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3D ULTRASOUND AS A DIAGNOSTIC METHOD FOR INCONTINENCE

Hypothesis / aims of study

Ulrasound has become an integral part of diagnostic imaging of pelvic floor. The lower urinary tract and pelvic floor can be depicted by different sonographic approaches. Ultrasound has been performed by transabdominal, perineal, introital and vaginal applications and advised for various reasons.

Two dimensional ultrasound, urodynamic evaluation and physical examination are the most important methods for diagnosing urinary incontinence. We must evaluate the urethra, bladder neck and surrounding structures. On the basis of these examinations we are able to define the structures responsible for the incontinence and we can decide about surgery for women. Using ultrasound after the operation we can evaluate the impact of the anti-incontinence srugery on the pelvic floor. Detailed morphological evaluation is very important especially for incontinent women after anti- incontinence surgery. In these cases three dimensional ultrasound is often used.

Three dimensional ultrasound (3D US) offers several advantages over two dimensional (2D US). Within a scanned volume every plane including sagittal, tranversal and coronal views can be depicted, a reconstruction of the organs can be done and volumes can be accurately measured.

Aim of study is to demonstrate the possibilities of three dimensional ultrasound in depicting the lower urinary tract at women with genuinne stress incontinence.

Study design, materials and methods

In this study we examinated women with primary genuinne stress incontinence, recurrent stress incontinence after surgical procedures and continent women as a control group. We used the 3D sonography of the Vouson 550MT (Kretztechnik, Austria) scanner. We performed the procedure by introital application, in a gynecological position with a bladder content of 300 ml of normal saline solution. At first a 2D examination was performed, then continued with 3D analysis and reconstruction. A 3D reconstruction of bladder, urethra and vagina was performed with Vocal software without the actual presence of the patient.

Results

We obtained 2D ultrasound pictures and then we performed sectional plane modes and 3D reconstructions of the bladders, urethras, and vaginas for continent women, who had not delivered a baby. We compared the physiological models with the sectional plane modes and 3D models in women with primary incontinence and those with recurrent stress incontinence after urogynecological surgery.

Interpretation of results

Physiological models demonstrate topical relationships of individual anatomical structures- the physiological curvature of the vagina, the shape of the vagina due to fixation to the pelvic floor on transversal and sagittal views, and relations of the bladder neck and the base of the urinary bladder.

The 3D models of pathological pelvic anatomy are especially instructive. We find typical changes of the urethrovesical junction after colposuspension for women with voiding dysfunction, the junction is elevated up the base of the urinary bladder, in the transversal view in the distal and medial part of vagina the lateral parts and fornices of the vagina are elevated by suspension, and the urethra is usually reclinated or verticalized.

We can see interesting changes of the base of the urinary bladder after anterior vaginal repair for descensus and stress incontinence, for relaxation we see an overcorrection of the cystocele and high posterior urethrovesical junction and during the valsalva maneuver the posterior angle is totally diminished.

Concluding message

Three dimensional sonography is a non- invasive diagnostic tool. 3D and 2D ultrasound complement each other, especially for women with recurrent stress incontinence after anti-

incontinence surgery. 3D ultrasound enables us to very well understand the anatomical relationships of the urethrovesical junction. That could be used to better characterize changes to the pevic floor, understand the etiology of incontinence and optimalize therapeutic decisions for women with stress incontinence. The limits of using 3D ultrasound as a diagnostic method for urinary incontinence are the difficulties of time and experience.