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RADICAL PROSTATECTOMY RESTORE THE DETRUSOR CONTRACTION SUSTAINABILITY: USING A NEW PRESSURE FLOW STUDY PARAMETER

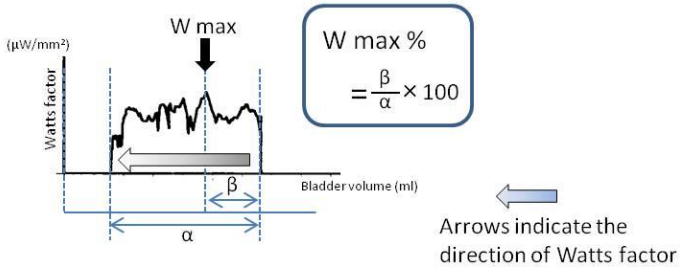
Hypothesis / aims of study

Pressure flow studies (PFS) have been regarded as the gold standard for evaluating not only bladder outlet obstruction, but also detrusor contractility. We previously reported that radical prostatectomy (RP) improved urodynamic parameters by releasing bladder outlet obstruction without affecting detrusor contractility. Although bladder contractility consists of strength and duration, the variable method for evaluating the contraction duration is not well validated. The contractility of the bladder was quantified by a parameter of approximated power per bladder wall area according to the Hill equation. The most widely used measurement of bladder contractility is the Watts factor (WF), which calculates the detrusor pressure in relation to the volume and flow rate [ref 1]. WF was calculated throughout bladder emptying and plotted as a function of the volume in the bladder at each moment in time. Impaired bladder contraction represent not only decreased peak of WF, but also poorly sustained detrusor contractions. From this point of view, the maximum height of the resulting curve (Wmax) and its pattern should be discussed separately. In the present study, we focused on the detrusor contraction sustainability using a new pressure flow study parameter.

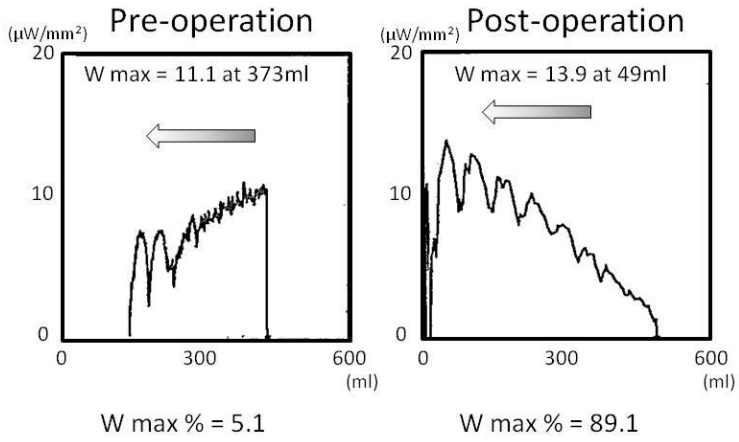
Study design, materials and methods

In the present study, we defined "Wmax %" as the percentage of maximum WF during micturition (fig.1 (a)). A normal detrusor contractility pattern show a sharp increase at the initiation of micturition, and slight increasing to the end of micturition. However, patients with impaired detrusor contractility show a fading contraction pattern (decreasing to the end of micturition) (fig.1 (b)). Mastrigt et al reported that, in the most patients, a preoperative fading contraction was restored to normal pattern after transurethral resection of the prostate surgery. Wmax % could represent the pattern of detrusor contractility.

(a) Definition of "W max %"



(b) Example of W max % pre and post radical prostatectomy



Thirty seven patients with clinically localized prostate cancer who were urodynamically evaluated pre- and post-RP. The urodynamic parameters included the maximum flow rate (Qmax), postvoid residual volume (PVR), detrusor pressure at maximum flow (Pdet at Qmax), Wmax, and Wmax % were examined.

All the data are described as mean ± standard deviation, and statistical analyses were conducted using paired t tests, and cases with a P value of 0.05 or smaller were considered statistically significant.

Results

Qmax increased significantly after RP (13.0 ± 6.6 → 17.3 ± 7.8 ml/min, P<0.01). Pdet at Qmax and PVR significantly decreased (49.6 ± 21.3 → 31.4 ± 16.3 cmH_2O, 48.6 ± 66.1 → 14.9 ± 28.5 ml P<0.05). Although Wmax did not changed significantly (10.5 ± 3.1 → 11.0 ± 3.2 W/m^2), Wmax % was increased significantly (51.6 ± 30.1 → 80.1 ± 20.2, P<0.01).

Interpretation of results

Wmax is the maximum instantaneous power of bladder contraction, whereas Wmax % can confirm the improvement of detrusor contraction sustainability. Determination of bladder outlet obstruction are well established by using data derived from the pressure flow studies. In contrast, quantification of detrusor power during voiding is less confirmed. The WF have been suggested for quantifying detrusor contraction power. However, threshold values of WF have never been thoroughly investigated. After RP, the anatomy and function of the bladder and bladder outlet are altered. Detrusor denervation is one explanation for changing detrusor contractility pattern. However, exact mechanism have not been completely clarified yet.

Concluding message

Our study confirmed that RP restore the detrusor contractility pattern of prostate cancer patients. The measurement of W max % provides some insight into the bladder contraction sustainability.

References

1. 2011.30.723-8

Disclosures

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