991; 165:1036-8.
4. Oppenheimer LW, Farine D. A new classification of placenta previa: measuring progress in obstetrics. *Am J Obstet Gynecol* 2009; 201:227-9.
5. Bhide A, Prefumo F, Moore J, Hollis B, Thilaganathan B. Placental edge to internal os distance in the late third trimester and mode of delivery in placenta praevia. *BJOG* 2003; 110:860-4.
6. Al Wadi K, Schneider C, Burym C, Reid G, Hunt J, Menticoglou S. Evaluating the safety of labour in women with a placental edge 11 to 20 mm from the internal cervical os. *J Obstet Gynaecol Can* 2014; 36:674-7.
7. Taga A, Sato Y, Sakae C, et al. Planned vaginal delivery versus planned cesarean delivery in cases of low-lying placenta. *J Matern Fetal Neonatal Med* 2016 May 16. Epub ahead of print.
8. Vergani P, Ornaghi S, Pozzi I, et al. Placenta previa: distance to internal os and mode of delivery. *Am J Obstet Gynecol* 2009; 201:266.e1-5.
9. Oppenheimer L, Holmes P, Simpson N, Dabrowski A. Diagnosis of low-lying placenta: can migration in the third trimester predict outcome? *Ultrasound Obstet Gynecol* 2001; 18:100-2.
10. Wortman AC, Twickler DM, McIntire DD, Dashe JS. Bleeding complications in pregnancies with low-lying placenta. *J Matern Fetal Neonatal Med* 2016; 29:1367-71.

Sexuality during Pregnancy among Chinese Couples in Hong Kong: A Prospective Cross-sectional Study

Wendy SHU MBBCh, MRCOG
Chung-Nin LEE MBBS, FRCOG, FHKAM(O&G)
Kwok-Keung TANG MBChB FRCOG FHKAM(O&G)
Department of Obstetrics and Gynaecology, Pamela Youde Nethersole Eastern Hospital, Hong Kong

Objective: Men perceive sexuality differently from women. This study aimed to evaluate sexuality during pregnancy among married Chinese couples in Hong Kong.
Methods: This cross-sectional study was conducted at a regional hospital in Hong Kong. Chinese pregnant women and their husbands were asked to complete a questionnaire separately and anonymously about their demographic data and sexual activities, perception, and knowledge and information about sexuality during pregnancy.
Results: A total of 216 couples were included. The response rate was 55%. Sexual desire was the strongest factor affecting sexual satisfaction. Both wives and husbands had a fear of 'negative consequences to the unborn baby' during sexual activity, with similar variance explained (46%). They were comfortable discussing sexual problems only when discussion was initiated by medical staff. The wives might feel unattractive during pregnancy although their husband did not share this view and instead appreciated their wife's altered appearance. The internet was the favoured source for information about sex in pregnancy. Nonetheless, more than half of the couples were unsure about the reliability of information found. They welcomed more information on this from their health care providers.
Conclusion: Accurate information about sexuality can help dispel myths and reduce anxiety and long-term conflict, as couples experience changes during pregnancy.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):36-44

Keywords: Family characteristics; Pregnancy; Sexuality

Introduction

Changes in sexuality during pregnancy can be significant for a variety of physical and emotional factors. One retrospective study observed a significant decline in sexual activity among Hong Kong couples, especially towards the third trimester when more than half of couples abstained from sexual intercourse[1]. Culture, inadequate knowledge, and excessive anxiety contribute to the marked reduction in sexuality in Chinese couples[2]. Most such studies focused on sexual activity, which is an objective measurement of sexuality (such as coital frequency and sex position).[1,2]. Nonetheless, sexual activity does not automatically imply sexual satisfaction, which is a subjective measurement of perception. Perception of sexuality is heavily influenced by culture, religion, and social roles[3]. Traditional Chinese medicine discourages sexual activity during pregnancy in order to protect the unborn child from 'malign influences' and to avoid pregnancy-associated problems[4]. Taiwanese women are often advised by their mother-in-law and mother to refrain from sexual intercourse[5].

Men have a different perception on sexuality to women. In a meta-analysis of non-pregnant subjects, men are typically more liberal and hypersexual than women[6]. In a longitudinal study of couples expecting their first child, many women experience reduced sexual desire, especially during the third trimester. In contrast, men experience reduced sexual desire only during the third trimester[7]. Pregnancy may represent a life crisis to the pregnant woman and her husband. Complex biopsychosocial demands may lead to insecurities, anxiety, and somatic complaints[8]. The father's attitude and feelings about the pregnancy are communicated to their wife through their behaviour towards them, and vice versa[9]. The couple's feelings, attitude, and knowledge about sexual behaviour during pregnancy are intertwined.

This study aimed to identify differences in sexual satisfaction among married couples in Hong Kong who were expecting a child, and to measure discrepancies

Correspondence to: Dr Wendy Shu
Email: sw294@ha.org.hk

in their knowledge and perception of sexuality during pregnancy. It aimed to raise awareness of married couples' sexual needs during pregnancy and investigate whether they wish to address any concerns with their obstetrician or midwives.

Methods

This cross-sectional survey study was approved by the Institutional Review Board of the Hospital. (Ref: HKEC-2016-010). Couples who attended the Obstetrics Department of Pamela Youde Nethersole Eastern Hospital in Hong Kong from March 2016 to August 2016 were invited to participate. Written information regarding the objective and details of the study was provided to couples in their third trimester during hospital admission or routine antenatal visit. Once written consent was obtained, the wife and husband each was asked to complete a self-administered anonymous questionnaire in Chinese.

Exclusion criteria included non-Chinese ethnicity, unmarried couples, and couples in whom sexual intercourse was clinically contra-indicated (e.g. low lying placenta).

Demographic data including age of the couple, gestational age, years of marriage, parity, educational level, occupation, past medical health, current obstetric problems, smoking and drinking habits, and income status were collected. Oral glucose tolerance test results were retrieved from the computerised antenatal record system.

The couples were assessed in three major areas concerning sexuality during pregnancy: sexual satisfaction, perception, and knowledge and information. The questions concerning sexual satisfaction were extracted from the female and male sexual quotient questionnaire used in two Brazilian studies[10,11]. These questions have been used in other studies that investigated various aspects of sexual function[12,13]. The questions were translated to Chinese by a medical doctor proficient in Chinese and English, and were pilot tested.

Sexual Satisfaction / Activity

A 6-point scale ranging from 0 (never) to 5 (always) was used for each question. Scores ≤2 indicated low sexual desire, arousal problems, orgasmic difficulties, and sexual dissatisfaction.

Perception

Potential factors that influence a woman's perception of sex during pregnancy, especially their fears and beliefs, have been identified[5,14]. These included fear of infection during intercourse, risk of threatened preterm labour, and concerns about untoward harm to the pregnancy.

Knowledge and Information

The couples were asked where and how they garnered their information about sex during pregnancy, whether they believed that the information received was correct, and whether they wished to receive additional information from their health service provider.

Statistical Analysis

Statistical analysis was performed using PASW Statistics 18, Release Version 18.0.0 (SPSS, Inc., Chicago [IL), US). Categorical data were presented as counts and percentages, and continuous data as median (interquartile range) as they were highly skewed.

To investigate potential factors that influence perception and knowledge of pregnant women and their husband, an exploratory factor analysis using the extraction method of principal component analysis with varimax rotation was performed, because the factor structure was uncertain. The number of factors to be extracted was based on the results of the screen-plots and the Kaiser's eigenvalue criterion (eigenvalue >1). The quality of the factor analysis models was assessed by Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy.

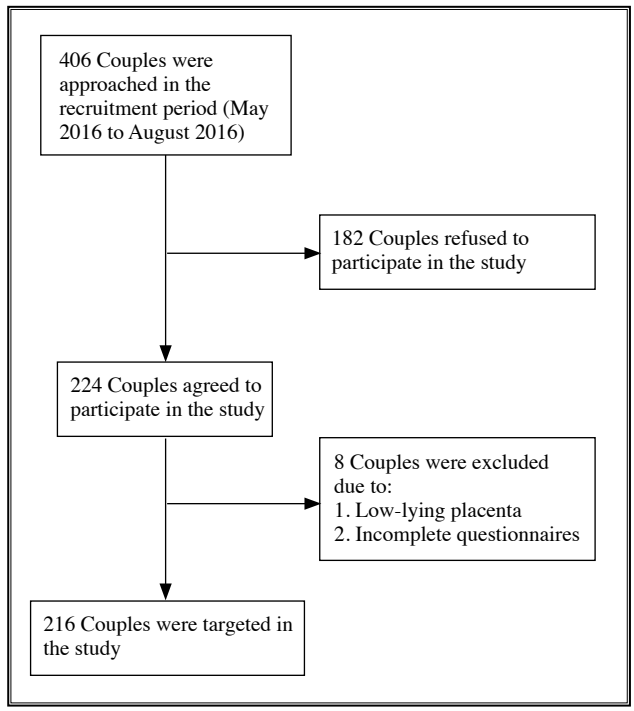


Figure. Recruitment process

Table 1. Demographic data of participants (n=216)*

Demographics	Pregnant women	Husbands
Age (years)	32.13 ± 4.57	34.93 ± 5.73
Gestation (weeks)	36 (29-38)	–
Years of marriage	3 (2-5)	
Gestational diabetes mellitus	48 (22.2)	–
Primiparous	145 (67.1)	–
Multiparous	71 (32.9)	–
Education level		
Primary	1 (0.5)	5 (2.3)
Secondary	73 (33.8)	75 (34.7)
Tertiary / university or above	142 (65.7)	136 (63.0)
Occupation		
Clerical work / secretary	56 (25.9)	18 (8.3)
Teacher / civil servant	25 (11.6)	34 (15.7)
Administrative worker	8 (3.7)	9 (4.2)
Information technology / media / advertising	9 (4.2)	28 (13.0)
Commercial / accounting	23 (10.6)	57 (26.4)
Food / beauty / sales / service industry	28 (13.0)	36 (16.7)
Medical staff	15 (6.9)	7 (3.2)
Housewife	43 (19.9)	0
Student	1 (0.5)	0
Unemployed	7 (3.2)	5 (2.3)
Others	1 (0.5)	22 (10.2)
Diseases		
Diabetes mellitus	0	4 (1.9)
Hypertension	3 (1.4)	7 (3.2)
Cardiovascular disease	0	1 (0.5)
Respiratory problem	8 (3.7)	13 (6.0)
Autoimmune disease	3 (1.4)	1 (0.5)
Musculoskeletal disease	1 (0.5)	3 (1.4)
Operations	25 (11.6)	13 (6.0)
Others	21 (9.7)	9 (4.2)
None	155 (71.8)	166 (76.9)
Smoking		
Active smoker	4 (1.9)	54 (25.0)
Non-smoker	188 (87.0)	142 (65.7)
Ex-smoker	24 (11.1)	20 (9.3)
Drinking		
Active drinker	4 (1.9)	33 (15.3)
Non-drinker	206 (95.4)	175 (81.0)
Ex-drinker	6 (2.8)	8 (3.7)
Medication or recreational drugs		
Active abuser	2 (0.9)	3 (1.4)
Non-abuser	213 (98.6)	213 (98.6)
Ex-abuser	1 (0.5)	0
Family monthly income (HK$)		
<10,000	8 (3.7)	
>10,000-$30,000	78 (36.1)	
>30,000-$50,000	72 (33.3)	
>50,000	58 (26.9)	
Pregnancy complications		
Persistent bleeding in pregnancy	11 (5.1)	–
Low-lying placenta	0	–
Multiple pregnancy	2 (0.9)	–
Oligohydramnios / polyhydramnios	7 (3.2)	–
Threatened preterm labour	2 (0.9)	–
Fetal impaired growth	2 (0.9)	–
None of the above	191 (88.4)	–

* Data are shown as mean ± standard deviation, median (range), or No. (%) of subjects

Results

Sample

Of 406 couples approached, 224 agreed to participate and completed the questionnaires. The response rate was 55%. Four couples did not fulfil the inclusion criteria and four others did not complete their questionnaire. A total of 216 pairs of questionnaires were analysed (Figure).

Demographic Data

The mean (± standard deviation [SD]) age of the wives and husbands was 32.1 ± 4.57 years and 34.9 ± 5.7 years, respectively (Table 1). The median gestational age was 36 (range, 29-38) weeks. The median years of marriage was 3 (range, 2-5) years. 48 (22%) of the women were diagnosed with gestational diabetes mellitus. 145 (67%) of the women were primiparous. 214 (99%) of the pregnancies were singleton. 155 (71%) of wives and 166 (76%) of husbands enjoyed good past health and had no previous surgeries. 11 (5.1%) of women experienced recurrent per vaginal bleeding during the course of pregnancy although sexual intercourse was not contra-indicated. More than 60% of couples were tertiary educated.

Table 2. Sexual activity during pregnancy*

Sexual activity during pregnancy	No	Infrequent / rarely	Sometimes	Nearly 50% of the time	Most of the time	Always
Pregnant women						
Q10. Think spontaneously about sex or imagine yourself having sex	40 (18.5)	79 (36.6)	90 (41.7)	6 (2.8)	1 (0.5)	0
Q11. Interest in sex sufficient for you to take part in sexual relations enthusiastically	29 (13.4)	49 (22.7)	64 (29.6)	42 (19.4)	27 (12.5)	5 (2.3)
Q12. Get lubricated (wet) during sexual relations	25 11.6)	28 (13.0)	43 (19.9)	35 (16.2)	64 (29.6)	21 (9.7)
Q13. Feel more stimulated for sex during sexual relations as your p sartner becomes more aroused	24 (11.1)	10 (4.6)	40 (18.5)	50 (23.1)	61 (28.2)	31 (14.4)
Q14. Reach orgasm (maximal pleasure) during sexual relations	30 (13.9)	28 (13.0)	41 (19.0)	53 (24.5)	49 (22.7)	15 (6.9)
Q15. Level of satisfaction you get from sexual relations make you want to have more sex again on other days	23 (10.6)	17 (7.9)	41 (19.0)	50 (23.1)	60 (27.8)	25 (11.6)
Husbands						
Q7. Your desire is high enough to encourage you to initiate sexual intercourse	25 (11.6)	40 (18.5)	75 (34.7)	41 (19.0)	29 (13.4)	6 (2.8)
Q8. Feel confident in your ability of seduction	15 (6.9)	18 (8.3	62 (28.7)	65 (30.1)	46 (21.3)	10 (4.6)
Q9. Feel foreplay is enjoyable and satisfy both of you	11 (5.1)	9 (4.2)	42 (19.4)	66 (30.6)	60 (27.8)	28 (13.0)
Q10. Your sexual performance is affected by your partner's sexual satisfaction	12 (5.6)	14 (6.5)	22 (10.2)	67 (31.0)	76 (35.2)	25 (11.6)
Q11. Maintain an erection sufficiently to complete sexual activity in a satisfactory way	8 (3.7)	4 (1.9)	13 (6.0)	29 (13.4)	60 (27.8)	102 (47.2)
Q12. After sexual stimulation, your erection is hard enough to ensure satisfying intercourse	9 (4.2)	4 (1.9)	13 (6.0)	28 (13.0)	66 (30.6)	96 (44.4)
Q13. To consistently obtain and maintain an erection whenever you have sexual activity	10 (4.6)	3 (1.4)	13 (6.0)	26 (12.0)	68 (31.5)	96 (44.4)
Q14. To control ejaculation so that sexual activity lasts as long as you want	16 (7.4)	17 (7.9)	37 (17.1)	60 (27.8)	62 (28.7)	24 (11.1)
Q15. To reach orgasm during sex	9 (4.2)	5 (2.3)	13 (6.0)	26 (12.0)	69 (31.9)	94 (43.5)
Q16. Your sexual performance encourages you to enjoy sex more frequently	13 (6.0)	12 (5.6)	52 (24.1)	68 (31.5)	54 (25.0)	17 (7.9)

* Data are shown as No. (%) of subjects

Sexual Activity During Pregnancy

209 (90%) of couples had few spontaneous thoughts of sex (Table 2). 142 (65%) had low interest in sex, if any. 96 (44.5%) of women could not achieve sufficient lubrication during sexual intercourse. 99 (46%) of women could not reach orgasm during sexual relations. 142 (65%) of women became stimulated for sex as their partner became aroused. 135 (62%) of women felt satisfied with their sexual relations. For the husbands, 140 (65%) had a low desire to initiate sexual intercourse. 154 (71%) felt that foreplay was enjoyable and satisfactory. 190 (>80%) were able to maintain an erection and to reach orgasm during sexual activity on most occasions. 139 (64%) were satisfied with their sexual performance most of the time.

Perception of Sexuality During Pregnancy

Both wives and husbands were concerned about bad consequences of sexual activity during pregnancy; 126 (58%) of wives and 138 (64%) of husbands believed it could lead to preterm delivery (Table 3). 132 (61%) of wives and 146 (67%) of husbands agreed that sexual intercourse could cause bleeding, and 139 (64%) of the couples believed that sexual intercourse could hurt the pregnancy in some way. 129 (60%) of wives and 142 (65%) of husbands were worried that their position during intercourse might be improper. Around half of the husbands were worried that sexual intercourse could cause discomfort to their wife. Only 90 (41.7%) of wives and 87 (40.3%) of husbands felt comfortable discussing their sexual problems with medical staff.

Knowledge and Information

127 (59%) of wives and 118 (54%) of husbands wished to obtain more information about sexual activity during pregnancy (Table 4). 123 (96.9%) of wives and 103 (87%) of husbands actively searched such information. 80 (65%) of wives and 70 (68%) of husbands used the internet to search for more knowledge. Only 56 (45%) of wives and 39 (38%) of husbands believed what they read was true, with the remainder being uncertain. If the Hospital Authority could provide more reading materials on this subject, 78% of wives and 63% of husbands would prefer

Table 3. Perception of sex during pregnancy*

Perception of sex during pregnancy	Perception (pregnant women / husbands)				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Q16. Feel comfortable to discuss sexual problems with medical staff					
Pregnant women	8 (3.7)	37 (17.1)	81 (37.5)	78 (36.1)	12 (5.6)
Husbands	4 (1.9)	39 (18.1)	86 (39.8)	65 (30.1)	22 (10.2)
Q17. Sexual relations will lead to preterm labour					
Pregnant women	10 (4.6)	51 (23.6)	29 (13.4)	98 (45.4)	28 (13.0)
Husbands	12 (5.6)	27 (12.5)	39 (18.1)	90 (41.7)	48 (22.2)
Q18. Sexual relations will lead to bleeding / hurt pregnancy					
Pregnant women	6 (2.8)	45 (20.8)	33 (15.3)	103 (47.7)	29 (13.4)
Husbands	10 (4.6)	24 (11.1)	36 (16.7)	95 (44.0	51 (23.6)
Q19. Feel unattractive during pregnancy					
Pregnant women	41 (19.0)	84 (38.9)	42 (19.4)	39 (18.1)	10 (4.6)
Husbands	53 (24.5)	83 (38.4)	54 (25.0)	23 (10.6)	3 (1.4)
Q20. Sexual relations will increase the chance of infection					
Pregnant women	8 (3.7)	43 (19.9)	26 (12.0)	114 (52.8)	25 (11.6)
Husbands	6 (2.8)	23 (10.6)	48 (22.2)	86 (39.8)	53 (24.5)
Q21. The position may be improper during sexual relations					
Pregnant women	7 (3.2)	30 (13.9)	50 (23.1)	109 (50.5)	20 (9.3)
Husbands	3 (1.4)	29 (13.4)	42 (19.4)	102 (47.2)	40 (18.5)
Q23. (Husbands only) Sexual intercourse / relations may cause discomfort to your wife	10 (4.6)	28 (13.0)	57 (26.4)	84 (38.9)	37 (17.1)

* Data are shown as No. (%) of subjects

Table 4. Information and knowledge of sex during pregnancy*

Information and knowledge of sex during pregnancy	Pregnant women	Husbands
To obtain more information regarding sexual activity during pregnancy	127 (58.8)	118 (54.6)
To proactively search information regarding sexual activity during pregnancy	123 (96.9)	103 (87.3)
Source(s) to obtain information about sexual activity during pregnancy		
Friend	23 (18.7)	19 (18.4)
Internet	80 (65.0)	70 (68.0)
Book	25 (20.3)	13 (12.6)
Newspaper / magazine	5 (4.1)	4 (3.9)
Pamphlets / manual	59 (48.0)	27 (26.2)
Seminar	12 (9.8)	16 (15.5)
Doctor and nurse	18 (14.6)	21 (20.4)
Others	1 (0.8)	2 (1.9)
Information you acquired was correct		
Yes	56 (45.5)	39 (37.9)
Uncertain	67 (54.5)	63 (61.2)
Incorrect	0	1 (1.0)
If Hospital Authority to provide the captioned information and consultation service, you would like to receive it from:		
Internet	60 (47.2)	71 (60.7)
Pamphlets / manual	100 (78.7)	74 (63.2)
Explanation by medical staff	44 (34.6)	42 (35.9)
Seminar or Workshop	29 (22.8)	26 (22.2)
Others	0	1 (0.9)

* Data are shown as No. (%) of subjects

to receive it in the form of a pamphlet. Only 44 (34%) of wives and 42 (36%) of husbands were willing to discuss the matter with medical staff. Workshops and seminars were the least favoured option (22.8% of wives and 22.2% of husbands).

Factor Analysis

In the exploratory factor analysis, the values of KMO measure of sampling adequacy were >0.6. The p values of Bartlett's test of sphericity were both <0.05. These indicated that the use of factor analysis was appropriate to investigate the underlying factors. One to two underlying factors (sexual desire and/or erection and seduction) were extracted for sexual activity and two underlying factors (negative consequences of sexual activity in pregnancy, and discussion with medical staff and wives' appearance) were extracted for perception (Table 5). All had an eigenvalue >1, indicating that these factors were meaningful. The total percentage of variance explained by the above factors ranged from 61.99% to 71.47%.

Discussion

Among Hong Kong Chinese women, sexual behaviour tends to be more conservative during pregnancy[1], and hence the response rate of this study was low (55%). Over 60% of the couples that completed the questionnaires had a tertiary education; more educated couples were more likely to participate.

Sexual activity declines drastically during pregnancy[1-5]. The low sexual desire and interest among wives may be reciprocated by their husband. The key factors for sexuality of husbands and wives were consistent, namely sexual desire, erection and seduction. Sexual desire was the strongest factor of sexual satisfaction, with the highest variance explained (64%). The items included in this factor had a similar coefficient of around 0.8, indicating that each item contributed the same weight to this factor. Sexual desire can be expressed in the form of foreplay, of which over 90% of the husbands reported enjoyment. Sexual desire can be inhibited by cultural beliefs and anxiety[15].

Table 5. Key factors that affect sexuality in pregnancy among wives and husbands by exploratory analysis*

Factor	Coefficient	Eigenvalue	Variance explained (%)
Pregnant women			
Factor 1: Sexual desire		3.887	64.782
Q10. Think spontaneously about sex or imagine yourself having sex	0.455		
Q11. Interest in sex sufficient for you to take part in sexual relations enthusiastically	0.813		
Q12. Get lubricated (wet) during sexual relations	0.809		
Q13. Feel more stimulated for sex during sexual relations as your partner becomes more aroused	0.893		
Q14. Reach orgasm (maximal pleasure) during sexual relations	0.857		
Q15. Level of satisfaction you get from sexual relations make you want to have more sex again on other days	0.913		
Husbands			
Factor 1: Erection		5.704	57.039
Q11. Maintain an erection sufficiently in order to complete sexual activity in a satisfactory way	0.923		
Q12. After sexual stimulation, your erection is hard enough to ensure satisfying intercourse	0.903		
Q13. To consistently obtain and maintain an erection whenever you have sexual activity	0.93		
Q14. To control ejaculation so that sexual activity lasts as long as you want	0.538		
Q15. To reach orgasm during sex	0.855		
Factor 2: Seduction		1.443	14.431
Q7. Your desire is high enough to encourage you to initiate sexual intercourse	0.811		
Q8. Feel confident in your ability of seduction	0.873		
Q9. Feel foreplay is enjoyable and satisfy both of you	0.677		
Q10. Your sexual performance is affected by your partner's sexual satisfaction	0.651		
Q16. Your sexual performance encourages you to enjoy sex more frequently	0.601		

* For women: value of Kaiser-Meyer-Olkin measure of sampling adequacy: 0.87, Bartlett's test of sphericity: Chi-square statistics 790.812, degrees of freedom 15, $p<0.001$. For husbands: value of Kaiser-Meyer-Olkin measure of sampling adequacy: 0.893, Bartlett's test of sphericity: Chi-square statistics 1731.778, degrees of freedom: 45, $p<0.001$.

About 55% of the wives could maintain lubrication and achieve orgasm during sexual intercourse. >80% of the husbands could maintain an erection and reach orgasm. 64% of the couples experienced overall satisfaction in their sexual relations.

There is no evidence that sex causes preterm birth or increases the risk of infection[16-18]. The strongest factor affecting perception was a fear of 'negative consequences to the unborn baby' during sexual activity. Both wives and husbands had similar variance explained (46%). Items included in this factor were fear of sex causing preterm labour, bleeding or adopting the wrong coital position. These items had a similar coefficient of around 0.7 to 0.8 and therefore had a similar contribution to this factor. For the second key factor ('discussion with medical staff' and 'wife's appearance'), the coefficient was positive (0.7 and 0.6). This indicated that the wives were comfortable discussing their sexual problems with medical staff and felt unattractive during her pregnancy. For the husbands, the coefficients were 0.6 and -0.7, respectively. This indicated that the husbands were equally comfortable discussing their sexual problems with medical staff but disagreed with their wife about her appearance in pregnancy. The husbands appreciated their wife's altered appearance during pregnancy. This is in keeping with the literature that about a quarter to a half of the pregnant women felt less attractive than before they conceived[19]. A pregnant

Table 6. Key factors that affect perception of sex during pregnancy among wives and husbands by exploratory analysis*

Factor	Coefficient	Eigenvalue	Variance explained (%)
Pregnant women			
Factor 1: Negative consequence of sexual activity during pregnancy		2.762	46.034
Q17. Sex will lead to preterm labour	0.842		
Q18. Sex will lead to bleeding / hurt pregnancy	0.889		
Q20. Sex will increase the chance of infection	0.779		
Q21. The position may be improper during sex	0.734		
Factor 2: Discussion with medical staff and personal appearance		1.039	17.32
Q16. Feel comfortable to discuss your sexual problem with the medical staff	0.794		
Q19. Feel unattractive during pregnancy	0.629		
Husbands			
Factor 1: Negative consequence of sexual activity during pregnancy		3.234	46.196
Q18. Sex will lead to preterm labour	0.835		
Q19. Sex will lead to bleeding / hurt pregnancy	0.834		
Q21. Sex will increase the chance of infection	0.841		
Q22. The position may be improper during sex	0.735		
Q23. Sexual intercourse / relationship may cause discomfort to your wife	0.729		
Factor 2: Discussion with medical staff and wife's appearance		1.106	15.795
Q17. Feel comfortable to discuss your sexual problem with the medical staff	-0.795		
Q20. Wife is unattractive during pregnancy	0.691		

* For women: value of Kaiser-Meyer-Olkin measure of sampling adequacy: 0.753, Bartlett's test of sphericity: Chi-square statistics 379.73, degrees of freedom 15, $p<0.001$. For husbands: value of Kaiser-Meyer-Olkin measure of sampling adequacy: 0.834, Bartlett's test of sphericity: Chi-square statistics 485.151, degrees of freedom: 21, $p<0.001$

woman's attractiveness as perceived by herself and by her spouse correlates positively with sexual enjoyment[20,21].

In our study, 59% of the wives and 118 (54%) of the husbands wished to obtain more information about sexuality in pregnancy. Both searched for further information regarding sexual activity in pregnancy with similar enthusiasm. The internet was the favoured source of information. Nonetheless, more than half of the couples were ambivalent or believed that the information they obtained was incorrect. If our obstetric service could provide more reading materials on this subject, most couples would prefer it in the form of a pamphlet that is easily accessible and provides anonymity. Workshops and seminars were the least favoured method (about 22%), given the conservative nature of our sample.

Conclusion

The key factor affecting sexual satisfaction was sexual desire, which is affected by interpersonal and intrapersonal factors. The negative perception of women on their appearance during pregnancy was not shared by their husband. Our couples had inadequate knowledge about sexuality during pregnancy. Most felt uncomfortable discussing it with health care providers. A false belief that sexuality may bring harm to the pregnancy needs to be addressed. Accurate information about sexuality can help dispel the myths and reduce anxiety and long-term conflict, as couples experience changes during pregnancy. Couples would welcome a discussion of sexual matters if it were initiated by the health care provider.

Acknowledgments

We would like to acknowledge Ms Grace Kwok, Mr Daniel Chan and Dr Carmen Choi for their helpful comments with the questionnaire. Last but not least, we would like to thank Dr Gladys ST Kwok for her contribution that greatly improved the manuscript.

Declaration

The authors have declared no conflict of interests in this study.

References

1. Haines CJ, Shan YO, Kuen CL, Leung DH, Chung TK, Chin R. Sexual behavior in pregnancy among Hong Kong Chinese women. *J Psychosom Res* 1996; 40:299-304.
2. Fok WY, Chan LY, Yuen PM. Sexual behavior and activity in Chinese pregnant women. *Acta Obstet Gynecol Scand* 2005; 84:934-8.
3. Cheung MW, Wong PW, Liu KY, Yip PS, Fan SY, Lam TH. A study of sexual satisfaction and frequency of sex among Hong Kong Chinese couples. *J Sex Res* 2008; 45:129-39.
4. Ip WY. Childbirth among Hong Kong Chinese. In: Selin H, Stone PK, editors. Childbirth across cultures. *Springer Netherlands*; 2009: 71-6.
5. Liu HL, Hsu P, Chen KH. Sexual activity during pregnancy in Taiwan: A qualitative study. *Sex Med* 2013; 1:54-61.
6. Petersen JL, Hyde JS. A meta-analytic review of research on gender differences in sexuality, 1993-2007. *Psychol Bull* 2010; 136:21-38.
7. Bogren LY. Changes in sexuality in women and men during pregnancy. *Arch Sex Behav* 1991; 20:35-45.
8. White SE, Reamy K. Sexuality and pregnancy: a review. *Arch Sex Behav* 1982; 11:429-44.
9. Curtis JA, Blume LB, Blume TW. Becoming a father: Marital perceptions and behaviors of fathers during pregnancy. *Michigan Fam Rev* 1997; 3:31-44.
10. de Lucena BB, Abdo CH. Personal factors that contribute to or impair women's ability to achieve orgasm. *Int J Impot Res* 2014; 26:177-81.
11. Abdo CH. The male sexual quotient: A brief, self-administered questionnaire to assess male sexual satisfaction. *J Sex Med* 2007; 4:382-9.
12. Smith A, Lyons A, Ferris J, Richters J, Pitts M, Shelley J. Are sexual problems more common in men who have had a vasectomy? A population-based study of Australian men. *J Sex Med* 2010; 7(2pt1):736-42.
13. Abdulcadir J, Botsikas D, Bolmont M, et al. Sexual anatomy and function in women with and without genital mutilation: A cross-sectional Study. *J Sex Med* 2016; 13:226-37.
14. Alder EM. Sexual behaviour in pregnancy, after childbirth and during breast-feeding. *Baillieres Clin Obstet Gynaecol* 1989; 3:805-21.
15. Babazadeh R, Najmabadi KM, Masomi Z. Changes in sexual desire and activity during pregnancy among women in Shahroud, Iran. *Int J Gynaecol Obstet* 2013; 120:82-4.
16. Sayle AE, Savitz DA, Thorp JM Jr, Hertz-Picciotto I, Wilcox AJ. Sexual activity during late pregnancy and risk of preterm delivery. *Obstet Gynecol* 2001; 97:283-9.
17. Klebanoff MA, Nugent RP, Rhoads GG. Coitus during pregnancy: is it safe? *Lancet* 1984; 2(8408):914-7.
18. Kurki T, Ylikorkala O. Coitus during pregnancy is not related to bacterial vaginosis or preterm birth. *Am J Obstet Gynecol* 1993; 169:1130-4.
19. Solberg DA, Butler J, Wagner NN. Sexual behavior in pregnancy. *N Engl J Med* 1973; 288:1098-103.
20. Reamy K, White SE, Daniell WC, Le Vine ES. Sexuality and pregnancy. A prospective study. *J Reprod Med* 1982; 27:321-7.
21. Miller WE, Friedman S. Male and female sexuality during pregnancy: Behavior and attitudes. *J Psychol Hum Sex* 1989; 1:17-37.

Difference in Serum Human Chorionic Gonadotrophin Levels Measured Using the World Health Organization 3rd versus 5th International Standard: A Correlation Study with Reference to Management of Pregnancy of Unknown Location

Kwai-Ying LUI MBBS, MRCOG
Yun-Ting LEE MBChB, MRCOG, FHKCOG, FHKAM(O&G)
Chun-Hong SO MBChB, MRCOG, FHKCOG, FHKAM(O&G)
Department of Obstetrics and Gynaecology, Princess Margaret Hospital, Hong Kong
Ellen LM YU BSc(Stat&Fin), MSc(Epi&Biostat)
Clinical Research Centre, Princess Margaret Hospital, Hong Kong

Objective: To evaluate the difference in serum human chorionic gonadotrophin (hCG) level in pregnant women when using assays calibrated against the World Health Organization (WHO) 3rd versus 5th International Standard (IS), and to determine the implications for management of pregnancy of unknown location (PUL).
Methods: 105 samples of serum hCG obtained from pregnant women were tested using assays calibrated against the WHO 3rd IS versus 5th IS. The clinical course, ultrasound findings, final diagnosis, and clinical outcome were evaluated. The optimal cut-off value of 'discriminatory zone' for management of PUL was determined using receiver operating characteristic curve analysis.
Results: Both WHO 3rd IS and 5th IS were highly correlated (Pearson's r=0.996, r^2=0.992) but not equivalent. The mean percentage difference was 12.9%. 34 paired samples were included in a diagnostic-validation study, and the cut-off value of 'discriminatory zone' was 1500 IU/L for the 3rd IS (sensitivity=50.0%, specificity=87.5%, area under curve=77.9%) and 1745 IU/L for the 5th IS (sensitivity=60.0%, specificity=87.5%, area under curve=79.2%).
Conclusion: Calibration of serum hCG using the WHO 3rd IS and 5th IS was highly correlated but not equivalent. A larger prospective study is required before recommendations can be made with regard to the cut-off value of a new 'discriminatory zone'.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):45-9

Keywords: Chorionic gonadotropin; Humans; Pregnancy; World Health Organization

Introduction

Serum human chorionic gonadotrophin (hCG) level and transvaginal ultrasonography are important diagnostic tools for ectopic pregnancy. Pregnancy of unknown location (PUL) is diagnosed when neither an intra-uterine pregnancy nor an extra-uterine pregnancy can be visualized on ultrasonography. Using transvaginal ultrasonography, an ectopic pregnancy is suspected if an intra-uterine pregnancy cannot be visualised when the hCG level is between 1500 and 2000 IU/L, which is defined as the 'discriminatory zone'[1,2]. In these studies, the hCG assays were calibrated against the World Health Organization (WHO) 3rd International Standard (IS).

In 1986, the 3rd IS for hCG (coded as 75/537) was established by the WHO Expert Committee on Biological Standardization[3]. In 1999, the 4th IS for chorionic gonadotrophin (coded as 75/589), calibrated by the same procedure, was established[4]. Both standards were purified from urine but contained small amounts of the nicked and ß-subunit forms of hCG. In 2009, WHO introduced the 5th IS for hCG (coded 07/364)[5]. This new preparation has been highly purified from urine to remove contaminating forms of hCG, particularly the nicked and free ß-subunit that was present in the old assays. This study aimed to evaluate the correlation between the 3rd IS and the 5th IS, and determine the implications for management of PUL.

Methods

This was a diagnostic correlation and validation

Correspondence to: Dr Kwai-Ying Lui
Email: lky690@ha.org.hk, linda821@gmail.com

study carried out at Princess Margaret Hospital and Kwong Wah Hospital in Hong Kong. All urgent blood samples for serum hCG were sent to the Clinical Pathology Laboratory of Princess Margaret Hospital for analysis. All pregnant patients with serum hCG taken between 5 October 2015 and 17 October 2015 were included. They were identified through the Princess Margaret Hospital Chemical Pathology Laboratory Database. Ethics approval was obtained from the Kowloon West Cluster Research Ethics Committee of the Hospital Authority of Hong Kong in April 2016.

Each blood sample was analysed using both the WHO 3rd IS (Beckman Coulter access total βHCG) and the 5th IS (Beckman Coulter access total βhCG 5th IS assay). The individual clinical records were reviewed. The clinical course, ultrasonographic findings, final diagnosis, and clinical outcome were evaluated.

Samples unrelated to management of PUL were excluded: (1) serum hCG level of <5 IU/L (indicating no pregnancy), (2) serum hCG level of >10,000 IU/L in either assay (the management of PUL was unlikely to be altered even when there was a discrepancy between the two assays), and (3) serum hCG taken for other purposes, for example, as a tumour marker in gestational trophoblastic neoplasm.

Samples taken at the time the diagnosis of PUL was made were included in the diagnosis-validation study to evaluate the impact of any change to the 'discriminatory zone'. The clinical course, serial level of serum hCG, and ultrasonographic findings were reviewed until a final diagnosis was established: ectopic pregnancy, intra-uterine pregnancy, or miscarriage.

Statistical Analysis

Pearson's correlation between WHO 3rd IS and 5th IS of hCG was calculated. The Bland-Altman plot was used to evaluate the agreement and interchangeability between the two International Standards. The Passing-Bablok regression was used to estimate the analytical agreement and observe any systematic or proportional difference between the two assays. The confidence intervals (CI) were calculated with the bootstrap (quantile) method.

Receiver operating characteristic curve analysis was performed to define the optimal value of the new 'discriminatory zone' by maximising the weighted Youden's index with cost of 1 and sample prevalence[6]. The area under the curve (AUC), sensitivity, specificity, accuracy, positive and negative predictive values were evaluated. All statistical analysis was performed using Microsoft Excel and R version 3.1.2 with 'mcr' (method comparison regression)[7], 'pROC'[8], and 'epiR' packages[9].

Results

Among 132 paired samples retrieved, 105 were included in the correlation study. 23 pairs of samples were excluded as the serum hCG was normal (<5 IU/L), and three pairs were excluded as the serum hCG exceeded 10,000 IU/L. One pair of sample was used as a tumour marker and thus excluded (Figure 1).

The correlation between the 3rd IS and the 5th IS in the calibration of serum hCG was high (Pearson's r=0.996, r^2=0.992). In the Bland-Altman plot (Figure 2), serum hCG values calibrated by the 5th IS were on average 12.9% higher (95% CI=10.6-15.2%) than those calibrated

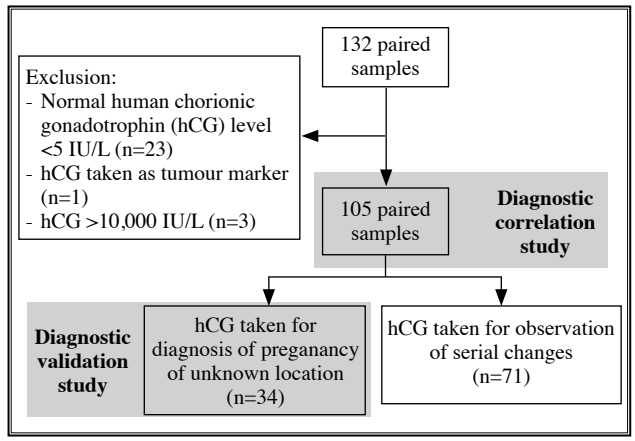


Figure 1. Study flowchart

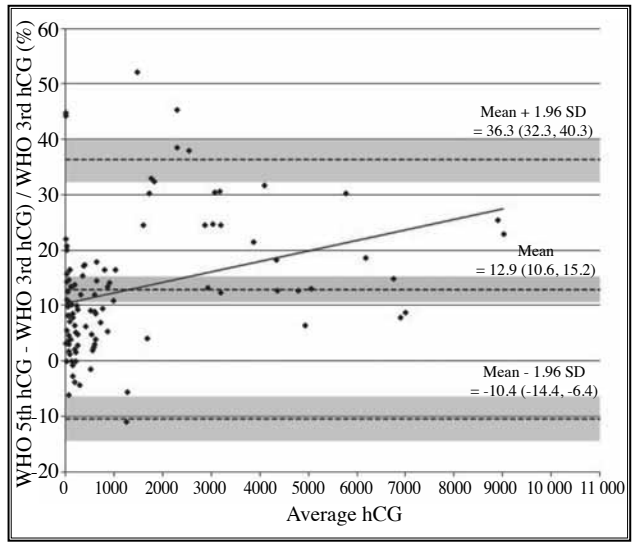


Figure 2. Bland-Altman plot

by the 3rd IS, with 93.3% of the sample differences lying between the limits of agreement (± 1.96). The lower limit of agreement was -10.4% (95% CI= -14.4 to -6.4%), and the upper limit of agreement was 36.3% (95% CI=32.3-40.3%).

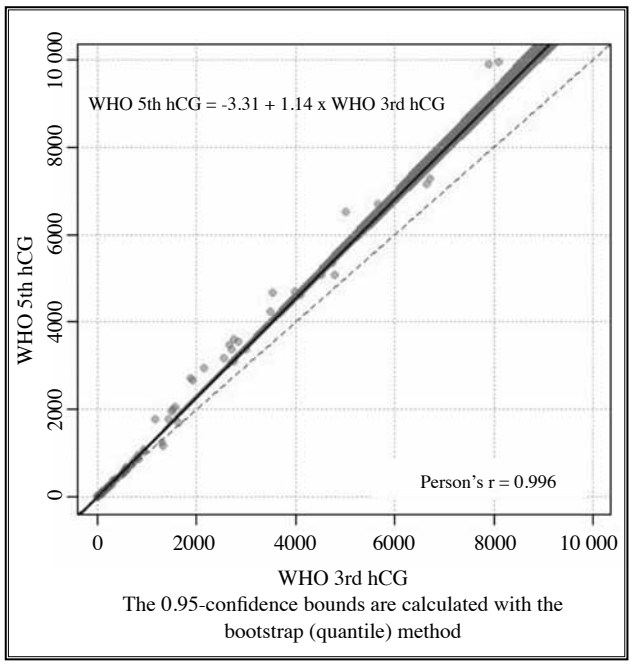


Figure 3. Passing-Bablok regression

In the Passing-Bablok regression (Figure 3), the slope was 1.14 (95% CI=1.12-1.18), and the intercept was -3.31 (95% CI= -8.44 to -0.87). There was a systematic difference and proportional difference between the two groups; the 3rd IS and 5th IS were not equivalent.

Defining the New 'Discriminatory Zone'

Among all the paired samples, 34 paired samples of serum hCG were taken when the diagnosis of PUL was made. Of these, the final diagnosis was ectopic pregnancy in 10, intra-uterine pregnancy in 9, and miscarriage in 15.

The cut-off values of the 'discriminatory zone' based on WHO 3rd and 5th IS assays were 1500 IU/L (sensitivity=50.0%, specificity=87.5%, AUC=77.9%) and 1745 IU/L (sensitivity=60.0%, specificity=87.5%, AUC=79.2%), respectively (Figure 4 and Table 1). Nonetheless, the number of samples was too small to make any recommendation for a change in the cut-off value of 'discriminatory zone'.

Discussion

In our study, serum hCG calibrated using the WHO 3rd IS and 5th IS were highly correlated (Pearson's r=0.996) but not equivalent. The mean percentage difference was 12.9% (95% CI=10.6-15.2%). The cut-off values of the 'discriminatory zone' were 1500 and 1745 IU/L for WHO 3rd and 5th IS, respectively.

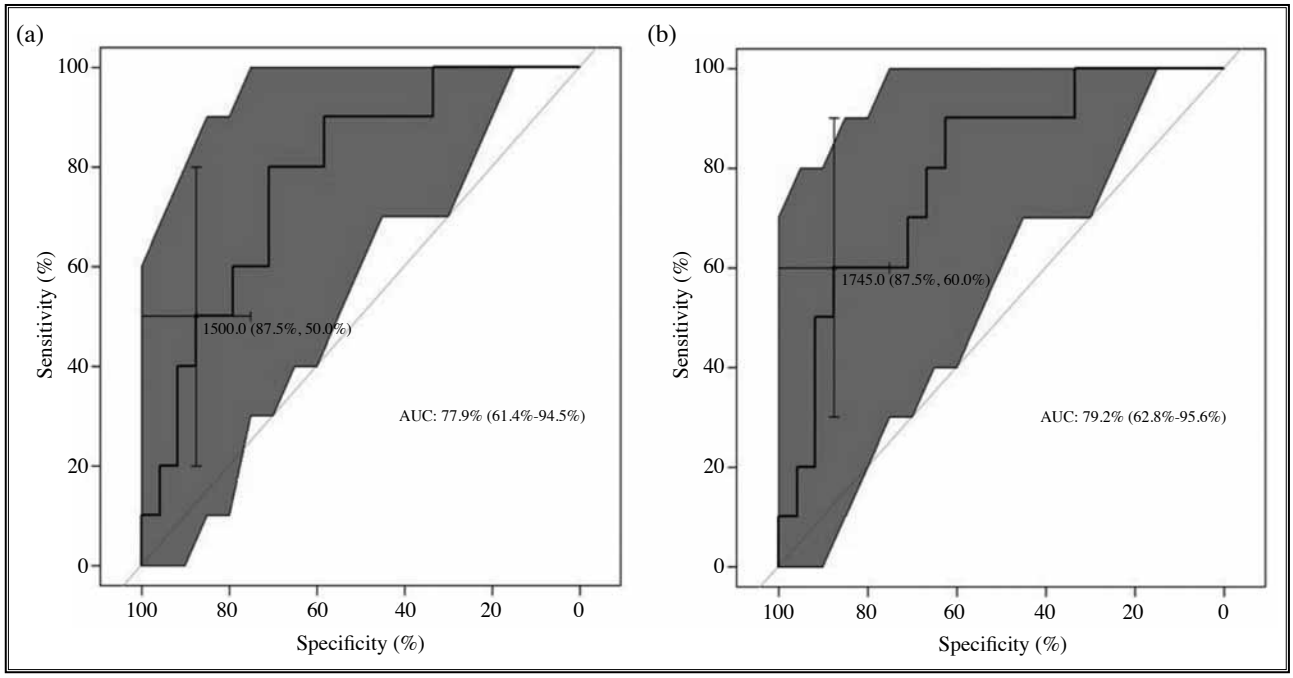


Figure 4. Receiver operating characteristic curve analysis for 'discriminatory zone' using the World Health Organization (a) 3rd and (b) 5th International Standard

Table 1. Receiver operating characteristic curve analysis

Characteristic	World Health Organization International Standard for serum human chorionic gonadotrophin	
	3rd	5th
Cut-off (IU/L)	1500	1745
Area under the curve (%)	77.92 (61.36-94.48)	79.17 (62.77-95.56)
Sensitivity (%)	50.00 (18.71-81.29)	60.00 (26.24-87.84)
Specificity (%)	87.50 (67.64-97.34)	87.50 (67.64-97.34)
Accuracy (%)	76.47 (58.83-89.25)	79.41 (62.10-91.30)
Positive predictive value (%)	62.50 (24.49-91.48)	66.67 (29.93-92.51)
Negative predictive value (%)	80.77 (60.65-93.45)	84.00 (63.92-95.46)

Table 2. Different analytical platforms used by different hospitals in the Hospital Authority

Hospital	Analytical platform	Calibration traceability
Kwong Wah Hospital	Beckman-Coulter	WHO 5th IS
Pamela Youde Nethersole Eastern Hospital	Abbott	WHO 4th IS
Prince of Wales Hospital	Roche	WHO 4th IS
Princess Margaret Hospital	Beckman-Coulter	WHO 5th IS
Queen Elizabeth Hospital	Abbott	WHO 4th IS
Queen Mary Hospital	Siemens	WHO 3th IS
Tseung Kwan O Hospital	Beckman-Coulter	WHO 5th IS
Tuen Mun Hospital	Abbott	WHO 4th IS
United Christian Hospital	Roche	WHO 4th IS

Abbreviations: IS = International Standard; WHO = World Health Organization

In Hong Kong, different hospitals use different assays and different analytical platforms for calibration of serum hCG (Table 2). Most laboratories will have to change to the new WHO 5th IS. Our study is the first in Hong Kong to evaluate the difference between the old and new assays.

Before the WHO 3rd IS was exhausted in October 2015, at Princess Margaret Hospital, the Department of Pathology and the Department of Obstetrics and Gynaecology collaborated to perform a parallel run of blood samples using the old and new assay. The transition period was short due to the short notice from the vendor, but the small number of paired samples were invaluable to compare the difference between the two assays.

To study the change of the 'discriminatory zone' for PUL, weighted Youden's index[6] was used to determine the appropriate cut-off for which sensitivity and specificity were maximised, taking cost and prevalence into account. If we aimed at a specificity of 0.875, precision of 0.1, and the confidence level at 95% (i.e. α=0.05), then 60 samples were required to identify significant difference. Nonetheless, only 34 paired samples were included. The sample size was too small to make any recommendation for a new cut-off value of 'discriminatory zone' or change in clinical management. Nevertheless, our findings confirmed the differences between different assay standards in clinical use. To study the clinical correlation of the new WHO 5th IS assay, a larger prospective study is required.

The difference between new and old assays may potentially have different implications in different clinical scenarios. In a study to determine the suitability of the WHO 5th IS in Down's syndrome screening, a proportional increase of 33% in serum hCG levels was reported using the new assay, compared with the old assay[10]. There was no difference in the overall detection rate of Down's

syndrome screening, because the risk calculation was by multiples of the median of serum hCG. Nonetheless, in the management of PUL, the absolute value of serum hCG is used, and clinicians should be aware of the difference.

Our study focused on the management of PUL, and only samples with serum hCG between 5 and 10,000 IU/L were included. Ideally in a correlation study, the two extremities of serum hCG should also be evaluated. There was a possibility that serum hCG may have a larger bias if the level is higher. We suggest that the new assay should be further evaluated in other clinical conditions, for instance in gestational trophoblastic neoplasm where the serum hCG can be up to 10,000 or 100,000.

Clinical users should be aware of the different analytical platforms used by different hospitals, and the results of serum hCG should not be directly compared among different hospitals.

Conclusion

Serum hCG using WHO 3rd IS and 5th IS was highly correlated, but not equivalent. Based on our limited paired samples, the cut-off values of 'discriminatory zone' for management of PUL using 3rd IS and 5th IS were 1500 and 1745 IU/L, respectively. Further prospective studies are required to determine the appropriate 'discriminatory zone' when using the new WHO 5th IS.

Acknowledgement

We would like to thank Dr Winnie Hui, Department of Obstetrics and Gynaecology, Kwong Wah Hospital, for her liaison and help. We would also like to thank Mr Daniel Leung, Dr Calvin Chong and Dr Hencher Lee, Department of Pathology, Princess Margaret Hospital, for their expert opinion.

Declaration

The authors have declared no conflicts of interest in this study.

References

1. Condous G, Kirk E, Lu C, Van Huffel S, et al. Diagnostic accuracy of varying discriminatory zones for the prediction of ectopic pregnancy in women with a pregnancy of unknown location. *Ultrasound Obstet Gynecol* 2005; 26:770-5.
2. Mol BW, Hajenius PJ, Engelsbel S, et al. Serum human chorionic gonadotropin measurement in the diagnosis of ectopic pregnancy when transvaginal sonography is inconclusive. *Fertil Steril* 1998; 70:972-81.
3. Guidelines for the preparation and establishment of international standards and reference reagents for biological substances. *Geneva, World Health Organization*; 1986.
4. WHO Technical Report Series No. 889: WHO Expert Committee on Biological Standardization: Forty-eighth report. *Geneva, World Health Organization*; 1999.
5. Burns C, Moore M, Sturgeon C, Hockley J, Rigsby P. WHO international collaborative study of the proposed 5th international standard for chorionic gonadotrophin. *Geneva: World Health Organization*; 2009.
6. Youden WJ. Index for rating diagnostic tests. *Cancer* 1950; 3:32-5.
7. Manuilova E, Schuetzenmeister A, Model F. mcr: method comparison regression, version 1.2.1; 2015.
8. Robin X, Turck N, Hainard A, et al. pROC: an open-source package for R and S+ to analyze and compare ROC curves. *BMC Bioinformatics* 2011; 12:77.
9. Stevenson M, Nunes T, Sanchez J, et al. epiR: Tools for the analysis of epidemiological data (R package version 0.9-69); 2012.
10. Palomaki GE, Lambert-Messerlian G. Down syndrome screening: suitability of a WHO 5 standardized total hCG assay. *Clin Biochem* 2014; 47:629-31.

Vaginal Ring Pessary Inserted by a Nurse for Pelvic Organ Prolapse in Chinese Women: A Prospective Study

Anny Wai-Mei TONG RN, RM, BcN, MHSM
Willy Cecilia CHEON MBChB, MRCOG, FHKAM(O&G)
Ka-Pui CHAN RN, RM, BSN
Department of Obstetrics and Gynaecology, Queen Elizabeth Hospital, Hong Kong

Objective: This study examined the efficacy and outcome of insertion of a vaginal ring pessary by a nurse in women with pelvic organ prolapse.
Methods: 96 women were prospectively recruited. Their demographics, urinary symptoms, and bowel function were evaluated. Grading of pelvic organ prolapse (using the Pelvic Organ Prolapse Quantification System), visual analogue scale on prolapse symptoms and voiding difficulty, validated pelvic floor distress inventory, pelvic floor impact questionnaire, patient decision on continuation of ring pessary use and satisfaction were recorded on the first visit and at three-month follow-up.
Results: The mean age of patients was 66.4 years. 78 (79.6%) of women were satisfied with the ring pessary; 15 (15.6%) discontinued ring pessary use. All urinary symptoms (urgency, urge incontinence, and voiding dysfunction) except for stress incontinence improved significantly. Quality of life also improved significantly.
Conclusion: Nurses can play an active role in conservative management for women with symptomatic pelvic organ prolapse.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):50-5

Keywords: Nursing staff, hospital/education; Pelvic organ prolapse; Pessaries

Introduction

Pelvic organ prolapse (POP) is defined as the descent of one or more of the following: anterior vaginal wall, posterior vaginal wall, and apex of vagina (cervix/uterus) or vault (cuff) following hysterectomy. Absence of prolapse is defined as stage 0, and prolapse as stages I to IV[1,2]. POP is common in women; its prevalence is 41.1% in the US[3] and 19.7% (range, 3.4-56.4%) in developing countries[4]. Women with POP usually also have urinary, bowel, or sexual symptoms, leading to distress and impaired quality of life[5,6].

Vaginal pessaries have been used to manage POP[7-10]. More than 86% of gynaecologists and 98% of urogynaecologists use pessaries daily for their patients[7,11]. Nurses can make a valuable contribution in the use of vaginal pessaries for POP and stress urinary incontinence[8,10].

According to the integral theory for irritative urinary symptoms (such as urgency, frequency and urge incontinence) in women, mechanical disturbance to the pelvic floor, particularly the pubo-urethral ligament, contributes to the irritative symptoms[12]. Thus, correction of the pelvic floor defect by either a ring pessary or surgery should be also curative of irritative symptoms[12].

This study aimed to review the efficacy and outcome of vaginal ring pessary inserted by a nurse, and the associated irritative urinary symptom improvement in women with POP.

Methods

All newly referred Chinese women without prior urogynaecological assessment who complained of symptomatic POP were recruited in a gynaecology nurse clinic (continence). Women who refused or were unable to give written consent, had cognitive impairment, pelvic inflammatory disease or were contraindicated to ring pessary insertion, for example suspected vaginal cancer, were excluded and referred to urogynaecologists. Eligible women were examined by vaginal speculum and digital examination to ensure that no abnormalities were detected. The ring pessary was inserted by one of two nurses who understood the assessment skill of the Pelvic Organ

Correspondence to: Ms Anny Wai-Mei Tong
Email: atongwm@yahoo.com.hk

Prolapse Quantification System (POPQ), the indications for pessary use, the skills to safely fit, insert, and remove a pessary, and the complications associated with POP.

Data on demographics, urinary symptoms (urgency, stress urinary incontinence, urge urinary incontinence, and voiding difficulty), and bowel function (any constipation or incontinence) were collected. POP was graded using the POPQ as described by the International Continence Society[5]. Visual analogue scale (VAS) on prolapse and urinary difficulty, incontinence impact questionnaire-7 (IIQ7), and validated Chinese version of pelvic floor distress inventory (PFDI) and pelvic floor impact questionnaire (PFIQ)[13] were used to assess the type and severity of symptoms and the impact of different types of pelvic floor disorders on the woman's activities and wellbeing. PFDI comprises Urinary Distress Inventory (UDI), Pelvic Organ Prolapse Distress Inventory (POPDI), and Colorectal-Anal Distress Inventory (CRADI), whereas PFIQ comprises Urinary Impact Questionnaire (UIQ), Pelvic Organ Prolapse Impact Questionnaire (POPIQ), and Colorectal-Anal Impact Questionnaire (CRAIQ).

Ring pessary was the first-line conservative management. Data were collected at the first visit and then three-month follow-up. The women's decision on whether to continue ring pessary and her satisfaction were recorded at three-month follow-up. If the ring pessary had dislodged, a different size ring pessary was inserted after assessment.

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS Windows version 13). The McNemar test was used to analyse any change in urinary and bowel symptoms from baseline to three months after pessary insertion. Student's *t* test was used to analyse the mean difference in scores of VAS, IIQ7, PFDI, and PFIQ. The study was approved by the Research Ethics Committee under KCC/KEC and compliant with International Conference on Harmonisation Good Clinical Practice guidelines.

Results

Of 100 women recruited, three could not be contacted and one underwent surgery in the private sector. For the remaining 96 women, the mean age was 66.4 ± 9.4 (range, 41-84) years, and the mean number of vaginal deliveries was 2.9 ± 1.4 (range, 0-9). The mean weight of heaviest babies delivered was 3.3 ± 0.7 (range, 0-5) kg. 90 (93.8%) of women were post-menopausal and 10 (10.4%) had undergone hysterectomy (Table 1). According to the POPQ staging, 7.3%, 76%, and 16.7% of women had stage I, stage II, and stage III / IV POP, respectively (Table 2).

Almost all urinary symptoms and bowel symptoms improved significantly after three months of ring pessary ($p=0.022$ to $p<0.001$), except for stress urinary incontinence ($p=1$) and urgency ($p=0.064$). VAS scores for prolapse symptoms and voiding difficulty also improved significantly ($p<0.001$) [Table 3].

In PFDI, prior to ring pessary, distress was greater in prolapse symptoms than in urinary symptoms or colorectal-anal symptoms (POPDI: 69.3 ± 52.7 vs. UDI: 53.3 ± 41.1 vs. CRADI: 38.6 ± 43.67). After three months, the distress associated with prolapse symptoms remained higher than other symptoms (POPDI: 24.8 ± 34.8 vs. UDI: 22.4 ± 26.2

Table 1. Demographic and clinical characteristics (n=96)*

Characteristics	Data
Age (years)	66.4 ± 9.4 (41-84)
Vaginal delivery	2.9 ± 1.4 (0-9)
Heaviest baby delivered (kg)	3.3 ± 0.7 (0-5)
Menopause	90 (93.8)
Hysterectomy done	10 (10.4)

* Data are shown as mean ± standard deviation (range) or No. (%) of subjects

Table 2. Staging of prolapse according to Pelvic Organ Prolapse Quantification System*

	Stage 0	Stage I	Stage II	Stage III / IV
Anterior compartment prolapse	-	5 (5.2)	75 (78.1)	16 (16.7)
Middle compartment prolapse	2 (2.1)	48 (50)	33 (34.4)	13 (13.5)
Posterior compartment prolapse	43 (44.8)	27 (28.1)	22 (22.9)	4 (4.2)
Overall	-	7 (7.3)	73 (76)	16 (16.7)

* Data are shown as No. (%) of subjects

Table 3. Subjective assessment of urinary symptoms, bowel symptoms, and prolapse before and after ring pessary (n=96)

	Before insertion*	Three months after insertion*	p Value
Stress urinary incontinence	37 (38.5)	36 (37.5)	1.0
Urgency	73 (76)	24 (25)	0.064
Urge urinary incontinence	33 (34.4)	25 (25)	<0.001
Voiding difficulty	61 (63.5)	7 (7.3)	<0.001
Constipation	11 (11.5)	2 (2.1)	0.004
Faecal incontinence	15 (15.6)	6 (6.3)	0.022
Visual analogue scale on prolapse	6.5 ± 2.4	2.4 ± 2.7	<0.001
Visual analogue scale on voiding difficulty	4.5 ± 3.1	1.9 ± 2.3	<0.001

* Data are shown as No. (%) of subjects or mean ± standard deviation

vs. CRADI: 15.3 ± 24.9), although all symptoms improved significantly (p≤0.001, Table 4).

For the UDI domain, obstructive subscale score was higher than the irritative and stress subscale scores before and after ring pessary; all subscale scores improved significantly after three months (p≤0.001). For the POPDI domain, the general subscale score was highest and the posterior subscale score was lowest before ring pessary. After three months, the general subscale score remained highest but the posterior subscale score was higher than the anterior subscale score; all subscale scores improved significantly (p≤0.001). For the CRADI domains, obstructive subscale score was the highest, followed by incontinence, pain, and rectal subscale scores both before and after ring pessary; all subscale scores improved significantly after three months (p≤0.001).

In PFIQ, prior to ring pessary, prolapse symptoms had a greater impact on quality of life than urinary symptoms and colorectal-anal symptoms (POPIQ: 60.1 ± 81.8 vs. UIQ: 44.9 ± 74.4 vs. CRAIQ: 19.6 ± 63.7). After three months, urinary symptoms had a greater impact on quality of life than prolapse symptoms and colorectal-anal symptoms (UIQ: 22.8 ± 47.7 vs. POPIQ: 15.4 ± 37.0 vs. CRAIQ: 3.0 ± 14.4). All domains improved significantly after three months (p=0.007 to p≤0.001).

For the UIQ domains, physical activity subscale score was highest, followed by emotion, travel, and social subscale scores before ring pessary. After three months, physical activity subscale score remained highest, followed by travel, emotion, and social subscales; all subscales improved significantly (p=0.001 to p≤0.001). In the POPIQ domains, physical activity subscale score was the highest, followed by emotion, travel, and social subscale scores before ring pessary. After three months, physical activity subscale score remained highest, followed by travel, emotion, and social subscale scores. All subscale scores improved significantly (all p≤0.001). In the CRAIQ domains, travel subscale score was highest, followed by physical, emotion, and social subscale scores before ring pessary. After three months, travel subscale score remained highest, followed by physical, social, and emotion subscale scores. All subscale scores improved significantly (p=0.024 to p=0.011).

15 (15.6%) women discontinued with the use of ring pessary owing to increased urinary incontinence (n=1, 6.7%), dislodgement (n=7, 46.7%), or self-removal of the ring pessary because of stretching discomfort (n=7, 46.7%). No woman encountered vaginal ulceration, voiding or defecation difficulty. The mean size of ring pessary used was 64.43 ± 5.5 mm; two women change to a double-ring pessary following reassessment. Overall, 78 (79.6%) women were satisfied with vaginal ring pessary treatment; 28 (29.2%) opted for surgery despite being satisfied.

Discussion

In this study, 81 (84.4%) of women were successfully fitted with a ring pessary and opted to continue its use after three months. The success rate is similar to that reported in other studies (64 to 85%)[14-16]. 78 (79.6%) of women were satisfied with the ring pessary; the satisfaction rate is also similar to that reported in other studies (70 to 93%)[15,17,18]. The reasons for discontinuation of ring pessary use have been

Table 4. Pelvic Floor Distress Inventory (PFDI) and Pelvic Floor Impact Questionnaire (PFIQ) scoring before and after ring pessary

Outcome measure	Before insertion*	Three months after insertion*	p Value
PFDI†			
UDI total	53.3 ± 41.1	22.4 ± 26.2	<0.001
UDI obstructive	23.2 ± 16.9	7.7 ± 10.6	<0.001
UDI irritative	17.8 ± 15.6	7.5 ± 9.9	<0.001
UDI stress	12.3 ± 14.3	7.1 ± 9.5	<0.001
POPDI total	69.3 ± 52.7	24.8 ± 34.8	<0.001
POPDI general	30.5 ± 19.2	10.9 ± 14.1	<0.001
POPDI anterior	20.7 ± 20.2	6.4 ± 11.0	<0.001
POPDI posterior	18.1 ± 20.6	7.6 ± 13.6	<0.001
CRADI total	38.6 ± 43.67	15.3 ± 24.9	<0.001
CRADI obstructive	18.1 ± 20.5	7.56 ± 13.6	<0.001
CRADI incontinence	8.4 ± 12.7	4.1 ± 8.0	<0.001
CRADI pain	7.3 ± 11.0	2.9 ± 6.2	<0.001
CRADI rectal	4.8 ± 13.0	0.8 ± 4.4	0.001
PFIQ‡			
UIQ total	44.9 ± 74.4	22.8 ± 47.7	0.001
UIQ travel	12.4 ± 21.6	6.8 ± 15.1	0.001
UIQ social	7.4 ± 14.9	3.4 ± 9.2	0.002
UIQ emotion	12.5 ± 20.7	4.6 ± 11.3	<0.001
UIQ physical	44.5 ± 73.7	7.1 ± 15.5	<0.001
POPIQ total	60.1 ± 81.8	15.4 ± 37.0	<0.001
POPIQ travel	16.1 ± 24.2	4.7 ± 14.5	<0.001
POPIQ social	7.8 ± 16.4	2.1 ± 7.4	<0.001
POPIQ emotion	16.2 ± 23.2	3.2 ± 9.0	<0.001
POPIQ physical	20.0 ± 26.1	5.4 ± 13.1	<0.001
CRAIQ total	19.6 ± 63.7	3.0 ± 14.4	0.007
CRAIQ travel	6.3 ± 19.2	1.1 ± 6.0	0.024
CRAIQ social	3.6 ± 13.1	0.6 ± 3.0	0.014
CRAIQ emotion	4.2 ± 14.8	0.4 ± 2.2	0.015
CRAIQ physical	5.6 ± 18.7	0.9 ± 5.3	0.011

* Data are shown as mean ± standard deviation

† PFDI comprises Urinary Distress Inventory (UDI), Pelvic Organ Prolapse Distress Inventory (POPDI), and Colorectal-Anal Distress Inventory (CRADI); a higher PFDI subscale score indicates more bothersome symptoms

‡ PFIQ comprises Urinary Impact Questionnaire (UIQ), Pelvic Organ Prolapse Impact Questionnaire (POPIQ), and Colorectal-Anal Impact Questionnaire (CRAIQ); a higher PFIQ subscale score indicates poorer quality of life

reported to be dislodgement (45%) and discomfort (35%)[15]. Non-surgical treatment is popular initial management, especially for older women and those with less severe anatomic prolapse[13,19]. Nonetheless, the median duration of vaginal pessary use is usually about seven years[20]. In our study, 29.2% of women opted for surgery after three months, some preferred a more definitive treatment, some had more urinary incontinence after ring pessary, and some felt uncomfortable with the increase in vaginal discharge.

Urinary symptoms (urge urinary incontinence and voiding difficulty) improved significantly after ring pessary. This could be due to rectification of pelvic floor defect that corrected the secondary urge urinary incontinence related

to pelvic organ prolapse, that in turn also corrected the associated anatomical distortion of the urethra that resulted in voiding difficulties[12,21]. The overall improvement in voiding difficulty was significant and comparable with other studies[17,21], although improvement in urgency was not significant. For stress urinary incontinence, occult stress incontinence may worsen, as the ring pessary actually supports the prolapsed vagina[13,17]. Nonetheless, the incidence of stress incontinence was not increased probably due to the relatively small sample size. For bowel symptoms, both constipation and faecal incontinence improved significantly due to anatomical correction in the posterior compartment, consistent with other study[19].

Regarding distress symptoms in the POPDI domain, before ring pessary, the anterior subscale score was higher than the posterior subscale score, as most women had stage II POP and more had anterior compartment prolapse. After ring pessary, the posterior subscale score was higher than the anterior subscale score, probably because the ring pessary could correct anterior compartment prolapse better than posterior compartment prolapse.

Regarding quality of life, before ring pessary, the POPIQ score was higher than UIQ and CRAIQ scores, as women regarded prolapse symptoms more bothersome than urinary symptoms. After ring pessary, UIQ score became higher than POPIQ and CRAIQ scores, as urinary incontinence could become dominant after correcting the prolapse. The disturbance from increasing urinary incontinence was also reflected in the travel subscale in UIQ, POPIQ, and CRAIQ. All scores in travel subscales were higher than those in social, emotion, and physical subscales after ring pessary insertion.

In this cohort, two women changed to a double ring pessary following reassessment as prolapse persisted. Use of a double ring pessary has been described in women with advanced prolapse who are unsuitable for surgical correction or in whom a single ring pessary has failed[22,23].

Self-management of ring pessary usage, including regular removal and replacement, is common in other countries[8,10,16]. It serves a hygienic purpose, allows for more convenient sexual activity, and prevents complications such as ulcer formation. Nonetheless, it depends on the willingness of the individual woman and the time required by health care professionals to teach the technique.

Conclusion

Nurses can play an active role in conservative management for women with symptomatic POP. They can teach such women self-management of a ring pessary to improve the quality of life. Longer-term efficacy of the ring pessary under the care of a nurse or the woman should be investigated in future studies.

Declaration

The authors have declared no conflict of interests in this study.

References

1. Chapple CR, Milsom I. Urinary incontinence and pelvic prolapse: epidemiology and pathophysiology. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA, editors. *Campbell-Walsh Urology*. 10th ed. Philadelphia: Saunders; 2011:1894-5.
2. Bump RC, Mattiasson A, Bø K, et al. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol* 1996; 175:10-7.
3. Sung VW, Hampton BS. Epidemiology of pelvic floor dysfunction. *Obstet Gynecol Clin North Am* 2009; 36:421-43.
4. Walker GJ, Gunasekera P. Pelvic organ prolapse and incontinence in developing countries: review of prevalence and risk factors. *Int Urogynecol J* 2011; 22:127-35.
5. Burrows LJ, Meyn LA, Walters MD, Weber AM. Pelvic symptoms in women with pelvic organ prolapse. *Obstet Gynecol* 2004; 104:982-8.
6. Rortveit G, Brown JS, Thom DH, Van Den Eeden SK, Creasman JM, Subak LL. Symptomatic pelvic organ prolapse: prevalence and risk factors in a population-based, racially diverse cohort. *Obstet Gynecol* 2007; 109:1396-403.
7. Atnip S, O'Dell K. Vaginal support pessaries: indications for use and fitting strategies. *Urol Nurs* 2012; 32:114-24.
8. Atnip SD. Pessary use and management for pelvic organ prolapse. *Obstet Gynecol Clin North Am* 2009; 36:541-63.
9. Bash KL. Review of vaginal pessaries. *Obstet Gynecol Surv* 2000; 55:455-60.
10. McIntosh L. The role of the nurse in the use of vaginal pessaries to treat pelvic organ prolapse and/or urinary incontinence: a literature review. *Urol Nurs* 2005; 25:41-8.
11. Cundiff GW, Weidner AC, Visco AG, Bump RC, Addison WA. A survey of pessary use by members of the American urogynecologic society. *Obstet Gynecol* 2000; 95(6 Pt 1):931-5.

12. Petros PE, Richardson P. OAB can be modulated by external musculo-elastic forces. *Neurourol Urodyn* 2011; 30:628-9.
13. Chan SS, Cheung RY, Yiu AK, et al. Chinese validation of Pelvic Floor Distress Inventory and Pelvic Floor Impact Questionnaire. *Int Urogynecol J* 2011; 22:1305-12.
14. Maito JM, Quam ZA, Craig E, Danner KA, Rogers RG. Predictors of successful pessary fitting and continued use in a nurse-midwifery pessary clinic. *J Midwifery Womens Health* 2006; 51:78-84.
15. Cheung ML, Lau NT, Ng TK. Use of vaginal pessary for pelvic organ prolapse in Chinese women. *HKJGOM* 2011; 11:40-8.
16. Hanson LA, Schulz JA, Flood CG, Cooley B, Tam F. Vaginal pessaries in managing women with pelvic organ prolapse and urinary incontinence: patient characteristics and factors contributing to success. *Int Urogynecol J Pelvic Floor Dysfunct* 2006; 17:155-9.
17. Clemons JL, Aguilar VC, Tillinghast TA, Jackson ND, Myers DL. Patient satisfaction and changes in prolapse and urinary symptoms in women who were successfully fitted with a pessary for pelvic organ prolapse. *Am J Obstet Gynecol* 2004; 190:1025-9.
18. Sitavarin S, Wattanayingcharoenchai R, Manonai J, Sarit-apirak S, Chittacharoen A. The characteristics and satisfaction of the patients using vaginal pessaries. *J Med Assoc Thai* 2009; 92:744-7.
19. Abdool Z, Thakar R, Sultan AH, Oliver RS. Prospective evaluation of outcome of vaginal pessaries versus surgery in women with symptomatic pelvic organ prolapse. *Int Urogynecol J* 2011; 22:273-8.
20. Sarma S, Ying T, Moore KH. Long-term vaginal ring pessary use: discontinuation rates and adverse events. *BJOG* 2009; 116:1715-21.
21. Romanzi LJ, Chaikin DC, Blaivas JG. The effect of genital prolapse on voiding. *J Urol* 1999; 161:581-6.
22. Singh K, Reid WM. Non-surgical treatment of uterovaginal prolapse using double vaginal rings. *BJOG* 2001; 108:112-3.
23. Myers DL, LaSala CA, Murphy JA. Double pessary use in grade 4 uterine and vaginal prolapse. *Obstet Gynecol* 1998; 91:1019-20.

Female Sexual Dysfunction — How Can Gynaecologists Help?

Sue ST LO MBBS, MD, FRCOG, PDipCommPsyMed
The Family Planning Association of Hong Kong, Hong Kong

Sexual dysfunction in women is common; gynaecologists are appropriate to provide initial management. Screening questions for sexual well-being should be included as a standard of practice to encourage women to initiate the discussion. A comprehensive sexual history and thorough examination is needed when evaluating a patient for sexual dysfunction. Psychometric tools can be used in special circumstances. Providing simple advice and information on intercourse position, anatomy, human physiology and human sexual response is adequate in managing most sexual complaints. Women with more complex conditions such as underlying psychosocial problems and a history of sexual trauma or marital problem should be referred for counselling and sex therapy.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):56-61

Keywords: Female; Gynecology; Sexual dysfunctions, psychological

Introduction

Sex is a basic human instinct and a good sex life contributes to the physical and emotional wellbeing of men and women. The breakthroughs in the treatment of male sexual dysfunction over the past 20 years have restored men's confidence and dignity and revived marriages. Awareness of and interest in male sexual dysfunction has also fuelled the study of female sexual dysfunction (FSD). The first drug for treating premenopausal hypoactive sexual desire disorder, Flibanserin (Addyi; Sprout Pharmaceuticals, Raleigh [NC], US), was marketed in 2015.

Gynaecologists are in an appropriate position to address women's sexual concerns and help them fulfil their sexual needs. 42% of women with sexual difficulties seek help from their gynaecologists[1]. 98.8% of 1480 women discuss sexual concerns with their gynaecologists during routine checkups[2]. All gynaecologists should be able to take a sexual history; recognise, counsel and plan initial management for sexual difficulties; and know when to refer a case[3].

Understanding Female Sexual Response

Masters and Johnson[4] were pioneers in the study of human sexual response. They proposed a linear model of human sexual responses that begins with excitement, pauses at the plateau, climaxes with orgasm and ends with resolution[4]. In 1979, Kaplan[5] added desire to human sexual responses and condensed the linear model into a tri-phasic model that begins with desire, followed by arousal, then concludes with orgasm. The diagnostic categorisation of FSD is largely based on the Kaplan's model.

Over the years, both models have been criticised for being male-oriented and may thus misjudge and pathologise normal female behaviour[6,7]. For example, many women do not progress sequentially; some skip the desire phase and start from arousal and progress to orgasm, whereas others experience desire and arousal without orgasm[7]. Basson[8] pointed out that female sexual desire is usually a response to the partner's sexual proposal or sexual aids rather than being spontaneous. Both models focused only on biological responses and ignored elements such as pleasure, satisfaction, and the couple's relationship.

In 1997, Whipple and Brash-McGreer[9] proposed a circular sexual response pattern for women. This circular model comprises four stages: seduction (encompassing desire), sensations (excitement and plateau), surrender (orgasm), and reflection (resolution). Pleasure and satisfaction during the resolution phase provide a positive stimulus to the seduction phase of the next sexual cycle. If a woman has had a bad sexual experience, she may not have any desire to repeat sex. In 2001, Basson[8] proposed a non-linear model that incorporates emotional intimacy, sexual stimuli, and relationship satisfaction into the biological responses. This model shifts the focus of female sexual activity away from achieving orgasm alone to gaining personal satisfaction that can manifest as emotional

Correspondence to: Dr Sue ST Lo
Email: stlo@famplan.org.hk

satisfaction (a feeling of intimacy and connection with a partner) and/or achieving orgasm.

Diagnostic Classifications of Female Sexual Dysfunction

Some women experience difficulties with sexual function at some point in their lives, but they do not necessarily have FSD. The diagnosis of FSD is based on the diagnostic classifications and definitions of sexual dysfunction listed in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM) or the World Health Organization's International Classification of Diseases (ICD).

According to the fifth edition of the DSM[10] released in 2013, the diagnosis of FSD is made when symptoms are severe enough to cause clinically significant distress in over 75% of sexual activities for at least 6 months. The more precise severity criteria help to distinguish transient sexual difficulties from more persistent sexual dysfunction. Another major change from previous versions of the DSM is the combination of desire and arousal disorders into interest/arousal disorder. Sexual response is non-linear, and the distinction between desire and arousal may be artificial[6-9]. Sexual aversion disorder has been removed because the diagnosis is rarely made and supporting research is lacking. The definition of orgasmic disorder remains unchanged. The diagnoses of vaginismus and dyspareunia are merged into a new genitopelvic pain/penetration disorder because they are highly co-morbid and difficult to distinguish. In this version, the subtypes of sexual dysfunction due to medical disease, psychological illness or combined factors are removed because both organic and psychological factors co-exist in most cases. Other contributing factors such as partner factors, relationship factors, individual vulnerability factors, cultural or religious factors, and medical factors are also included.

The 10th revision of the ICD[11] released in 1992 defined sexual dysfunction as various ways in which an individual is unable to engage in a sexual relationship as desire. Diagnostic categories include lack or loss of sexual desire, sexual aversion and lack of sexual enjoyment, failure of genital response, orgasmic dysfunction, nonorganic vaginismus, nonorganic dyspareunia, and excessive sexual drive.

Prevalence of Female Sexual Dysfunction

In the 20th century, the prevalence of FSD was variable because different researchers used different definitions of FSD and the assessment tools were not standardised or validated. The US National Health and Social Life Survey reported FSD in 43% of women aged 18 to 59 years[12]. It provided a well-designed survey that included a large randomised sample with ethnic minorities and a good response rate and detailed measures of sexuality.

In the 21st century, psychometric tools or diagnostic classifications (such as the DSM or the ICD) have been used to define FSD in clinical studies. In culturally conservative countries such as India and Bangladesh, the prevalence of FSD among women attending gynaecology outpatient clinics was 55.6%[13] and 51.8%[14], respectively. In Hong Kong, 59% of 2146 sexually active women aged 21 to 40 years who attended the birth control and pre-pregnancy checkup clinics of the Family Planning Association of Hong Kong reported at least one type of FSD for at least three months within the past year[15]. In this cohort, 31.8% reported no desire, 31.7% were not aroused, 40% had anorgasmia, and 33.8% experienced coital pain[15]. Among 371 women aged 40 to 60 years who visited the association, 77.2% reported at least one type of FSD for at least 3 months within the past year[16]. The most common problem was no lubrication, with 42.9% of women being affected. The prevalence of FSD in clinic attendees is usually higher than in the general population. In a local population survey, 38% of married women aged 19 to 49 years had at least one type of FSD. The prevalence increased with age: 34% among women aged 19 to 29 years, 37% among women aged 30 to 39 years, and 39% among women aged 40 to 49 years[17].

Aetiology of Female Sexual Dysfunction

There are limited publications about risk factors for FSD. According to the US National Health and Social Life Survey[12], low desire in women is associated with a history of sexually transmitted infections, emotional problems or stress, >20% drop in household income between 1988 and 1991, thoughts about sex less than once a week, and intercourse less than once a month. Arousal disorder is more common in women who had urinary tract symptoms, emotional problems or stress, infrequent intercourse, or who had been sexually touched before puberty or sexually coerced[12]. Sexual pain disorder correlates with a lower level of education, urinary tract symptoms, emotional problems or stress, poor to fair health, and >20% drop in household income[12]. Low physical and emotional satisfaction and low general happiness are associated with low desire, arousal disorder, and sexual pain[12]. In the Melbourne Women's Midlife Health Study, decline in sexual interest

is associated with natural menopause transition, decreased wellbeing, decreasing employment, increased vasomotor, cardiopulmonary and skeletal symptoms, and hormone therapy[18].

In Hong Kong women of reproductive age, FSD is strongly associated with sex behaviour–related factors (unidirectional coitus initiation, low foreplay enjoyment, low coital frequency); and weakly associated with demographic factors (lower education level, planning for pregnancy, history of medical disease)[15]. Among midlife Hong Kong women, FSD is associated with menopause status: 88.9% of surgically menopausal women have at least one type of FSD, followed by 79.3% of naturally menopausal women, 78.2% of perimenopausal women, and 72.2% of premenopausal women[16].

Clinical Evaluation

During any regular visit for cervical smear or contraceptive counselling, the gynaecologist can open a discussion by asking "Are you happy with your sex life?" "Do you want to talk about it?" If the answer is yes, further evaluation can be made.

Taking a Sexual History

It is important to first define whether the woman has a transient difficulty or a genuine dysfunction. Opening questions in Table 1 help to determine whether FSD is present, whether the dysfunction is lifelong or acquired, whether it is general or situational, and what triggers it.

After the patient has given an account of her difficulties, more detail about her sexual repertoire is needed. The open-ended questions in Table 2 help reveal what happens in the bedroom. Nonetheless, patients may become vague and circumlocutory, and the gynaecologist has to be astute in understanding what the patient is trying to say, clarify any vagueness, and be careful and tactful when interpreting information.

Medical and Drug History

Normal sexual functioning depends on a healthy body and mind. The gynaecologist should take a full history of medical illness, surgery, psychiatric disease, medication and gynaecological detail of menopause, endometriosis, infection, malignancy, radiotherapy and pelvic surgery to exclude organic causes and drugs that contribute to FSD.

Psychosocial Evaluation

An in-depth enquiry about the patient's upbringing, self-image, sexual attitudes, sexual identity, past traumatic

Table 1. Opening questions

Opening questions
What is the problem?
How frequent does it occur?
How long has the difficulty been present?
What do you think triggers the difficulty?
Are you distressed? Please describe how you feel
Does it affect the relationship with your partner? Please elaborate

Table 2. Detailed assessment of a sexual encounter

Detailed assessment of a sexual encounter
When was the last time you have sex?
Who initiates sex? What is the proportion of him initiating? What is the proportion of you initiating?
Are you interested in sex?
Do you feel aroused? Please describe your feelings, both emotional and physical
Do you have an orgasm? Please describe your feelings, both emotional and physical
How do you feel when he penetrates? Please describe your feelings, both emotional and physical
How is the afterplay?
What is in your mind during the sexual encounter?

events such as rape, culture, religion, personality, life stressors, and relationship issues is needed to decipher the underlying causes of FSD. Equally important is evaluation of the impact of FSD on the patient's life, emotions, relationship and psychosocial function.

Physical Examination

A general physical examination is essential to exclude organic causes of FSD. A pelvic examination is performed to look for evidence of endometriosis, infection, atrophy, vestibulitis, vaginismus, and aversion to intromission.

Investigations

Baseline oestrogen, prolactin and thyroid levels are measured to exclude any organic cause of female sexual interest/arousal disorder. Blood glucose should be checked if diabetes mellitus is suspected as an underlying cause for anorgasmia. Vaginal and endocervical swabs should be taken if bacterial vaginosis or sexually transmitted infection is suspected.

Psychometric Tools

Screening instruments such as the Female Sexual Function Index[19] and the Female Sexual Distress Scale[20] are commonly used.

The Chinese version of the Female Sexual Function Index has been translated and validated in an urban Chinese population with high reliability (Cronbach's alpha=0.96) and validity (87.10%)[21]. It comprises 19 questions that assess desire, arousal, lubrication, orgasm, pain, and satisfaction in the preceding 4 weeks. The cut-off is ≤23.45 for overall score; ≤2.7 for low desire; ≤3.15 for arousal disorder; ≤4.05 for lubrication disorder; ≤3.8 for orgasm disorder and ≤3.8 for sexual pain[22].

The Female Sexual Distress Scale[20] is a 12-item questionnaire for sexual distress in women. A total score ≥15 is highly predictive of distress.

After clinical evaluation, the gynaecologist should be able to determine whether a woman has transient sexual difficulty or FSD, the chronology of events that are related to the difficulty, and whether there is any organic and/or psychosocial aetiology. The gynaecologist can provide initial management such as advice about normal sexual responses, basic human anatomy, and various sexual positions. Patients can be taught to master various sexual techniques that can enhance erotic feelings and intimacy. Sex aids such as romantic novels, movies, music, tantalizing aromas, erotic artwork, fresh flowers, and provocative clothing can enhance sexual pleasure and ecstasy. Women who have communication conflicts with their partners or underlying emotional/psychological aetiologies of FSD should be referred for sex therapy.

Sex Therapy

Sex therapy is a form of psychotherapy that helps couples overcome their sexual difficulties. It excludes organic causes of FSD, addresses underlying emotional and psychological problems that contribute to FSD, and customises cognitive behavioural therapy for clients. Couple therapy is preferable to woman-alone therapy.

During cognitive therapy, women with interest/arousal disorder are encouraged to develop sexual fantasies by reading romantic novels or watching sexually explicit movies. Cognitive restructuring techniques such as self-instructional training and identification of cognitive distortion help replace sexual anxiety with sexual comfort, correct distorted sexual attitudes, and develop realistic expectations of sex[23].

Depending on the type of FSD, different exercises are prescribed to modify maladaptive behaviour. Sensate focus exercises help couples build trust and intimacy and give and receive pleasure[24]. It is a series of stepwise exercises that help couples re-establish sexual pleasure, appreciate sexual enjoyment, and reduce performance anxiety. It is often prescribed to women with interest/arousal disorder and orgasmic disorder. Women with anorgasmia are taught to practice directed masturbation that comprises education and exercises in self-exploration and self-pleasuring[25]. In a review of nine randomized controlled trials on directed masturbation, 60 to 90% of women with primary anorgasmia can achieve orgasm during masturbation and 33 to 85% became orgasmic during partnered sexual activity[26]. Directed masturbation in combination with sensate focus exercises is more effective than directed masturbation alone in the treatment of anorgasmia[27].

For women who cannot consummate their marriage, a vaginal digital examination that is gauged to their tolerance is itself therapeutic. The examination provides reassurance that the vagina is normal and intromission is possible. Relaxation of pelvic muscles together with slow breathing are taught during the examination and women are encouraged to continue practicing at home using one then two fingers, a vibrator or a toy penis. These women are also encouraged to use tampons during menstruation. Vaginal dilators are not needed in women with a normal vagina. The

aim of the exercise is to desensitise their phobia towards intromission rather than mechanical dilatation.

Perimenopausal and postmenopausal women who complain of painful sex and lack of lubrication should be examined vaginally before vaginal oestrogen cream is prescribed. Vulvovaginal atrophy is seldom the cause for dryness in perimenopausal women or women in their early menopause. Other conditions such as vulvodynia and sexual interest/arousal disorder should be excluded.

Drugs for Female Desire Arousal Disorders

Testosterone therapy has been shown to be effective in improving libido, arousal, orgasm, sexual responsiveness, self-image, and sexual distress in postmenopausal women[28-30]. Nonetheless, no androgen preparation has been approved by the US Food and Drug Administration for the treatment of female sexual interest/arousal disorder.

Tibolone (Livial; Merck Sharp & Dohme [Asia] Ltd., Hong Kong) is a synthetic drug with oestrogenic, progestogenic, and androgenic properties. The Cochrane Review concluded that tibolone was associated with either no effect or a small benefit in sexual function[31].

Flibanserin is the only drug approved by the US Food and Drug Administration for the treatment of premenopausal hypoactive sexual desire disorder. It modulates serotonin to increase sexually satisfying events by 0.5 to 1 count per month[32]. Side-effects of the drug include drowsiness, hypotension, and syncope. Due to the potential serious interaction with alcohol, only certified physicians and pharmacists who have completed training are allowed to prescribe this drug in the US[33]. This drug has not been registered in Hong Kong.

Conclusion

FSD is a prevalent problem among Hong Kong women. Gynaecologists can provide initial management through provision of information about normal sexual responses, anatomy, position, and technique. Women who have deep-seated issues of control and trust, negative attitudes towards sexuality and body image, previous sexual trauma, communication problems with partners, or underlying psychosocial problems should be referred for sex therapy.

Declaration

The author has declared no conflicts of interest in this manuscript.

References

1. Berman L, Berman J, Felder S, et al. Seeking help for sexual function complaints: what gynecologists need to know about the female patient's experience. *Fertil Steril* 2003; 79:572-6.
2. Nussbaum MR, Gamble G, Skinner B, Heiman J. The high prevalence of sexual concerns among women seeking routine gynecological care. *J Fam Pract* 2000; 49:229-32.
3. Royal College of Obstetricians and Gynaecologists Curriculum consultation. Core module 15: Sexual and reproductive health (contraception, termination of pregnancy, sexually transmitted infections and HIV, sexual problems). Available from: https://www.rcog.org.uk/globalassets/documents/careers-and-training/core-curriculum/2013-05-16_core_module_15.pdf. Accessed 28 Jun 2016.
4. Masters WH, Johnson VE. Human sexual response. New York: Bantam Books; 1966.
5. Kaplan HS. Disorders of sexual desire and other new concepts and techniques in sex therapy. New York: Brunner/Hazel Publications; 1979.
6. Working Group on A New View of Women's Sexual Problems. A new view of women's sexual problems. *Electronic Journal of Human Sexuality* 2000; (3):Nov 15. Available from: http://www.ejhs.org/volume3/newview.htm. Accessed 1 Jun 2016.
7. Whipple B. Women's sexual pleasure and satisfaction: A new view of female sexual function. *Female Patient* 2002; 27:44-7.
8. Basson R. Human sex-response cycles. *J Sex Marital Ther* 2001; 27:33-43.
9. Whipple B, Brash-McGreer KB. Management of female sexual dysfunction. In: Sipski ML, Alexander CJ, editors. Sexual function in people with disability and chronic illness. A health professional's guide. *Gaithersburg, MD: Aspen Publishers*; 1997: 509-34.
10. Diagnostic and Statistical Manual of Mental Disorders 5th ed. *Arlington: American Psychiatric Association*; 2013.
11. World Health Organization. International classification of diseases and related health problems, 10th revision. *Geneva: World Health Organization*; 1992.
12. Laumann EO, Paik A, Rosen RC. Sexual dysfunction in the United States: prevalence and predictors. *JAMA* 1999; 281:537-44.
13. Aggarwal RS, Mishra VV, Panchal NA, Patel NH, Deshchougule VV, Jasani AF. Sexual dysfunction in women: an overview of risk factors and prevalence in Indian women.

J South Asian Federation OG 2012; 4:134-6.
14. Jahan MS, Billah SM, Furuya H, Watanabe T. Female sexual dysfunction: facts and factors among gynecology outpatients. *J Obstet Gynaecol Res* 2012; 38:329-35.
15. Lo SS, Kok WM. Sexual behavior and symptoms among reproductive age Chinese women in Hong Kong. *J Sex Med* 2014; 11:1749-56.
16. Lo SS, Kok WM. Sexuality of Chinese women around menopause. *Maturitas* 2013; 74:190-5.
17. Zhang H, Yip PS. Female sexual dysfunction among young and middle-aged women in Hong Kong: prevalence and risk factors. *J Sex Med* 2012; 9:2911-8.
18. Dennerstein L, Lehert P, Burger H. The relative effects of hormones and relationship factors on sexual function of women through the natural menopausal transition. *Fertil Steril* 2005; 84:174-80.
19. Rosen R, Brown C, Heiman J, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual dysfunction. *J Sex Marital Ther* 2000; 26:191-208.
20. DeRogatis LR, Rosen R, Leiblum S, Burnett A, Heiman J. The Female Sexual Distress Scale (FSDS): initial validation of a standardized scale for assessment of sexually related personal distress in women. *J Sex Marital Ther* 2002; 28:317-30.
21. Chang SR, Chang TC, Chen KH, Lin HH. Developing and validating a Taiwan version of the female sexual function index for pregnant women. *J Sex Med* 2009; 6:1609-16.
22. Ma J, Pan L, Lei Y, Zhang A, Kan Y. Prevalence of female sexual dysfunction in urban Chinese women based on cutoff scores of the Chinese version of the female sexual function index: a preliminary study. *J Sex Med* 2014; 11:909-19.
23. Lazarus AA. The practice of multimodal therapy. *New York: McGraw-Hill*; 1981.
24. Masters WH, Johnson VE. Human sexual inadequacy. *Boston: Little Brown*; 1970.
25. Heiman JR, LoPiccolo J. Becoming orgasmic: a sexual and personal growth program for women. Rev. ed. *New York*: Simon and Schuster; 1988.
26. Ter Kuile MM, Both S, van Lankveld JJ. Sexual dysfunctions in women. In: Sturmey P, Hersen M, editors. Handbook of evidence-based practice in clinical psychology, Volume 2, Adult disorders. *Hoboken, NJ: Wiley*; 2012: 413-36.
27. Heiman JR. Psychologic treatments for female sexual dysfunction: are they effective and do we need them? *Arch Sex Behav* 2002; 31:445-50.
28. Sarrel P, Dobay B, Wiita B. Estrogen and estrogen-androgen replacement in postmenopausal women dissatisfied with estrogen-only therapy. Sexual behavior and neuroendocrine responses. *J Reprod Med* 1998; 43:847-56.
29. Davis SR, van der Mooren MJ, van Lunsen RH, et al. Efficacy and safety of testosterone patch for the treatment of hypoactive sexual desire disorder in surgically menopausal women: a randomized, placebo-controlled trial. *Menopause* 2006; 13:387-96.
30. Flöter A, Nathorst-Böös J, Carlström K, von Schoultz B. Addition of testosterone to estrogen replacement in oophorectomized women: effects on sexuality and well-being. *Climacteric* 2002; 5:357-65.
31. Martins WP, Lara LA, Ferriani RA, Rosa-E-Silva AC, Figueiredo JB, Nastri CO. Hormone therapy for female sexual function during perimenopause and postmenopause: a Cochrane review. *Climacteric* 2014; 17:133-5.
32. Katz M, DeRogatis LR, Ackerman R, et al. Efficacy of flibanserin in women with hypoactive sexual desire disorder: results from the BEGONIA trial. *J Sex Med* 2013; 10:1807-15.
33. FDA approves first treatment for sexual desire disorder [press release]. US Food and Drug Administration; 2015 Aug 18. Available from: http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm458734.htm. Accessed 24 Jun 2016.

A Review of Surgical Treatment for Pelvic Organ Prolapse

Symphorosa SC CHAN MD, FRCOG, FHKAM(O&G), FHKCOG
Rachel YK CHEUNG MBChB, MRCOG, FHKAM(O&G), FHKCOG
Department of Obstetrics and Gynaecology, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong

Pelvic organ prolapse (POP) is common in women and may impair quality of life. Although vaginal pessary can relieve the symptoms and improve quality of life, women may opt for surgical treatment. This paper reviews some common surgical options for POP and their outcome. Anterior colporrhaphy is commonly performed for anterior compartment prolapse but the reported recurrence rate was high. Reinforcement with mesh can reduce the recurrence and re-operation rate; but there are higher intra-operative and long term complications. It should be performed in well-selected cases and by experienced surgeons. There is insufficient evidence to support mesh repair for posterior compartment prolapse. Vaginal hysterectomy is a commonly performed for uterine prolapse; followed by McCall culdoplasty or sacrospinous ligament fixation (SSLF) to suspend the vaginal vault and prevent the recurrence of vaginal vault prolapse. In women with vaginal vault prolapse, abdominal sacrocolpopexy was shown to have a lower recurrence of vaginal vault prolapse when compared with SSLF although there was no difference in the re-operation rate. Laparoscopic sacrocolpopexy can be a more minimally invasive surgery but it has a longer learning curve. Uterus-preserving POP repair is increasingly popular. Women prefer to preserve their uterus for various reasons. Manchester operation or sacrospinous hysteropexy can be the choices for women who have further fertility wish. Sacrohysteropexy can be the option if women have no fertility wish as there is limited information on pregnancy outcome. Finally, colpoclesis, an obliterative procedure, can be an option for women who are no longer sexually active.
Hong Kong J Gynaecol Obstet Midwifery 2017; 17(1):62-8

Keywords: Female; Pelvic organ prolapse; Treatment outcome; Uterine prolapse

Introduction

Pelvic organ prolapse (POP) is common in women and may impair quality of life[1]. It may also give rise to complications such as postmenopausal bleeding or even hydronephrosis[2]. Pelvic floor muscle training has been shown to improve the overall symptoms of mild prolapse (with leading edge above the hymen) compared with watchful waiting, although the difference was below the level of clinical relevance[3]. A vaginal pessary is a non-invasive treatment and has also been shown to relieve the symptoms of prolapse and improve quality of life[4]. Nonetheless, women may opt for surgical treatment because of complications related to vaginal pessary use, concomitant urodynamic stress incontinence, or the severity of the prolapse[1,4]. The reported lifetime risk of POP surgery for an 80-year-old woman is 13 to 19%[5,6].

This paper aims to review the surgical options for POP and their outcome. Brief descriptions of some of the more common procedures are given (Table). In most cases, more than one vaginal compartment is involved, and therefore more than one type of surgical procedure is required.

Anterior Compartment

Anterior Vaginal Wall Repair alone

Anterior colporrhaphy is the most common procedure for anterior vaginal wall repair. It begins with hydrodissection by injection of normal saline with or without vasoconstrictor beneath the vaginal mucosa, followed by a midline incision from the bladder neck to the vaginal apex or anterior fornix. The mucosa is separated from the underlying fibromuscular layer and up to the inferior pubic rami using sharp and/or blunt dissection. The fibromuscular fascia is plicated using two to four stitches, and the excessive vaginal mucosa is trimmed. The anterior vaginal wall is then closed with interrupted or continuous absorbable sutures.

The rate of recurrence of anterior compartment prolapse has been reported to be 40% or more within 1 to 2 years[7,8]. As a result, reinforcement with mesh is added.

Anterior Vaginal Wall Repair with Reinforcement by Graft / Synthetic Absorbable or Non-absorbable Synthetic Mesh

The anterior vaginal wall prolapse can be reinforced using a biological graft, absorbable synthetic mesh, or non-absorbable synthetic mesh. For the latter, type I mesh of monofilament polypropylene is recommended because of large-pore size (>1 mm^2), light weight (<45 g/m^2), and

Correspondence to: Dr Symphorosa SC Chan
Email: symphorosa@cuhk.edu.hk

Table. Common surgical procedures for pelvic organ prolapse according to the involved vaginal compartment

Procedure	Anterior compartment	Apical compartment	Posterior compartment
Vaginal			
Native tissue	Anterior colporrhaphy	- Vaginal hysterectomy - McCall Culdoplasty - Sacrospinous ligament fixation - Uterosacral ligament suspension	- Posterior colporrhaphy - Rectovaginal septum repair
Mesh repair	- Graft reinforcement - Use of absorbable synthetic mesh - Use of non-absorbable synthetic mesh (transobsturator kit)	No evidence to support the use	No evidence to support the use
Uterine preservation	Not applicable	- Sacrospinous hysteropexy - Manchester operation	Not applicable
Vaginal obliteration	Colpoclesis	Colpoclesis	Colpoclesis
Abdominal			
Mesh repair	Not applicable	Sacrocolpopexy	Not applicable
Uterine preservation	Not applicable	Sacrohysteropexy	Not applicable

lower stiffness[9]. Different types of synthetic mesh are available such as self-styled armless type, tension-free type, or transobturator mesh kit. In Hong Kong, a polypropylene transobturator mesh kit (non-absorbable synthetic mesh) is most commonly used.

Generally, an anterior midline vaginal incision is made following hydrodissection. The vaginal mucosa is dissected from the fibromuscular layer toward the inferior pubic rami and ischial spines without disruption of the arcus tendinous pelvic fascia. The mesh repair system is placed transcutaneously through the medial portion of the obturator foramen and used to anchor the mesh along the arcus tendineus pelvic fascia at the level of the bladder neck and 1 to 2 cm caudal to the ischial spines. The proximal and distal ends of the mesh may be trimmed to fit the vaginal length. The mesh is then secured to the endopelvic fascia and vaginal wall with absorbable sutures. Tension of the mesh is adjusted and should not be tight. The vaginal wall is closed with absorbable sutures. Usually, the vaginal wall is not trimmed, and the midline anterior vaginal incision connected to the apical incision is avoided if a prior hysterectomy has been performed.

Anterior Vaginal Wall Repair Versus Anterior Vaginal Wall Repair with Permanent Mesh

According to the Cochrane review up to July 2015, there are 25 trials that compared anterior colporrhaphy with a variety of permanent mesh repair techniques[10]. The mesh groups resulted in more intraoperative complications, higher blood loss[11], and more bladder injury (risk ratio [RR]=3.92; 95% confidence interval [CI], 1.6-9.5)[10].

In 12 trials (involving 1614 women) that reported awareness of prolapse or vaginal bulge at 1 to 3 years after surgery, women with a permanent mesh repair were less likely to report awareness of prolapse than those with a native tissue repair (RR=0.66; 95% CI, 0.5-0.8)[10]. In 13 trials (involving 1406 women) that reported surgical failure (a stage 2 or greater anterior compartment prolapse) at 1 to 3 years after surgery, women with a transvaginal mesh repair were less likely to report failure than those with a native tissue repair (RR=0.45; 95% CI, 0.4-0.6)[10]. The rate of repeat surgery for prolapse recurrence was also lower in the mesh group (RR=0.53; 95% CI, 0.3-0.9)[10].

In three trials that compared absorbable mesh and native tissue repair and 10 trials that compared biological graft and native tissue repair, the evidence to support the use of absorbable mesh or biological graft is insufficient, as it does not reduce the rate of recurrence compared with native tissue repair[10].

In 2011 according to the US Food and Drug Administration, mesh used in transvaginal POP repair introduces risk not present in traditional non-mesh surgery for POP repair; most such risks are related to mesh erosion[12]. 12% of women with mesh repair had mesh exposure; the rate was lower in women with only anterior mesh repair than with multi-compartment repair (10% vs. 17%)[10]. Although mesh exposure is often asymptomatic, symptoms of discharge, bleeding, and dyspareunia have been reported[13,14]. Surgery for mesh exposure was required in 8% of women[10]. Most required only minor outpatient intervention[14,15]. Women with mesh repair were more likely to report de-novo stress urinary

incontinence (RR=1.4; 95% CI, 1.1-1.8) although there was no difference in de-novo voiding disorder, urgency, detrusor overactivity, or overactive bladder[10].

Since 2011, many mesh manufacturers have withdrawn from the market. Balancing the risk-benefit profile, it is concluded that a transvaginal mesh has limited utility in primary surgery[10]. In women with a higher risk of recurrence, the benefits may outweigh the risks[10]. In 186 women (most were postmenopausal) in Taiwan followed up for at least three years, transvaginal mesh surgery resulted in a high subjective and objective success rate and a low mesh exposure rate of 3.5%, even though 91% had concomitant hysterectomy[15]. This suggests that transvaginal mesh surgery may be beneficial in well-selected cases and when performed by an experienced surgeon.

Posterior Compartment

Posterior Vaginal Wall Repair alone

The posterior vaginal wall repair generally begins with a transverse incision made at the mucocutaneous junction and the posterior vaginal wall is incised at the midline to the posterior fornix. The rectal wall and rectovaginal connective tissue are separated from the vaginal wall. The rectovaginal fascia is united at the midline with interrupted absorbable sutures. The perineorrhaphy is performed with one or two horizontal sutures. Excess vaginal mucosa is then excised, and the vaginal wall is closed with absorbable sutures.

Another way to repair the posterior compartment prolapse is to repair the rectovaginal septum. The rectovaginal septum may have defects at different sites, for example detachment from the uterosacral ligaments, central or lateral defects in the midvaginal portion of the septum, detachment of the septum from the perineal body, or disruption of the perineal body. An incision is made transversely at the junction of the perineal skin and posterior vaginal wall. The vaginal epithelium is dissected from the underlying connective tissue in the relatively avascular plane just beneath the epithelium and the rectovaginal septum is exposed. Defects, if any, on the rectovaginal septum are repaired with interrupted sutures along the defects at each site starting from the perineal body, mid-rectovaginal septum, and uterosacral ligament attachments to the rectovaginal septum[16].

Transanal Approach Versus Vaginal Approach

Few trials have compared methods to repair posterior compartment prolapse. In two trials (involving 57 and 30 women) that compared the vaginal approach with the transanal approach to rectocoele repair, the transvaginal approach was superior to transanal approach for posterior vaginal wall repair in terms of subjective (RR=0.4; 95% CI, 0.13-1) and objective (RR=0.2; 95% CI, 0.1-0.6) failure rates[17,18]. Nonetheless, the two approaches were comparable in the rate of postoperative difficulty in bowel evacuation, faecal incontinence, or dyspareunia[17,18]. In addition, both trials were limited by small sample size[17,18].

Native Tissue Repair Versus Augmentation with Mesh

In two trials that compared native tissue repair with repair with absorbable or non-absorbable mesh, there was no difference in the rate of recurrence or cure rate, patient satisfaction, or subjective improvement at one year[8,19]. In another study, the reoperation rate was 1% in both groups, and there were no complications associated with the use of mesh[10]. On the contrary, in another study, the mesh erosion rate was 13%, and the dyspareunia rate increased from 6 to 69% postoperatively[20]. This suggests that there is insufficient evidence to support the use of mesh for posterior compartment repair[10].

Apical Compartment: Uterine Prolapse or Vaginal Vault Prolapse

Uterine Prolapse

Vaginal Hysterectomy and McCall Culdoplasty or Sacrospinous Ligament Fixation

Generally, women with uterine prolapse are offered vaginal hysterectomy. After completion of vaginal hysterectomy, some procedures are performed to suspend the vaginal vault and prevent the risk of recurrence of vaginal vault prolapse, for example McCall culdoplasty or sacrospinous ligament fixation (SSLF).

The McCall culdoplasty begins with the passage of an absorbable suture to the uterosacral and cardinal ligament and the peritoneal surface of the vaginal wall. Two arms of the sutures are then tied. This process closes off the cul-de-sac, draws the posterior vaginal apex up to the supporting structures and elevates it. The vaginal vault is then closed[21]. For SSLF, the posterior vaginal wall is opened longitudinally from the introitus to the vaginal vault. The right rectovaginal space is entered by sharp and blunt dissection to the level of the ischial spine. The sacrospinous ligament is then traced medially. Long-acting absorbable sutures are placed through the ligament, approximately 2 cm medial to the ischial spine using an instrument such as a Miya hook. These sutures are passed through the vaginal epithelium at the vaginal vault and left untied. The vaginal wall is closed, followed by tying of the sutures which brings the vaginal vault to the ligament[21]. Recently, some devices enable self-retrieval of the suture

while passing through the ligament and thus facilitate SSLF. SSLF carries a risk of pudendal vascular or nerve injury. Intra-operative bleeding requiring transfusion has been reported in 0.5% to 2.5% of cases and rectal injury in 0.6% to 0.8%[22]. When SSLF was first invented, the idea was to take away the vaginal apex from the midline so as to protect it from the effect of high abdominal pressure acting on the genital hiatus[22,23]. Therefore, usually only unilateral SSLF is performed. Bilateral fixation may fix the lateral parts of the vagina and leave the central part of the apex without support and vulnerable to intra-pelvic pressure on the genital hiatus, although there is no evidence to support this theory[22]. Both McCall culdoplasty and SSLF may shorten the vaginal length, which does not affect sexual function in women[24]. Generally, McCall culdoplasty is for women with vaginal cuff up to hymen level, whereas SSLF is for women with more severe prolapse. The options of uterine preserving surgery are discussed below.

Vaginal Vault Prolapse

Sacrospinous Ligament Fixation

SSLF for vaginal vault prolapse has the advantage of being performed through the vagina under regional rather than general anaesthesia.

Sacrocolpopexy

Sacrocolpopexy uses a piece of Y-shaped mesh or two pieces of rectangular mesh to suspend the anterior and posterior vaginal wall from the medial longitudinal ligament of the sacral promontory. The peritoneum over the sacral promontory is opened and the medial longitudinal ligament is identified. Then, the peritoneum along the right pelvic side wall is opened with caution to prevent injury to the right ureter. A Breisky retractor or a vaginal probe is inserted into the vagina to facilitate the following dissections. The peritoneum and bowel that cover the posterior vaginal wall are dissected from the vaginal wall, whereas the peritoneum and urinary bladder are dissected from the anterior vaginal wall. Generally, it is adequate to free 3 to 4 cm on each side of the anterior and posterior vaginal wall. Some surgeons may advocate dissecting until the levator ani muscle is reached. The distal arms of Y-shaped mesh or one side of the rectangular meshes are then anchored to each side of the vaginal wall using absorbable sutures. The proximal arm(s) are anchored to the medial ligament of the sacral promontory using non-absorbable sutures or helical tackers. The peritoneum is closed to avoid bowel adhesion to the mesh and intestinal obstruction. In a report of 450 women, the reoperation rate for bowel complications was similar in women with or without reperitonealisation (1.5% vs. 1.0%, p=0.9)[25]. Some surgeons perform site-specific vaginal repairs (anterior and or posterior colporrhaphy) in conjunction with laparoscopic sacrocolpopexy (LSC)[26].

Sacrospinous Ligament Fixation Versus Sacrocolpopexy

According to the Cochrane review in 2008, three trials compared abdominal sacrocolpopexy with vaginal SSLF[27-29]. Abdominal sacrocolpopexy was superior to vaginal SSLF in terms of a lower rate of recurrent vaginal vault prolapse (RR=0.23; 95% CI, 0.07-0.77) and less postoperative dyspareunia (RR=0.39; 95% CI, 0.18-0.86) [27-29]. Nonetheless, abdominal sacrocolpopexy resulted in a longer operating time and higher cost[27,29]. There was no significant difference in the re-operation rate between the two surgeries[30].

Laparotomy Versus Laparoscopic Sacrocolpopexy Versus Robotic-assisted Laparoscopic Sacrocolpopexy

LSC was first reported in 1994[31]. Generally, laparoscopic surgery is associated with less blood loss, a lower transfusion rate, and a shorter length of hospital stay than open surgery. In a review of 11 reports involving 1197 women, the rate of conversion to laparotomy was 2.7%[32]. The success rate and patient satisfaction rate at a mean of 25 months were 75% to 100% and 79% to 98%, respectively, and only 1.8% of patients required mesh removal[32]. In two studies reporting the long-term outcome at 5 years, the anatomical recurrence rate was 7 to 16%, the reoperation rate was 3.5%, and the rate of mesh exposure was 0 to 9%[26,33]. LSC for vaginal vault prolapse has a long learning curve. In experienced surgeons, the operating time decreased significantly after 30 cases and stabilised after 90[34]. It took a trainee 31 cases to achieve an operation time comparable with that of an experienced surgeon in terms of dissecting the vaginal vault if he had practiced endoscopic suturing for 15 hours before learning LSC[35].

Robotic-assisted laparoscopic sacrocolpopexy (RALSC) was first performed in 2004[36]. In a review of 27 studies involving 1488 women, the conversion rate to laparotomy was <1%, the objective and subjective cure rates were 84 to 100% and 92 to 95% respectively, the mesh erosion rate was 2%, and the learning curve was 10 to 20 procedures[37]. Although RALSC and LSC were comparable in terms of the complication rate and short-term outcome, in a recent meta-analysis of seven trials that involved 264 RALSC and 267 LSC, RALSC was associated with a longer operating time by a mean of 40 minutes and higher costs[38].

Uterine Preserving Surgeries

Recently, uterus-preserving POP repair is increasingly popular. Women prefer to preserve their

uterus for various reasons, such as a concern about female sexuality and body image.

Sacrospinous Hysteropexy

Sacrospinous hysteropexy is mostly performed unilaterally to the right sacrospinous ligament. A midline incision is made in the posterior vaginal wall and extended to the posterior part of the cervix. The right sacrospinous ligament is identified. Sutures are placed through the right sacrospinous ligament about 2 cm medial to the ischial spine and then through the posterior side of the cervix. The cervix is placed in close contact with the ligament without a suture bridge[39]. In one trial that compared sacrospinous hysteropexy with vaginal hysterectomy, sacrospinous hysteropexy resulted in shorter length of stay in hospital and earlier return to working activities, with no operative complication reported[39]. 57% of women needed >3 months to recover from vaginal hysterectomy; this is longer than our clinical experience suggests. Nonetheless, sacrospinous hysteropexy resulted in a higher recurrence of apical prolapse (21% vs. 3%) and 6% of patients required repeat surgery by one year[39]. Six successful pregnancies and vaginal deliveries have been reported in five out of 19 women[40]. In four of the five women, normal anatomic restoration was accomplished after pregnancy and vaginal delivery[40].

Sacrohysteropexy (Uterus Preserving and Sacrocolpopexy)

The anterior and posterior vaginal walls are prepared by dissecting the bladder, peritoneum, and bowel from the walls. An anterior Y-shaped mesh is positioned on the anterior vaginal wall, and the two sides of the mesh are passed through the broad ligaments. The rectangular posterior mesh is attached to the posterior vaginal wall. Both meshes are fixed to the sacral promontory and the peritoneum is closed over the meshes[41]. Open, laparoscopic, and robotic surgical options have been reported[41,42]. In 52 women followed up for a mean of 60 months, there was no recurrence of uterine prolapse, and the recurrence of anterior and posterior compartment prolapse (defined as ≥stage 2) was 8% and 6%, respectively[41]. Patient satisfaction was high; only 5% of patients had mesh erosion and underwent successful vaginal repair[41].

Manchester Operation

The Manchester operation includes diagnostic curettage; detachment, suturing and reattachment of both cardinal and uterosacral ligaments to the anterior aspect of the uterine isthmus; amputation of the cervix; and covering of the cervical stump with vaginal mucosa[43]. Postoperative urinary retention has been reported in up to 22% of women and cervical stenosis in 0 to 11%[43]. If symptomatic, cervical dilation under general anaesthesia or repeat dilation is needed[43,44]. One woman ultimately required hysterectomy because of recurrent cervical stenosis[43]. The cure rates for the apical, anterior, and posterior compartments were 93 to 100%, 95%, and 99 to 100% respectively, whereas the reoperation rate for recurrence of prolapse was 0 to 4% for apical prolapse and 0 to 4% for any prolapse[43,44]. Pregnancies and successful deliveries after this operation have been reported[43,45]. The Manchester operation is a viable option for young women who wish to become pregnant in future.

There is no comparison study of different types of uterine preserving surgery, which is usually reserved for women with no uterine or cervical pathology. The choice of surgery depends on the expertise of the surgeon. In women without abnormal per vaginal bleeding, the incidence of concurrent uterine malignancy during hysterectomy for POP surgery was 0.2%, and the incidence of pre-malignant uterine pathology was 0.4%[46]. Pap smear screening should be performed before surgery and continue afterwards. Although successful pregnancies and vaginal deliveries have been reported following sacrospinous hysteropexy or Manchester operation, information about the risks in pregnancy and delivery is limited, and there is potential for prolapse recurrence.

Colpoclesis

Colpoclesis is an obliterative procedure for POP for women who are no longer sexually active. The anterior vaginal wall that extends from 2 cm proximal to the tip of the cervix to 4 to 5 cm below the external urethral meatus is denuded. A mirror image on the posterior aspect of the cervix is removed by sharp dissection. A maximum amount of fibromuscular vaginal wall should be left behind on the bladder and rectum. The cut edges of the anterior and posterior vaginal wall are sewn together with interrupted delayed absorbable sutures. The uterus and vaginal apex are gradually turned inward and the inferior margin is sutured after plication of the bladder neck. An aggressive perineorrhaphy is recommended[47]. 90% of women achieved good anatomic results, and 85% had relief of symptoms[48]. The incidence of postoperative urinary stress incontinence was 10 to 30%; some reported incomplete bladder emptying[47,49]. Significant improvement occurred not only in symptoms and quality of life, but also in body image; the rate of regret or dissatisfaction was 10%[49]. Nonetheless, future evaluation of any uterine bleeding or cervical pathology is difficult, and these limitations should be explained to women. Endometrial biopsy and Pap smear must be considered before surgery.

Concomitant Continent Surgery

Women frequently report symptoms of stress urinary incontinence (SUI) after correction of POP. About 40 to

50% of women with POP have concomitant SUI; they are at highest risk of SUI postoperatively[50]. Continent women can also develop SUI after surgery, particularly in about 20-30% of women with occult SUI[51,52]. A combination of a prolapse surgery and an anti-incontinence procedure is usually performed to treat or prevent SUI. In women with co-existing SUI, the combined surgery significantly reduced the risk of SUI at 1 year (5% vs. 23%)[53]. In continent women following POP surgery, the combined surgery reduced the subjective SUI (24% vs. 41%, RR=0.6; 95% CI, 0.2-1.4), and the number needed to treat to prevent one woman from developing de-novo subjective SUI following prolapse repair was six[54]. The prevalence of occult SUI in the CARE trial and OPUS trial was 27% and 33% respectively[55,56]. Both studies showed a lower rate of postoperative SUI after combined surgery and lower risk of objective SUI (22% vs. 52%, RR=0.4; 95% CI, 0.3-0.8)[55,56]. The number needed to treat to prevent one woman with occult SUI from developing de-novo objective SUI was three[55,56]. The bladder storage function following combined surgery remained unchanged, but women may need longer catheterisation after continent surgery and adverse events such as bladder perforation, urinary tract infection, and major bleeding complications may increase[55,56]. In our local population, the efficacy of a concomitant continent procedure was not inferior to continence procedure alone and the complication rate was also similar[57].

Conclusion

In addition to assessing the stage and site of POP and planning for prolapse surgery, symptoms of urinary incontinence should also be evaluated. It is worthwhile to discuss whether to combine continent surgery with surgical repair for POP.

Declaration

The authors have declared no conflicts of interest in this manuscript.

References

1. Chan SS, Cheung RY, Yiu KW, Lee LL, Pang AW, Chung TK. Symptoms, quality of life, and factors affecting women's treatment decision regarding pelvic organ prolapse. *Int Urogynecol J* 2012; 23:1027-33.
2. Hui SY, Chan SC, Lam SY, Lau TK, Chung KH. A prospective study on the prevalence of hydronephrosis in women with pelvic organ prolapse and their outcomes after treatment. *Int Urogynecol J* 2011; 22:1529-34.
3. Wiegersma M, Panman CM, Kollen BJ, Berger MY, Lisman-Van Leeuwen Y, Dekker JH. Effect of pelvic floor muscle training compared with watchful waiting in older women with symptomatic mild pelvic organ prolapse: randomised controlled trial in primary care. *BMJ* 2014; 349:g7378.
4. Cheung RY, Lee JH, Lee LL, Chung TK, Chan SS. Vaginal pessary in women with symptomatic pelvic organ prolapse: a randomized controlled trial. *Obstet Gynecol* 2016; 128:73-80.
5. Løwenstein E, Ottesen B, Gimbel H. Incidence and lifetime risk of pelvic organ prolapse surgery in Denmark from 1977 to 2009. *Int Urogynecol J* 2015; 26:49-55.
6. Wu JM, Matthews CA, Conover MM, Pate V, Jonsson Funk M. Lifetime risk of stress urinary incontinence or pelvic organ prolapse surgery. *Obstet Gynecol* 2014; 123:1201-6.
7. Weber AM, Walters MD, Piedmonte MR, Ballard LA. Anterior colporrhaphy: a randomized trial of three surgical techniques. *Am J Obstet Gynecol* 2001; 185:1299-304.
8. Sand PK, Koduri S, Lobel RW, et al. Prospective randomized trial of polyglactin 910 mesh to prevent recurrence of cystoceles and rectoceles. *Am J Obstet Gynecol* 2001; 184:1357-62.
9. Jallah Z, Liang R, Feola A, et al. The impact of prolapse mesh on vaginal smooth muscle structure and function. *BJOG* 2016; 123:1076-85.
10. Maher C, Feiner B, Baessler K, Christmann-Schmid C, Haya N, Marjoribanks J. Transvaginal mesh or grafts compared with native tissue repair for vaginal prolapse. *Cochrane Database Syst Rev* 2016; (2):CD012079.
11. Nguyen JN, Burchette RJ. Outcome after anterior vaginal prolapse repair: a randomized controlled trial. *Obstet Gynecol* 2008; 111:891-8.
12. US Food and Drug Administration. Update on serious complications associated with transvaginal placement of surgical mesh for pelvic organ prolapse: FDA safety communication. Jul 2011. Available from: http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm262435.htm. Accessed 24 Jul 2016.
13. Dwyer P, Riss P. The mesh debate. *Int Urogynecol J* 2012; 23:1-2.
14. Fan HL, Chan SS, Cheung RY, Chung TK. Tension-free vaginal mesh for the treatment of pelvic organ prolapse in Chinese women. *Hong Kong Med J* 2013; 19:511-7.
15. Lo TS, Pue LB, Tan YL, Wu PY. Long-term outcomes of synthetic transobturator nonabsorbable anterior mesh versus anterior colporrhaphy in symptomatic, advanced pelvic organ prolapse surgery. *Int Urogynecol J* 2014; 25:257-64.
16. Julian TM. Posterior compartment defects. In: Rock JA, Jones 3rd JW, editors. Te Linde's operative gynecology. 9th ed. *Philadelphia: Lippincott Williams & Wilkins*; 2003:892-6.
17. Nieminen K, Hiltunen KM, Laitinen J, Oksala J, Heinonen PK. Transanal or vaginal approach to rectocele repair: a prospective, randomized pilot study. *Dis Colon Rectum* 2004; 47:1636-42.
18. Kahn MA, Stanton SL, Kumar D, Fox SD. Posterior colporrhaphy is superior to the transanal repair for the treatment of posterior vaginal wall prolapse [abstract]. *Neurourol Urodyn* 1999; 18:329-30.
19. Madsen LD, Nüssler E, Kesmodel US, Greisen S, Bek KM, Glavind-Kristensen M. Native-tissue repair of isolated primary rectocele compared with nonabsorbably mesh: patient-reported outcomes. *Int Urogynecol J* 2016 Jul 5. Epub ahead of print.
20. Salvatore S, Soligo M, Meschia M, Luppino G, Piffarotti P, Arcarci V. Prosthetic surgery for genital prolapse: functional outcome. *Neurourol Urodyn* 2002; 21:296-7.
21. Kleeman SD, Karram MM. Vaginal vault prolapse. In: Rock JA, Jones 3rd JW, editors. Te Linde's operative gynecology. 9th ed. *Philadelphia: Lippincott Williams & Wilkins*; 2003:911-35.
22. Petri E, Ashok K. Sacrospinous vaginal fixation — current status. *Acta Obstet Gynecol* Scand 2011; 90:429-36.

23. Richter K: Die chirurgische anatomie der vaginaefixatio sacrospinalis vaginalis. Ein beitrag zur operativen behandlung des scheidenblindsackprolapses [in German]. *Geburtsh Frauenheilk* 1968; 28:321-7.
24. Kokanali MK, Cavkaytar S, Aksakal O, Doğanay M. McCall culdoplasty vs. sacrospinous ligament fixation after vaginal hysterectomy: comparison of postoperative vaginal length and sexual function in postmenopausal women. *Eur J Obstet Gynecol* Reprod Biol 2015; 194:218-22.
25. Mueller MG, Jacobs KM, Mueller ER, Abernethy MG, Kenton KS. Outcomes of 450 women after minimally invasive abdominal sacrocolpopexy for pelvic organ prolapse. *Female Pelvic Med Reconstr Surg* 2016; 22:267-71.
26. Ross JW, Preston M. Laparoscopic sacrocolpopexy for severe vaginal vault prolapse: five-year outcome. *J Minim Invasive Gynecol* 2005; 12:221-6.
27. Benson JT, Lucente V, McClellan E. Vaginal versus abdominal reconstructive surgery for the treatment of pelvic support defects: a prospective randomized study with long-term outcome evaluation. *Am J Obstet Gynecol* 1996; 175:1418-21; discussion 1421-2.
28. Lo TS, Wang AC. Abdominal colposacropexy and sacrospinous ligament suspension for severe uterovaginal prolapse: a comparison. *J Gynecol Surg* 1998; 14:59-64.
29. Maher CF, Qatawneh AM, Dwyer PL, Carey MP, Cornish A, Schluter PJ. Abdominal sacral colpopexy or vaginal sacrospinous colpopexy for vaginal vault prolapse: a prospective randomized study. *Am J Obstet Gynecol* 2004; 190:20-6.
30. Maher CM, Feiner B, Baessler K, Glazener CM. Surgical management of pelvic organ prolapse in women: the updated summary version Cochrane review. *Int Urogynecol J* 2011; 22:1445-57.
31. Nezhat CH, Nezhat F, Nezhat C. Laparoscopic sacral colpopexy for vaginal vault prolapse. *Obstet Gynecol* 1994; 84:885-8.
32. Ganatra AM, Rozet F, Sanchez-Salas R, et al. The current status of laparoscopic sacrocolpopexy: a review. *Eur Urol* 2009; 55:1089-103.
33. Sarlos D, Kots L, Ryu G, Schaer G. Long-term follow-up of laparoscopic sacrocolpopexy. *Int Urogynecol J* 2014; 25:1207-12.
34. Claerhout F, Roovers JP, Lewi P, Verguts J, De Ridder D, Deprest J. Implementation of laparoscopic sacrocolpopexy — a single centre's experience. *Int Urogynecol J Pelvic Floor Dysfunct* 2009; 20:1119-25.
35. Claerhout F, Verguts J, Werbrouck E, Veldman J, Lewi P, Deprest J. Analysis of the learning process for laparoscopic sacrocolpopexy: identification of challenging steps. *Int Urogynecol J* 2014; 25:1185-91.
36. Di Marco DS, Chow GK, Gettman NT, Elliott DS. Robotic-assisted laparoscopic sacrocolpopexy for treatment of vaginal vault prolapse. *Urology* 2004; 63:373-6.
37. Serati M, Bogani G, Sorice P, et al. Robot-assisted sacrocolpopexy for pelvic organ prolapse: a systematic review and meta-analysis of comparative studies. *Eur Urol* 2014; 66:303-18.
38. Pan K, Zhang Y, Wang Y, Wang Y, Xu H. A systematic review and meta-analysis of conventional laparoscopic sacrocolpopexy versus robot-assisted laparoscopic sacrocolpopexy. *Int J Gynaecol Obstet* 2016; 132:284-91.
39. Dietz V, van der Vaart CH, van der Graaf Y, Heintz P, Schraffordt Koops SE. One-year follow-up after sacrospinous hysteropexy and vaginal hysterectomy for uterine descent: a randomized study. *Int Urogynecol J* 2010; 21:209-16.
40. Kovac SR, Cruikshank SH. Successful pregnancies and vaginal deliveries after sacrospinous uterosacral fixation in five of nineteen patients. *Am J Obstet Gynecol* 1993; 168(6 Pt 1):1778-83; discussion 1783-6.
41. Costantini E, Lazzeri M, Zucchi A, Bini V, Mearini L, Porena M. Five-year outcome of uterus sparing surgery for pelvic organ prolapse repair: a single-center experience. *Int Urogynecol J* 2011; 22:287-92.
42. Paek J, Lee M, Kim BW, Kwon Y. Robotic or laparoscopic sacrohysteropexy versus open sacrohysteropexy for uterus preservation in pelvic organ prolapse. *Int Urogynecol J* 2016; 27:593-9.
43. Ayhan A, Esin S, Guven S, Salman C, Ozyuncu O. The Manchester operation for uterine prolapse. *Int J Gynecol Obstet* 2006; 92:228-33.
44. Dietz V, Schraffordt Koops SE, van der Vaart CH. Vaginal surgery for uterine descent; which options do we have? A review of the literature. *Int Urogynecol J Pelvic Floor Dysfunct* 2009; 20:349-56.
45. Skiadas CC, Goldstein DP, Laufer MR. The Manchester-Fothergill procedure as a fertility sparing alternative for pelvic organ prolapse in young women. *J Pediatr Adolesc Gynecol* 2006; 19:89-93.
46. Wan OY, Cheung RY, Chan SS, Chung TK. Risk of malignancy in women who underwent hysterectomy for uterine prolapse. *Aust N Z J Obstet Gynaecol* 2013; 53:190-6.
47. Kleeman SD, Karram MM. Vaginal vault prolapse. In: Rock JA Jr, Jones HW III, editors. Te Linde's operative gynecology. 10th ed. *Philadelphia: Lippincott Williams & Wilkins*; 2008: 928-9.
48. Goldman J, Ovadia J, Feldberg D. The Neugebauer-Le Fort operation: a review of 118 partial colpocleises. *Eur J Obstet Gynaecol Reprod Biol* 1985; 12:31-5.
49. Crisp CC, Book NM, Cunkelman JA, Tieu AL, Pauls RN; Society of Gynecologic Surgeons' Fellows' Pelvic Research Network. Body image, regret, and satisfaction 24 weeks after colpocleisis: a multicenter study. *Female Pelvic Med Reconstr Surg* 2016; 22:132-5.
50. Lensen EJ, Withagen MI, Kluivers KB, Milani AL, Vierhout ME. Urinary incontinence after surgery for pelvic organ prolapse. *Neurourol Urodyn* 2013; 32:455-9.
51. Kleeman S, Vassallo B, Segal J, Hungler M, Karram M. The ability of history and a negative cough stress test to detect occult stress incontinence in patients undergoing surgical repair of advanced pelvic organ prolapse. *Int Urogynecol J Pelvic Floor Dysfunct* 2006; 17:27-9.
52. Svenningsen R, Borstad E, Spydslaug AE, Sandvik L, Staff AC. Occult incontinence as predictor for postoperative stress urinary incontinence following pelvic organ prolapse surgery. *Int Urogynecol J* 2012; 23:843-9.
53. Borstad E, Abdelnoor M, Staff AC, Kulseng-Hanssen S. Surgical strategies for women with pelvic organ prolapse and urinary stress incontinence. *Int Urogynecol J* 2010; 21:179-86.
54. van der Ploeg JM, van der Steen A, Oude Rengerink K, van der Vaart CH, Roovers JP. Prolapse surgery with or without stress incontinence surgery for pelvic organ prolapse: a systematic review and meta-analysis of randomised trials. *BJOG* 2014; 121:537-47.
55. Visco AG, Brubaker L, Nygaard I, et al. The role of preoperative urodynamic testing in stress-continent women undergoing sacrocolpopexy: the Colpopexy and Urinary Reduction Efforts (CARE) randomized surgical trial. *Int Urogynecol J Pelvic Floor Dysfunct* 2008; 19:607-14.
56. Wei JT, Nygaard I, Richter HE, et al. A midurethral sling to reduce incontinence after vaginal prolapse repair. *N Engl J Med* 2012; 336:2358-67.
57. Law TS, Cheung RY, Chung TK, Chan SS. Efficacy and outcomes of transobturator tension-free vaginal tape with or without concomitant pelvic floor repair surgery for urinary stress incontinence: five-year follow-up. *Hong Kong Med J* 2015; 21:333-8.