

## PERINEAL AND VAGINAL TEARS ARE MARKERS FOR OCCULT LEVATOR ANI TRAUMA

### Hypothesis / aims of study

Vaginal delivery is a major etiological factor in pelvic floor dysfunction, and one of the pathophysiological mechanisms seems to involve trauma to the levator ani muscle [1]. Diagnosis in Delivery Suite is usually impossible as levator tears are commonly occult, and difficult to assess even if exposed by vaginal tears. There are a number of clinical risk factors, the most obvious being Forceps delivery [2]. In this study we tried to determine whether vaginal and perineal tears, in particular 3<sup>rd</sup> and 4<sup>th</sup> degree tears (OASIS) are an indicator of increased risk of levator trauma as diagnosed by 4D translabial ultrasound (US) at 3-6 months postpartum. Such clinical markers may become useful in the identification of women at high risk of levator trauma and future pelvic floor dysfunction.

### Study design, materials and methods

This is a retrospective analysis of data obtained in the context of two ongoing perinatal trials. A total of 774 nulliparous women were seen 3 – 6 months after their first birth of a term singleton cephalic baby. The assessment included an interview, clinical assessment and 4 dimensional translabial ultrasound (US). The assessor was blinded to previous results as well as all delivery information and the woman's abdomen was covered by a sheet. Clinical data was obtained from the institutional obstetric database, including information on vaginal and perineal tears. In doubtful cases and in all cases of a 'vaginal tear', we reviewed all clinical entries to estimate the extent and location of such tears. Data analysis was performed at a later time, on a desktop personal computer using GE Kretz 4D View v 7.0- 10.0. Levator avulsion was diagnosed on postprocessing of archived US volume data sets, using tomographic ultrasound imaging (TUI) as previously described [3].

We then analysed the association between levator avulsion and 3<sup>rd</sup> degree perineal tears/ vaginal tears, using logistic regression models to model levator avulsion for risk factors of interest. A multivariate model was also built for each outcome, using risk factors that were statistically significant at  $p=0.05$ . It is worth noting that two models were used for avulsion as side wall tears are a type of vaginal tear, so a model was produced with each variable. No adjustments were made for multiple comparisons. P-values  $< 0.05$  were considered statistically significant. SAS V9.3 was used for all modelling. This research was undertaken in the context of previous parent studies that had been approved by the Institution's Human Research Ethics Committee. Power calculations were not performed as this is a secondary analysis of two trials for which sample size was determined independently.

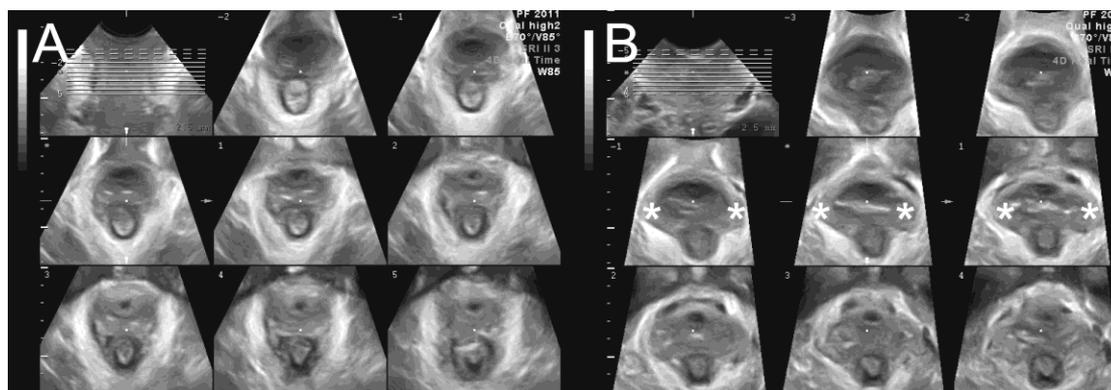


Figure: Vaginal tear (A) associated with a major right- sided avulsion as seen on rendered volume (B) and tomographic ultrasound (C).

### Results

Seven hundred and seventy four data sets were able to be analysed. Four hundred and nine women (53%) had had a normal vaginal delivery, 47 (6%) a forceps, and 94 (12%) a Vacuum delivery. The mean maternal age of the women was 28 yrs (range 18 - 45) and the average BMI in third trimester was 30 (range 19.3 – 56.5). The mean gestational age was 36.5 weeks (range 33.2 – 38.6) at first presentation, and the average gestation at delivery was 40 weeks (range 36 – 42.7 weeks). Eighty- four (n=652) were Caucasian. An epidural was used in 348 (45%), Syntocinon in 335 (43%). The length of 2<sup>nd</sup> stage was recorded at a median of 63 minutes, and the mean birthweight was 3477 (2010- 4996) g. Of those delivered vaginally, 86 had an episiotomy, 266 had a perineal tear (1<sup>st</sup> degree, n=68; 2<sup>nd</sup> degree, n=146;; 3<sup>rd</sup> or 4<sup>th</sup> degree, n=32) and 94 had been diagnosed with a vaginal tear (17% of vaginally parous women). Of the latter, 24 tears were described as affecting the lateral vaginal wall (4% of the vaginally parous).

Variable	Avulsion*	No Avulsion*	Univariate Analysis	
	(n=86)	(n=688)	OR (95% CI)	P-value
<b>Episiotomy</b>	32 (22%)	54 (9%)	6.9 (4.0-12.1)	<0.0001
<b>Perineal tear</b>				<0.0001
-no tear	43 (50%)	465 (68%)	1	

-first degree	7 (8%)	61 (9%)	1.24 (0.54-2.88)	ns
-second degree	24 (28%)	142 (21%)	1.49 (0.87-2.54)	ns
-3rd/ 4th degree	12 (13%)	20 (2.9%)	6.49 (2.97-14.17)	<0.001
<b>Vaginal tear</b>	19 (22%)	75 (11%)	2.32 (1.32-4.07)	0.003
-side wall tear	10 (12%)	14 (2%)	6.34 (2.72-14.75)	<0.0001
-anterior / periurethral tear	2 (2.3%)	8 (1.2%)	--	ns
-labial tear	11 (12.8%)	32 (4.7%)	3.0 (1.36- 6.52)	0.005
-post. wall tear	3 (3.5%)	28 (4.1%)	--	ns
-U shaped tear	1 (1.2%)	4 (0.6%)	--	ns

Table 1: Univariate association between perineal/ vaginal trauma and levator ani avulsion. \*Data given as number, %.

Levator avulsion was diagnosed in 88 women. Both on univariate and multivariate analysis, OASIS and vaginal tears were associated with avulsion. This effect of vaginal tears was almost completely explained by lateral vaginal tears; see Table 1 for univariate analysis. The association with episiotomy became nonsignificant on multivariate analysis, but both 3<sup>rd</sup> degree perineal tears and vaginal sidewall tears remained independently and highly significant ( $p < 0.0001$  for the former, and  $P = 0.002$  for the latter).

#### Interpretation of results

In this large observational series we have been able to show that both OASIS and vaginal sidewall tears are strongly associated with levator avulsion diagnosed by translabial 4D tomographic ultrasound 3-6 months after the birth of a first child. The odds ratio for avulsion in women suffering from such overt trauma was 6.49 for OASIS and 6.34 for vaginal sidewall tears.

#### Concluding message

Both OASIS and vaginal sidewall tears are strong and independent clinical markers for levator avulsion. They may become useful in defining a high- risk group for secondary prevention trials. Where such facilities exist, OASIS and sidewall tears may be regarded as an indication for pelvic floor imaging in the puerperium to allow diagnosis of levator trauma and early physiotherapeutic intervention.

#### References

1. Am J Obstet Gynecol 2006; 195(1): 23-28
2. Ultrasound Obstet Gynecol 2012; 39(4): 367-371
3. Int Urogynecol J 2011;22(6):699-704.

#### Disclosures

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