A ten-year evaluation of the incidence of obstetric anal sphincter injury with a reduced episiotomy rate

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ABSTRACT

Introduction: The role of episiotomy in preventing obstetric anal sphincter injury (OASIS) remains controversial. Liberal use of episiotomy has been reduced locally. This study aimed to review the incidence of OASIS in our unit over the past decade given the reduced episiotomy rate.

Methods: A retrospective study was conducted in a single tertiary obstetrics and gynaecology unit. All singleton vaginal deliveries, including normal and instrumental deliveries, between 2012 and 2021 were included. Data were retrieved from the hospital electronic delivery database between July 2022 and June 2023. The degree of OASIS was assessed using the Abdul Sultan classification.

Results: In total, 43 732 deliveries were included. The episiotomy rate decreased from 62.8% in 2012 to 44.7% in 2021 (P<0.001), while the OASIS rate increased from 0.3% to 1.4% over the same period (P<0.001). Among nulliparous women, the OASIS rate was significantly lower with episiotomy in both normal vaginal deliveries (0.6% vs 1.7%; P<0.001) and instrumental deliveries with episiotomy than without (1.7% vs 42.9%; P<0.001). Among multiparous women, the OASIS rate was significantly lower in normal vaginal delivery without episiotomy than with (0.3% vs 0.5%; P=0.026), but significantly lower in instrumental deliveries with episiotomy than without (0.5% vs 23.5% P<0.001). Overall, episiotomy was a protective factor for OASIS (odds ratio=0.273, 95% confidence interval= 0.208-0.358; P<0.001).

Conclusion: Episiotomy was protective against OASIS among nulliparous women with singleton normal vaginal delivery and instrumental delivery in an Asian population. It also conferred protection among multiparous women undergoing instrumental delivery but not in those having normal vaginal delivery.

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New knowledge added by this study

- Episiotomy is a protective factor against obstetric anal sphincter injury (OASIS) among nulliparous women undergoing singleton normal vaginal delivery and instrumental delivery in an Asian population.
- Episiotomy also confers protection against OASIS among multiparous women undergoing instrumental delivery in an Asian population.
- Conversely, episiotomy may increase the risk of OASIS in multiparous women undergoing normal vaginal delivery.

Implications for clinical practice or policy

- It is recommended that women should be informed of these findings to support informed decision-making regarding episiotomy.
- A more restrictive approach should be adopted in multiparous women undergoing normal vaginal delivery.

Introduction

Obstetric anal sphincter injury (OASIS) is a serious complication of vaginal delivery that can result in faecal incontinence, thereby impairing women's quality of life. Reported prevalence rates of OASIS range from less than 1% to 11%.[1-3] In the United Kingdom, the incidence tripled from 1.8% to 5.9% between 2000 and 2012, presumably due to improved detection techniques and increased awareness.[4] In Hong Kong, the incidence increased from 0.04% in 2004 to 0.1% in 2009, and to 0.3% in 2014 during normal vaginal deliveries.[5] Episiotomy, commonly performed during the second stage of labour to facilitate delivery and prevent excessive stretching of the perineal muscles, may increase intrapartum blood loss and perineal pain.[6] The role of episiotomy

會陰切開率下降對產科肛門括約肌損傷發生率的十年回顧評估

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引言：會陰切開術在預防產科肛門括約肌損傷（OASIS）方面的作用仍具爭議。近年本地對會陰切開術的寬鬆使用已有所減少。本研究旨在回顧本院在過去十年於會陰切開率下降的情況下OASIS發生率的變化。

方法：本回顧性研究於香港一所單一三級婦產科醫療中心進行，納入2012至2021年期間的所有單胎陰道分娩個案，包括自然分娩及使用產鉗或吸引器等輔助分娩方式。相關數據於2022年7月至2023年6月期間從院內電子分娩資料庫提取。OASIS分級根據Abdul Sultan分類法進行評估。

結果：本研究共納入43 732例分娩個案。會陰切開率由2012年的62.8%降至2021年的44.7%（P<0.001），而同期OASIS發生率則由0.3%上升至1.4%（P<0.001）。在初產婦中，無論是自然分娩（0.6%比1.7%；P<0.001）或輔助分娩（1.7%比42.9%；P<0.001），有進行會陰切開術的OASIS發生率均顯著較低。在經產婦中，自然分娩未進行會陰切開者的OASIS發生率較低（0.3%比0.5%；P=0.026），而輔助分娩中有會陰切開者的OASIS發生率顯著較低（0.5%比23.5%；P<0.001）。整體而言，會陰切開是OASIS的保護因素（勝算比：0.23，95%置信區間：0.18-0.31；P<0.001）。

結論：在亞洲人口中，會陰切開對於接受單胎自然分娩及輔助分娩的初產婦具有預防OASIS的作用，對於接受輔助分娩的經產婦亦具保護效應，但對自然分娩的經產婦則無此效果。

in mitigating OASIS remains controversial.[7,8] Consequently, the liberal use of episiotomy has declined in Hong Kong, with rates falling from 81% in 2004 to 66.2% in 2009 and 47.4% in 2014.[5] Ethnic differences in pelvic floor biometry and pelvic organ mobility have been reported,[8,9] and studies suggest that Asian women are more prone to OASIS.[10,11] This study aimed to review the incidence of OASIS in our unit over the past decade in the context of declining episiotomy rates.

TABLE 1. Abdul Sultan classification of obstetric anal sphincter injury[12]

Degree	Injury
Intact	No visible tear
First	Perineal skin only
Second	Perineal muscles, not involving the anal sphincter
Third	Anal sphincter complex 3a: <50% of the external anal sphincter thickness torn 3b: >50% of the external anal sphincter thickness torn 3c: Both the external and internal anal sphincter torn
Fourth	Anal sphincter complex and anal mucosa
Rectal buttonhole	Isolated rectal buttonhole with or without third-degree tear

Methods

This study was conducted in Prince of Wales Hospital, a tertiary obstetrics and gynaecology unit with an annual delivery volume of approximately 4500 to 6000. All singleton vaginal deliveries—including spontaneous vaginal, ventouse, or forceps deliveries—between 1 January 2012 and 31 December 2021 were included. Breech and preterm deliveries were excluded. Maternal demographics were entered into the electronic record either antenatally by midwives or obstetricians if women had received antenatal care in our unit, or by midwives immediately after delivery. Maternal age and body mass index (BMI) were recorded at delivery. Macrosomia was defined as a birth weight of ≥4000 g. Most spontaneous vaginal deliveries were conducted by trained midwives or student midwives under supervision; instrumental deliveries were performed by trained obstetricians or trainees under senior supervision. When indicated, a left mediolateral episiotomy and a hands-on approach to protect the perineum were used by both midwives and doctors. Per vaginal and per rectal examinations were performed immediately after delivery. If OASIS was suspected, assessment was conducted by an obstetric specialist. The degree of OASIS was classified using the Abdul Sultan classification (Table 1).[12] Delivery details were documented by midwives immediately after birth. Operative records for instrumental deliveries and OASIS repair, where applicable, were completed immediately after the procedure. Data were extracted from the hospital's electronic delivery database between July 2022 and June 2023. Statistical analyses were performed using SPSS (Windows version 29.0; IBM Corp, Armonk [NY], United States). Descriptive analyses were used to examine demographics, mode of delivery, and the prevalences of episiotomy and OASIS. Means were compared between groups using the independent samples *t* test. Frequencies were compared using the Pearson Chi squared test or Fisher's exact test, as appropriate. Trends were analysed using the Chi squared test for trend (Cochran–Armitage test). All risk factors were included in multivariable logistic regression analysis except epidural analgesia, nulliparity, and neonatal birth weight (justification provided in Results section). A P value of <0.05 was considered statistically significant.

Results

A total of 43 732 deliveries were included in this study. The mean ± standard deviation maternal age at delivery was 31.5 ± 4.7 years and the median parity was 0 (interquartile range, 1). Of these, 22 566 (51.6%) were nulliparous and 21 166 (48.4%) were multiparous. Among the latter, 2268 (10.7%) had only previously delivered by Caesarean section

and were therefore vaginally nulliparous. Data concerning previous delivery mode were missing for 905 women (4.3%). In total, 39 603 women (90.6%) had a normal vaginal delivery, 3528 (8.1%) had ventouse delivery, and 601 (1.4%) had a forceps delivery. Over the 10-year period from 2012 to 2021, the overall instrumental delivery rate and ventouse delivery rate declined significantly, from 13.2% to 12.0% (P<0.001) and from 11.8% to 8.6%, respectively (P<0.001) [Fig 1]. Overall, 23 325 women (53.3%) underwent episiotomy, whereas 20 407 (46.7%) did not; 326 women (0.7%) sustained OASIS, whereas 43 406 (99.3%) did not. The overall episiotomy rate decreased from 62.8% to 44.7% (P<0.001), with reductions observed in both nulliparous (from 89.2% to 68.5%; P<0.001) and multiparous women (from 31.7% to 23.8%; P<0.001). Conversely, the overall OASIS rate increased from 0.3% to 1.4% (P<0.001), with higher rates in nulliparous (from 0.4% to 2.5%; P<0.001) and multiparous women (0.1%-0.5%; P<0.001) [Fig 2].

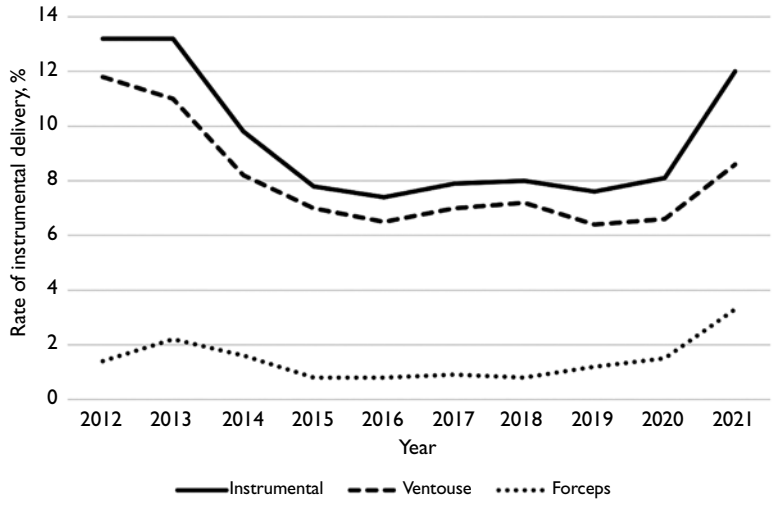

FIG 1. Ten-year trend in instrumental delivery (n=43 732)

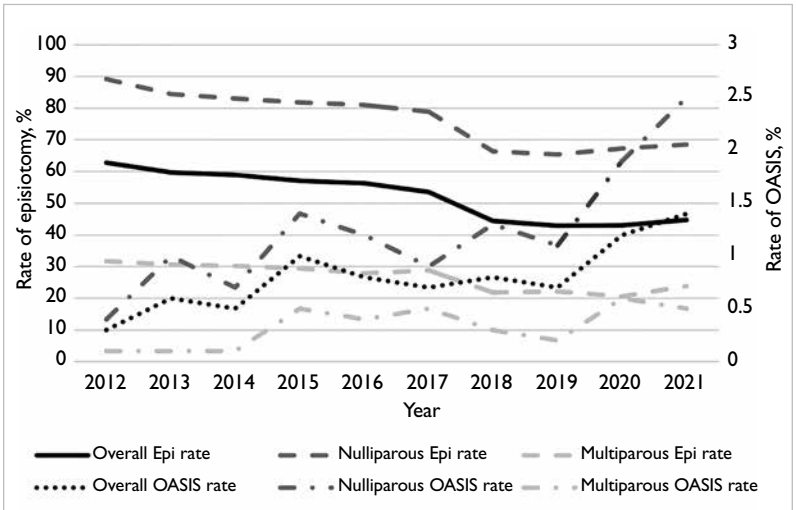

FIG 2. Ten-year trends in obstetric anal sphincter injury and episiotomy rates (n=43 732)
Abbreviations: Epi = episiotomy; OASIS = obstetric anal sphincter injury

The characteristics of the study population are summarised in Table 2. Episiotomy rates among women with and without OASIS were 51.8% and 53.3%, respectively (P=0.587). A higher proportion of women in the OASIS group were nulliparous (79.1% vs 51.4%; P<0.001) and vaginally nulliparous (85.9% vs 56.5%; P<0.001). Instrumental delivery was also more common in the OASIS group compared with the non-OASIS group (29.1% vs 9.3%; P<0.001). No statistically significant difference was observed between the type of instrumental vaginal delivery and the occurrence of OASIS (P=0.128). Women with OASIS had a lower BMI, a longer duration of labour, and delivered heavier neonates. No significant differences were observed in mean maternal age, ethnicity, gestational age, onset of labour, epidural analgesia, episiotomy, or macrosomia. All risk factors were included in the multivariable logistic regression analysis except epidural analgesia, nulliparity, and neonatal birth weight. Epidural analgesia was excluded because only one delivery with OASIS involved epidural analgesia, while nulliparity and neonatal birth weight were excluded due to their strong correlation with vaginal nulliparity and macrosomia, respectively. Macrosomia was considered to have greater clinical relevance than neonatal birth weight because a standard cut-off value exists. Multivariable logistic regression analysis revealed that vaginal nulliparity and instrumental delivery remained independent risk factors for OASIS, whereas BMI and labour duration did not. Induced labour (odds ratio [OR]=0.734, 95% confidence interval [CI]=0.577-0.934; P=0.012) and episiotomy (OR=0.273, 95% CI=0.208-0.358; P<0.001) were identified as protective factors, while macrosomia (OR=2.754, 95% CI=1.435-5.284; P<0.001) was identified as a risk factor for OASIS (Table 3). Missing data were noted for BMI in 543 cases (1.2%) and for onset of labour in 82 cases (0.2%).

In the subgroup analysis of nulliparous women, the OASIS rate was significantly lower among those undergoing normal vaginal delivery with episiotomy compared to those without (0.6% vs 1.7%; P<0.001) and those undergoing instrumental delivery with episiotomy (1.7% vs 42.9%; P<0.001). Among multiparous women, the OASIS rate was significantly lower in those undergoing normal vaginal delivery without episiotomy (0.3% vs 0.5%; P=0.026) and those undergoing instrumental delivery with episiotomy

TABLE 2. Characteristics of the study population and comparison between women with and without obstetric anal sphincter injury (n=43 732)*

	No OASIS (n=43 406)	OASIS (n=326)	P value†
Maternal age at delivery, y	31.5 ± 4.7	31.5 ± 4.0	0.283
Ethnicity			0.613
Chinese	42 303 (97.5%)	315 (96.6%)	
Western descent	172 (0.4%)	2 (0.6%)	
Others	931 (2.1%)	9 (2.8%)	
Maternal BMI at delivery, kg/m^2	22.4 ± 3.4	21.9 ± 3.3	0.018
<18.5	3819 (8.9%)	37 (11.5%)	
18.5-24.9	30 563 (71.3%)	231 (71.5%)	
25.0-29.9	7012 (16.4%)	48 (14.9%)	
30.0-34.9	1256 (2.9%)	6 (1.9%)	
≥35	216 (0.5%)	1 (0.3%)	
Parity			<0.001
Nulliparous	22 308 (51.4%)	258 (79.1%)	
Multiparous	21 098 (48.6%)	68 (20.9%)	
Vaginally nulliparous	24 541 (56.5%)	280 (85.9%)	<0.001
Maturity at delivery, weeks	39 ± 1.1	39 ± 1.0	0.186
Onset of labour			0.281
Spontaneous	28 630 (66.1%)	224 (68.9%)	
Induced	14 695 (33.9%)	101 (31.1%)	
Epidural analgesia			0.142
No	42 890 (98.8%)	325 (99.7%)	
Yes	516 (1.2%)	1 (0.3%)	
Labour duration, min	412 ± 370	503 ± 285	<0.001
Episiotomy			0.587
No	20 250 (46.7%)	157 (48.2%)	
Yes	23 156 (53.3%)	169 (51.8%)	
Neonatal birth weight, g	3176 ± 375	3282 ± 393	<0.001
Macrosomia (≥4000 g)	768 (1.8%)	10 (3.1%)	0.077
Mode of delivery			<0.001
Normal	39 372 (90.7%)	231 (70.9%)	
Ventouse	3452 (8.0%)	76 (23.3%)	
Forceps	582 (1.3%)	19 (5.8%)	

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

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

† Comparison between no OASIS and OASIS groups

(0.5% vs 23.5% without episiotomy; P<0.001). Among vaginally nulliparous women within the multiparous group, no statistically significant difference in OASIS rates was observed between normal vaginal deliveries with and without episiotomy; however, the OASIS rate was significantly lower among those undergoing instrumental deliveries with episiotomy compared with those without (0% vs 37.5%; P<0.001) [Table 4].

Discussion

In recent years, many obstetric units in Hong Kong have promoted a reduction in episiotomy use in recent years. Our unit achieved substantial reductions in episiotomy rates among nulliparous and multiparous women between 2012 and 2021. Although the overall rate of OASIS remained low, considerable increases were observed in both groups during the study period. Vaginal nulliparity and operative vaginal delivery were identified as independent risk factors for OASIS, consistent with previous findings.[7,11] Furthermore, episiotomy was identified as a protective factor against OASIS in multivariable logistic regression analysis (OR=0.273, 95% CI=0.208-0.358) [Table 3].

In nulliparous women, episiotomy was protective against OASIS in both normal and instrumental vaginal deliveries. These findings differ from those of previous large-scale studies.[7,11] In a large retrospective study in the Netherlands involving over 281 000 vaginal deliveries,[13] and in another study including more than 10 000 women in Australia,[14] mediolateral episiotomy was shown to reduce the risk of OASIS in nulliparous women (OR=0.21[13] and 0.54,[14] respectively). However, Mahgoub et al[11] in France reported no association between episiotomy and OASIS. In their cohort of 42 626 women, the overall OASIS rate was 1.2% and the overall episiotomy rate was only 10%.[11] Perrin et al[7] reported an episiotomy rate of 63.2% in nulliparous women and an OASIS rate of 0.7%, regardless of episiotomy use. In their analysis, episiotomy was not associated with OASIS in normal vaginal delivery but appeared to be protective in nulliparous women undergoing operative vaginal delivery at term.[7]

The above studies mainly involved women in Western populations. Several studies have indicated that Asian women have a two- to nine-fold increased risk of sustaining OASIS.[15-19] In a study conducted in Israel involving over 80 000 women, including 997 of Asian origin, the OASIS rate among Asian women was 9 times higher than that among women of Western descent (3.5% vs 0.4%; P=0.001).[16] Asian women also had a higher proportion of fourth-degree tears (17.1% vs 6.6%; P=0.039), despite smaller newborns (mean birth weight: 3318 g vs 3501 g; P=0.004).[16] Anatomical differences between ethnic groups may contribute to this disparity. Cheung et al[9] reported that pregnant women of East Asian origin had a thicker pubovisceral muscle, a smaller levator hiatus, and reduced pelvic organ mobility compared with pregnant women of Western descent. These factors may contribute to the higher risk of OASIS.[9] Moreover, Bates et al[20] found that a shorter perineal length measured during the second stage of labour prior to pushing was significantly associated with OASIS. Although a study conducted in Hawaii found no significant difference in perineal body

TABLE 3. Simple and multivariable logistic regression of risk factors for obstetric anal sphincter injury

	Unadjusted OR (95% CI)	P value (unadjusted)	Adjusted OR (95% CI)	P value (adjusted)
Maternal age at delivery	0.999 (0.976-1.022)	0.283	1.028 (1.003-1.054)	0.027
Ethnicity	0.747 (0.408-1.366)	0.613	0.768 (0.405-1.458)	0.420
Maternal BMI at delivery	0.960 (0.928-0.993)	0.018	0.967 (0.934-1.001)	0.058
Vaginal nulliparity	4.679 (3.424-6.395)	<0.001	7.155 (5.076-10.087)	<0.001
Maturity at delivery	1.068 (0.968-1.179)	0.186	1.043 (0.942-1.155)	0.419
Onset of labour	0.877 (0.693-1.110)	0.281	0.734 (0.577-0.934)	0.012
Labour duration	1.000 (1.000-1.000)	<0.001	1.000 (1.000-1.000)	0.652
Episiotomy	0.941 (0.757-1.171)	0.587	0.273 (0.208-0.358)	<0.001
Macrosomia	1.757 (0.932-3.310)	0.077	2.754 (1.435-5.284)	<0.001
Instrumental delivery	4.013 (3.154-5.107)	<0.001	4.770 (3.565-6.382)	<0.001

Abbreviations: 95% CI = 95% confidence interval; BMI = body mass index; OR = odds ratio

length between Western and Chinese women, measurements were taken during the first stage of labour rather than before pushing.[21] Further studies are needed to determine whether perineal body length differs during the second stage of labour. The reasons for the higher OASIS rates among Asian women remain unclear but are likely to be complex and multifactorial.

Another notable point is the higher rate of epidural analgesia use among Western women compared with Asian women (50%-90% vs 0%-2.2%), even within the same hospital setting where epidural analgesia is offered free of charge to all women.[7,11,16,20] In the present study, the rate of epidural analgesia was low throughout the study period. In this cohort, epidural analgesia was not associated with OASIS. A meta-analysis examining risk factors for OASIS found no association with epidural analgesia; however, it included only two studies.[22] In contrast, Mahgoub et al[11] identified epidural analgesia as a protective factor for OASIS, whereas another meta-analysis reported it as a risk factor.[19] These conflicting findings suggest that the role of epidural analgesia in OASIS remains unclear.

There is limited literature on the role of episiotomy in normal vaginal delivery among multiparous women. In the present study, episiotomy did not protect multiparous women from OASIS, except in the context of instrumental vaginal delivery. Indeed, episiotomy may increase the risk of OASIS in this group.[23] However, we noted that episiotomy was protective against OASIS among multiparous women undergoing instrumental vaginal delivery (OR=0.028). This finding is supported by a Dutch study which reported five-fold and ten-fold reductions in OASIS during vacuum and forceps deliveries, respectively.[24] In light of these findings, we recommend a more restrictive approach to episiotomy among multiparous women undergoing normal vaginal delivery.

TABLE 4. Rate of obstetric anal sphincter injury according to parity, episiotomy status, and mode of vaginal delivery

	No episiotomy	Episiotomy	P value*
Nulliparous women			
Normal vaginal delivery	85/4890 (1.7%)	84/14 172 (0.6%)	<0.001
Instrumental delivery	30/70 (42.9%)	59/3434 (1.7%)	<0.001
Multiparous women			
Normal vaginal delivery	39/15 430 (0.3%)	23/5111 (0.5%)	0.026
Instrumental delivery	4/17 (23.5%)	3/608 (0.5%)	<0.001†
Vaginally nulliparous among multiparous women			
Normal vaginal delivery	9/1277 (0.7%)	10/807 (1.2%)	0.211
Instrumental delivery	3/8 (37.5%)	0/176	<0.001

* P values compare rates between episiotomy and no episiotomy groups
† Odds ratio = 0.028

The rising trend of OASIS over the past decade may also be attributable to improvements in clinical detection following the promotion of more thorough post-delivery assessments by both midwives and obstetricians. Kwok et al[25] reported that the prevalence of occult OASIS—detected by endoanal ultrasound but not identified by clinical examination after delivery—was as high as 7.8% after normal vaginal delivery and 3.8% after instrumental delivery. Subsequently, regular OASIS workshops were introduced to train midwives and doctors in performing standardised vaginal and rectal examinations after vaginal delivery. When a major perineal tear is suspected, immediate reassessment by an obstetric specialist is conducted. This practice

has been shown to improve the detection rate of OASIS.[26] We also analysed trends in instrumental vaginal delivery over the 10-year period. Overall, decreasing trends were observed for both instrumental and ventouse deliveries. The rate of forceps delivery remained similar or showed a slight decrease, except in 2021. Therefore, the rising trend in OASIS is unlikely to be explained by changes in instrumental delivery rates.

Strengths and limitations

The strengths of this study include its large sample size, 10-year study period, and the documented reduction in episiotomy rates, which allowed evaluation of the role of episiotomy in OASIS. Our unit is a tertiary centre with the highest delivery volume in Hong Kong, and this represents the largest retrospective study to date focusing on an Asian population. However, as a retrospective study, missing data were noted during data collection and entry. In addition, several risk factors previously identified in meta-analyses—such as the duration of the second stage of labour, fetal head position at delivery, history of previous OASIS, and shoulder dystocia—were not analysed in the present study,[19,27] representing a key limitation. Furthermore, some cases of OASIS may have been missed on clinical examination. High-quality research is needed to further investigate OASIS, given its substantial impact on women's quality of life.

Conclusion

With a substantial reduction in episiotomy rates, a corresponding increase in the rate of OASIS was observed. Episiotomy was protective against OASIS among nulliparous women undergoing singleton normal vaginal delivery and instrumental delivery. It also conferred protection in multiparous women undergoing instrumental delivery but not in those having normal vaginal delivery. Among vaginally nulliparous women within the multiparous group, the OASIS rate was significantly higher in those undergoing instrumental deliveries without episiotomy, similar to the rate observed in nulliparous women. Conversely, the OASIS rate was higher in the episiotomy group during normal vaginal delivery, although this difference was not statistically significant and may have been influenced by the small sample size. Further high-quality research is warranted, and women should be informed of these findings to enable informed decision-making regarding episiotomy.

Author contributions

Concept or design: SSC Chan, RYK Cheung.
Acquisition of data: SSC Chan, RYK Cheung, TW Chau, YY Lau, SM Ng, TM Tso.
Analysis or interpretation of data: SSC Chan, YY Lau.
Drafting of the manuscript: YY Lau.
Critical revision of the manuscript for important intellectual content: All authors.

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.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Declaration

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Ethics approval

This research was obtained from the Joint Chinese University of Hong Kong–New Territories East Cluster Clinical Research Ethics Committee, Hong Kong (Ref No.: 2022.259). The requirement for patient consent was waived by the Committee due to the retrospective nature of the research. The study complied with the Declaration of Helsinki and the International Council for Harmonization Guideline for Good Clinical Practice.

References

1. Tung CW, Cheon WC, Tong WM, Leung HY. Incidence and risk factors of obstetric anal sphincter injuries after various modes of vaginal deliveries in Chinese women. Chin Med J (Engl) 2015;128:2420-5.
2. Jangö H, Langhoff-Roos J, Rosthøj S, Sakse A. Modifiable risk factors of obstetric anal sphincter injury in primiparous women: a population-based cohort study. Am J Obst Gynecol 2014;210:59.e1-6.
3. Hsieh WC, Liang CC, Wu D, Chang SD, Chueh HY, Chao AS. Prevalence and contributing factors of severe perineal damage following episiotomy-assisted vaginal delivery. Taiwan J Obstet Gynecol 2014;53:481-5.
4. Gurol-Urganci I, Cromwell DA, Edozien LC, et al. Third- and fourth-degree perineal tears among primiparous women in England between 2000 and 2012: time trends and risk factors. BJOG 2013;120:1516-25.
5. Hong Kong College of Obstetricians and Gynaecologists. Territory-wide Audit in Obstetrics & Gynaecology. 2014. Available from: https://www.hkcog.org.hk/hkcog/Download/Territory-wide_Audit_in_Obstetrics_Gynaecology_2014.pdf. Accessed 1 May 2020.
6. Woolley RJ. Benefits and risks of episiotomy: a review of the English-language literature since 1980. Part II. Obstet Gynecol Surv 1995;50:821-35.
7. Perrin A, Korb D, Morgan R, Sibony O. Effectiveness of

episiotomy to prevent OASIS in nulliparous women at term. Int J Gynaecol Obstet 2023;162:632-8.
8. Abdool Z, Dietz HP, Lindeque BG. Ethnic differences in the levator hiatus and pelvic organ descent: a prospective observational study. Ultrasound Obstet Gynecol 2017;50:242-6.
9. Cheung RY, Shek KL, Chan SS, Chung TK, Dietz HP. Pelvic floor muscle biometry and pelvic organ mobility in East Asian and Caucasian nulliparae. Ultrasound Obstet Gynecol 2015;45:599-604.
10. Brown J, Kapurubandara S, Gibbs E, King J. The great divide: country of birth as a risk factor for obstetric anal sphincter injuries. Aust N Z J Obstet Gynaecol 2018;58:79-85.
11. Mahgoub S, Piant H, Gaudineau A, Lefebvre F, Langer B, Koch A. Risk factors for obstetric anal sphincter injuries (OASIS) and the role of episiotomy: a retrospective series of 496 cases. J Gynecol Obstet Hum Reprod 2019;48:657-62.
12. de Leeuw JW, Struijk PC, Vierhout ME, Wallenburg HC. Risk factors for third degree perineal ruptures during delivery. BJOG 2001;108:383-7.
13. Okeahialam NA, Taithongchai A, Thakar R, Sultan AH. The incidence of anal incontinence following obstetric anal sphincter injury graded using the Sultan classification: a network meta-analysis. Am J Obstet Gynecol 2023;228:675-88.e13.
14. Hauck YL, Lewis L, Nathan EA, White C, Doherty DA. Risk factors for severe perineal trauma during vaginal childbirth: a Western Australian retrospective cohort study. Women Birth 2015;28:16-20.
15. Grobman WA, Bailit JL, Rice MM, et al. Racial and ethnic disparities in maternal morbidity and obstetric care. Obst Gynecol 2015;125:1460-7.
16. Baruch Y, Gold R, Eisenberg H, et al. High incidence of obstetric anal sphincter injuries among immigrant women of Asian ethnicity. J Clin Med 2023;12:1044.
17. D'Souza JC, Monga A, Tincello DG. Risk factors for perineal trauma in the primiparous population during non-operative vaginal delivery. Int Urogynecol J 2020;31:621-5.
18. Yeaton-Massey A, Wong L, Sparks TN, et al. Racial/ethnic variations in perineal length and association with perineal lacerations: a prospective cohort study. J Matern Fetal Neonatal Med 2015;28:320-3.
19. Hu Y, Lu H, Huang Q, et al. Risk factors for severe perineal lacerations during childbirth: a systematic review and meta-analysis of cohort studies. J Clin Nurs 2023;32:3248-65.
20. Bates LJ, Melon J, Turner R, Chan SS, Karantanis E. Prospective comparison of obstetric anal sphincter injury incidence between an Asian and Western hospital. Int Urogynecol J 2019;30:429-37.
21. Tsai PJ, Oyama IA, Hiraoka M, Minaglia S, Thomas J, Kaneshiro B. Perineal body length among different racial groups in the first stage of labor. Female Pelvic Med Reconstr Surg 2012;18:165-7.
22. Barba M, Bernasconi DP, Manodoro S, Frigerio M. Risk factors for obstetric anal sphincter injury recurrence: a systematic review and meta-analysis. Int J Gynaecol Obstet 2022;158:27-34.
23. Eggebø TM, Rygh AB, von Brandis P, Skjeldestad FE. Prevention of obstetric anal sphincter injuries with perineal support and lateral episiotomy: a historical cohort study. Acta Obstet Gynecol Scand 2024;103:488-97.
24. van Bavel J, Hukkelhoven CW, de Vries C, et al. The effectiveness of mediolateral episiotomy in preventing obstetric anal sphincter injuries during operative vaginal delivery: a ten-year analysis of a national registry. Int Urogynecol J 2018;29:407-13.
25. Kwok SP, Wan OY, Cheung RY, Lee LL, Chung JP, Chan SS. Prevalence of obstetric anal sphincter injury following vaginal delivery in primiparous women: a retrospective analysis. Hong Kong Med J 2019;25:271-8.
26. Andrews V, Sultan AH, Thakar R, Jones PW. Occult anal sphincter injuries—myth or reality? BJOG 2006;113:195-200.
27. Pergialiotis V, Bellos I, Fanaki M, Vrachnis N, Doumouchtsis SK. Risk factors for severe perineal trauma during childbirth: an updated meta-analysis. Eur J Obstet Gynecol Reprod Biol 2020;247:94-100.

