JOURNAL OF CLINICAL AND HEALTH SCIENCES

ORIGINAL ARTICLE

A 10-Year Review of Obstetrics Anal Sphincter Injury at a Tertiary Teaching Hospital in the East Coast of Peninsular Malaysia

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Received
24th January 2022
Received in revised form
8th August 2022
Accepted
5th January 2023
Published
1st March 2023

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ABSTRACT

Introduction: Obstetric anal sphincter injury (OASIS) is an uncommon complication that may occur during vaginal delivery and increases the risk of pelvic floor dysfunction following delivery. This 10-year review is aimed to determine the occurrence of OASIS at a tertiary teaching hospital. **Methods:** A retrospective review of records of women who had their newborns delivered at Hospital Universiti Sains Malaysia between 2007-2016 was conducted. OASIS was classified according to the classification proposed by Sultan AH in 1999. Women who delivered on the same day with the index delivery but without OASIS acted as the control group (n = 154). **Results:** There were 61,049 vaginal deliveries over the ten years. A total of 154 women were recorded to have vaginal delivery complicated with OASIS, with a cumulative prevalence of 0.25% per year. Of these, 86% (n = 133) sustained a third-degree, and the remaining 14% (n = 21) had a fourth-degree perineal tear. Three independent risk factors for OASIS were identified using multivariable analysis: primiparity, greater gestational age, and higher infant birth weight. **Conclusion:** Nulliparous, primiparous, and a higher infant birth weight > 3500 g pose a higher possibility of developing OASIS during vaginal delivery among women who delivered at a tertiary teaching hospital on the east coast of Malaysia.

KEYWORDS: Nulliparous; primiparous; higher birth weight; obstetric anal sphincter injuries; Hospital USM

INTRODUCTION

Approximately 70–80% of women who give birth vaginally sustain childbirth-related perineal trauma, either through a spontaneous tear or surgical cut (episiotomy) [1]. This perineal trauma can sometimes extend into the anal sphincter muscles, known as obstetric anal sphincter injuries (OASIS).

A UK study found a four-fold rise in the rate of third- or fourth-degree perineal tears in England, with the rate of 1.8% in 2000 increasing to 5.9% in 2011 [2]. In Malaysia, the national rate of OASIS is quoted as < 0.5%, with risk factors of primiparous (Para 1) and instrumental delivery [3]. In general, OASIS's increased risk has been associated with women who are over 25 years of age, who had undergone assisted delivery (forceps or ventouse) (especially without episiotomy), who are of Asian ethnicity, who are of higher socioeconomic status, and who had higher infant birth weight, and shoulder dystocia. A rise in maternal age and maternal body weight at first birth have also been linked to larger babies and the risk of perineal tears.

OASIS has short- and long-term implications for women's health. Recent studies have shown that women who have sustained OASIS at birth have double to triple times more risk of developing subsequent anal incontinence (AI), with rates of AI ranging between

7–61% [4,5]. One study quoted that up to 20–40% of women still described symptoms of AI at 12 months postdelivery [6]. Our study was conducted to review OASIS in a tertiary teaching hospital on the east coast of Malaysia, as well as the occurrence, sociodemographic data, and risk factors.

MATERIALS AND METHODS

Study design

This is a retrospective review of women who had delivered at Hospital Universiti Sains Malaysia (Hospital USM), Kubang Kerian, Kelantan, Malaysia, from 2007 to 2016 to determine the occurrence, sociodemographic data, and risk factors OASIS. Hospital USM is a tertiary public health hospital referral center in the state for the 10 districts in the State of Kelantan, with an estimated catchment population of about 1.89 million people. The hospital also serves as a teaching hospital for postgraduate and undergraduate medical students and is an internship training site for health care professionals in the country. There are 7,000–7,500 deliveries at the maternity unit per year, an average of 400–600 deliveries in a month or 15–20 deliveries daily [7].

Participants

Our analysis included 61,049 vaginal deliveries over the 10-year period (2007–2016). Women who had OASIS were identified (n = 154); the matching control group consisted of women who delivered during the same day with the index delivery but without OASIS (n = 154) (total n = 308). The sample size requirement was calculated using the Power and Sample size (PS) software [8]. P_o is taken based on the proportion of women who had sustained OASIS from a local study [9]. The minimum sample size required was 304.

Data collection

The data were collected using a standardized data collection form. All patients who delivered vaginally and sustained OASIS from January 2007–December 2016 were identified through electronic medical records, and patients in the control group were selected using a simple random sampling method from the list of deliveries during the same period but did not experience OASIS. The medical records of both groups of patients were viewed, and their data were collected. All singleton pregnancies with vaginal birth deliveries were included, while pregnancies with fetuses < 500 g and/or incomplete birth records were excluded. The data collection was divided into three categories: maternal risk factors, delivery risk factors, and infant risk factors. All OASIS cases were assessed by the attending clinician (specialist/consultant) who was trained in assessing and repairing OASIS; the cases were classified based on the method described by Sultan AH [10].

Statistical analysis

The collected data were analyzed using tests in the IBM SPSS version 22. Deliveries with incomplete data were excluded. All variables were collected as categorical variables and described as frequencies (n) and percentages (%). Pearson's chi-square test was used to determine the association between the two categorical variables. Fisher's exact test was used if the Pearson's chi-square test assumptions were not met. A crude odds ratio (OR) with a 95% confidence interval (CI) was determined to evaluate the strength of the association between the variables and OASIS using univariable analysis (simple binary logistic regression analysis), followed by multivariable binary logistic regression analysis, which was used to establish the association. All statistical tests were conducted as a two-sided hypothesis test, and a p-value of less than 0.05 was considered statistically significant.

Ethical considerations

This research was approved by the Human Research Ethics Committee, USM, with a reference number of USM/JEPeM/17010018.

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https://doi.org/10.24191/jchs.v8i1.17035

RESULTS

Sociodemographic data and clinical presentations

The sociodemographic data are presented in Table 1. Regarding maternal risk factors, most of the women who sustained OASIS were 26–30 years old (42.9%) and belonged to the Malay ethnic group (94.8%); Of the total number of women with OASIS, 61.7% were nulliparous (Para 0), and 40.9% were overweight (body mass index 25-30). For delivery risk factors, OASIS was most commonly seen among women with spontaneous labor (83.8%), in the second stage of labour of less than one hour (87.7%), and those with episiotomy (52.6%). For infant risk factors, OASIS was higher in women delivering male babies (61.0%), with a gestational age of 37–39 + 6 weeks (64.3%), and those delivering babies with a birth weight of 2,500–3,499 g (67.5%).

Table 1 Sociodemographic and clinical data of patients with and without OASIS

Variable	OASIS (n=154)	Non-OASIS (n=154)
	n (%)	n (%)
Maternal age (years)		
<20	2 (1.3)	6 (3.9)
20-25	48 (31.2)	40 (26.0)
26-30	66 (42.9)	55 (35.7)
31-34	29 (18.8)	28 (18.2)
>35	9 (5.8)	25 (16.2)
Ethnicity		
Malay	146 (94.8)	140 (90.9)
Non-Malay	8 (5.2)	14 (9.1)
Parity		
Para 0	95 (61.7)	59 (38.3)
Para 1	39 (25.3)	37 (24.0)
Para ≥ 2	20 (13.0)	58 (37.7)
Body mass index (kg/m^2)		
<18.5	6 (3.9)	5 (3.2)
18.5-24.9	57 (37.0)	64 (41.6)
25.0-30.0	63 (40.9)	58 (37.7)
>30	28 (18.2)	27 (17.5)
Mode of delivery		
Spontaneous	129 (83.8)	123 (79.9)
Induction	9 (5.8)	19 (12.3)
Ventouse	3 (1.9)	4 (2.6)
Forceps	13 (8.4)	8 (5.2)
Duration of second stage of labour		
< 1 hour	135 (87.7)	145 (94.2)
≥ 1 hour	19 (12.3)	9 (5.8)
Episiotomy		
Done	81 (52.6)	58 (37.7)
Not done	73 (47.4)	96 (62.3)

Vol 8(1) (2023) 43-51 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
https://doi.org/10.24191/jchs.v8i1.17035

Sex of infant		
Male	94 (61.0)	74 (48.1)
Female	60 (39.0)	80 (51.9)
Gestational age (weeks)		
<36+6	2 (1.3)	8 (5.2)
37-39+6	99 (64.3)	88 (57.1)
>40	53 (34.4)	58 (37.7)
Birth weight (gram)		
<2500	2 (1.3)	14 (9.1)
2500-3499	104 (67.5)	109 (70.8)
>3500	48 (31.2)	31 (20.1)

Prevalence of OASIS

There were 61,049 vaginal deliveries over the 10 years. According to the actual data, there were 154 cases of OASIS, giving a cumulative prevalence of OASIS in Hospital USM, of 0.25% per year (Figure 1). Out of the 154 cases with OASIS, 133 (86%) had third-degree perineal tears, while 21 (14%) had fourth-degree tears, as shown in Figure 2.

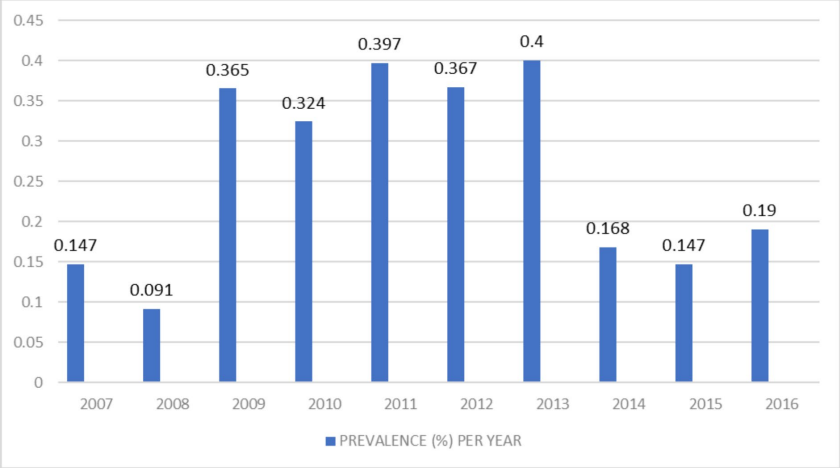

Figure 1 The trend of prevalence of OASIS per year in HUSM in 10-year period (2007-2016)

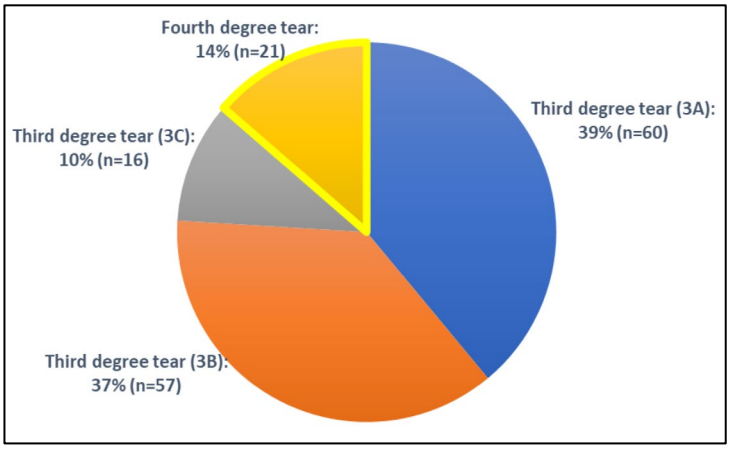

Figure 2 The proportions of third- and fourth-degree perineal tears among OASIS

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https://doi.org/10.24191/jchs.v8i1.17035

Risk factors for OASIS

Univariate analysis (simple binary logistic regression analysis) revealed a significant association between, maternal age, parity, episiotomy, infant sex, and birth weight and OASIS. Compared to those aged between 20 and 25, patients aged more than 35 years had 70% lower odds of OASIS. Compared to patients who were multiparous (Para 2 or more), those who were nulliparous (Para 0) and primiparous (Para 1) had 4.67- and 3.06-times higher odds of OASIS, respectively. Patients who had an episiotomy performed on them had 1.84 times higher odds of OASIS compared to those who had no episiotomy performed. Higher odds of OASIS (1.69 times higher) were observed among patients with male infants. Patients with low birthweight infants (< 2,500 gram) had 85% lower odds for OASIS compared to those with normal weight infants (Table 2).

Table 2 Factors associated with OASIS by simple logistic regression analysis

Variable	Crude regression coefficient (b)	Crude Odds Ratio (95% CI)	Wald statistic	p-value
Maternal age (years)				
<20	-1.28	0.28 (0.05, 1.43)	2.30	0.129
20-25	Ref			
26-30	0.00	1.00 (0.58, 1.74)	0.00	>0.999
31-34	-0.15	0.86 (0.44, 1.68)	0.19	0.666
>35	-1.20	0.30 (0.13, 0.72)	7.36	0.007
Ethnicity				
Malay	Ref			
Non-Malay	-0.60	0.55 (0.22, 1.35)	1.72	0.190
Parity				
Para 0	1.54	4.67 (2.55, 8.54)	25.07	<0.001
Para 1	1.12	3.06 (1.55, 6.03)	10.41	0.001
Para ≥ 2	Ref			
Body mass index (kg/m^2)				
<18.5	0.30	1.35 (0.39, 4.65)	0.22	0.637
18.5-24.9	Ref			
25.0-30.0	0.20	1.22 (0.74, 2.02)	0.60	0.441
>30	0.15	1.16 (0.62, 2.20)	0.22	0.640
Mode of delivery				
Spontaneous	Ref			
Induction	-0.80	0.45 (1.97, 1.04)	3.52	0.061
Ventouse	-0.34	0.72 (0.16, 3.26)	0.19	0.665
Forceps	0.44	1.55 (0.62, 3.87)	0.88	0.348
Duration of second stage of labour				
< 1 hour	Ref			
≥ 1 hour	0.82	2.27(0.99, 5.19)	3.76	0.052
Episiotomy				
Done	0.61	1.84 (1.17, 2.89)	6.88	0.009
Not done	Ref			

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https://doi.org/10.24191/jchs.v8i1.17035

Sex of infant				
Male	0.53	1.69 (1.08, 2.66)	5.21	0.022
Female	Ref			
Gestational age (weeks)				
<36+6	-1.5	0.22 (0.05, 1.07)	3.50	0.222
37-39+6	Ref			
>40	-0.21	0.81 (0.51, 1.30)	0.75	0.386
Birth weight (gram)				
<2500	-1.90	0.15 (0.03, 0.68)	6.11	0.013
2500-3499	Ref			
>3500	0.48	1.62 (0.96, 2.75)	3.26	0.071

Multivariate analysis using the forward stepwise method of multiple binary logistic regression analysis revealed that only parity, gestational age, and birth weight were significantly associated with OASIS. Compared to patients who were Para 2 or more, those who were Para 0 and Para 1 had 6.95- and 4.17 times higher odds for OASIS, respectively, when gestational age and birth weight were adjusted. Patients with a gestational age of more than 40 weeks had 45% lower odds for OASIS compared to patients with gestational age between 37 and 39 + 6 weeks when parity and birth weights were adjusted.

Compared to patients with normal weight infants (birth weight between 2,500 g and 3,499 g), patients with low-birth-weight infants (< 2,500 g) had 84% lower odds and patients with high birthweight infants (> 3,500 g) had 2.5 times higher odds of OASIS when parity and gestational age were adjusted (Table 3). Forward LR method applied. No multicollinearity and no interaction between the independent variables. Model fitness assessment indicate that the model is adequately fit; Hosmer-Lemeshow Test $\chi^2(7) = 2.12$, p=0.953; Overall percentage of correct prediction = 65.9%; Area under ROC curve = 72.4%, 95% CI: 66.8%, 78.0%.

Table 3 Factors associated with OASIS by multiple logistic regression analysis

Variable	Crude regression coefficient (b)	Crude Odds Ratio (95% CI)	Wald statistic	p-value
Parity				
Para 0	1.94	6.95 (3.56, 13.57)	32.21	<0.001
Para 1	1.43	4.17 (2.01, 8.66)	14.69	<0.001
Para ≥ 2	Ref			
Gestational age (weeks)				
<36+6	-1.21	0.30 (0.05, 1.68)	1.88	0.170
37-39+6	Ref			
>40	-0.63	0.55 (0.32, 0.90)	5.50	0.020
Birth weight (gram)				
<2500	-1.99	0.14 (0.03, 0.65)	6.24	0.012
2500-3499	Ref			
>3500	0.92	2.50 (1.37, 4.56)	8.90	0.003

Vol 8(1) (2023) 43-51 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
https://doi.org/10.24191/jchs.v8i1.17035

DISCUSSION

As reported worldwide, the OASIS rate varies, with the incidence varying from 1 to 6% [11-16]. In this study, the prevalence of 0.25% of OASIS is low compared to the rate reported elsewhere in high-income countries, for example, in England (which had tripled from 1.8% in 2000 to 5.9% in 2012) [2]. The lower rate of OASIS in the local population compared to that in the developed countries is best explained by the fact that the majority of local Kelantan women who gave birth were of higher parity, while in Western countries, most women who delivered were of nulliparous/low parity. Second, the low prevalence of OASIS in this study was partly due to underreporting or failure to recognize OASIS correctly. Despite the routine practice of manual perineal protection prior to fetal head delivery, rectal examination post vaginal delivery was not routinely done, and this may have contributed to the lower occurrence of OASIS.

A previous study in Hospital USM in 2001 found that the rate of OASIS was 0.16% [17]. Thus, the current study showed an increased trend of OASIS in the recent decade. Figure 1 shows the trend of detection of OASIS in Hospital USM, which decreased from 0.16% (2001) to initial 0.147% (2007), then increased to 0.365% (2009), and then became static in 2013, ranging from 0.324% to 0.400%. In 2014, the OASIS rate decreased to 0.168% and became static in 2016, with a range of 1.147% to 0.19%. The initial increase in OASIS prevalence in this hospital was likely due to improved awareness, clinical detection, and documentation. The subsequent reduction of OASIS from 2014 onwards was followed by a static trend. In recent years, a relatively higher rate of Caesarean section was performed at this institution, which showed an increase from 11.6% in 2000 to 18.2% in 2017 [7].

Our study found that those who were nulliparous (Para 0) and primiparous (Para 1) had an increased risk of OR of 6.95 (95% CI: 3.56, 13.57; $p < 0.001$) and 4.17 (95% CI: 2.01, 8.66; $p < 0.001$), respectively, to develop OASIS compared to multiparous (Para ≥ 2) women. Many studies found that the rate of OASIS was higher among primiparous compared to multiparous women, with some registered studies showing a 2–7-fold increased risk for OASIS in primiparous than multiparous women with previous vaginal delivery [12,16,18-20]. The risk of OASIS is reduced with an increasing birth order [16,20]. The biological mechanism is likely to be due to the limited elasticity of the perineum among primiparity, nulliparous women compared to multiparous.

CONCLUSION

Nulliparous, primiparous, and a higher infant birth weight > 3,500 g conferred the highest odds of OASIS among women who delivered at this tertiary teaching hospital on the east coast of Malaysia. These findings will help identify clinically at-risk patients and every attempt should be made to avoid OASIS.

Conflict of interest

Authors declare none.

Acknowledgements

We would like to express our gratitude to the director of Hospital USM, Kubang Kerian, Kelantan, Malaysia, for granting permission to the investigators to use the medical records of patients and hospital facilities while conducting the research.

Authors' Contribution

All authors conducted the audit, wrote, edited and approved the final version of the article.

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Vol 8(1) (2023) 43-51 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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Vol 8(1) (2023) 43-51 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
https://doi.org/10.24191/jchs.v8i1.17035