

# Ultrasonographic tracking of the proximal humerus during second stage of labour for detection of shoulder dystocia

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We conducted a pilot study of ultrasonographic tracking of anterior shoulder engagement at the second stage of labour to look for any warning sign for shoulder dystocia in 12 women.

*Keywords: Shoulder dystocia; Ultrasonography*

## Introduction

Traditionally, shoulder dystocia can only be observed through the 'turtle sign' after delivery of fetal head. The International Society of Ultrasound in Obstetrics and Gynaecology recommends that ultrasonography be used to ascertain fetal head position and station before considering instrumental vaginal delivery<sup>1</sup>. Ultrasonographic examination of the scapular orientation to determine shoulder engagement has been reported<sup>2</sup>, as has continuous tracking of the proximal humerus (anterior shoulder) as direct visualisation of the shoulder engagement<sup>3</sup>. We carried out a pilot study to look for any warning sign of shoulder dystocia at the second stage of labour by continuous tracking of the proximal humerus.

## Methods

This study was approved by Kowloon Central / Kowloon East Cluster Research Ethics Committee (reference: KC/KE-19-0160/ER-4). From January 2016 to August 2018, 12 non-consecutive women with full-term singleton pregnancy at risk of shoulder dystocia were recruited. The risk factors included short stature, macrosomia, previous shoulder dystocia, oxytocin augmentation, prolonged second stage, and vacuum extraction (Table 1). The ultrasonographic probe was

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**Table 1. Demographics of the 12 women**

Case	Age, y	Parity	Gestation, weeks	Risk factors for shoulder dystocia	Onset of labour
1	31	1	39	Short stature, polyhydramnios, prolonged second stage	Induction of labour
2	26	0	40	Nil	Augmentation
3	40	3	38	Previous macrosomia, gestational diabetes mellitus / large for gestational age	Induction of labour
4	40	1	39	Previous shoulder dystocia, gestational diabetes mellitus	Induction of labour
5	40	0	38	Prolonged second stage	Induction of labour
6	32	0	38	Polyhydramnios, prolonged second stage	Induction of labour
7	34	0	39	Maternal fever, prolonged second stage	Induction of labour
8	22	0	38	Nil	Induction of labour
9	31	0	39	Hypertension	Induction of labour
10	27	1	39	Large for gestational age, prolonged second stage	Induction of labour
11	40	0	39	Gestational diabetes mellitus, large for gestational age	Induction of labour
12	26	0	39	Pre-eclampsia, prolonged second stage	Induction of labour

placed sagittally and perpendicular to the suprapubic region of the maternal abdomen. The proximal humerus was traced continuously from the expulsive phase before crowning of the fetal head until the delivery of the baby.

## Results

Two phases of anterior shoulder engagement were observed. For the nine women without shoulder dystocia, the proximal humerus of the baby moved downwards simultaneously with the descent of the baby head at the initial phase, followed by the disappearance of the proximal humerus just before delivery of the baby head (Figure 1). For the three women complicated by shoulder dystocia, the proximal humerus of the baby descended horizontally at the initial phase, and the proximal humerus was persistently visualised above the pubic symphysis even after delivery of the baby head (Figure 2). All babies were delivered by external or internal manoeuvres within 2 minutes of

delivery of the baby head. There were no adverse birth outcomes (Table 2).

## Discussion

To the best of my knowledge, we are the first to study the shoulder engagement of the baby by ultrasonographic tracking of the proximal anterior humerus during delivery. Although the time interval between the ultrasonographic findings and occurrence of shoulder dystocia is short, this finding may be a potential warning sign for shoulder dystocia. Further research with a larger sample size is needed to verify these ultrasonographic observations, which can be classified into normal delivery and complicated by shoulder dystocia. On speculation, those with clavicular fracture may represent an intermediate group.

## Conclusion

Engagement of the anterior shoulder during the



Figure 1. Normal engagement of the anterior shoulder by transabdominal ultrasonography (sagittal plane over suprapubic region).



Figure 2. Second phase of shoulder engagement upon crowning/delivery of the baby head: (a) normal engagement of anterior shoulder with disappearance of the proximal humerus (asterisk), (b) persistence visualisation of the proximal humerus in a case of shoulder dystocia (asterisk), and (c) schematic representation.

**Table 2. Transabdominal ultrasonographic findings and pregnancy outcome**

Case	Fetal head position	Direction during descent	Proximal anterior humerus seen above pubis		Mode of delivery	Birth weight, kg	Apgar score	Shoulder dystocia	Remarks
			At crowning	At head out					
1	Direct occiput anterior	Downward	Yes	No	Normal spontaneous	3.82	8, 9	No	-
2	Left occiput anterior	Downward	Yes	No	Normal spontaneous	3.18	8, 9	No	-
3	Direct occiput anterior	Downward	Yes	No	Normal spontaneous	4.3	10, 10	No	-
4	Right occiput anterior	Downward	No	No	Normal spontaneous	3.78	9, 10	No	-
5	Right occiput anterior	Downward	No	No	Vacuum extraction	3.01	8, 9	No	-
6	Right occiput posterior	Downward	Yes	No	Vacuum extraction	3.21	8, 9	No	-
7	Right occiput anterior	Horizontal	Yes	Yes	Vacuum extraction	3.58	8, 10	Yes	Head to delivery interval=1 min 40 sec, delivered by posterior arm
8	Right occiput posterior	Horizontal then Downward	Yes	No	Vacuum extraction (non-reassuring fetal status)	2.81	9, 10	No	Fracture left clavicle
9	Right occiput transverse	Horizontal then Downward	Yes	Yes	Vacuum extraction (non-reassuring fetal status)	2.56	8, 9	Yes	Head to delivery interval=1 min, delivered by posterior arm
10	Right occiput anterior	Horizontal then downward	Yes	Yes (bounced back after transient engagement)	Vacuum extraction	3.85	9, 10	Yes	Head to delivery interval=30 sec, delivered by McRobert & suprapubic pressure
11	Right occiput posterior	Downward	No	No	Vacuum extraction (non-reassuring fetal status)	3.74	9, 10	No	-
12	Right occiput posterior	Downward	No	No	Vacuum extraction (4 pulls)	3.01	8, 9	No	-

second stage of labour can be observed by transabdominal ultrasonography. Difference between those with and without shoulder dystocia are observed.

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### Declaration

The authors have no conflicts of interest to disclose. An abstract of a study of our first nine cases has been published in: WL Lau, V Ng, L Lai, et al. OC16.05: Sonographic assessment of shoulder engagement and a novel sign in early recognition of shoulder dystocia. *Ultrasound Obstet Gynecol* 2018;52(Suppl 1):1-65.

## Author contributions

WLL was responsible for literature review, data collection, result interpretation, and manuscript writing.

VC and VN contributed to manuscript review. All authors approved the final version to be published and agreed to be accountable for the accuracy and integrity of the work.

## References

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1. Ghi T, Eggebø T, Lees C, et al. ISUOG Practice Guidelines: intrapartum ultrasound. *Ultrasound Obstet Gynecol* 2018;52:128-39. [Crossref](#)
2. Volpe N, Migliavacca C, Dall'Asta A, et al. Intrapartum ultrasound examination of fetal shoulder following head delivery. *Ultrasound Obstet Gynecol* 2018;52:803-5. [Crossref](#)
3. WL Lau, V Ng, L Lai, et al. OC16.05: Sonographic assessment of shoulder engagement and a novel sign in early recognition of shoulder dystocia. *Ultrasound Obstet Gynecol* 2018;52(Suppl 1):1-65. [Crossref](#)