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PREOPERATIVE ULTRASOUND-GUIDED PELVIC FLOOR MUSCLE TRAINING PROMOTES EARLY RECOVERY OF URINARY CONTINENCE AFTER ROBOT ASSISTED RADICAL PROSTATECTOMY

Hypothesis / aims of study

The efficacy of preoperative pelvic floor muscle training (PFMT) for urinary incontinence after robot-assisted radical prostatectomy (RARP) is still unclear (1). A previous study evaluating the somatic and autonomic innervation of the pelvic floor and external urethral sphincter using neurophysiological tests demonstrated that autonomic afferent denervation of the membranous urethral mucosa was seen in most patients after nerve-sparing radical prostatectomy, and this denervation was proposed to attribute to post-prostatectomy incontinence (2). A recent study in postpartum women received an intensive 3-month PFMT program augmented with biofeedback using ultrasound (US)-images (US-guided PFMT) from 3 to 6 months postpartum showed that motor learning of correct pelvic floor muscle (PFM) contractions was associated with early recovery of urinary continence (3). We hypothesized that if similar US-guided PFMT introduced before RARP facilitates motor learning of correct PFM contraction and ameliorates urethral sphincter dysfunction related to the membranous urethral afferent denervation after RARP, US-guided PFMT would be applicable also for achieving early recovery of urinary continence after RARP. To test this hypothesis, we examined whether this US-guided PFMT promotes early recovery of urinary continence after RARP.

Study design, materials and methods

This prospective observational study included 116 patients who underwent RARP from March to November 2016. These patients were divided into two groups; the US-guided PFMT group consisted of 36 patients who voluntarily visited the pelvic floor rehabilitation clinic to have US-guided PFMT before RARP, and the verbal-PFMT group consisted of the other 80 patients who received verbal instruction of PFMT after RARP. In the US-guided PFMT, a team composed of a physiotherapist and a nurse taught a patient about pelvic floor anatomy and continence mechanism using a standardized leaflet, provided individually PFMT augmented with US-guided biofeedback, and finally instructed the patient about home PFM exercises at 2-3 weeks before RARP. The biofeedback was carried out by using transperineal US images visualizing whether a patient was able to contract PFM correctly or not. The correct contraction of PFM was judged by shortening the membranous urethral diameter and closing of the bladder neck on the US images. Thereby, patients could recognize the strength and sensation of PFM contractions before RARP and relearn them after RARP. In the verbal-PFMT group, patients received verbal instruction of PFMT by a nurse using a standardized leaflet after the removal of a transurethral catheter in the ward. Urinary continence status was defined as pad-use less than one per day by self-report postoperatively. Statistical analyses were carried out by Student's t test, Fisher's exact test, or the Cox proportional-hazards model.

Results

There were no differences in demographic or operative parameters between the US-guided PFMT group and verbal-PFMT group except the operative time, which was significantly longer in the US-guided PFMT group than the verbal-PFMT group (229.2 ± 47.6 vs. 207.7 ± 51.9, $p = 0.033$) [Table 1]. The continence status was achieved within 90 days after RARP in 88.9 % (32/36 patients) of the US-guided PFMT group, which tended to be higher ($p = 0.09$, by Fisher's exact test) than that of the verbal-PFMT group (73.8 %; 59/80 patients). After adjusted by the demographic and operative parameters, the US-guided PFMT was solely associated with better postoperative continence status (Hazard ratio (95% Confidence interval): 0.55 (0.31-0.99), $p = 0.050$) [Table 2].

Interpretation of results

The present US-guided PFMT introduced preoperatively seems beneficial to achieve early recovery of urinary continence after RARP. It is considered that the preoperative US-guided biofeedback would be helpful for patients to percept the correct contraction of PFM before surgery, when they have normal function and sensation of urethral closure, and that this motor learning may promote relearning of PFM contraction after RARP. Randomized control studies are needed to confirm the efficacy of the preoperative US-guided PFMT.

Concluding message

Our results suggest that the preoperative US-guided PFMT is helpful for patients to achieve urinary continence recovery earlier after RARP.

Table 1. Demographic and operative parameters in US-guided PFMT and verbal-PFMT groups

	US-guided PFMT (n=36)	Verbal-PFMT (n=80)	*p*
Age (years)	66.5 ± 6.2	66.5 ± 5.8	0.973
Body Mass Index (Kg/m^2)	24.4 ± 3.2	24.0 ± 2.9	0.666
PSA level	11.3 ± 11.8	10.3 ± 8.5	0.602
D'Amico risk stratification			
Low	4 (11.1%)	11 (13.8%)	0.820
Moderate	22 (61.1%)	44 (55.0%)	
High	10 (27.8%)	25 (31.3%)	
Operative time (min)	229.2 ± 47.6	207.7 ± 51.9	0.033
Nerve sparing (yes)	6 (16.7%)	17 (21.3%)	0.625
Lymph node dissection (yes)	5 (27.8%)	19 (23.1%)	0.765
Prostate volume (ml)	48.3 ± 15.7	47.6 ± 20.4	0.769
pT stage (≥ pT3a)	5 (13.9%)	12 (15.2%)	1.000
Surgeon volume * (> 50)	11 (30.6%)	29 (36.3%)	0.674
Catheter duration (days)	6.9 ± 1.8	7.0 ± 1.9	0.903
OAB before RARP (yes)	5 (27.8%)	19 (23.1%)	0.765

Mean ± SD (range), n (%). Student t test or Fisher's exact test.
*Surgeon volume ; the number of procedures performed by the surgeon

Table 2. The association of postoperative continence status with clinical parameters

	Hazard ratio (95CI)	*p*
Age (years)	0.98 (0.93-1.03)	0.436
Operative time (min)	1.00 (0.99-1.01)	0.562
Prostate volume (ml)	1.00 (0.99-1.02)	0.574
Nerve sparing (yes = 1)	1.06 (0.53-2.10)	0.872
Lymph node dissection (yes = 1)	1.68 (0.80-3.54)	0.170
pT stage (≥ pT3a = 1)	1.31 (0.47-3.67)	0.609
Surgeon volume (experiences > 50 = 1)	1.02 (0.52-2.03)	0.945
US-guided PFMT (yes = 1)	**0.55 (0.31-0.99)**	**0.050**

Cox proportional-hazards model, CI; Confidence interval.

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Disclosures
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