

DOES CHRONIC BLADDER OUTLET OBSTRUCTION IN PELVIC ORGAN PROLAPSE CAUSE DETRUSOR UNDERACTIVITY?

Hypothesis / aims of study

The voiding dysfunction is the most common symptom of pelvic organ prolapse (POP). It is thought that the voiding dysfunction is related to the bladder outlet obstruction (BOO). However the voiding dysfunction in some POP patients does not improve after surgery to remove BOO. Therefore we investigated whether the voiding dysfunction of POP is caused by not only BOO but also detrusor underactivity (DU) by POP.

Study design, materials and methods

A retrospective study was performed using urodynamic studies (UDS) including pressure flow study (PFS) for the consecutive 202 women with stage 2 or greater POP associated with anterior vaginal prolapse before surgery between February 2010 and March 2015.

UDS was performed before and after the correction of their POP using a single gauze pack in the vagina in the sitting position using a 7-French double lumen catheter. The bladder was filled at a constant rate of 50 ml/min by a flow restrictor using normal saline solution at room temperature.

101 out of 202 women could void during PFS and we analysed them. We divided those patients into three groups by the bladder outlet obstruction index (BOOI) represented by the equation ($BOOI = Pdet \text{ at } Q_{max} - 2 Q_{max}$): $BOOI > 40$ = the group O (obstructed); $BOOI 20-40$ = the group E (equivocal); and $BOOI < 20$ = the group U (unobstructed).

PIP1: $PdetQ_{max} + Q_{max}$, a modification of the contractility parameter BCI (PIP5) designed to be more satisfactory for assessment of older females¹⁾, was used to estimate the projected isovolumetric detrusor pressure from a pressure-flow study performed in each of the three groups.

In addition, the cystography at the standing position while straining were performed for measuring the distance from the inferior margin of pubic bone to the bottom of the cystocele.

Results

The mean age of the patients was 71.4 ± 7.0 years (51-86 years). There were not significant differences between 3 groups except for the number of parity and the degree of cystocele (Table 1).

Q_{max} was 5.4 ± 3.1 ml/sec in group O, which was significantly low, compared to 7.2 ± 3.4 ml/sec in group E and 13.8 ± 7.3 ml/sec in group U. Q_{max} in group E was significantly low, compared to that in group U (the Wilcoxon rank sum test).

$PdetQ_{max}$ was 67.6 ± 15.4 ml/sec in group O, which was significantly high, compared to 42.6 ± 9.3 ml/sec in group E and 19.6 ± 8.9 ml/sec in group U. $PdetQ_{max}$ in group E was significantly high, compared to that in group U.

In all group, Q_{max} increased and $PdetQ_{max}$ decreased after POP correction by using gauze, with statistically significant differences (the Wilcoxon signed-rank test).

PIP1 decreased significantly 73 ± 15.6 to 51.2 ± 12.1 ($p < 0.01$) in the group O and decreased significantly 49.8 ± 12.1 to 40.1 ± 15.5 ($p < 0.001$) in the group E, but did not change in the group U after POP correction by using gauze (the Wilcoxon signed-rank test).

Interpretation of results

Q_{max} was significantly low in POP associated with BOO compared to without BOO.

$PdetQ_{max}$ was significantly high in POP associated with BOO compared to without BOO.

Both of them were improved immediately after correcting the POP.

PIP1 decreased in POP associated with BOO compared to without BOO and were improved immediately after correcting the POP.

Concluding message

Q_{max} decreased and $PdetQ_{max}$ increased in POP associated with BOO, which also has severe degree of cystocele.

After correcting the POP, by improving BOO, both Q_{max} and $PdetQ_{max}$ were improved.

$PdetQ_{max}$ and PIP1 were rather near a normal value both before and after correcting POP in the cases with BOO than without BOO. However we speculated that the phenomenon, higher isovolumetric detrusor pressure, has a possibility of inducing detrusor muscle fatigue, which may introduce DU in the future. If chronic hard work of detrusor during voiding introduces underactive bladder, it is better to remove BOO in POP which has severe degree of cystocele, by pessary or surgery early time.

	Group O BOOI>40 (n=11)	Group E BOOI 20-40 (n=16)	Group U BOO<20 (n=74)
Age (year)	72.7 ± 8.5	70.1 ± 7.3	71.4 ± 6.9
Duration of symptom (mons) [min-max]	26.5 ± 23.3 [3-72]	41.7 ± 50.4 [1-180]	36.3 ± 56.4 [1-252]
Parity	1.9 ± 0.3 ^{††}	2.2 ± 1.1	2.3 ± 0.6
BMI (kg/m ²)	23.0 ± 3.2	25.5 ± 4.0	23.9 ± 2.8
Hysterectomy	3	2	16
Distance from the inferior margin of pubic bone to the bottom of the cystocele (mm)	67.5 ± 24.7 [†]	61.3 ± 24.5	51.2 ± 21.9
OAB (%)	5 (45.5)	7 (43.8)	35 (47.3)

Statistical significant difference between Group O and U; † p<0.05, †† p<0.01 (the Wilcoxon rank sum test)

Table 1 Patient's characteristics

	Group O BOOI > 40 (n=11)	Group E BOOI 20-40 (n=16)	Group U BOO < 20 (n=74)
MUCP (cmH ₂ O)	42 ± 12.0	41.7 ± 13.5	34.9 ± 10.2
FDV (ml)	124.2 ± 88.5	109.2 ± 37.6	129.2 ± 58.0
FDV (ml) after correcting POP	136.3 ± 91.7	144.7 ± 51.9 ^{##}	151.1 ± 63.4 ^{###}
MDV (ml)	241.4 ± 65.2	200.7 ± 61.5 [†]	240.3 ± 86.3
MDV (ml) after correcting POP	255.0 ± 93.4	256.6 ± 45.1 ^{####}	264.7 ± 79.1 ^{##}
Qmax (ml/sec)	5.4 ± 3.1 [†]	7.2 ± 3.4 ^{††}	13.8 ± 7.3
Qmax (ml/sec) after correcting POP	21 ± 4.3 ^{#####}	17.9 ± 6.7 ^{#####}	17.6 ± 7.4 ^{#####}
PdetQmax (cmH ₂ O)	67.6 ± 15.4 ^{†***}	42.6 ± 9.3 ^{††}	19.6 ± 8.9
PdetQmax (cmH ₂ O) after correcting POP	30.2 ± 14.7 ^{†####}	22.2 ± 13.9 ^{#####}	15.7 ± 10.7 ^{###}
PIP1 (cmH ₂ O)	73 ± 15.6 ^{†**}	49.8 ± 12.1 ^{††}	33.5 ± 10.8
PIP1 (cmH ₂ O) after correcting POP	51.2 ± 12.1 ^{†###}	40.1 ± 15.5 ^{#####}	33.3 ± 11.5

Statistical significant difference between Group O and U; † p<0.0001 (the Wilcoxon rank sum test)

Statistical significant difference between Group O and E; * p<0.03, ** p<0.0004, *** p<0.0001 (the Wilcoxon rank sum test)

Statistical significant difference between Group E and U; ‡ p<0.04, ‡‡ p<0.0001 (the Wilcoxon rank sum test)

Statistical significant difference between before and after correcting the POP; # p<0.03, ## p<0.02, ### p<0.01, #### p<0.001, ##### p<0.0001 (the Wilcoxon signed-rank test)

Table 2 Bladder Storage Function and Voiding Function: Data from Urodynamics

References

1. Neurorol Urodyn. 2004;23(3):184-9.

Disclosures

Funding: No **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** In our hospital, all of the patients who were planning to undergo surgery for the treatment of POP have received UDS with and without gauze packing on a regular basis, for detecting neurogenic bladder as well as associated SUI. We received written informed consent stating that we may use any data obtained from all patients who received UDS. **Helsinki:** Yes **Informed Consent:** Yes