

## INFLUENCE OF MODE OF DELIVERY ON URETHRAL MOBILITY SIX MONTHS POSTPARTUM

### Hypothesis / aims of study

Damage of the supporting structures during vaginal birth plays an important role in the development of changes in pelvic floor anatomy and function in the postpartum period and later in woman's life. One of the changes that have already been established is the increase in urethral mobility short after delivery (1). This can be assessed by ultrasound, measuring angular or linear parameters at rest and while performing a Valsalva manoeuvre. The urethropelvic angle, formed by the axis of the pubis symphysis and the axis of the urethra is one of the angular parameters that have been defined to evaluate urethral mobility (2).

The aim of this study was to evaluate the influence of mode of delivery on urethral mobility six months after first delivery by measuring the urethropelvic angle. The study hypothesis is that caesarean section may protect from injuries to the urethral supporting structures, while instrumental vaginal delivery may be associated with a greater damage.

### Study design, materials and methods

A prospective cohort study was undertaken to evaluate the influence of first delivery on urethral mobility. The study group was selected from the primigravid women who came to give birth at our Public Health Hospital from April to October, 2007. The exclusion criteria were: multiple pregnancy, gestational age of less than 37 weeks, previous urogynecological surgery or malformations and neurological disorders.

Urethral mobility was evaluated at inclusion and six months after delivery by introitus ultrasound in the lithotomy position. Bladder and urethra were visualized in relation to the pubis symphysis to measure the urethropelvic angle. Examination was performed using a General Electrics echograph model Voluson 730 - ProV and a 6 MHz multifrequency convex vaginal probe. Urethropelvic angle was measured at rest and while performing a maximum Valsalva manoeuvre by a single experienced sonographer, who was blinded to all delivery data to reduce bias. At least three Valsalva manoeuvres were performed, and the one producing the most marked urethral movement was used for numerical evaluation. The difference between the measurements (degrees at Valsalva – degrees at rest) was defined as urethral rotational angle. Joint hypermobility was evaluated at the 6-month follow-up visit according to the modified Beighton criteria. Delivery and newborn details were obtained from the clinical charts. Women were divided in three groups according to mode of delivery: caesarean section, spontaneous vaginal delivery and instrumental vaginal delivery.

Correlation of constitutional, delivery and newborn variables with urethral rotational angle was examined by comparison of means (Student's test and ANOVA). A Linear regression model was performed with mode of delivery and other statistically significant variables in order to assess its relationship with urethral rotational angle six months postpartum. Statistical significance was set as  $p=0.05$  throughout.

### Results

During the inclusion period, 450 pregnant women at term who came to give birth at our Public Hospital had an ultrasound examination. From the total, 371 (82.4%) attended the 6 months follow-up visit forming the study group. Mean age was 31.2 years (range:18-46) and mean BMI was 23.3 (range:15.9-44.2). Mode of delivery was caesarean section in 48 (12.9%), spontaneous vaginal delivery in 223 (60.1%) and instrumental delivery in 100 (27%). There were no significant differences in urethral rotational angle prior to delivery among these groups ( $13.2\pm 11.2$ ;  $14.0\pm 13.2$ ;  $13.1\pm 12.8$ ;  $p=0.8$ ). The univariant analysis performed to associate urethral mobility six months postpartum with different variables is shown in table 1.

A linear regression model was built with the statistically significant variables. This analysis indicated that urethral rotational angle was significantly larger after spontaneous vaginal delivery (mean difference:8.7;  $p=0.01$ ) and instrumental vaginal delivery (mean difference:8.0;  $p=0.02$ ) in comparison with caesarean section. There were no significant differences between spontaneous and instrumental vaginal delivery (mean difference:-0.5;  $p=0.8$ ). The mean value of urethral rotational angle was also significantly higher in women with BMI  $\geq 25$  (mean difference:7.1;  $p=0.006$ ).

**Table 1.** Results of the univariant analysis performed to associate urethral rotational angle six months postpartum with different variables

Constitutional, delivery and newborn variables	n	Urethral rotational angle six months postpartum		P value	
		Mean	SD		
Age (years)	< 30	99	34.2	19.9	0.4
	30-34	206	35.5	22.0	
	35-39	61	37.3	23.3	
	$\geq 40$	5	27.0	21.6	
BMI	< 25	279	32.4	21.4	0.006

	≥ 25	92	39.6	21.5	
Joint hypermobility	No	329	33.4	21.2	0.05
	Yes	42	40.2	24.1	
Mode of delivery	Caesarean section	48	27.1	17.3	0.05
	Spontaneous vaginal delivery	223	35.0	22.5	
	Instrumental vaginal delivery	100	35.7	20.9	
Birth weight ≥ 4000g	No	348	34.0	21.5	0.4
	Yes	23	37.3	23.6	
Newborn cephalic perimeter ≥ 36 cm	No	292	33.5	20.9	0.24
	Yes	79	36.7	23.9	

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BMI: body mass index. SD: standard deviation

#### Interpretation of results

Vaginal delivery, either spontaneous or instrumental, significantly increased urethral mobility six months postpartum in comparison with caesarean section. When we compared both types of vaginal delivery, urethral mobility was nearly the same.

#### Concluding message

Vaginal delivery is associated with an increase in urethral mobility, probably due to injury to urethral supporting structures during childbirth. It appears that this damage is not greater in women delivered instrumentally.

#### References

1. Dietz HP, Bennett MJ. *Obstet Gynecol* 2003; 102:223–228
2. Constantini S, Esposito F, Nadalini C, Lijoi D, Morano S, Lantieri P, Mistrangelo E. *Ultrasound Obstet Gynecol* 2006; 27:183-187

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<b><i>Is this a clinical trial?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>Medical Ethics and Investigation Committee of the Hospital Donostia</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>