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# THE IMPACT OF PREVIOUS PREGNANCY ON OBSTETRIC ANAL SPHINCTER INJURIES IN SUBSEQUENT BIRTH

Hypothesis / aims of study
To evaluate the relationship between prior mode of delivery and incidence of obstetric anal sphincter injuries (OASIs).

Study design, materials and methods
OASIs can have both physical and psychological effects on women. It is therefore important to be aware of potential risk factors. This study aims to evaluate the impact previous pregnancy and labour has on the perineum, specifically third- or fourth-degree perineal trauma, in subsequent vaginal delivery.

This 16 year retrospective study looks into first and second pregnancies from 1999 to 2015. Data were extracted from 74,184 maternity records and logged in a database. Women included in the study are those who had not previously suffered perineal trauma and had varying antenatal and intrapartum exposure.

There are four groups of women in this study. 1) Those who have had a vaginal delivery (VD) after a previously failed operative vaginal delivery (FOVD) with resultant emergency caesarean section at second stage of labour (n = 52). These women have previously experienced the effects of both pregnancy and labour up to second stage, including active pushing on the perineum resulting in stretching and swelling of the perineum before caesarean section (CS). 2) Those having their second child vaginally having had a prior elective caesarean section (ELCS) (n = 139). These women have experienced the effects of pregnancy, including the increased intra-abdominal pressure on the pelvic floor but not the effects of labour. 3) Those having a second VD (n = 1554) who maintained an intact perineum during their first VD. These women have experienced previous pregnancy, labour and vaginal delivery. These three groups were compared to the fourth control group. 4) Primiparous women (n = 19,790) having their first child vaginally. These have had no other effect on the perineum apart from their current first pregnancy.

Alongside these previous modes of birth, recognised risk factors for OASIs have been incorporated into the analysis. Univariate regression analysis has been used to determine if these factors were statistically significant for third- or fourth-degree perineal trauma. A multivariate regression analysis of the previous modes of delivery has then been carried out, controlling for all identified statistically significant co-variables, to isolate the actual effect of previous mode of delivery. The risk factors analysed were: maternal age; maternal ethnicity; maternal body mass index; birth weight; epidural use; intervention (forceps, ventouse, failed ventouse to forceps) and fetus sex.

Results
Women sustaining OASIs was n = 1,229. The incidence of OASIs in women undergoing first VD was 17.3% after prior FOVD and 12.6% after prior ELCS. In women undergoing second VD (after prior VD maintaining an intact perineum) the incidence was 0.6%. The incidence of OASIs in the control primiparous group was 6%. Multivariate regression analysis demonstrates prior FOVD to be statistically significant with a 2.8-fold increase risk of OASIS (odds ratio (OR): 2.795; 95% confidence interval (CI): 1.351-5.782; p-value = 0.006) and prior ELCS having a 2.1-fold increase (OR: 2.106; 95% CI: 1.273-3.484; p-value = 0.004). Prior VD maintaining an intact perineum was discovered to be protective (OR: 0.087; 95% CI: 0.045-0.168; p-value <0.001), when compared to the primiparous control group of women.

Interpretation of results
This study identified that women having first VD after CS have a significantly increased risk of OASI than the primiparous control group. Furthermore, a higher risk of OASIs was found in the women undergoing VD when their previous CS was a result of FOVD rather than as an ELCS. This study proposes that prior pregnancy and labour, including the stretching and swelling of the perineal anatomy in the active second stage, but not going on to complete the birth by VD, may have a negative effect on the perineum for a future vaginal birth when compared with an ELCS. Furthermore, the prior FOVD group may have a predisposition to feto-pelvic disproportion which may have led to a FOVD at the first birth and have also contributed to an increased risk of OASIs in the subsequent birth.

There is limited evidence whether prior uterine scar has significant influence on maternal outcomes. However, from the results of this study a relationship is shown. During CS, the uterus is incised and then sutured after delivery of the fetus. This results in uterine muscle stretching and scarring which interrupts the uterine muscle fibres. It is recognized in the literature that fibrotic scarring alters the muscle mechanic, reducing the contractile capability of the muscle and, therefore, the strength of the contraction compared to non-damaged muscle [1]. It has also previously been found that if 50-60% stretch-strain is placed on a muscle, it can completely eliminate force production [2]. This study proposes that we can apply this principle to uterine muscle and that this may have an effect on subsequent pregnancies, after CS, on the physiological process of labour. There may be an alteration of muscle contractility which would affect the movement of fetus through the uterus and birthing canal, altering the common descent a fetus takes. It follows that this altered descent and fetal presentation may be a reason for increased risk of OASIs.

A further finding of this study is that women who had previously delivered vaginally with no perineal trauma are protected against OASI in a second VD compared to primiparous women.

Concluding message

Due to the physical and psychological implications of perineal trauma, this study recommends that the statistically significant impact of a previous abdominal delivery on the risk of obstetric anal sphincter injuries should be incorporated into the counseling of expectant mothers considering an elective caesarean section for their first birth and for women considering a vaginal birth after caesarean section. The findings of this study may also be important for future research into OASIs and in creating predictive models.

**Results Table 6: Multivariate Regression of previous modes of delivery**

| | **Patients with third- or fourth-degree trauma (n = 1,229)** | | **Patients without third- or fourth-degree trauma (n = 20,306)** | | **Odds Ratio (OR)*** | **95% Confidence Interval (CI)** | **P-value (<0.05)** |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | | | |
| **Previous mode of delivery** | | | | | | | |
| Nil – Primiparous | 1193 | 6.0 | 18597 | 94.0 | 1.000 | n/a | n/a |
| FOVD | 9 | 17.3 | 43 | 82.7 | 2.795 | (1.351-5.782) | 0.006 |
| ELCS | 18 | 12.9 | 121 | 87.1 | 2.106 | (1.273-3.484) | 0.004 |
| VD with intact perineum | 9 | 0.6 | 1545 | 99.4 | 0.087 | (0.045-0.168) | 0.001 |

*1.000 represents a referent value

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