

Evaluation of Risk Factors for the Occurrence of Obstetric Anal Sphincter Injuries. A Cohort Study

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Abstract

Background: Obstetric Anal Sphincter Injuries (OASIS) continue to be a major complication of vaginal delivery. Although many women do not suffer consequences, others develop different degrees of faecal and/or flatus incontinence that are directly related to the degree of perineal tearing. Anal sphincter injuries are more frequent when instrumental deliveries are performed. The use of forceps is associated with a higher incidence of obstetric perineal trauma, followed using spatulae. Ventouse deliveries are the least likely to cause maternal injuries, at a rate comparable with normal vaginal deliveries. There remains little consensus on the risk factors for the occurrence of OASIS.

Objective: To evaluate the incidence of Obstetric Anal Sphincter Injury (OASIS) in our population and the risk factors for the occurrence of OASIS at the time of delivery.

Material and Methods: Descriptive, retrospective cohort study, in which a perinatal database was used for all births attended at Manises Hospital, Valencia, Spain. All deliveries attended in our hospital between January 1, 2015 and December 31, 2016. In total 3241 deliveries were included. The main variable was the rate of OASIS. The odds ratio adjusted for the OASIS by risk groups was estimated using logistic regression models and reported with 95% confidence intervals (CI).

Results: The study was conducted on 2682 vaginal deliveries performed in our Unit. 529 caesarean sections were excluded. There were 42 cases of OASIS. The overall OASIS rate was 1,56%. After performing multivariate analysis, statistically significant risk factors were previous cesarean section OR = 3,62 CI 95% (0,01 - 0,05), ventouse delivery OR = 2,78 CI 95% (0,005 - 0,006) and forceps delivery OR = 2,28 CI 95% (0,004 - 0,055). Performance of an episiotomy OR = 1,43 CI 95% (-0,01 - 0,02) increased the risk of OASI but was not statistically significant. Previous vaginal births were found to be a protective factor against OASIS OR = -1,3 CI 95% (0,03- -0,02), although it was not statistically significant.

Conclusion: The main associated risk factors were forceps delivery, ventouse delivery and previous cesarean section. Patients with previous cesarean section should therefore be warned of the risk of anal obstetric injury if they are going to attempt a vaginal birth after cesarean section.

Keywords: Anal Sphincter Injury; Risk Factors; Perineal Trauma; Third-and Fourth-Degree Tears; Ventouse

Abbreviations

BMI: Body mass index; CI: Confidence Interval; OASIS: Obstetric Anal Sphincter Injuries

Introduction

Maternal efforts during the active second stage of labour can cause muscular, aponeurotic and neurological damage to the perineum [1]. With the modernisation of intrapartum care, the morbidity and mortality associated with childbirth has been significantly reduced. However, Obstetric Anal Sphincter Injuries (OASIS) continue to be a major complication of vaginal delivery [2]. Although many women do not become symptomatic, others develop different degrees of faecal and/or flatus incontinence that are associated with the degree of perineal tearing [3].

The incidence of OASIS varies from one country to another [4,5] and its correct identification and repair depends on the degree of training of the birth attendant, either midwife or gynaecologist [6,7]. Between 15 to 30% of women who deliver vaginally, present some significant lesion in the puborectal muscle that is part of the levator ani muscle [8]. Avulsion of the levator ani muscle is more prevalent among patients with anal sphincter tears and predisposes to pelvic floor dysfunction [9].

The use of forceps is associated with a higher incidence of obstetric perineal trauma, followed using spatulae. Ventouse deliveries are the least likely to cause maternal injuries, at a rate comparable with normal vaginal deliveries [2]. There remains little consensus on the risk factors for the occurrence of OASIS.

Materials and Methods

Study population

Descriptive, retrospective cohort study, in which a perinatal database was used for all births attended at the Hospital Manises. All deliveries attended in the hospital between January 01, 2015 and December 31, 2016, in total 3241 deliveries were included. The 529 cesarean deliveries were excluded from the study. The main variable studied was Obstetric Anal Sphincter Injury (OASIS). Ethical approval was required, and it was obtained from the bioethics committee of the Health Research Institute of La Fe Hospital in Valencia. All patient identifiers were replaced with a unique patient code.

Collection of data

As it is customary in obstetric practice in Spain, all normal vaginal deliveries are performed by trained midwives. The presence of an obstetrician is required if an instrumental delivery or a caesarean delivery is needed or when an anal sphincter tear or any other complication are suspected. In our study, the midwife in charge was responsible for collecting and entering data on pregnancy, labor and delivery in the electronic discharge system used to obtain this dataset.

Statistical analysis

The odds ratio adjusted for the OASIS by risk groups was estimated using logistic regression models and reported with 95% confidence intervals (CI). The statistical calculations were made using the statistical program Fstat. The dichotomous variables were coded as 0 or 1. For the continuous variables (gestational age, weight of the newborn) the mean and the standard deviation were calculated and for the qualitative variables the median and the interquartile range were calculated. First, a univariate analysis of the main variable (OASIS) was used with the dependent variables. In order to correct the effects that the variables exert on each other, a multivariate logistic regression analysis was performed. All the statistically signified variables used in the univariate analysis were used in the multivariate logistic regression model. In order to study interactions between variables, likely interactions were modelled using a combination of t-tests, chi-squared testing and/or univariate logistic regression. The resulting odds ratios were used to calculate a risk-scoring algorithm that was used to test whether accurate prediction of OASIS could be achieved on a new cohort of deliveries.

Results

Our study was conducted on the 2682 vaginal delivery performed in our hospital. There were 42 cases with OASIS. The overall OASIS rate was 1,56%. The data is described in table 1.

Descriptive variables	N	%
Maternal Age at delivery	31,87 (SD ± 5,38)	
Body Mass Index (BMI kg/m ²)	24,59 (SD ± 6,38)	
Nulliparous	967	36,1
Vaginal delivery	2011	74,8
Forceps	125	4,66
Ventouse	527	19,7
Spatulae	19	0,7
Epidural anaesthesia	2118	78,9
Another Anaesthesia	564	21,1
Second stage duration	Median 20	IQR (10 - 40)
Midlateral episiotomy	670	24,9
Fetal weight	3296 (SD ± 441)g	

Table 1: Descriptive variables.

Univariant analysis is described in table 2.

Variable	p-value	OR	IC 95%
Labour induction	0,824	1,08	0,55 - 2,09
Active third stage	0,208	0,41	0,09 - 1,72
Previous pregnancy	0,025	0,52	0,27 - 0,96
Previous vaginal deliveries	< 0,001	0,20	0,08 - 0,47
Prior Cesarean section	< 0,001	3,33	1,51 - 7,32
Instrumental delivery	< 0,001	11,07	5,25 - 23,32
Episiotomy	< 0,001	4,14	2,19 - 7,81
Postpartum Haemorrhage > 500 ml	0,881	0,86	0,11 - 6,33
Anaesthesia type	0,571	1,41	0,43 - 4,59
Term pregnancy	0,813	1,27	0,17 - 9,37
Fetal Weight	0,998	1,01	0,24 - 4,19

Table 2: Univariant analysis.

After performing multivariate analysis, statistically significant risk factors were previous cesarean section OR 3,62 CI 95% (0,01 - 0,05), ventouse delivery OR 2,78 CI 95% (0,005 - 0,006) and forceps delivery OR 2,28 CI 95% (0,004 - 0,055). Performance of an episiotomy OR 1,43 CI 95% (-0,01 - 0,02) increased the risk of OASI but was not statistically significant.

Previous vaginal births were found to be a protective factor against OASIS OR -1,3 CI 95% (0,03- -0,02), although it was not statistically significant.

Variable	P - value	OR	IC95%
Previous vaginal delivery	0,19	-1,30	0,03- -0,02
Episiotomy	0,15	1,43	-0,01- 0,02
Previous cesarean section	< 0,001	3,62	0,01 - 0,05
Ventouse	< 0,001	2,78	0,005 - 0,006
Forceps	< 0,001	2,28	0,004 - 0,055

Table 3: Multivariate analysis.

Discussion

Our retrospective study has shown that operative vaginal delivery, previous caesarean section and performance of an episiotomy are all factors that increase the risk of OASIS. Also, multiparity was found to be a protective factor against OASIS although it did not turn out to be statistically significant.

A number of publications mention that instrumental delivery is a significant risk factor for OASIS [2,4]. In these studies, the use of forceps appears to confer a higher risk for OASIS than ventouse delivery. The relationship between ventouse delivery and the risk of OASIS is controversial. Some publications did not show any association [10] while others did [11]. Also, other papers found that performing a mediolateral episiotomy for instrumentation appears to be a protective factor [12]. Other authors associate the risk of OASIS while performing ventouse instrumental deliveries to the degree of experience of the operator, with a five-fold increase if the delivery is performed by a less experienced obstetrician [13]. Other studies showed that developing a program of perineal repair training improves the outcome of OASIS in ventouse instrumental deliveries [14].

The cause of this discrepancy between the risk of OASIS with the ventouse and the forceps has not yet been understood. One opinion is that this observed variation is due to the indications for which each instrument is chosen. Forceps tend to be used in more difficult instrumental vaginal deliveries and therefore increases the force applied to the perineum. This may also explain the association with forceps delivery with both pelvic organ prolapse and stress incontinence, in accordance with the idea of increased soft tissue injury with the use of forceps [15-17].

The performance of central episiotomy as well as the mid-lateral episiotomy with an angle inferior to 30° has been associated with an increased risk of OASIS [18]. In our study, all the episiotomies were midlateral and the difference was not statistically significant.

Previous caesarean section as a risk factor for OASIS is controversial. Some studies found no differences [19]. However, in a large cohort study conducted in England which included 192,057 women, rates of OASIS of 5.0% were obtained in primiparous women, 5,8% in women with one previous elective caesarean section and 7,8% in women with one previous emergency caesarean section. They concluded that women should be advised that, attempting a vaginal delivery after a previous emergency cesarean section has a higher risk of OASIS than if they are primiparous and, also higher risk of OASIS, although to a lesser degree, if the caesarean had been elective [5]. In our study we obtained similar results although we did not differentiate between elective or emergency caesarean sections.

The existence of previous vaginal deliveries has been described as a protective factor of the OASIS in a multitude of publications [18,20,21]. Our study confirms what was found in these studies. Ultrasound studies show that after a vaginal birth, the dimensions of the perineal hiatus is increased, and this change reduces the risk of OASIS by decreasing the rigidity of the pelvic floor or perineal tissue [22-24].

Conclusion

There are several factors that influence the risk of OASIS. The main associated risk factors were instrumental delivery either with forceps or ventouse and a previous caesarean section. Midlateral episiotomy did not prove to be a risk factor. We found multiparity to be a protective factor against OASIS. Instrumental delivery, and the performance of an episiotomy, especially midline or midlateral < 30° are modifiable risk factors. This study confirms that improved intrapartum care can reduce the risks associated with OASIS and their sequelae, therefore improving their quality of life. Patients with a previous caesarean section should be warned about the risk of OASIS if they are attempting a vaginal delivery in future pregnancies.

Conflict of Interest

No conflict or financial interest.

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