

# Characteristics, risk factors and outcomes of deliveries complicated with obstetrical anal sphincter injury

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**Abstract:** *Aim:* Vaginal delivery is often complicated with perineal tears, mostly in the first and second degree, in severe cases there is damage to the anal sphincter with possible long term morbidity. Risk factors for severe perineal include nulliparity, previous severe perineal tears, macrosomia, prolonged second stage and instrumental deliveries. These risk factors are non-modifiable, the aim of our study was to explore the risk factors and seek for a modifiable risk factor. *Methods:* Our study included all deliveries that took place in a 1000-bed tertiary teaching hospital between January 2011 and March 2016. A total of sixty patients suffered a severe perineal tear at this time. *Results:* Our main findings included that the common risk factors for severe perineal tears were found in our study population, other important findings include a 39% rate of positive vaginal culture for *Candida* species, 15% of newborns had a first minute Apgar score < 7 and 19% had a pH < 7.1. *Conclusions:* Severe perineal tears have grave long term morbidity and with many known unmodifiable risk factors. We found an elevated rate of vaginal *Candida* colonization in women with severe perineal tears and believe there may be a possible association.

**Keywords:** Obstetric complications; Anal incontinence.

## INTRODUCTION

Vaginal delivery is often complicated with perineal tears which may be associated with short and long term morbidity. The majority of these tears are first and second degree tears-lacerations which extends the fourchette, perineal skin and vaginal mucosa to perineal muscles and fascia. However, on rare occasions the tear can be severe- with a disruption that involves the anal sphincter and even the rectal mucosa (third or fourth degree tears).

Perineal tears are associated with significant long-term morbidity and pelvic floor dysfunction which can lead to pelvic organ prolapse, urinary incontinence<sup>8</sup> and dyspareunia<sup>24</sup>. In cases of OASIS there may also be damage to the anal sphincter leading to flatulence and fecal incontinence<sup>7,22,23</sup>. Post-partum depression was reported in higher rates in these patients<sup>21</sup>.

Having the considerable morbidity in young healthy women, many studies have explored the risk factors for severe perineal tears and OASIS. These include nulliparity, OASIS in previous deliveries, Asian race, increased fetal birth weight and head circumference, prolonged duration of the second stage of labor and instrumental deliveries<sup>8-20</sup>. Studies regarding episiotomy have contradicting results, while some have found it to be a risk factor<sup>1,6</sup> others did not find such an association or even found episiotomies to be protective against OASIS<sup>2,17</sup>.

Most of these risk factors are non-modifiable. There may be some additional modifiable risk factors such as the work experience of the midwife birthing the patient that according to one study, was found to be associated with all degrees of perineal tears, but not with OASIS<sup>25</sup>.

In order to reduce the rate of perineal lacerations an increase in cesarean deliveries was noted which too holds substantial risks to the mother<sup>26</sup>.

Vaginal candidiasis has been associated with different pregnancy complications including preterm delivery, premature rupture of membranes and low birth weight<sup>27</sup>. The prevalence of candida was found to be as high as 15-30% in pregnant women using a vaginal swab which is an easy to use, low cost and painless test<sup>27,28</sup>. The treatment with locally administered antifungal agents is effective and safe during gestation<sup>29</sup>.

Only few studies have explored vaginal flora's effect on perineal tears. One study found no association between

bacterial vaginosis and perineal tears<sup>5</sup>. However, no studies to date, explored the association of perineal tears with vaginal candidiasis or other pathogens in the vaginal flora.

We evaluated the current case series in order to explore the characteristics, unmodifiable as well as some modifiable risk factors and perinatal outcomes of deliveries complicated with OASIS.

## METHODS

### Study population

This study is a retrospective cohort study of all women who gave birth between January 2011 and March 2016 in a 1000-bed tertiary teaching hospital. It is the only tertiary center for a population of 700,000 people. During the study period the average annual number of deliveries managed at our medical center was around 15,000.

Inclusion criteria for the study was a delivery complicated with a severe perineal tear.

Data was collected from the computerized database of all the deliveries and the infant hospitalization data. Data collected includes information on maternal baseline characteristics, co-morbidities and pregnancy complications; data regarding the delivery – including mode of delivery, length of first and second stages of birth, length of work experience of the midwife; the infant – including birth weight, Apgar scores, cord blood gas and complications; vaginal culture results and data regarding the suture of the severe perineal tear.

The study was approved by the Institutional Review Board Committee.

### Clinical definitions

Perineal tear is a discontinuation in the integrity of the perineal tissues that usually occurs during childbirth. perineal tears are divided into four degrees according to severity.

First-degree tear: laceration is limited to the fourchette and superficial perineal skin or vaginal mucosa

Second-degree tear: laceration extends beyond fourchette, perineal skin and vaginal mucosa to perineal muscles and fascia, but not the anal sphincter.

Third-degree tear: fourchette, perineal skin, vaginal mucosa, muscles, and anal sphincter are torn; third-degree tears may be further subdivided into three subcategories:

3a: partial tear of the external anal sphincter involving less than 50% thickness;

3b: greater than 50% tear of the external anal sphincter;

3c: internal sphincter is torn.

Fourth-degree tear: fourchette, perineal skin, vaginal mucosa, muscles, anal sphincter, and rectal mucosa are torn. OASIS obstetric anal sphincter injuries are third and fourth perineal tears.

**Data analysis**

The data on continuous variables with normal distribution were presented as mean ± SD. Continuous variables not normally distributed and ordinal variables were presented as median with inter-quartile range (IQ range). Categorical data were shown in counts and percentages.

**RESULTS**

A total of 60 women suffered a severe perineal tear during the study period.

Baseline characteristics of the study population included a mean maternal age was 26.87±5.08. Regarding ethnicity, 54.2% (32) were Jewish and 45.8% (27) were Bedouin Arabs. The mean height was 162.79±5.89 cm and a mean weight of 77.00±14.73 kg.

The majority of subjects (39, 81.7%) were nulliparous. Mean gravidity and parity of the study population were 1.52±0.81 and 1.23±0.53, respectively.

**Perineal tears characteristics**

More than half of the tears (51%) were sutured by a gynecologist, while another third (30%) were treated by a general surgeon and 19.0% by a colorectal surgeon.

The suture took place in the operating room under general anesthesia in 50.9% and in the labor and delivery room under local or regional anesthesia in 49.1%.

The distribution of degrees of the perineal tears is presented in figure 1, it consists of ten cases of fourth degree tears (16.9%), and the rest were third degree: 3a (47.5%), 3b (15.3%) and 3c (20.3%).

**Midwives' characteristics**

We investigated the midwives' years of experience. The mean length of work experience of the midwives was 10.20±9.98, with a median of six year (interquartile range of

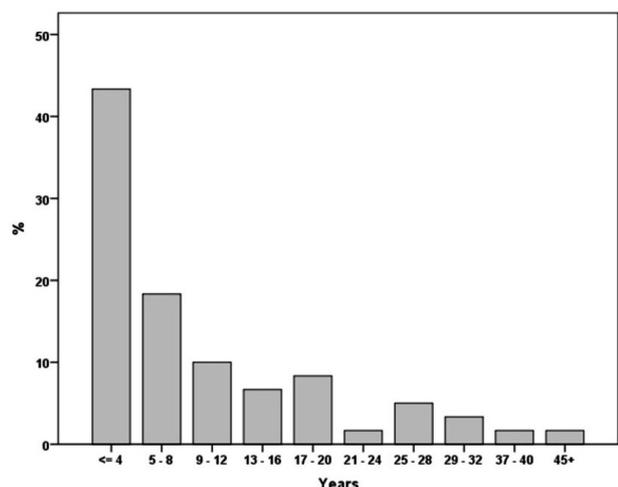


Figure 1. – Distribution of midwives years of experience.

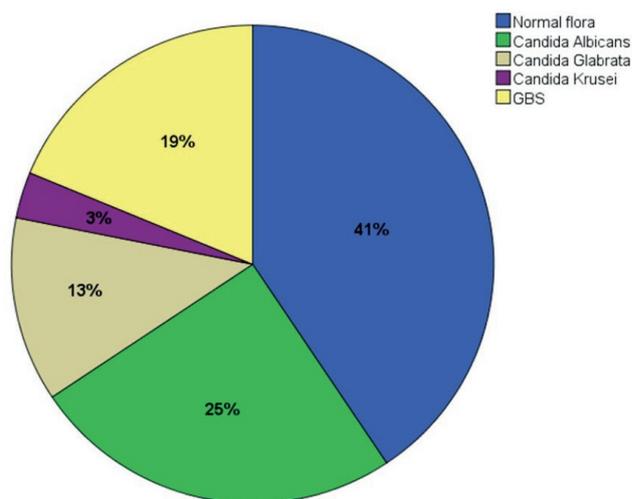


Figure 2. – Vaginal flora distribution.

3.25-13.75). Close to half (46.7%) of the midwives were young and had five years of experience or less. The distribution of the midwives' years of experience is presented in figure 2.

**Delivery characteristics**

The first stage of labor was 5.93±4.67 hours (a median of 4.63, interquartile range 3.0-7.25). The second stage of labor was 1.40±1.15 hours long (a median of 1.27, interquartile range 0.33-2.17). Six patients had a prolonged second stage of labor (> 3 hours).

Most of the cases were delivered vaginally, in 27.1% of deliveries a vacuum extraction was performed and episiotomy was performed 40.7% (24) of deliveries.

**Vaginal culture**

Vaginal culture was taken from 31 women (51.7%). Of these, 13 (41.9%) resulted in growth of normal flora, six patients (19.4%) were positive for group B streptococcus (GBS) and another 12 patients (38.7%) had growth of candida species.

Of patients with candida species growth, eight had Candida Albicans (61.5%), 3 had Candida Glabrata (30.8%) and one with Candida Krusei (7.7%).

**Neonatal characteristics**

The mean birth weight was 3450.22±540.62, with twelve large for gestational age (> 4000 gr) newborns (20.3%). There were 63.2% male neonates (36) and 36.8% (21) female neonates.

The mean first minute Apgar score was 8.36±1.30 with a median of 9 (interquartile range 8-9). Nine newborns had a first minute Apgar score under 7 (15.3%). The mean five minute Apgar score was 9.90±0.44 with a median of 10 (interquartile 10-10), only in one case was the fifth minute Apgar score under 7 (1.7%).

The mean cord blood gas pH was 7.22±0.11, 11 cases (19.3%) had a low pH (<7.1).

The mean PCO2 was 54.93±14.90, base excess was recorded at -7.82±8.65, mean HCO3 level was 21.28±6.13, mean PO2 level was 21.77±24.41 and mean lactic acid level was 18.63±23.70.

**DISCUSSION**

Our study is a retrospective case series study which included all cases of severe perineal tears that took place at the

SUMC during the study period. The main findings of our study include a high rate of nulliparity (82%) among patients with OASIS, prolonged second stage of labor was found in 10% of the cases, vacuum extraction was used in 27% of deliveries and episiotomy was found in 41% of the cases.

We also found that the midwives' work experience was short, with 44% of the midwives treating the cases of OASIS had less than 4 years of experience.

Vaginal cultures revealed a rate of 38% of *candida* infection and 20% of *GBS* infection. Most of the *candida* cases were infected with

*candida albicans*.

Additionally, a high rate of neonates were large for gestational age (20% of neonates weighed over 4 kg), a high rate of hypoxia was noted (19% of newborns had a cord blood pH level of less than 7.1 and 15% had a first minute Apgar score of less than seven).

These results are in accordance with previous studies<sup>1-20</sup>. Known risk factors for OASIS include prolonged second stage of labor, instrumental delivery, macrosomic fetuses and unexperienced midwives<sup>25</sup>. Episiotomy has been found as a risk factor in some studies but others have not found such an association.

The higher rates of hypoxia and lower Apgar scores that we (have found in this group are known to be associated with the use of vacuum extraction and performing an episiotomy<sup>31</sup>. These risk factors for severe perineal tears are unmodifiable. A rise in performing cesarean<sup>26</sup> sections in order to avoid severe perineal tears holds short and long term morbidity, as stated in the ACOG committee opinion .

The rate of vaginal *candidiasis* in this study population was 38% whereas the rate reported during pregnancy was reported to be between 15-30%<sup>29</sup>. We believe that the *candida* infection may cause changes in the vaginal tissue and make it more friable, leading to more tears of all grades as well as more severe tears. No previous studies investigating this association have been found to date. Since that detection and the treatment of vaginal *candidiasis* are simple, not expensive and have little side effects, we believe that this modifiable risk factor is worth exploring in a clinical trial setting.

The merits of this study include being a single center for the entire region of southern Israel serving a large obstetrical population accounting for a relatively large and unselected study population. However, there are shortcomings to the study including its retrospective nature leading to some missing data –such as missing vaginal cultures. This was a descriptive retrospective cohort study. Farther studies are needed in order to investigate the association we have described between vaginal *candida* colonization and severe perineal tears.

In conclusion, severe perineal tears have grave long term morbidity and with many known unmodifiable risk factors. We found an elevated rate of vaginal *candida* colonization in women with OASIS and believe there might be an association between the two.

#### DISCLOSURE STATEMENT

No author has any potential conflict of interest, any relationship with the companies that have financial interest in the information in this manuscript.

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