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Review Article

Is Bladder Training by Clamping Before Removal Necessary for Short-Term Indwelling Urinary Catheter Inpatient? A Systematic Review and Meta-analysis

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SUMMARY

Purpose: Urinary catheterization is a common technique in clinical practice. There is, however, no consensus on management prior to removal of the indwelling catheter for short-term patients. This systematic review examined the necessity of clamping before removal of an indwelling urinary catheter in short-term patients.

Methods: A systematic literature review was conducted using eight databases and predetermined keywords-guided searches. Some 2,515 studies were evaluated. Ten studies that met the inclusion criteria were selected.

Results: The quality of the studies was assessed using the Jadad scoring system. Only 40.0% of studies were rated as high quality. This review found that catheter clamping prior to removal was not necessary for the short-term patient. When made a comparison with the unclamping group, there was no significant difference in recatheterization risk, risk of urine retention, patients' subjective perceptions and rate of urinary tract infection.

Conclusions: This review indicated that bladder training by clamping prior to removal of urinary catheters is not necessary in short-term catheter patients. In addition, clamping carries the risk of complications such as prolonging urinary catheter retention and urinary tract injury. Further investigation requires higher quality methodologies and more diverse study designs.

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Introduction

Use of an indwelling urinary catheter is very common in clinical practice. At least 15.0%–25.0% of inpatients have indwelling urethral catheters, mostly on a short-term basis [1–3]. Urinary catheters provide some information about physical function, but also increase the chances of infection. Approximately 40.0% of nosocomial infections originate from the urinary tract [4], and 80.0% occur after placement of urinary catheters. Some 20.0%–50.0% of patients whose urinary catheter remained in place for more than 1 week

were found to have bacteriuria [3,5], and prolonged urinary catheter use increased bacteriuria by 3.0%–10.0% per day [3,6–8]. The most important risk factor for developing a catheter-associated urinary tract infection (UTI) was prolonged use of an indwelling catheter. This increased the risk of infection and the medical costs associated with infection treatment, prolonged patients' hospital stay, and was potentially life threatening [3]. Centers for Disease Control recommended in 2015 [9] that urinary catheters should only be used for appropriate indications and should be removed as soon as they are no longer needed.

Difficulty in voiding after removal of the catheter, especially in aging patients with poor bladder contractile function, is another concern. Clamping the indwelling urinary catheter before removal was first recommended by Ross in 1936 [10]. The clamping process is

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supposed to strengthen the bladder detrusor muscle, improve muscle tone and sensation of the bladder, and stimulate normal filling and emptying of the bladder [11,12]. There are, however, several disadvantages to clamping, such as bladder over distension if the clamping lasts too long [11], increased rate of re-indwelling by up to 1.06 fold per indwelling urinary day [13], increased duration of retaining the indwelling catheter and infection rate [11,14,15].

No clear guideline for bladder clamping has been listed in clinical practice. Each practitioner makes their own decision to clamp the catheter or not before removal based on their opinions of necessity. Cochrane reviews and some trials showed insufficient evidence that support the effectiveness of clamping in short-term indwelling catheter patients [1,6]. In addition, the Healthcare Infection Control Practices Advisory Committee (HICPAC) [16] and the Joanna Briggs Institute (JBI) [17] showed that, in order to prevent catheter-associated UTI, clamping indwelling catheters prior to removal provided weak evidence, as the poor quality of methodology in these studies was the major reasons [6,18].

Clearly, the necessity of clamping the urinary catheter before removal still is an important issue needing to be explored. Does clamping intervention before removal improve bladder function? Does it prolong return to normal voiding or prolong catheter retention? Research evidence to support the management of removal of urinary catheters are needed through systematic research and quality appraisal. The purpose of this systematic review was to identify the necessity of bladder clamping prior to removal of urinary catheter in patients with short-term indwelling catheter.

Methods

Review questions

The “participant, intervention, comparison and outcome” or PICO principle was used to formulate clinical questions that guided the search strategy, as shown in Table 1. The main research question was “What are the effects of urinary catheter clamping in short-term inpatients with the indwelling catheter?”

Search strategy

Search terms (Table 1) were selected using keywords from previous studies and dictionaries of Medical Subject Headings

(MeSH terms); truncation symbols were used to broaden the search strategy. Eight databases were independently searched: Medline, EMBASE, CINAHL, PubMed, PsycINFO, ProQuest, Chinese Electronic Periodical Service and the Cochrane Controlled Trials Register. Search filters included English or Chinese language, and adult participants. The search was also limited to papers published prior to May 2016. Citation search of relevant published studies and systematic reviews were also used to locate relevant studies that may have been missed in the strategy described above.

Selection criteria for studies

Studies were eligible for inclusion if they met the following criteria: (a) randomized controlled trials or quasiexperimental study design; (b) urinary catheter was inserted in adult inpatients for up to 14 days; (c) with indwelling transurethral or suprapubic urinary catheters; and (d) conducted an intermittent clamping regimen. The exclusion criteria were as follows: (a) patients with congenital abnormalities of the genitourinary system; (b) received intermittent catheterization; (c) combined with drug treatment (including medication affecting bladder contraction, prophylactic antibiotics for UTI); (d) receiving pelvic floor exercise, or filling fluid into the bladder; (e) removal of nephrostomy tubes; and (f) relevant procedure not clearly reported.

Quality assessment of selected studies

Each of the two authors independently evaluated the quality of methodology by the Jadad scoring system and the risk of bias in each study. The possible range of Jadad scores was 0–5, and a score of 3–5 indicated high quality [19].

Data extraction and management

After confirming the eligibility of studies, two reviewers independently extracted the data from the included studies. The parameters extracted for each study included: study reference (author, year of publication), study design, setting, participants (number, mean age), types of interventions, types of control group, and outcome measures. The findings are summarized in Table 2.

Table 1 Research Question (PICO Framework).

Key element	Description	Search terms
Population	Adult inpatient Indwelling urinary catheter up to 14 days.	Catheter, Indwelling/Indwelling Catheter/Indwelling Catheters/In-Dwelling Catheters/Catheter, In-Dwelling/Catheters, In-Dwelling; Urinary catheter, indwelling*/Urinary catheter*/Catheter, Urinary/Catheters, Urinary/Urinary Catheter/Ureteral Catheters/Catheter, Ureteral; Urinary catheterization*/Catheterizations, Urinary/Urinary Catheterizations/Catheterization, Urinary/Catheterization, Ureteral/Catheterizations, Ureteral/Ureteral Catheterizations/Ureteral Catheterization/ Catheterization, Urethral/Catheterizations, Urethral/ Urethral Catheterizations/Urethral Catheterization/Foley Catheterization/Catheterization, Foley
Intervention	Regular clamp on urinary catheter and clamp off before removal	Urinary catheter clamping*/Urinary catheter on and off*/Urinary catheter clamp and release*/Urinary catheter close and open*/Clamping urinary catheter*/Bladder function clamping*/Bladder function management*/Bladder function intervention*/Bladder function retraining*/Bladder function training*/Foley catheter clamping*
Comparison	Keeping the urinary catheter on free draining until removal	
Outcome	Recatheterization after removal of indwelling urinary catheter; Timing of the first void; Volume of first voiding; incidence of urinary retention; and urinary tract infection.	

Note. PICO = participant, intervention, comparison and outcome.

* denotes the truncation to explore the potential references.

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