

## ANATOMIC 2D AND 3D ULTRASONOGRAPHIC EVALUATION OF THE EXTERNAL URETHRAL SPHINCTER IN MALE SUBJECTS.

### Hypothesis / aims of study

External urethral sphincter's morphology and physiology have been matter of many anatomical and functional researches in the past years, nonetheless up to now there is no agreement upon these subjects.

In this confused context, our purpose is to test out if rhabdosphincter's morphology is adequately demonstrable with transrectal ultrasonography (TRUS) and, if it is, which other anatomical and physiological information we are able to obtain with this method.

### Study design, materials and methods

A total of 35 subjects have been studied. All subjects underwent TRUS, both longitudinal and transversal sections were acquired. 3D reconstruction has been obtained as well. Many parameters have been measured : diameter, right and left lateral thickness, length of rhabdosphincter, each one at rest, after coughing and after pelvic floor contraction. The ultrasonographic aspect of the external urethral sphincter has also been evaluated through a semi-quantitative scale dividing sphincters in anecogenic, moderately ecogenic and hyperecogenic. Contractility of the rhabdosphincter has been measured through a new parameter: Crivellaro-Palazzetti Index (CPI). This parameter is calculated as the ratio of the difference between sphincter's diameter after cough and the diameter at rest divided by the diameter at rest. This we called the involuntary CPI (iCPI). We also calculated a voluntary CPI (vCPI) where we used the diameter of the sphincter after pelvic floor contraction.

### Results

External urethral sphincter has been easily assessable with TRUS in all subjects as an hypo-anecogenic ring shaped structure dorsal to membranous urethra which stops ventrally to it. Medium measured diameter was 12.09 mm, medium left lateral thickness was 2.4 mm, and medium right lateral thickness was 2.2 mm, medium length was 16.38 mm at rest. After coughing the same parameters were 12.26 mm, 2.4 mm, 2.3 mm, 15.1 mm and after pelvic floor contraction were 12.46 mm, 2.2 mm, 2.4 mm, 14.98 mm. 3D reconstruction didn't allow to take any measurements and it has been partially helpful in the evaluation of the ecogenicity only.

### Interpretation of results

Analysis of ultrasonographic aspect demonstrated that in young subjects tends to prevail an anecogenic rhabdosphincter, and that ecogenicity varies with age of subjects in a way that makes hyperecogenicity more prevalent in older patients. CPI perfectly correlates with rhabdosphincter contraction adding important information on its function. 3D reconstruction didn't give us any additional informations

### Concluding message

TRUS permits ad adequate visualization of the external urethral sphincter in male patients. This anatomic structure has a unique ultrasonographic morphology that has never been described before now. Analysis of rhabdosphincter contractility with CPI also permits a functional evaluation of this muscle which is the key structure in maintaining continence after radical prostatectomy.

### References

1. De Leval – Le sphincter striè de l'uretre. Journal d'Urologie 1984, 90, n° 7, 439-454.
2. Koraitim MM – The male uretra sphincter complex revisited: an anatomical concept and its physiological correlate. J Urol 2008, 179, 1683-1689.
3. Strasser H – Three-dimensional transrectal ultrasound of the male urethral rhabdosphincter. World J Urol 2004, 22: 335-338.

<b><i>Specify source of funding or grant</i></b>	none
<b><i>Is this a clinical trial?</i></b>	No
<b><i>What were the subjects in the study?</i></b>	HUMAN
<b><i>Was this study approved by an ethics committee?</i></b>	No
<b><i>This study did not require ethics committee approval because</i></b>	Ultrasonography was not performed in a sperimental setting.
<b><i>Was the Declaration of Helsinki followed?</i></b>	Yes
<b><i>Was informed consent obtained from the patients?</i></b>	Yes