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Zahariou A[1], Tyligada E[1], Moutselou E[1], Papaioannoy P[1], Konstantinidou E[2], Apostolidis A[2]
1. *Elpis Hospital, Volos, Greece,* ***2.*** *Center For The Study Of Continence And Pelvic Floor Disorders, Aristotle University, Thessaloniki, Greece*

POST-RADICAL PROSTATECTOMY INCONTINENCE: ULTRASONOGRAPHIC CHANGES OF THE STRIATED URETHRAL SPHINCTER AFTER PELVIC FLOOR MUSCLE TRAINING

Hypothesis / aims of study

Urinary incontinence following radical prostatectomy (RP) continues to be a distressing problem with severe impact on the quality of patient's life (1, 2). Incontinence has been reported in 2% to 87% of men after RP depending on the definitions, diagnosis, modalities and interval from surgery. Behavioural interventions, pharmacotherapy and surgery are the treatment options for patients with urinary incontinence (UI) after RP. Based on the principle that the least invasive, repeatable method with the fewest side-effects should be the first choice when treating UI, pelvic floor muscle training (PFMT) has been recommended as the first step of conservative management of stress urinary incontinence (SUI). Recent enhancement in imaging has allowed the use of three-dimensional ultrasound to evaluate the anatomy of striated urethral sphincter (rhabdosphincter) (3). The aim of this study is to assess the effect of an intensive 12-week pelvic floor rehabilitation program on morphology of striated urethral sphincter of patients with UI after RP and to assess the use of morphological changes of urethral sphincter as a predictor of PFMT program results.

Study design, materials and methods

This is a non-randomised, convenient sample, single-centre prospective study. Male patients visiting an outpatient clinic, complaining for SUI after RP, were included in the study. All patients underwent an urodynamic investigation (3 months post-operatively in order to exclude possible impact of post-op oedema and hematoma). The sonographic examination was performed in all patients within a maximum time interval of 1 week after urodynamic investigation. The ultrasound probe was held steady and each patient was asked to lie still on the examination couch. The transducer rotates and about 200 two-dimensional ultrasound sections are obtained, digitized and stored in the computer's memory. Any structure within the volume scanned can be imaged from any orientation. The length of the rhabdosphincter was measured in the coronal plane, and its thickness was measured in the transverse plane at the level of maximum urethral diameter. This procedure was repeated after the termination of the 12 week PFMT program.

The pelvic floor muscle training consisted of four office biofeedback sessions and home training program. The home exercise program consisted of a progressive increase in the number of muscle contractions. The exercise sets included two sets of 5 quick and 10 sustained contractions with a 10-second interval-rest period. The number of sustained contractions increased progressively to a final regimen of 5 quick and 20 sustained contractions twice daily. All patients attended weekly office visits. Training was reinforced with monthly 30-minute biofeedback sessions and regular contact with the registered pelvic floor trainer.

All of them completed a three day frequency-volume chart for the evaluation of the severity of micturition frequency, nocturia, number of incontinence episodes and voided volumes at baseline and after the finalisation of the PFMT program.

Comparisons were done using Student *t* test (version 13.0, SPSS Inc., Chicago, IL). Correlation was tested using the Spearman rank test. Data were expressed as mean, standard deviation (SD), minimum and maximum.

Results

Subjects were recruited over a 12-month period. Out of the 30 patients screened during the study period, 26 (86%) agreed to participate and signed the informed consent. The patients had a mean age of 65.2 years (range 56-72) and had undergone RP before 3.1 months (range 3.0-3.2 months) in different centres. According to the operation report, all had undergone unilateral or bilateral nerve sparing radical prostatectomy.

Using three-dimensional ultrasonography, we were able to visualise striated urethral sphincter and the periurethral tissues in all men examined. The sphincter was thicker on the ventral and lateral aspects of urethral and was absent dorsally. The echogenicity of the muscle was increased due to the previous surgical procedures. The examination was well tolerated by all subjects. At the beginning of PFMT program the urethral sphincter length (mm) was 14.1 ± 2.6 and the thickness (mm) 2.5 ± 0.4. Data are presented as mean ± standard deviation. After the 12 week PFMT program the urethral sphincter length (mm) was 14.5 ± 2.7 and the thickness (mm) 3.2 ± 0.5. There was a statistical significant improvement in muscle thickness (P=0,028).

Patients after PFMT experienced a significant reduction in the number of incontinence episodes per week. There were 12 patients continent and the 14 incontinent subjects revealed a reduction of about 58.3% in the number of incontinence episodes per week (before treatment 9.1±3.4, after treatment 3.8±1.8, $p<0.005$). There was also a 79% reduction of continence pads used per week (before treatment 10±8, after treatment 2.1±2 pads, $p<0.001$). Ultrasound findings (muscle thickness) was inversely correlated with the number of incontinent episodes per week (Rho=-0.423, P=0.009).

Interpretation of results

Using three-dimensional ultrasonography, the urethra is clearly viewed in every patient studied and the different layers of its structure were evaluated. There was an increase in muscle thickness due to intensive PFMT but the length was not significantly improved as expected. The enhanced muscle thickness permitted patients to become continent and it is expected to be statistically correlated with the decrease of incontinent episodes of subjects.

Concluding message

The striated urethral muscle thickness after a PFMT program in incontinent patients with RP is increased. That allows significant improvement of SUI and predicts the success of intensive pelvic floor training programs.

References

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Is this a clinical trial?	**Yes**
Is this study registered in a public clinical trials registry?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**ELPIS HOSPITAL**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**