Urethral mobility : transvaginal technique

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Background :

Low urethral closure pressure, high cough pressure and fixed bladder neck are known as the main risk factors for failure in classical incontinence surgery. Transvaginal linear array ultrasound is the most precise way to measure the descent of the bladder neck during abdominal hyperpressure.

Method:

The patient is in gynaecological position. The probe must be horizontal and introduced only a few millimetres beyond the bladder neck. To get the right section plain you must obtain an image including the urethral lumen (or catheter) and the arcuate ligament of the pubis at the level where it is the thickest (1).

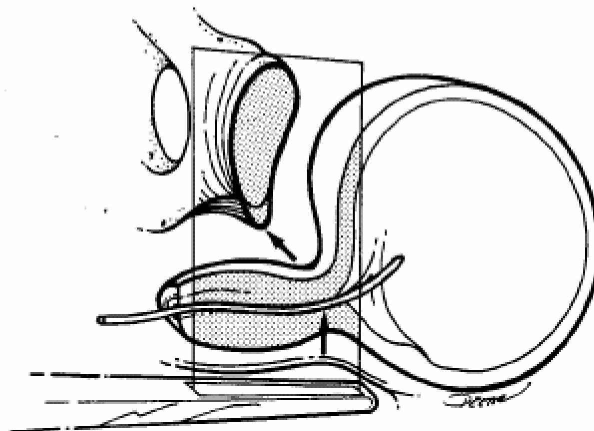

Fig. 6. — Standardised section plane. It includes a line : the manometric catheter in its portion above the pubis (arrow)and a point : the posterior edge of the pubic arcuate ligament at its thickest (arrow). The emitting portion of the probe is perfectly horizontal.

The bladder neck is defined by the junction between the front bladder wall and the urethral wall.

Fig. 13. — Sonography locates the vesical neck more accurately than X-rays. A. Vesical neck located by sonography: junction between the sphincteric zone and the anterior vesical wall. This reference point is very clear. B. The vesical neck is very difficult to locate on X-rays. This difficulty increases during an effort (funnel-shaped bladder) and in case of incompetent cervix.

To obtain a more precise definition of the position of the urethra 5 parameters can be used.

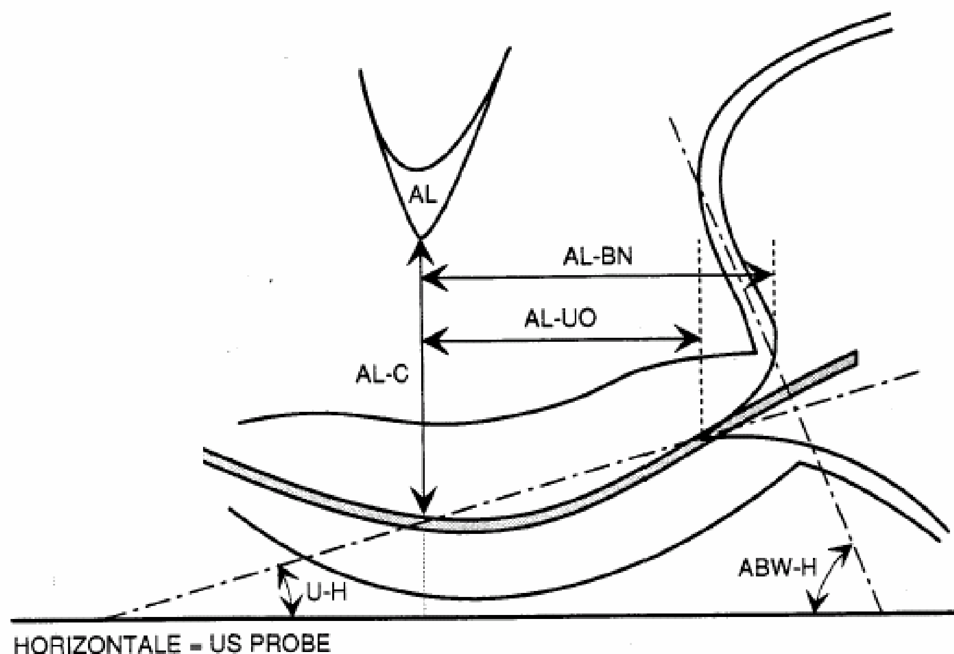

Fig. 15. — Static sonographic parameters (5, 6). AL-BN: distance arcuate ligament (AL) – vesical neck. AL-UO: distance arcuate ligament – extremity of the cervical incompetence. AL-C = distance arcuate ligament – manometric catheter. UH = angle urethra above the symphysis – horizontal plane. ABW-H = angle anterior vesical wall-horizontal plane.

The probe must move freely during the abdominal hyperpressure.

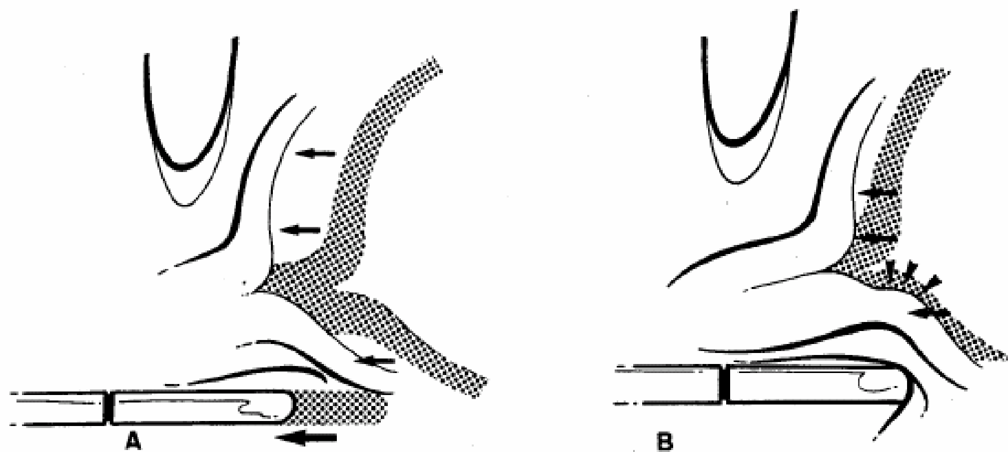

Fig. 14. — To measure the neck descent during an effort, the linear endovaginal or endorectal probe moves freely in the horizontal plane. A = mobile probe: the neck descent is only slightly influenced. B = fixed probe: the neck descends much less. Measurement is indeed easier but it is no longer reliable.

Results:

The position of the urethra is correlated with the maximum urethral closure pressure (2).

Table 23.1 Ultrasonographic parameters: values and correlations. These values and correlations have been obtained in a population of 91 female patients who have never been operated (59 are incontinent during stress). The average age is 47.3 years and average urethral closure pressure (MUCP) is 53.4 cmH_2O.

				Pearson correlation coefficient		
Parameters	Mean	Min.	Max.	Age	MUCP	Parity
AL–BN (mm)	16	−5	32	−0.58	0.51	NS
AL–UO (mm)	14.4	−5	31	−0.56	0.55	NS
AL–C (mm)	9.4	3	24	0.30	−0.34	NS
ABW–H (°)	86.6	36	137	0.61	−0.46	NS
U–H (°)	−0.6	−35	116	0.38	−0.38	NS
BN descent (mm)	10.6	2	32	NS	NS	NS

AL–BN, arcuate ligament–bladder neck distance; AL–UO, arcuate ligament–urethral opening distance; AL–C, arcuate ligament–anterior border of the manometric catheter; ABW–H, anterior bladder wall–horizontal angle; U–H, urethra–horizontal angle; BN descent, descent of the anterior edge of the bladder neck in relation to the posterior edge of the arcuate ligament of the pubis during a maximum cough (see Fig. 23.5 and 23.6).

In 1991, we have presented in the IUGA meeting a small study (2,3,4) about the prognostic value of ultrasound and urodynamics in incontinence surgery according to Mouchel (mini vaginal tape with PTFE). In the 22 parameters studied by a stepwise discriminant analysis, 7 were selected. With these 7 parameters, it was possible to predict the result of surgery in 96 % of the cases. Only two of them were urodynamics parameters.

Parameters (in efficiency order)	Method	Average squared canonical correlation (% prognostic)
Bladder neck descent	Utrasound	0.34
Maximum urethral closure pressure	Urodynamics	0.51
ABW-H angle	Ultrasound	0.65
AL-UO distance	Ultrasound	0.75
AL-C distance	Ultrasound	0.86
U-H angle	Ultrasound	0.91
Maximal cough pressure	Urodynamics	0.96

In the same study, if only urodynamics parameters were used the prognostic value was 40%. The prognostic value of ultrasound alone was 87 %.

References:

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(full text available on www.ultrasonography.org).

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