

Prevalence of obstetric anal sphincter injury following vaginal delivery in primiparous women: a retrospective analysis

Sonia PK Kwok, Osanna YK Wan, Rachel YK Cheung, LL Lee, Jacqueline PW Chung, Symphorosa SC Chan *

ABSTRACT

Introduction: Obstetric anal sphincter injuries (OASIS) may be underdetected in primiparous women. This study evaluated the prevalence of OASIS in primiparous women after normal vaginal delivery or instrumental delivery using endoanal ultrasound (US) during postnatal follow-up.

Methods: This study retrospectively analysed endoanal US data collected during postnatal follow-up (6-12 months after vaginal delivery) at a tertiary hospital in Hong Kong. Offline analysis to determine the prevalence of OASIS was performed by two researchers who were blinded to the clinical diagnosis. Symptoms of faecal and flatal incontinence were assessed with the Pelvic Floor Distress Inventory.

Results: Of 542 women included in the study, 205 had normal vaginal delivery and 337 had instrumental delivery. The prevalence of OASIS detected by endoanal US was 7.8% (95% confidence interval [CI]=4.1%-11.5%) in the normal vaginal delivery group and 5.6% (95% CI=3.1%-8.1%) in the instrumental delivery group. Overall, 82.9%

of women with OASIS on endoanal US did not show clinical signs of OASIS. Birth weight was significantly higher in the OASIS group ($P=0.012$). At 6 to 12 months after delivery, 5.5% of women reported faecal incontinence and 17.9% reported flatal incontinence, but OASIS was not associated with these symptoms.

Conclusions: Additional training for midwives and doctors may improve OASIS detection.

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New knowledge added by this study

- The prevalence of obstetric anal sphincter injury in primiparous women was 7.8% in the normal vaginal delivery group and 5.6% in the instrumental delivery group.
- Most obstetric anal sphincter injuries, as determined by endoanal ultrasound, were not detected clinically. At 6 to 12 months after delivery, obstetric anal sphincter injuries were not associated with symptoms of faecal or flatal incontinence, but a longer-term study is needed to confirm these findings.

Implications for clinical practice or policy

- Obstetric anal sphincter injuries occur at similar rates during normal vaginal delivery and instrumental delivery. Detailed vaginal and rectal examinations are recommended after both types of deliveries.
- Additional training for midwives and doctors may improve the detection of obstetric anal sphincter injury.

Introduction

Obstetric anal sphincter injuries (OASIS) is a serious complication of vaginal delivery that is associated with an increased risk of anal incontinence (complaint of involuntary loss of faeces or flatus).¹ The incidence of OASIS is reportedly much lower in Hong Kong (0.32%) than in other countries, such as the United Kingdom, Norway, and Sweden (2.9%-4.2%).²⁻⁵ This could be affected by a number of factors. First, delivery practices in Hong Kong are quite different from elsewhere in the world, such

that they include the use of a hands-on approach to protect the perineum and liberal use of episiotomy.⁶ The episiotomy rates are reportedly high in Hong Kong: 83.7% for primiparous women and 54.8% for multiparous women.⁵ Moreover, in Hong Kong, a left mediolateral episiotomy is used, whereas midline episiotomy or right mediolateral episiotomy are used in many other parts of the world.⁷ Second, there may be ethnic differences in pelvic floor biometry. In particular, Chinese women have a smaller hiatal dimension and reduced pelvic organ mobility.⁸ It is

初產婦於陰道分娩後患有肛門括約肌損傷的患病率：回顧性研究

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引言：初產婦於陰道分娩後，臨床檢查有可能未能完全檢測到肛門括約肌的損傷。本研究透過為初產婦於陰道分娩後，在產後覆診期間，使用肛門超聲波 探測肛門括約肌的損傷，從而得出肛門括約肌損傷的患病率。

方法：本研究回顧性分析在香港一所大學醫院於產後覆診（陰道分娩後6-12個月）期間收集的肛門超聲波數據。兩名對臨床診斷不知情的研究人員各自分析超聲波數據，以得出肛門括約肌損傷的患病率。使用經驗證的盆底功能障礙簡表（PFDI）對糞便失禁症狀進行評估。

結果：研究包括542名女性，其中205名屬於陰道正常分娩，337名屬於儀器助產陰道分娩。在正常陰道分娩的女性中，透過使用肛門超聲波檢測到的肛門括約肌損傷的患病率為7.8%（95%置信區間：4.1%-11.5%），儀器助產陰道分娩的女性的患病率為5.6%（95%置信區間：3.1%-8.1%）。82.9%用超聲波測出有肛門括約肌受損的個案並未能於臨床檢查中診斷。肛門括約肌受損者的嬰兒出生體重顯著較沒有受損的重（ $P=0.012$ ）。分娩後6至12個月，5.5%女性出現大便失禁的症狀，17.9%女性出現屁失禁的症狀，但這些症狀與肛門括約肌損傷並無關聯。

結論：加強培訓助產士和醫生有可能改善臨床檢查時對肛門括約肌損傷的診斷。

unclear how these differences in practice and pelvic floor biometry influence the incidence of OASIS.

Importantly, it is also possible that the reduced incidence of OASIS in Hong Kong is a result of underdetection. In a recent local prospective observational study, women were assessed by a single experienced clinician via rectal examination after either normal or instrumental vaginal delivery; the results of that study showed that the incidence of OASIS in primiparous Asian women in Hong Kong was 10%,⁶ which suggests that the OASIS rate might be higher than previously published. Obstetric anal sphincter injuries that are identified after an extended interval (such as during postnatal follow-up) is regarded as occult OASIS. There is limited information in the literature regarding occult OASIS; thus far, studies have been conducted in the United Kingdom and Australia.^{9,10}

The use of endoanal ultrasound (US) may facilitate identification of OASIS.¹¹ Endoanal US comprises a non-invasive assessment modality and is regarded as the gold standard in studies of anal sphincter injury.^{9,11} Moreover, all cases of clinically identified OASIS can also be identified on endoanal US.⁹ The aim of this study was to determine the prevalence of OASIS in primiparous women after normal vaginal delivery or instrumental delivery using endoanal US during postnatal follow-up.

Understanding the prevalence and detection rates of OASIS can help inform training policies for midwives and doctors on the awareness and detection of OASIS.

Methods

Patients and study design

This was a retrospective analysis of archived US volumes from two previously published studies that were performed at a tertiary university hospital in Hong Kong. The initial study recruited 442 nulliparous women in the first trimester, during the period from August 2009 to September 2010.^{12,13} The second study recruited 292 primiparous women at 1 to 3 days after instrumental delivery, during the period from September 2011 to May 2012. None of the women in either study reported symptoms of pelvic floor disorders, including faecal incontinence to solid or loose stool, before pregnancy.¹⁴ Details of deliveries, including any occurrence of perineal tearing, were recorded after each delivery. Ethics approval was obtained from The Joint Chinese University of Hong Kong–New Territories East Cluster Clinical Research Ethics Committee (Ref CRE-2013.332). The STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines were followed in the preparation of this report.¹⁵

Delivery and immediate assessment

Generally, each woman underwent perineal examination by the attending midwife or doctor who conducted the delivery, immediately after vaginal delivery. This information was immediately recorded in the medical record. Third- or fourth-degree tears were assessed and repaired by a trained obstetrician. The anorectal mucosa was repaired by continuous or interrupted sutures with 3-O Vicryl. Internal anal sphincter tears were repaired separately by interrupted end-to-end sutures with 2-O Vicryl. External anal sphincter (EAS) tears were repaired by overlapping or end-to-end sutures with 2-O Vicryl. Perineal muscles and the vagina were repaired with 2-O Vicryl. The diagnosis and operative record of each woman were immediately entered into the electronic medical record. The degree of perineal tear was defined using Sultan's classification of perineal trauma.¹⁶

Follow-up assessment

During postnatal follow-up (6-12 months after delivery), the urinary, bowel, and prolapse symptoms of each woman, as well as their quality of life, were assessed using the Chinese Pelvic Floor Distress Inventory (PFDI) and Pelvic Floor Impact Questionnaire (PFIQ).¹⁷ Assessment of the anal sphincter was performed with endoanal US using a

10-MHz 360-degree rotating probe (Focus 400, BK Medical; Gentofte, Denmark) with the woman in the lithotomy position. Automatic image acquisition was performed with two volumes stored for each woman.

Blinded offline analysis of endoanal ultrasound

Offline analysis of the endoanal US volumes was performed in 2018 by two experienced obstetricians (OYKW, SSCC) who were blinded to the clinical diagnosis and questionnaire information. An anal sphincter defect was defined as a discontinuity of >30 degrees in endosonographic images of the internal (hypoechoic ring) and/or external (mixed echogenic ring) sphincters.¹⁸ A partial-thickness EAS injury was defined as a defect of <50% thickness of the EAS, whereas a defect of >50% of the EAS was regarded as a full-thickness injury. We considered any EAS and/or internal anal sphincter injury to be OASIS. This follows the clinical classification of OASIS by Sultan.¹⁶ Each researcher reviewed all endoanal US volumes independently. Any discrepancies were resolved by consensus review of the relevant US volumes.

Definitions of incontinence

The PFDI and PFIQ are comprehensive validated instruments which assess the symptoms and impact of pelvic floor disorders.¹⁷ In this study, faecal incontinence was defined as an affirmative response to either item 38 (“Do you usually lose stool beyond your control if your stool is well formed?”) or item 39 (“Do you lose stool beyond your control if your stool is loose or liquid?”) of the PFDI. Flatal incontinence was defined as an affirmative response to item 40 (“Do you usually lose gas from the rectum beyond your control?”) of the PFDI.

Statistical analysis

Data were analysed by SPSS (Window version 22.0; IBM Corp, Armonk [NY], United States). Descriptive analyses were used to study the prevalence of OASIS on endoanal US. Means were compared between groups using the independent-samples *t* test. Comparisons of frequencies were made using the Chi squared test or Fisher’s exact test, where appropriate. Univariate analysis was performed to evaluate the influence of potential risk factors on OASIS. Differences with *P*<0.05 were considered to be statistically significant. Power calculations were not performed with regard to this specific research question, as this study comprised a subanalysis of two prior projects, as described earlier in this paper.

Results

Patient characteristics

A total of 544 women who had vaginal delivery were enrolled in this study; 207 had normal vaginal delivery and 337 had instrumental delivery (285 vacuum extraction, 52 forceps). Ultrasound images were suboptimal for two women who had normal vaginal delivery; these women were excluded from the analysis.

The demographic data and delivery information are shown in Table 1. Left mediolateral episiotomy was performed in 187 (91.2%) women in the normal vaginal delivery and 336 (99.7%) women in the instrumental delivery group. The duration of active second stage was longer in the instrumental delivery group than in the normal vaginal delivery group (62.7 ± 40.9 min vs 27.9 ± 22.4 min, *P*<0.005), as a prolonged second stage was the most common indication for instrumental delivery in this cohort (48.4%). More women had epidural analgesia in the instrumental delivery group than in the normal vaginal delivery group (15.7% vs 8.8%, *P*=0.028).

TABLE 1. Baseline characteristics of 542 women with vaginal delivery*

	All (n=542)	NVD (n=205)	Instrumental (n=337)	P value†
Maternal age at delivery (years)	30.8 ± 3.7	30.9 ± 3.4	30.8 ± 3.9	0.649
Maternal BMI at follow-up of this study (kg/m ²)	22.7 ± 3.0	22.8 ± 3.1	22.7 ± 3.0	0.897
Epidural analgesia	71 (13.1%)	18 (8.8%)	53 (15.7%)	0.028
Gestational age at delivery (weeks)	39.4 ± 1.2	39.3 ± 1.2	39.5 ± 1.3	0.079
Birth weight (kg)	3.14 ± 0.39	3.12 ± 0.39	3.15 ± 0.40	0.428
Duration of active second stage of labour (min)	49.6 ± 38.9	27.9 ± 22.4	62.7 ± 40.9	<0.005
Episiotomy	523 (96.5%)	187 (91.2%)	336 (99.7%)	<0.005
Clinical 3rd or 4th degree perineal tear	6 (1.1%)	0	6 (1.8%)	0.134

Abbreviations: BMI = body mass index; NVD = normal vaginal delivery

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

† Comparison between NVD and instrumental delivery groups

There was no significant difference between the normal vaginal delivery and instrumental delivery groups regarding the timing of endoanal US assessment ($P=0.22$).

Endoanal ultrasound findings and relationship of obstetric anal sphincter injuries with delivery factors

The Figure shows endoanal US images of intact anal sphincters, as well as sphincters with different degrees of OASIS. There were discrepancies or uncertainties in the endoanal US analysis of 16 women with respect to the diagnosis of OASIS. The two researchers determined the diagnoses of these women by consensus review; six were diagnosed with OASIS and 10 were regarded as normal.

The prevalence of clinically detected OASIS was 0% in the normal vaginal delivery group and 1.8% ($n=6$) in the instrumental delivery group. Table 2 shows that the prevalence of OASIS detected by endoanal US was 7.8% ($n=16$; 95% confidence interval [CI]=4.1%-11.5%) in the normal vaginal delivery group and 5.6% ($n=19$; 95% CI=3.1%-8.1%) in the instrumental delivery group ($P=0.415$). Twenty-nine (82.9%) women had OASIS, as detected by endoanal US, that was not diagnosed during clinical assessment immediately after delivery. Therefore, the occult OASIS rate was 7.8% (95% CI=4.1%-11.5%) in the normal vaginal delivery group and 3.8% (95% CI=1.8%-5.8%) in the instrumental delivery group. In addition, 63.6% ($n=21$) of occult EAS injuries comprised partial-thickness EAS injuries, whereas 36.4% ($n=12$) comprised full-thickness EAS injuries.

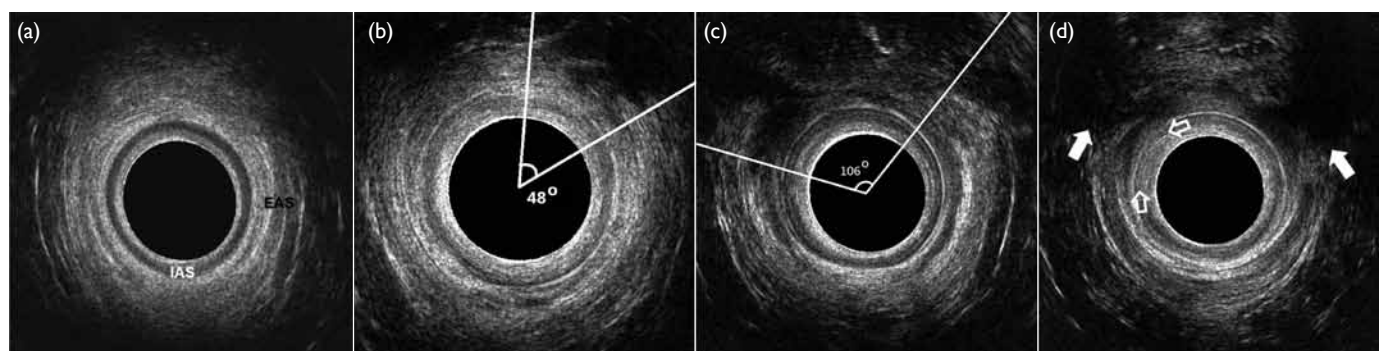


FIG. (a) Endoanal ultrasound of a 34-year-old woman after normal vaginal delivery. She was asymptomatic of anal incontinence. There was a complete hypoechoic ring (IAS) and mixed echogenic ring (EAS), signifying intact IAS and EAS with no OASIS. (b) Endoanal ultrasound of a 34-year-old woman after vacuum extraction. She was asymptomatic of anal incontinence. There was a hypoechoic defect of 48 degrees in the EAS involving less than half of the thickness of the EAS, indicating an occult partial-thickness EAS injury. The IAS was intact. (c) Endoanal ultrasound of a 29-year-old woman after vacuum extraction. She was diagnosed with a third degree (grade 3a) tear with repair done after delivery. A hypoechoic area in the EAS was present from 9 to 2 o'clock region (106 degrees) spanning the full thickness of the EAS; while the IAS was intact. She did not have symptoms of anal incontinence. (d) Endoanal ultrasound of a 30-year-old woman after normal vaginal delivery with occult anal sphincter injury. There was a hypoechoic area at 10 to 2 o'clock region (between solid arrows) involving full thickness of the EAS and a discontinuity in the hypoechoic ring which was the IAS at 9 to 11 o'clock (between arrow outlines), signifying both EAS and IAS injury. She was asymptomatic of anal incontinence. Abbreviations: EAS = external anal sphincter; IAS = internal anal sphincter; OASIS = obstetric anal sphincter injury

TABLE 2. Rate of OASIS detected by endoanal US*

	Total (n=542)	NVD (n=205)	Instrumental (n=337)	VE (n=285)	Fr (n=52)	P value†
EAS injury	33 (6.1%)	14 (6.8%)	19 (5.6%)	16 (5.6%)	3 (5.8%)	1.0
Partial-thickness EAS injury	21 (3.9%)	8 (3.9%)	13 (3.9%)	11 (3.9%)	2 (3.8%)	
Full-thickness EAS injury	12 (2.2%)	6 (2.9%)	6 (1.8%)	5 (1.8%)	1 (1.9%)	
IAS injury	8 (1.5%)	7 (3.4%)	1 (0.3%)	1 (0.4%)	0	–
Isolated IAS	2 (0.4%)	2 (1.0%)	0	0	0	
Both EAS and IAS injury	6 (1.1%)	5 (2.4%)	1 (0.3%)	1 (0.4%)	0	
OASIS	35 (6.5%)	16 (7.8%)	19 (5.6%)	16 (5.6%)	3 (5.8%)	1.0

Abbreviations: EAS = external anal sphincter; Fr = forceps delivery; IAS = internal anal sphincter; NVD = normal vaginal delivery; OASIS = obstetric anal sphincter injury; US = ultrasound; VE = vacuum extraction

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

† Comparison between VE and Fr groups

When women with OASIS were compared to those without OASIS, increased birth weight was the only delivery factor associated with an increased risk of OASIS (odds ratio [OR]=3.1, 95% CI=1.3%-7.6%, P=0.012) [Table 3].

Relationships of faecal and flatal incontinence symptoms with obstetric anal sphincter injuries

Overall, nine (1.7%) and 29 (5.4%) women reported faecal incontinence to solid and loose stool, whereas 97 (17.9%) women reported flatal incontinence (Table 4). All affected women reported mild symptoms. Among the women with OASIS, only one (2.9%) with a repaired third degree (3a) tear reported symptoms of both (faecal incontinence to loose stool and flatal incontinence). Three women (10.3%) who had occult injury reported flatal incontinence. There were no associations between the presence of OASIS and faecal incontinence (P=0.71) or between the presence of OASIS and flatal incontinence (P=0.37).

Discussion

Primiparity has been associated with increased risks of OASIS (ORs of 2.39 and 8.34) in large retrospective studies.^{19,20} In the present study, which included large number of primiparous women, the findings on endoanal US were compared with women's

reported symptoms of faecal and flatal incontinence. Importantly, there were no associations between faecal or flatal incontinence and the presence of OASIS.

After assessment by endoanal US, the prevalence of OASIS in the normal vaginal delivery group increased from 0% to 7.8% and that in the instrumental delivery group increased from 1.8% to 5.6%. Overall, 82.9% of women with OASIS detected by endoanal US had not been diagnosed with OASIS during clinical assessment immediately after delivery. This finding is consistent with the results of the study by Andrews et al.⁹ In that study, the prevalence of OASIS markedly increased from 11% to 24.5% when women were re-examined by an experienced research fellow; 87% of OASIS diagnoses were missed by midwives and 28% were missed by junior doctors.⁹ In our study, normal vaginal deliveries were primarily attended by midwives, whereas instrumental deliveries were performed by residents. The higher rate of occult OASIS in the normal vaginal delivery group suggests that midwives currently receive inadequate training for clinical identification of OASIS. Thus, to improve the detection of OASIS, midwives and doctors should be trained to recognise OASIS by performing a standardised vaginal and rectal examination after delivery.

Compared with previous studies, the rate of OASIS determined by endoanal US in our study

TABLE 3. Correlation between OASIS and delivery factors*

	OASIS (n=35)	No OASIS (n=507)	P value
Maternal age at delivery (years)	31.3 ± 3.3	30.8 ± 3.7	0.412
Maternal BMI at this study (kg/m ²)	22.5 ± 2.6	22.8 ± 3.1	0.647
Epidural analgesia	4 (11.4%)	67 (13.2%)	0.965
Gestational age at delivery (weeks)	39.7 ± 1.3	39.4 ± 1.2	0.240
Birth weight (kg)	3.30 ± 0.40	3.12 ± 0.39	0.012
Duration of active second stage of labour (min)	43.6 ± 37.6	50.0 ± 39.0	0.348
Instrumental delivery	19 (54.3%)	318 (62.7%)	0.415
Episiotomy	33 (94.3%)	490 (96.6%)	0.795

Abbreviations: BMI = body mass index; OASIS = obstetric anal sphincter injury

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

TABLE 4. Incidences of faecal and flatal incontinence symptoms and their associations with OASIS*

	No	Yes	No OASIS (n=507)	Repaired clinical injury (n=6)	Occult injury (n=29)
Faecal incontinence	512 (94.5%)	30 (5.5%)	29 (5.7%)	1 (16.7%)	0
Solid stool	533 (98.3%)	9 (1.7%)	9 (1.8%)	0	0
Loose stool	513 (94.6%)	29 (5.4%)	28 (5.5%)	1 (16.7%)	0
Flatal incontinence	445 (82.1%)	97 (17.9%)	93 (18.3%)	1 (16.7%)	3 (10.3%)

Abbreviation: OASIS = obstetric anal sphincter injury

* Data are shown as No. (%)

(6.5%) was lower than the rate of 10% determined by a single examiner in a prospective observational study conducted in the same unit.⁶ This could be a result of the small sample size (70 subjects) in the prior study. Furthermore, most patients with OASIS (5/7) in that study were reported to have small 3a tears. There were no 3c or fourth-degree tears in that study. Following the same delivery practices, clinically detected small 3a tears may therefore appear normal in endoanal US. Furthermore, these tears might not result in long-term consequences.^{6,21}

The finding of an overall lower OASIS rate in Hong Kong, compared with that in Asian women who deliver in Caucasian countries, is not new.⁶ Asian women who deliver in locations with more restrictive policies regarding episiotomy have shown higher rates of OASIS.²²⁻²⁴ In a study conducted in the United States, OASIS was found significantly more frequently in Asian women than in women of other ethnicities.²³ In Australia, nulliparous women born in South Asia and South-East Asia were 2.6-fold and 2.1-fold more likely to exhibit OASIS than women born in Australia or New Zealand women.²⁴ It is uncertain whether the increased rate of episiotomy might protect against OASIS in Asian women and contribute to the relative reduction in the rate of OASIS in Hong Kong. Thus, our unit is currently conducting a randomised controlled trial to compare restrictive and routine episiotomy. In addition to episiotomy, the delivery technique and hands-on approach might contribute to the relative reduction in the rate of OASIS. All deliveries in our study were conducted with women in a lithotomy position, with their feet on footplates or in stirrups. All midwives and doctors conducting the deliveries used hands-on techniques to protect the perineum in each woman. Either firm pressure or pressure with squeezing of the perineum, also known as the modified Ritgen manoeuvre, was used.⁶ Warm compresses were not commonly used by midwives and doctors in our study.

The OASIS rate in the normal vaginal delivery group was higher than that in the instrumental delivery group, but this difference was not statistically significant. The majority of deliveries by women in the instrumental delivery group were performed using vacuum extraction. The rate of OASIS in these women could be similar to that of women in the normal vaginal delivery group. The OASIS rates were similar in women who delivered with the aid of vacuum extraction or with forceps, whereas previous studies showed that forceps delivery was associated with an increased risk of OASIS.^{19,20,25} The small number of forceps deliveries in this study might have led to insufficient statistical power to detect a difference between the two types of instrumental deliveries. Furthermore, the use of forceps was primarily restricted to patients who

were low risk, and mostly comprised outlet/low-cavity forceps deliveries. Previous studies reported that macrosomia, higher birth weight (OR=1.14, 95% CI=1.0-1.3, P=0.039), and shorter perineal length were risk factors for OASIS.^{6,19,20} The present study had similar findings, in that higher birth weight was a risk factor for OASIS (OR=3.1, 95% CI=1.3-7.6, P=0.012). However, perineal length was not assessed, which is an important limitation of this study.

Flatal incontinence was present in 17.9% of women after delivery, which is comparable to the rate reported in previous studies.^{26,27} In addition to OASIS, irritable bowel syndrome, high body mass index, and mode of delivery constitute factors associated with flatal incontinence.^{20,21} Overall, 5.5% of women reported faecal incontinence; most of these women reported faecal incontinence to loose stool and mild symptoms only. Most obstetric anal sphincter injuries were not detected during clinical examination. Shortly after delivery, the presence of OASIS was not associated with symptoms of faecal or flatal incontinence, but a longer-term study is needed to confirm these findings. However, we previously found that only antenatal faecal incontinence symptoms increased the likelihood of faecal incontinence at 12 months after delivery (OR=6.1, 95% CI=1.8-21.5, P=0.005), whereas maternal characteristics, mode of delivery, and the presence of OASIS did not.²⁸ In longer-term follow-up (3-5 years after delivery), 2.1% and 5.9% of women who had one vaginal delivery reported faecal incontinence to solid and loose stool, respectively.²⁹

To the best of our knowledge, there have been no randomised controlled trials regarding the optimal timing for the use of endoanal US to assess OASIS after vaginal delivery. One randomised controlled trial has been conducted to compare clinical examination alone (control group) and clinical examination with additional endoanal US immediately after delivery (intervention group).^{30,31} The results of that study showed that US performed immediately after delivery—before repair—might detect more cases of OASIS: 5.6% of women were found to have full-thickness OASIS that was not recognised during clinical examination alone.³¹ However, the study also showed that five of 21 women underwent unnecessary intervention, as the sonographic defect could not be clinically located, despite surgical exploration.³¹ Therefore, the use of endoanal US immediately after delivery and before repair was not recommended.

Women with OASIS should undergo follow-up after delivery to assess symptoms of faecal incontinence. Currently, there is no consensus regarding the optimal mode of delivery for these women in subsequent pregnancies. Scheer et al³² and Karmarkar et al³³ assessed women who had OASIS in subsequent pregnancies using a questionnaire,

endoanal US, and manometry. Vaginal delivery was recommended for asymptomatic women with normal findings. Women were reassessed after subsequent deliveries. There were no statistically significant differences in anal manometry findings, anal symptoms, or quality of life following subsequent vaginal delivery or caesarean section.^{32,33} In the study by Scheer et al,³² new OASIS occurred in only one woman after a vaginal delivery. Therefore, decisions regarding the mode of delivery for subsequent pregnancies after OASIS should be based on clinical symptoms, anal manometry, and endoanal US. This would help to preserve anal sphincter function and avoid unnecessary caesarean sections. Currently, the value of the above assessments is limited in Hong Kong. The significance of an incidental finding of occult anal sphincter defect remains uncertain.

Conclusion

The prevalence of OASIS determined by endoanal US was higher than the rate determined by clinical practice. This may indicate that additional training for midwives and doctors may be required to improve the detection of OASIS. At 6 to 12 months after delivery, OASIS was not associated with symptoms of faecal or flatal incontinence, but a longer-term study is needed to confirm these findings.

Author contributions

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

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Drafting of the article: All authors.

Critical revision for important intellectual content: SPK Kwok, OYK Wan, RYK Cheung, SSC Chan.

Declaration

The results from this research have been presented, in part, at the following conferences:

1. Wan OYK, Cheung RYK, Chan SSC. 6th Annual Meeting of the Asia-Pacific Urogynecology Association and 13th Japanese Society of Pelvic Organ Prolapse Surgery Joint Conference–Young Doctors Session. Okinawa, Japan, 22-24 March 2019 (oral abstract presentation).
2. Wan OYK, Kwok SPK, Cheung RYK, Chan SSC. Hospital Authority Convention 2019, Hong Kong, 14-15 May 2019 (e-poster presentation).
3. Kwok SPK, Wan OYK, Cheung RYK, Lee LL, Chung JPW, Chan SSC. Obstetrical and Gynaecological Society of Hong Kong Annual Scientific Meeting 2019, Hong Kong, 1-2 June 2019 (oral presentation).

Conflicts of interest

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