Urinary Incontinence after Caesarean Section in Hong Kong Chinese Women

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Objectives: To assess the prevalence of urinary incontinence in Chinese women after undergoing Caesarean section and its possible risk factors.
Methods: This prospective cohort study was conducted in the postnatal wards of Queen Elizabeth Hospital, a tertiary hospital in Hong Kong. All Chinese women, with no history of vaginal delivery, who delivered by Caesarean section in our unit from March 2007 to September 2010 were recruited. Respondents' quality of life was assessed by the validated Chinese version of Urogenital Distress Inventory. The same questionnaire was used to assess the condition of the respondents 3 months after delivery.
Results: Among the 680 women recruited, 374 (55%) reported urinary incontinence during pregnancy. The frequency dropped to 7% (n=39) 3 months after delivery. Age, parity, mode of Caesarean section, and practice of pelvic floor exercises during pregnancy all affected the prevalence of urinary incontinence as well as stress incontinence during pregnancy. Age, pre-pregnant body mass index, and stress incontinence during pregnancy were associated with stress incontinence 3 months post-delivery.
Conclusion: About 90% of the women who complained of urinary incontinence during pregnancy noted resolution of their symptoms 3 months after delivery. Notably, persons aged ≥37 years, overweight before pregnancy, and having de-novo urinary incontinence during pregnancy were at risk of postpartum stress incontinence even after Caesarean section. Thus, elective Caesarean section may not be advisable solely as a means of preventing or reducing urinary incontinence.
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Keywords: Cesarean section; Prevalence; Risk factors; Urinary incontinence

Introduction

Urinary incontinence is a pelvic floor functional disorder that increases with age but is also present in young people. Postnatal urinary incontinence is a common occurrence, which affects 3-30% of women[1-3]. It affects both physical and psychological aspects of the individual. It also imposes huge medical and economic burdens on society[4,5].

During pregnancy, the female genitourinary system undergoes both anatomical and physiological changes due to the hormonal effects as well as direct pressure by the gravid uterus. The progesterone effect on smooth muscle relaxation and ureteral enlargement may predispose to stress urinary incontinence in the future. Various studies[6-9] suggest that vaginal delivery has a detrimental effect on the pelvic floor. In particular, the pelvic floor supportive tissues may be traumatised by direct laceration[10], muscle distension[11], or injury to the pudendal nerves[12].

It has been proposed that elective Caesarean section may prevent pelvic floor dysfunction by avoiding direct trauma to the pelvic floor and pudendal nerves which may occur during fetal passage through the vaginal canal[3,8]. However, neurophysiological injuries can also occur during the antenatal period. Thus, it still remains uncertain whether Caesarean section protects the patient from subsequent risk of long-term pelvic floor dysfunction, and to what extent the mode of subsequent deliveries affects outcomes[13].

Caesarean section is common nowadays; in Queen Elizabeth Hospital, the rate has increased from 18% in 1998 to 27% in 2010. This study aimed to: (1) investigate the prevalence of urinary incontinence 3 months after Caesarean delivery, and (2) identify possible risk factors for postnatal urinary incontinence in those who have never given birth vaginally.

Methods

This was a prospective cohort study of Caesarean deliveries between 1 March 2007 and 30 September 2010

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conducted in the postnatal ward of the Queen Elizabeth Hospital, a tertiary obstetric facility in Hong Kong. During the study period, consecutive Chinese parturients with singleton pregnancies, with no history of a previous vaginal delivery, who delivered by Caesarean section for the index pregnancy, and who consented to entering our study were recruited and followed up 3 months postpartum. Women who were unable to give informed consent, unable to complete the questionnaires, or unwilling to participate were excluded. Ethics approval was granted by the local institution, and written informed consent was obtained from each patient by a research assistant. We expected the point prevalence of post-Caesarean urinary incontinence in Chinese women to be 4.3%, as reported by Yang et al[14]. Assuming our study would yield a similar figure (about 5%) with a dropout rate of 20%, a sample of 650 was derived as necessary to yield a 95% confidence interval with ± 1.7% error[15].

The Urogenital Distress Inventory Short Form (UDI-6) questionnaire was used to assess the impact of the urinary incontinence on the respondents (Appendix 1). It entailed urinary incontinence–specific psychometric questions dealing with six items which provided information over three domains: irritative symptoms (items 1 and 2), stress symptoms (items 3 and 4), and obstructive / discomfort symptoms (items 5 and 6). Specific items in UDI-6 provide predictive information regarding urodynamic findings in female subjects[16,17]. Demographic and obstetric data were also collected (Appendix 2). Participants were interviewed with the same questionnaire via telephone 3 months after delivery.

The Statistical Package for the Social Sciences Windows version 19.0 (SPSS Inc., Chicago [IL], US) was used for data management and analysis. Results were presented as mean ± standard deviation. Categorical variables were compared using Chi-square or Fisher's exact tests, and the Student's *t* test was used to compare continuous variables. Any p value of <0.05 was considered statistically significant.

Results

From 1 March 2007 to 30 September 2010, 680 eligible patients gave their consent to participate in the study. Regarding these respondents, their mean age was 32 (range, 16-44) years, mean maturity at delivery was 38 (range, 25-42) weeks, mean parity was 0 (range, 0-5), mean body mass index (BMI) before pregnancy was 22 (range, 12-34) kg/m^2, and the mean birth weight of their babies was 3.1 (range, 0.7-4.5) kg. Regarding their mode of Caesarean delivery, in 377 (55%) it was an emergency procedure while in 303 (45%) it was an elective operation. Moreover, 192 (28%) of the respondents stated they had constipation during their pregnancy, and 204 (30%) stated they practised pelvic floor exercises during the antenatal period.

Incontinence during Pregnancy

The point prevalence of urinary incontinence during pregnancy was 55% (374/680), whilst 24% (n=163) had urge incontinence and 53% (n=361) had stress urinary incontinence. Women who had urinary incontinence during pregnancy were more likely to be older, multiparous, liable to have emergency Caesarean sections, and less likely to have practised pelvic floor exercise during pregnancy (Table 1). With regard to the group with stress incontinence, the same associations were present (Table 2).

Incontinence after Delivery

Of the 680 women recruited, only 535 could be contacted via phone 3 months after delivery, resulting in a dropout rate of 21%. The overall urinary incontinence rate had decreased to 7% (39/535); 15 (3%) had urge incontinence and 32 (6%) had stress incontinence. Of the 39 women who had postpartum urinary incontinence, 33 of these had persistent symptoms. For those who had postpartum urinary incontinence, they tended to have undergone elective operations and had urinary or stress incontinence during pregnancy (Table 3). With regard to respondents with stress incontinence, they tended to be older, heavier before pregnancy, and had had urinary stress incontinence or just urinary incontinence during their pregnancy (Table 4).

Discussion

Caesarean section was once considered a means of preserving pelvic floor function. It is clear that in young and middle-aged women, vaginal delivery increases the risk of pelvic floor disorders by two- to three-fold[18-20]. Iosif and Ingemarsson[21] showed that stress urinary incontinence could also occur after elective Caesarean delivery, but much less frequently than after vaginal birth. In the International Randomized Term Breech Trial[22], 4.5% of the women having planned Caesarean sections had urinary incontinence 3 months postpartum. Boyles et al[23] carried out a population-based survey, which recruited 5599 primigravida in Oregon, and found that the frequency of urinary incontinence at 3 to 6 months postpartum in the Caesarean section group was 6%. The EPINCONT study in Norway[24] also showed that the point prevalence of urinary incontinence in the Caesarean section–only group could be as high as 15.9% (compared to 10.1% in the nulliparous

Table 1. Urinary incontinence during pregnancy

Characteristic	Mean ± standard deviation or No. (%)		p Value
	Urinary incontinence (n=374)	No urinary incontinence (n=306)	
Age (years)	32.6 ± 4.4	31.9 ± 4.5	0.042
Maturity at delivery (weeks)	38.2 ± 1.8	38.2 ± 2.4	0.74
Parity			0.040
Primiparous	203 (54)	190 (62)	
Multiparous	171 (46)	116 (38)	
Body weight before pregnancy (kg)	53.7 ± 8.6	52.9 ± 7.9	0.195
Body mass index before pregnancy (kg/m^2)	21.6 ± 3.2	21.3 ± 3.0	0.218
Body weight of baby (kg)	3.2 ± 0.5	3.1 ± 0.6	0.137
Mode of Caesarean section			0.039
Elective	180 (48)	123 (40)	
Emergency	194 (52)	183 (60)	
Constipation			0.811
Yes	107 (29)	85 (28)	
No	267 (71)	221 (72)	
Pelvic floor exercise			0.001
Yes	132 (35)	72 (24)	
No	242 (65)	234 (76)	

Table 2. Stress incontinence during pregnancy

Characteristic	Mean ± standard deviation or No. (%)		p Value
	Stress incontinence (n=361)	No stress incontinence (n=319)	
Age (years)	32.7 ± 4.4	32.0 ± 4.6	0.034
Maturity at delivery (weeks)	38.2 ± 1.9	38.1 ± 3.0	0.337
Parity			0.034
Primiparous	195 (54)	198 (62)	
Multiparous	166 (46)	121 (38)	
Body weight before pregnancy (kg)	53.7 ± 8.6	53.0 ± 7.9	0.274
Body mass index before pregnancy (kg/m^2)	21.6 ± 3.2	21.3 ± 3.0	0.224
Body weight of baby (kg)	3.2 ± 0.5	3.1 ± 0.6	0.152
Mode of Caesarean section			0.042
Elective	174 (48)	129 (40)	
Emergency	187 (52)	190 (60)	
Constipation			0.990
Yes	102 (28)	90 (28)	
No	259 (72)	229 (72)	
Pelvic floor exercise			0.001
Yes	128 (35)	76 (24)	
No	233 (65)	243 (76)	

Table 3. Urinary incontinence 3 months after delivery

Characteristic	Mean ± standard deviation or No. (%)		p Value
	Urinary incontinence (n=39)	No urinary incontinence (n=496)	
Age (years)	33.7 ± 4.8	32.3 ± 4.4	0.054
Maturity at delivery (weeks)	38.7 ± 2.2	38.1 ± 2.7	0.178
Parity			0.317
Primiparous	20 (51)	295 (59)	
Multiparous	19 (49)	201 (41)	
Body weight before pregnancy (kg)	54.8 ± 9.3	53.3 ± 8.5	0.304
Body mass index before pregnancy (kg/m^2)	22.4 ± 3.2	21.4 ± 3.2	0.081
Body weight of baby (kg)	3.2 ± 0.5	3.1 ± 0.6	0.163
Mode of Caesarean section			0.049
Elective	23 (59)	212 (43)	
Emergency	16 (41)	284 (57)	
Constipation (pregnancy)			0.694
Yes	12 (31)	138 (28)	
No	27 (69)	358 (72)	
Constipation (3 months)			0.329
Yes	7 (18)	62 (13)	
No	32 (82)	434 (87)	
Pelvic floor exercise (pregnancy)			0.966
Yes	12 (31)	151 (30)	
No	27 (69)	345 (70)	
Pelvic floor exercise (3 months)			0.548
Yes	17 (44)	192 (39)	
No	22 (56)	304 (61)	
Urinary incontinence during pregnancy			<0.001
Yes	33 (85)	258 (52)	
No	6 (15)	238 (48)	
Stress incontinence during pregnancy			<0.001
Yes	33 (85)	248 (50)	
No	6 (15)	248 (50)	

group and 21% in the vaginal delivery group). Based on these findings, it was concluded that there was no difference in incontinence rates in older women (aged 50-64 years) and that a very large increase in Caesarean section rate would be necessary to decrease the incontinence rate by 5-10%. It therefore seemed that Caesarean section was not an ideal solution for pelvic floor dysfunction. The development of postpartum urinary incontinence is multi-factorial. We carried out this study in order to identify particular groups who might benefit from elective Caesarean section.

We chose to review the respondents' continence status 3 months after delivery, instead of after a longer period to avoid recall bias. Earlier review also eliminates factors which may present in older women and affects the liability to incontinence, such as diabetes mellitus, obesity, faecal impaction, stroke, and oestrogen depletion.

Effects of Age and Body Mass Index before Pregnancy

Our study showed that age and BMI before pregnancy were the two factors that were significantly associated with stress incontinence 3 months after delivery.

Age is a well-known risk factor for urinary

Table 4. Stress incontinence 3 months after delivery

Characteristic	Mean ± standard deviation or No. (%)		p Value
	Stress incontinence (n=32)	No stress incontinence (n=503)	
Age (years)	33.9 ± 4.7	32.3 ± 4.4	0.048
Age-group			0.027
<37 Years	22 (69)	422 (84)	
≥37 Years	10 (31)	81 (16)	
Maturity at delivery (weeks)	38.9 ± 2.4	38.1 ± 2.6	0.109
Parity			0.293
Primiparous	16 (50)	299 (59)	
Multiparous	16 (50)	204 (41)	
Body weight before pregnancy (kg)	56.3 ± 8.8	53.2 ± 8.5	0.051
Body mass index before pregnancy (kg/m^2)	22.9 ± 3.1	21.4 ± 3.2	0.013
Body mass index			0.023
≤23 kg/m^2	18 (56)	375 (75)	
>23 kg/m^2	14 (44)	128 (25)	
Body weight of baby (kg)	3.2 ± 0.5	3.1 ± 0.6	0.304
Mode of Caesarean section			0.148
Elective	18 (56)	217 (43)	
Emergency	14 (44)	286 (57)	
Constipation (pregnancy)			0.991
Yes	9 (28)	141 (28)	
No	23 (72)	362 (72)	
Constipation (3 months)			0.309
Yes	6 (19)	63 (13)	
No	26 (81)	440 (87)	
Pelvic floor exercise (pregnancy)			0.921
Yes	10 (31)	153 (30)	
No	22 (69)	350 (70)	
Pelvic floor exercise (3 months)			0.852
Yes	13 (41)	196 (39)	
No	19 (59)	307 (61)	
Urinary incontinence during pregnancy			<0.001
Yes	28 (87)	263 (52)	
No	4 (13)	240 (48)	
Stress incontinence during pregnancy			<0.001
Yes	28 (87)	253 (51)	
No	4 (13)	250 (49)	

incontinence. In our study, maternal age of ≥37 years was associated with stress incontinence after delivery (p=0.027). It is possible that the degenerative changes in the pelvic floor at an older age cause increase symptoms. Some studies[1,6,25,26] have shown that older maternal age at first birth was associated with more urinary incontinence. In our study, maternal BMI before pregnancy was associated with stress incontinence after delivery. Glazener et al[19] found that mothers with higher pre-pregnant BMIs (>25 kg/m^2, i.e. overweight subjects based on Caucasian criteria) were more likely to be incontinent after delivery. A cut-off BMI of 23 kg/m^2 (Chinese criteria for overweight)[27] was used

in our study, as all our respondents were Chinese, and we too showed that being overweight was a risk factor for postpartum stress incontinence (p=0.023).

Effect of Parity

Parity is a commonly mentioned risk factor for urinary incontinence. MacArthur et al[26] concluded that having four or more births was significantly associated with more urinary incontinence. Our study showed that parity was associated with some sort of urinary incontinence during, but not necessarily after, pregnancy. Since we excluded those with a history of vaginal delivery, the effect of muscle trauma during the process of labour in previous pregnancies was eliminated.

Furthermore, the majority of our respondents (>90%) had had two or less deliveries (including the index pregnancy). The high point prevalence of urinary incontinence during pregnancy was most likely due to mechanical effects together with the hormonal effects of pregnancy on the pelvic floor, which were expected to cease soon after delivery. A larger number of women with higher order of parity would be needed to reflect the true effect of this factor on urinary incontinence, and specifically on stress incontinence, after deliveries by Caesarean section only.

Effect of Pelvic Floor Muscle Training

The practice of pelvic floor exercises was found protective against both overall urinary incontinence and stress incontinence during pregnancy, but not afterwards. A Cochrane review in 2012[28] concluded that intensive pelvic floor muscle training (PFMT) is useful in the prevention of de-novo urinary incontinence during pregnancy as well as for treatment of persistent symptoms 3 months after delivery (and possibly up to 12 months postpartum). We failed to demonstrate the effect of PFMT in the postpartum period. This may due to the lack of standardisation for the frequency of PFMT and how it was done.

Effect of Mode of Caesarean Section

Among women who were incontinent during pregnancy, Wesnes et al[29] noted the risk of incontinence 6 months postpartum was significantly greater after acute non-elective Caesarean section (intended spontaneous vaginal delivery) than elective Caesarean section. On the contrary, in our series, respondents who underwent elective Caesarean section were more likely to have persistent urinary incontinence after delivery. The majority (66%) of the respondents who underwent elective Caesarean section were multiparous, while 76% of those having emergency Caesarean sections were primiparous. Damage to muscles and nerves during previous pregnancies and deliveries may account for persistent urinary incontinence in the index pregnancy.

Conclusion

The results of our study showed that 7% of the women who had had Caesarean sections exclusively still experienced incontinence 3 months after delivery. Although higher parity, emergency Caesarean section, and lack of practice of pelvic floor exercises were all significantly associated with urinary incontinence during pregnancy, the importance of these factors were still uncertain, as their symptoms resolved postpartum in almost 90% of the sufferers.

Age, pre-pregnant BMI, and history of incontinence during pregnancy were all associated with stress incontinence after delivery. Those aged ≥37 years, who were overweight before pregnancy, and who developed de-novo urinary incontinence during pregnancy were all at risk of postpartum stress incontinence even after Caesarean section, and thus elective Caesarean section may not be advisable. Other obstetric risk factors were found to be non-significant. Further studies with longer follow-up after delivery would yield more information to identify women who will benefit from elective Caesarean section in reducing urinary incontinence.

Appendices

Additional material related to this article can be found on the HKJGOM website. Please go to <http://www.hkjgom.org>, search for the appropriate article, and click on Full Text (PDF).

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Appendix 1. Urogenital Distress Inventory Short Form

Do you experience, and, if so, how much are you bothered by:

- frequent urination?
- leakage related to feeling of urgency?
- leakage related to activity, coughing, or sneezing?
- small amounts of leakage (drops)?
- difficulty emptying bladder?
- pain or discomfort in lower abdominal or genital area?

Appendix 2. Demographics and obstetric data part of questionnaire

Age (years): _____

Occupation: _____

Parity: _____

Maturity: _____

Past medical health: _____

Obstetric history: _____

Body weight before pregnancy (kg): _____

Body height (m): _____

Body mass index before pregnancy (kg/m^2): _____

Mode of delivery: Emergency / Elective Caesarean section

Indication for Caesarean section: _____

Body weight of baby (kg): _____