International Urogynecology Journal (2019) 30:1897–1902
https://doi.org/10.1007/s00192-018-3818-9

ORIGINAL ARTICLE

Reducing postoperative catheterisation after anterior colporrhaphy from 48 to 24 h: a randomised controlled trial

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Received: 11 July 2018 / Accepted: 6 November 2018 / Published online: 27 November 2018

Abstract

Introduction and hypothesis There is a distinct lack of literature on postoperative management after anterior colporrhaphy (AC). Our traditional postoperative protocol consisted of 24 h of indwelling catheterisation followed by 24 h of self-intermittent catheterisation. We hypothesised that a new protocol consisting of only 24 h of indwelling catheterisation might produce better results without additional complications.

Methods From April 2014 to July 2017, all candidates for AC were randomised to catheter removal 24 or 48 h after surgery. The primary outcome was the postoperative urinary retention (POUR) rate. Secondary outcomes included: asymptomatic bacteriuria (AB), urinary tract infection (UTI) and postoperative pain after 24 h.

Results A total of 79 patients were recruited. Thirty-seven and 40 patients were randomised to follow the 48-h protocol and the 24-h protocol respectively. There were no significant differences in relation to the POUR rate: 3 patients (8.1%) vs 1 (2.5%) in the 48-h vs the 24-h group respectively ($p = 0.346$). The UTI rate was 2 (8.1%) vs 0 patients respectively ($p = 0.139$) and the postoperative AB rate was 3 (9.1%) vs 0 patients ($p = 0.106$). In the postoperative pain evaluation, the visual analogue scale score was significantly higher in the 48 h group (0.35 vs 0.13, $p = 0.02$).

Conclusions According to our results, reducing the catheterisation from 48 to 24 h after AC does not increase the risk of POUR and decreases the rate of UTI, AB and postoperative pain. This new postoperative management protocol of pelvic floor surgery would improve postoperative outcomes and shorten the stay in hospital.

Keywords Anterior colporrhaphy · Postoperative catheterization · Postoperative urinary retention

Introduction

The repair of anterior vaginal wall prolapse with native tissue remains an established surgical procedure in comparison with other techniques using meshes or biological grafts [1]. However, there is no standardised postoperative management and the optimal post-voiding trial has yet to be defined.

Four main and controversial factors might explain this lack of consensus. Even though transurethral catheterisation is commonly used after pelvic organ prolapse (POP) surgery, the use of suprapubic catheterisation can reach 12%, according to previous studies [2]. The choice of indwelling versus intermittent catheterisation makes comparison between studies difficult. Furthermore, the criterion for defining postoperative urinary retention (POUR), which is the main postoperative complication after anterior colporrhaphy (AC), has not been established [3]. Likewise, different thresholds have been previously used: 300 mL [4], 200 mL [5, 6] and 100 ml [7]. Several recent studies have focused on the right timing of catheter removal. The duration of catheterisation has ranged from 3 h to 7 days and the best time for catheter removal remains ambiguous.

This article was presented as an oral communication at the EUGA Congress, Barcelona 2017

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Therefore, the aim of our study was to determine the most beneficial time of catheterisation after an anterior vaginal wall prolapse surgery. The main objective was to compare the incidence of POUR after catheter removal at 24 and 48 postoperative hours and the secondary outcomes were the comparisons of asymptomatic bacteriuria (AB), urinary tract infection (UTI) and postoperative pain between the two groups.

Materials and methods

A 3-year prospective, randomised, open (unblinded), single-centre trial was conducted in the Pelvic Floor Unit of a tertiary university hospital (Hospital Sant Joan de Déu, Barcelona, Spain). Ethical approval was granted by the ethics committee and informed written consent was obtained from each patient.

Before this study, the standardised time of catheterisation in our unit was 48 h. Our protocol consisted of 24 h of indwelling catheterisation and then 24 h of self-intermittent catheterisation (SIC).

From April 2014 to June 2017, the patients affected by an anterior vaginal wall prolapse ≥ grade II according to the Pelvic Organ Prolapse Quantification-Short (POPQ-S) [8] and candidates to undergo AC with native tissue, with or without posterior repair, were selected. They were personally informed about the risks and advantages of being included in the study. After surgery, the patients were randomised to catheter removal after either 24 or 48 h.

Women who refused to participate or who were unable to give informed consent were excluded. Other exclusion criteria were: a stress urinary incontinence (SUI) candidate who has undergone concomitant surgical treatment, voiding dysfunction assessed by a urodynamic study, intra-operative urethral or bladder damage, emptying dysfunction, chronic pelvic pain syndrome and intolerance to non-steroidal anti-inflammatory drugs (NSAIDs).

The preoperative assessment included: a urogynaecological history including prolapse and incontinence questionnaires (ICI Q-SF [9], PFDI [10], PISQ-IR [11]), genital examination with vaginal prolapse classification, blood test, electrocardiogram and chest X-ray. AB [8] was ruled out by preoperative and postoperative urine culture.

The preoperative antibiotic prophylaxis was 2 g of intravenous cephazolin (or 900 mg of clindamycin +240 mg of gentamicin in the case of a B-lactam allergy). A local injection of mepivacaine + epinephrine in the anterior vaginal wall was carried out and the AC with midline fascial plication [12] was performed under spinal anaesthesia. A senior pelvic floor surgeon performed or supervised every surgery.

Patients were randomly assigned to the new 24-h protocol with indwelling catheterisation or to our standard 48-h protocol (Fig. 1). Once the catheter was removed and two micturitions were registered, the post-void residual volume (PRV) was measured using perineal ultrasound. The bladder volume was calculated according to the formula: volume = length × width × height × 0.52 [13].

The protocol was considered successful when the PRV was less than 100 ml. A PRV higher than 100 ml and the last micturition volume was considered as a POUR and registered as a failed protocol. In the case of a PRV greater than 100 ml but less than the last micturition, a second PRV was measured. Whether the second PRV was <100 ml or > 100 ml the protocol was defined as a success or a failure respectively (Fig. 1). After a successful post-voiding protocol the patients were discharged and followed up 30 days later. In the case of a failed protocol, the patients were discharged with SIC for 7 days and visited the outpatient department.

The primary outcome measured in the study was the number of failed protocols in each group. We hypothesised that the 24-h post-voiding protocol was not inferior to the 48 h protocol. We assumed that the POUR rate of both protocols could be 10% [5, 6], and set the non-superiority limit to 18% according to the average of previous published literature [6, 14]. Therefore, by including at least 35 patients in each group, we would be able to detect that the 24-h protocol is not inferior to the 48 h one with regard to the recatheterisation rate with a power of 80% and a significance of 5%.

The secondary outcomes were the AB and UTI rates for each group; both were measured in urine cultures and defined according to the international guidelines [8]. AB was considered to be >100,000 CFU/ml on a voided or catheterised specimen. A UTI was microbiological evidence of significant bacteriuria and pyuria accompanied by symptoms such as increased bladder sensation, urgency, frequency, dysuria, urgency urinary incontinence, and/or pain in the lower urinary tract. Every patient diagnosed with a UTI within 30 days of surgery was included in the analysis. Finally, the postoperative pain was evaluated according to the visual analogue scale (VAS) by our nursing team.

For continuous scale data, the statistical analysis was performed using Student's and Wilcoxon tests. In addition, the categorical data were compared using the Mann–Whitney *U* test, Chi-squared test or Fisher's exact test as appropriate. The analysis was carried out using SPSS package version 19.0 (IBM Corp.; Armonk, NY, USA).

Results

Between April 2014 and June 2017, a total of 79 patients were candidates for AC; they accepted and signed the informed consent (Fig. 2). Among these, a patient was excluded after surgery because the surgeon decided to perform a vaginal hysterectomy associated with the AC and a second patient informed us of an NSAID allergy after surgery. Therefore, 37 and 40 patients were randomised to follow the 48-h protocol and 24-h protocol respectively. Finally, four and two urine

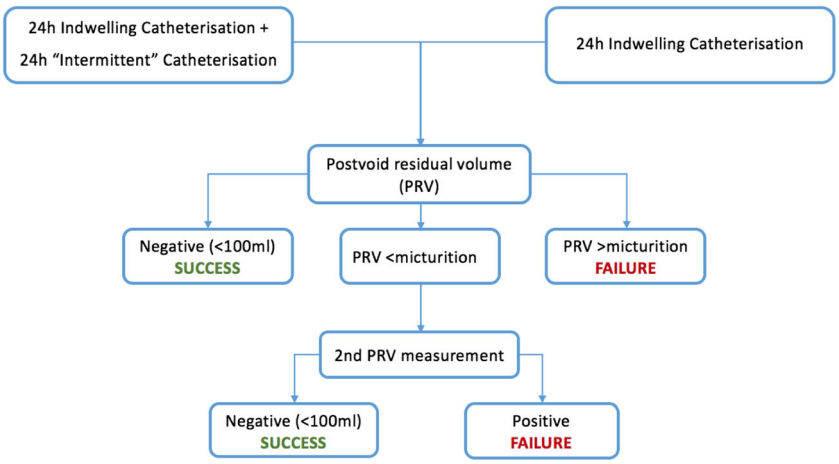

Fig. 1 Flow diagram of the study

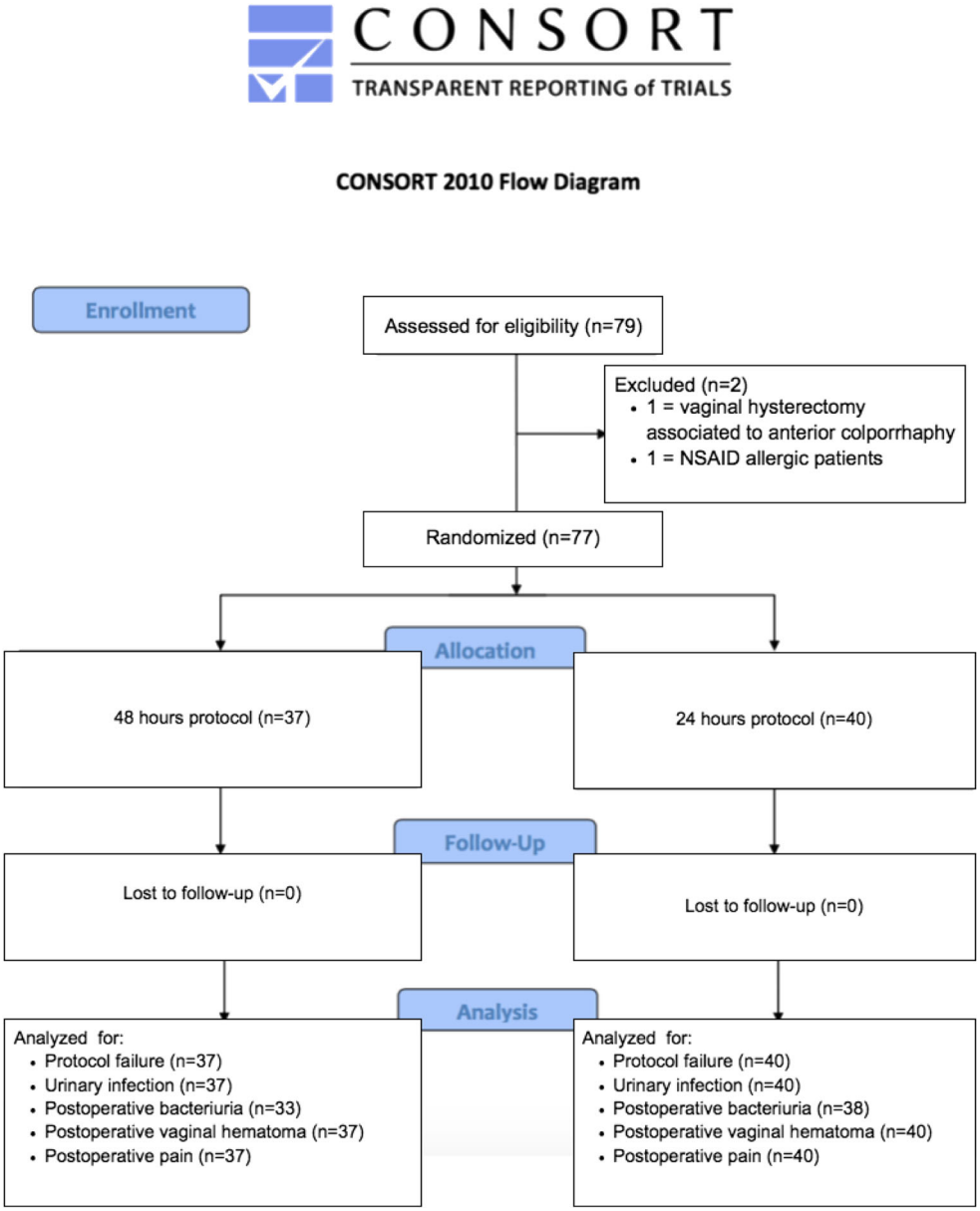

Fig. 2 CONSORT 2010 flow diagram

cultures were not collected after surgery in each group respectively.

Clinical data of both groups of patients are detailed in Table 1. The epidemiological and physical examination data did not show significant differences between groups, except for a higher age in patients recruited for the 48-h group than for the 24-h group: 66 vs 62 years ($p = 0.031$) respectively. Furthermore, there were 4 vs 0 patients with previous hysterectomy in the 48-h vs 24-h respectively ($p = 0.034$).

The results of the protocol outcomes and complications are reported in Table 2. The protocol failure (POUR) rates were 3 patients (8.1%) vs 1 (2.5%) in the 48-h vs the 24-h group respectively ($p = 0.346$). Therefore, in the non-superiority test we also accepted the alternative hypothesis that the POUR rate in the 24-h group is non-superior to the 48-h one, with $p = 0.001$ according to the established non-inferiority limit of 18%. The UTI rates were 2 (8.1%) vs 0 patients for each group ($p = 0.139$). The postoperative bacteriuria rates were 3 (9.1%) vs 0 patients respectively ($p = 0.106$). The mean hospital stay was 2.14 vs 1.08 ($p = 0.001$) for the 48-h vs the 24-h group respectively. Concomitant posterior repair was performed in 2 and 0 patients respectively ($p = 0.228$). Finally, there were no intraoperative complications such as a vaginal haematoma or a bladder injury in either group.

The 24-h group showed significantly less pain 24 h after surgery (Table 3). The pain on VAS score was 0.35 vs 0.13 ($p = 0.02$) for the 48-h vs 24-h groups respectively. Furthermore, there were 24 (64.9%) vs 35 (87.5%) patients with no pain 24 h after the surgery ($p = 0.019$). Finally, the total doses of analgesic treatment after the first postoperative day were not different between groups.

Discussion

According to our results, the POUR rates were 8.1 and 2.5% in the 48- and 24-h groups respectively with no significant differences. Therefore, we demonstrated that a 24-h post-voiding trial after AC did not have inferior rates of POUR to the 48-h protocol.

In recent years, the reduction of catheterisation days after AC has been studied with the aim of establishing a proper balance between POUR and UTI rates. However, in a recent systematic review [15], there was no strong conclusion with regard to the proper time of catheter removal and an significant variation among the published results in the literature was observed. In a randomised study among patients with vaginal prolapse surgery without meshes, Hakvoort et al. [6] showed that 9% vs 40% of their patients needed recatheterisation if the Foley catheter was removed after 5 days or 24 h respectively. Another study published by Weemhoff et al. [5] showed that more patients needed temporary catheter replacement (9% versus 28%, $p < 0.01$) in the 5-day vs 2-day protocol after AC. However, these high rates of POUR after 2 days of catheterisation are in contrast to other studies in which 24 h after vaginal surgery the POUR rates were 1.5% [4] and 3% respectively [14].

Table 1 Clinical data

	48-h group ($n = 37$)	24-h group ($n = 40$)	p value
Age (years)	66 ± 8.3	62 ± 8	**0.031**
BMI	27 ± 3.8	27.5 ± 3.8	0.601
Parity	2.32 ± 0.9	2.5 ± 1	0.407
Smoke (%)	2 (5.4)	0	0.139
Diabetic patients (%)	5 (13.5)	2 (5)	0.251
Menopausal status (%)	35 (94.6)	37 (92.5)	0.711
Previous surgeries (%)			
Hysterectomy	4 (10.8)	0	**0.034**
MUS for SUI	0	3 (7.5)	0.091
Anterior vaginal wall prolapse (%)			0.810
POP-2	4 (10.8)	5 (12.5)	
POP-3	25 (64.9)	26 (65)	
POP-4	9 (24.3)	9 (22.5)	
Positive urine culture (%)	2 (5.6)	2 (5)	0.914
Symptoms of urge incontinence (%)	12 (32.4)	9 (22.5)	0.485
Symptoms of SUI (%)	7 (18.9)	9 (22.5)	0.701

Data are presented as mean ± SD, median with range or n (%) and were analysed using Student's test, the Mann–Whitney U test, Chi-squared test or Fisher's exact test as appropriate. The entries in boldface indicate a significant p value

BMI body mass index, *MUS* mid-urethral sling, *POP* pelvic organ prolapse, *SUI* stress urinary incontinence

Table 2 Protocol outcomes and complications

	48-h group ($n = 37$)	24-h group ($n = 40$)	p value
Hospital stay (days)	2.14	1.08	**0.001**
Protocol failure (n)	3 (37)	1 (40)	0.346
Urinary infection (n)	2 (37)	0 (40)	0.139
Postoperative bacteriuria (n)	3 (33)	0 (38)	0.106
Vaginal haematoma (n)	0 (37)	0 (40)	1
Intraoperative bladder injury (n)	0 (37)	0 (40)	1

Data are presented as a number of patients and they were analysed using Student's test, Mann–Whitney U test or Fisher's exact test as appropriate. Entries in boldface indicate a significant p value

One of the factors that might explain these variations in POUR rates is the different cut-off values of PRV in considering urinary retention. Even though the accuracy and feasibility of PRV has been studied [16, 17], there is not yet any standard recommendation in the international guidelines [8]. Some authors consider a limit of 300 ml [4], whereas others 200 ml [5] or 150 ml [18]. Obviously, with a lower threshold of PRV, the sensitivity in diagnosing a retention increases and the risk of underestimation decreases, which is why we decided to consider a limit of 100 ml to define a POUR. Other risk factors that have been identified as independent predictors for POUR are a blood loss higher than 100 ml, ≥ grade 3 of cystocele and performing Kelly plication [19].

Furthermore, both the UTI and postoperative AB rates analysed in our study did not show statistically significant differences between groups: 5.4 vs 0% ($p = 0.139$) and 9.1 vs 0% ($p = 0.106$) respectively. Our findings were similar to those of previous studies, in which the UTI rate ranged between 4 and 9% [6, 14, 20]. The UTI rate in other studies reached 22% [5] 2 days after surgery. However, Weemhoff et al. [5] included patients with hysterectomy or sacrospinal fixation associated with AC. Therefore, we decided to exclude patients who underwent medial compartment surgery associated with AC to reduce the risk of bias for either POUR and UTI.

To our knowledge, there are no previous studies that have evaluated postoperative pain after AC. We decided to analyse the postoperative pain once the catheter was removed at 24 h post-surgery. According to our results, the postoperative pain at 1, 6 and 12 h was similar in the both groups. However, the number of patients without pain (VAS = 0) was significantly higher in the 24-h vs the 48-h group with 87.5% vs 64.9% ($p = 0.019$) of patients respectively. Therefore, our findings demonstrated that by reducing the duration of catheterisation by 1 day, the postoperative course may be more comfortable for the patients.

The first limitation of our current study is that the sample size is smaller in comparison with other studies. Nevertheless, with the 77 patients recruited, we can assume that the 24-h group does not have a superior rate of POUR to the 48-h group, with a power of 80% and a significance of 5%. The second limitation is that the measurement of PRV was performed using different operators and it is well studied that the accuracy of small PRV is lower and it requires repetition to confirm consistency [16]. To diminish this bias, we designed a second PRV measurement in cases of PRV higher than 100 ml, but lower than the last micturition (Fig. 1). The third limitation is the effect of higher age and rate of previous hysterectomy in the 48-h group. However, they did not affect the results of the 24-h group.

Table 3 Postoperative pain evaluation

	48-h group ($n = 37$)	24-h group ($n = 40$)	p value
Postoperative pain on the visual analogue scale (mean)			
At 1 h	0.86 ± 0.9	0.68 ± 0.76	0.379
At 6 h	1.19 ± 1	0.88 ± 0.9	0.160
At 12 h	0.78 ± 0.7	0.55 ± 0.8	0.077
At 24 h	0.35 ± 0.5	0.13 ± 0.3	**0.020**
VAS = 0 n, (%)	24 (64.9)	35 (87.5)	**0.019**
Total dose of analgesic treatment during the 1st day (mean)	1.74 ± 0.8	1.63 ± 0.9	0.576

Data are presented as mean ± SD or as a number of patients and were analysed using Student's test or Chi-squared test as appropriate. Postoperative pain was evaluated using a visual analogue scale. Entries in boldface indicate a significant p value. The analgesic treatment includes: 1 g of paracetamol, 50 mg of dexketoprofen, 575 mg of metamizole, 50 mg of diclofenac and 100 mg of tramadol

VAS: Visual analogue scale

In conclusion, removing the urethral catheter after 24 h following AC instead of 48 h shortens the stay in hospital and decreases postoperative pain. Furthermore, the rate of POUR with 24 h of catheterisation does not increase and the UTI and AB rates of the two time periods are similar. Therefore, reducing the transurethral catheterisation from 48 h to 24 h after AC seems to be beneficial for our patients.

Compliance with ethical standards

Conflicts of interest None.

References

1. Maher C, Feiner B, Baessler K, Haya N, Brown J. Surgery for women with anterior compartment prolapse (review) summary of findings for the main comparison. Cochrane Database Syst Rev 2016;11:CD004014.
2. Hakvoort RA, Burger MP, Emanuel MH, Roovers JP. A nationwide survey to measure practice variation of catheterisation management in patients undergoing vaginal prolapse surgery. Int Urogynecol J. 2009;20(7):813–8.
3. Haylen BT, Freeman RM, Lee J, Swift SE, Cosson M, Deprest J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint terminology and classification of the complications related to native tissue female pelvic floor surgery. Neurourol Urodyn. 2012;31:406–14.
4. Glavind K, Morup L, Madsen H, Glavind J. A prospective, randomised, controlled trial comparing 3 hour and 24 hour postoperative removal of bladder catheter and vaginal pack following vaginal prolapse surgery. Acta Obstet Gynecol Scand. 2007;86(9):1122–5.
5. Weemhoff M, Wassen MMLH, Korsten L, Serroyen J, Kampschöer PHNM, Roumen FJME. Postoperative catheterization after anterior colporrhaphy: 2 versus 5 days. A multicentre randomized controlled trial. Int Urogynecol J. 2011;22(4):477–83.
6. Hakvoort RA, Elberink R, Vollebregt A, Ploeg T, Emanuel MH. How long should urinary bladder catheterisation be continued after vaginal prolapse surgery? A randomised controlled trial comparing short term versus long term catheterisation after vaginal prolapse surgery. BJOG. 2004;111(8):828–30.
7. Bray R, Cartwright R, Digesu A, Fernando R, Khullar V. A randomised controlled trial comparing immediate versus delayed catheter removal following vaginal prolapse surgery. Eur J Obstet Gynecol Reprod Biol. 2017;210:314–8. https://doi.org/10.1016/j.ejogrb.2017.01.015.
8. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. Neurourol Urodyn. 2010;29:4–20.
9. Espuña M, Rebollo PPM. Validation of the Spanish version of the International Consultation on Incontinence Questionnaire-Short Form. A questionnaire for assessing the urinary incontinence. Med Clin. 2004;122:288–92.
10. Sánchez-Sánchez B, Torres-Lacomba M, Yuste-Sánchez MJ, Navarro-Brazález B, Pacheco-da-Costa S, Gutiérrez-Ortega C, et al. Cultural adaptation and validation of the Pelvic Floor Distress Inventory Short Form (PFDI-20) and Pelvic Floor Impact Questionnaire Short Form (PFIQ-7) Spanish versions. Eur J Obstet Gynecol Reprod Biol. 2013;170(1):281–5.
11. Mestre M, Lleberia J, Pubill J, Espuña-Pons M. Spanish version of the Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire IUGA-Revised (PISQ-IR): transcultural validation. Int Urogynecol J. 2017;28(12):1865–73.
12. Haylen BT, Maher CF, Barber MD, Camargo S, Dandolu V, Digesu A, et al. Erratum to: an International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic organ prolapse (POP). Int Urogynecol J. 2016;27(4):655–84.
13. Dicuio M, Pomara G, Menchini Fabris F, Ales V, Dahlstrand CMG. Measurements of urinary bladder volume: comparison of five ultrasound calculation methods in volunteers. Arch Ital Urol Androl. 2005;77(1):60–2.
14. Kringel U, Reimer T, Tomczak S, Green S, Kundt G, Gerber B. Postoperative infections due to bladder catheters after anterior colporrhaphy: a prospective, randomized three-arm study. Int Urogynecol J. 2010;21(12):1499–504.
15. Phipps S, Lim YN, McClinton S, Barry C, Rane A, N'Dow JM. Short term urinary catheter policies following urogenital surgery in adults. Cochrane Database Syst Rev. 2006;2:CD004374.
16. Saaby ML, Lose G. Repeatability of post-void residual urine ≥ 100 ml in urogynaecologic patients. Int Urogynecol J. 2012;23(2):207–9.
17. Haylen BT, Lee J. The accuracy of post-void residual measurement in women. Int Urogynecol J. 2008;19(5):603–6.
18. Wang R, Won S, Haviland MJ, Von Bargen E, Hacker MR, Li J, et al. Voiding trial outcome following pelvic floor repair without incontinence procedures. Int Urogynecol J. 2016;27(8):1215–20.
19. Hakvoort RA, Dijkgraaf MG, Burger MP, Emanuel MH, Roovers JP. Predicting short-term urinary retention after vaginal prolapse surgery. Neurourol Urodyn. 2009;28:225–8.
20. Alonzo-Sosa JE, Flores Contreras JT, Paredes-Canul M. Method for transurethral catheterization for 1–3 days for pelvic floor relaxation in the postoperative period. Ginecol Obstet Mex. 1997;65:455–7.