Suprapubic Compared With Transurethral Bladder Catheterization for Gynecologic Surgery

A Systematic Review and Meta-Analysis

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OBJECTIVE: Suprapubic catheterization is commonly used for postoperative bladder drainage after gynecologic procedures. However, recent studies have suggested an increased rate of complications compared with urethral catheterization. We undertook a systematic review and meta-analysis of randomized controlled trials comparing suprapubic catheterization and urethral catheterization in gynecologic populations.

DATA SOURCES: PubMed, EMBASE, CINAHL, Google Scholar, and trial registries were searched from 1966 to March 2012 for eligible randomized controlled trials comparing postoperative suprapubic catheterization and urethral catheterization in gynecologic patients. We used these search terms: "catheter," "supra(-)pubic catheter," "urinary catheter," "gyn(a)ecological," "catheterization techniques gyn(a)ecological surgery," "transurethral catheter," and "bladder drainage." No language restrictions were applied.

METHODS AND STUDY SELECTION: The primary outcome was urinary tract infection. Secondary outcomes were the need for recatheterization, duration of catheterization, catheter-related complications, and duration of hospital stay. Pooled effect size estimates were calculated using the random effects model from DerSimonian and Laird.

TABULATION, INTEGRATION, AND RESULTS: In total, 12 eligible randomized controlled trials were included in the analysis (N=1,300 patients). Suprapubic catheterization was associated with a significant reduction in postoperative urinary tract infections (20% compared with 31%, pooled odds ratio [OR] 0.31, 95% confidence interval [CI] 0.185–0.512, $P<.01$) but an increased risk of complications (29% compared with 11%, pooled OR 4.14, 95% CI 1.327–12.9, $P=.01$). Complications were mostly related to catheter tube malfunction with no visceral injuries reported. No differences in the rate of recatheterization or hospital stay were demonstrated. Robust patient satisfaction and cost-effectiveness data are lacking.

CONCLUSION: Based on the best available evidence, no route for bladder drainage in gynecologic patients is clearly superior. The reduced rate of infective morbidity with suprapubic catheterization is offset by a higher rate of catheter-related complications and crucially does not translate into reduced hospital stay. As yet, there are insufficient data to determine which route is most appropriate for catheterization; therefore, cost and patient-specific factors should be paramount in the decision. Minimally invasive surgery may alter the requirement for prolonged postoperative catheterization.

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Bladder drainage is an established part of routine perioperative care in gynecologic surgery.[1,2] The propensity for women to develop urinary tract infection and the proximity of most gynecologic surgery to the bladder neck render women undergoing operative gynecologic procedures particularly vulnerable to postoperative urinary complications. Although urinary catheters increase the risk of urinary tract infection, women with high postvoid residual bladder volumes secondary to urinary retention are also prone to infective complications and voiding dysfunction postoperatively.[3] Thus, a balance is required

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between preventing high postvoid residual bladder volumes postoperatively and minimizing catheter-related morbidity.

The two commonly used routes for bladder catheterization in gynecologic patients are transabdominally through the suprapubic region and transurethrally. Suprapubic catheterization was pioneered in the 1960s, particularly among gynecologic patients.[4,5] Varying user rates of suprapubic catheterization for postoperative bladder management are reported; a recent article published in The Netherlands reported that 12% of gynecologists were performing suprapubic catheterization.[1] Although suprapubic catheterization is more invasive, studies on general surgical populations have shown it to be associated with higher patient satisfaction and lower rates of bacteriuria compared with urethral catheterization.[6] Increasingly, the use of intermittent urethral catheterization, or "in–out" catheters, is being investigated as an alternative to the indwelling urethral catheter or suprapubic catheter. Intermittent urethral catheterization techniques (clean intermittent catheterization and clean intermittent self-catheterization) have demonstrated decreased rates of urinary tract infection when compared with indwelling urethral catheterization,[7,8] although increased nursing workload, cost, and varying patient preferences are factors that mitigate against opting for these newer forms of postoperative bladder drainage.[7,9,10]

A recent Cochrane review examined options for short-term catheterization and concluded that further evidence was required before definite consensus could be reached.[11] However, the scope of the 2006 Cochrane was broad, including studies on both male and female populations. Furthermore, since then, several additional prospective studies specific to gynecologic patients have been published,[7,9,12,13] making reanalysis of this issue timely. We undertook a systematic review and meta-analysis to determine the benefits of suprapubic catheterization compared with urethral catheterization in women undergoing gynecologic surgery.

SOURCES

This meta-analysis was conducted in accordance with the Preferred Reporting Items in Systematic Reviews and Meta-Analyses guidelines.[14] Medline, PubMed, CINAHL, EMBASE, the Cochrane Library, Google, and Google Scholar were electronically searched from 1966 to March 2012 using combinations of the following search terms: "catheter," "supra(-)pubic catheter," "urinary catheter," "gyn(a)ecological," "catheterization techniques gyn(a)ecological surgery," "transurethral catheter," and "bladder drainage." The search was performed in March 2012. Trial registries at http://clinicaltrials.gov, http://www.controlled-trials.com and www.ukcrc.org were also searched for unpublished trials. No language or other restrictions were placed on the searches. Potentially relevant articles were reviewed independently by two authors (E.F.H. and S.RW.) to determine eligibility. Reference lists of full-text articles identified by the systematic review were also scrutinized for further eligible publications.

STUDY SELECTION

Studies were eligible for inclusion provided the following criteria were satisfied: randomized clinical trial; suprapubic catheterization compared with indwelling urethral catheterization or intermittent urethral catheterization (clean intermittent catheterization or clean intermittent self-catheterization), also referred to as "in–out" catheterization, patients undergoing elective or emergency gynecologic surgery for benign or malignant conditions, and at least one outcome measure reported. Studies were excluded if they were quasirandomized, eg, sequential day allocation or if random patient allocation could not be confirmed either from study reports or by contacting study authors. The primary outcome for the meta-analysis was the development of urinary tract infection within 7 days postoperatively because within this timeframe data could be collated from the largest numbers of studies without introducing bias as a result of inconsistent or varied follow-up procedures. Secondary outcomes were the need for recatheterization, duration of catheterization, catheter-related complications, and duration of hospital stay. Data were abstracted into a computerized spreadsheet for analysis. The abstracted data were then crosschecked by the senior author.

To calculate a pooled effect size estimates for each outcome measure, we used a random-effects model as per DerSimonian and Laird.[15] In comparison to the fixed-effects model of Mantel-Haenszel and Peto, this model takes additional sources of variation into consideration such as random error and real differences between the study populations.[16] The weighted mean difference was determined for continuous variables, whereas categorical variables were evaluated by means of pooled odds ratios (ORs). Cochran's Q test was used to evaluate the degree of heterogeneity between studies; this is a null hypothesis test in which a result with $P<.05$ implies the presence of significant heterogeneity between studies. The Cochran's Q test is not considered reliable in

cases of small numbers of studies; in this case, the I^2 index was used to test for heterogeneity.[16]

The risk of bias across trials was assessed by means of the Egger test and by visual inspection of funnel plots. The risk of bias within trials was evaluated using the Jadad score[17] and scrutinizing trials as per the Cochrane Handbook for Systematic Reviews[18] (Table 1). The Jadad score objectively quantifies the risk of bias by assigning numerical scores in three domains: randomization; blinding; and description of withdrawals and dropouts. A Jadad score of less than 2 indicates a lower-quality study, whereas a

Table 1. Risk of Bias and Study Quality

Trial	Year	Random Sequence Generation	Allocation Concealment	Blinding of Patients, Personnel, and Outcomes	Incomplete Data Outcomes	Selective Reporting	Overall Judgment of Article
Stekkinger	2011	Randomized Not adequately described	Sealed opaque envelopes	Not possible	Fully reported	No	Good; low risk of bias
Kringel	2010	Permutated block randomization	Not adequate	Not possible	Fully reported	No	Unclear; moderate risk of bias
Dixon	2010	Random number generation	Sealed opaque envelopes	Not possible	Fully reported	No	Good; low risk of bias
Jannelli	2007	Random number generation	Sealed opaque envelopes	Not possible	Fully reported	No	Good; low risk of bias
Naik	2005	Independent administrator; inadequate	Sealed envelopes	Not possible	Fully reported	No	Good; low risk of bias, however randomization not adequately described
Nwabineli	1993	Random sampling numbers	Not described	Not possible	Fully reported	No	Unclear; moderate risk of bias; poor description of randomization or concealment
Schiøtz	1989	Blind allocation on admission by an independent nurse	Not described	Not possible	Not adequate	?	Unclear; moderate to high risk of bias; inadequate randomization
Bergman	1987	Randomized but not adequately described	Not described	Not possible	Fully reported	No	Unclear; moderate risk of bias; inadequate description of randomization
Harms	1985	Randomized but not adequately described	Not described	Not possible	Not adequate	No	Poor; moderate to high risk of bias; inadequate randomization
Andersen	1985	Random number generation tables	Not described	Not possible	Fully reported	No	Good; low risk of bias; however allocation not adequately concealed
Barents	1978	Random number generation tables	Not described	Not possible	Not adequate	?	Poor; moderate to high risk of bias; inadequate randomization, description of dropouts
Wiser	1974	Randomization by independent third party	Not adequate	Not possible	Not adequate	No	Unclear; moderate risk of bias; inadequate concealment, description or drop-outs

score of 2 or more indicates a higher-quality study. In addition to this, Cochrane incorporates analysis of concealment of allocation. The statistical analyses were performed on an intention-to-treat basis using Statsdirect 2.5.8. All *P* values are two-sided and the 5% level was considered significant.

RESULTS

The results of the search are summarized in Figure 1. The primary search yielded 64 relevant abstracts. On further review, 22 articles were considered potentially eligible. On detailed review of these 22 articles, we retrieved 12 randomized controlled trials (RCTs), which met our inclusion criteria: nine were explicitly titled "randomized controlled trials"[7,9,10,12,13,19–22] with the remaining three studies identified following review of the full text.[23–25] The remaining 10 articles did not meet inclusion criteria and were rejected (Fig. 1).

Overall, 12 RCTs were included in the present meta-analysis. Details of the included trials are summarized in Table 2. Of a total 1,300 women, 590 were randomized to suprapubic catheterization and 710 women were randomized to some form of urethral catheterization, indwelling urethral catheterization, indwelling urethral catheterization followed by intermittent urethral catheterization,[7,19,20] or exclusively intermittent urethral catheterization[9] (Table 3). The included trials reported outcomes from a variety of abdominal and vaginal procedures for stress incontinence and pelvic organ prolapse and, in two cases, for cervical cancer (Table 2). Exclusion criteria were reported by eight of 12 included trials and are detailed in Table 2. A theoretical clinical trial 80% power to detect a reduction in urinary tract infections from 10% in the urethral catheterization arm to 5% in the suprapubic catheterization arm at the 5% significance level would require a minimum of 475 patients in each arm of the trial. Thus, although the available sample is relatively small, it was felt to be sufficient powered to justify meta-analysis.

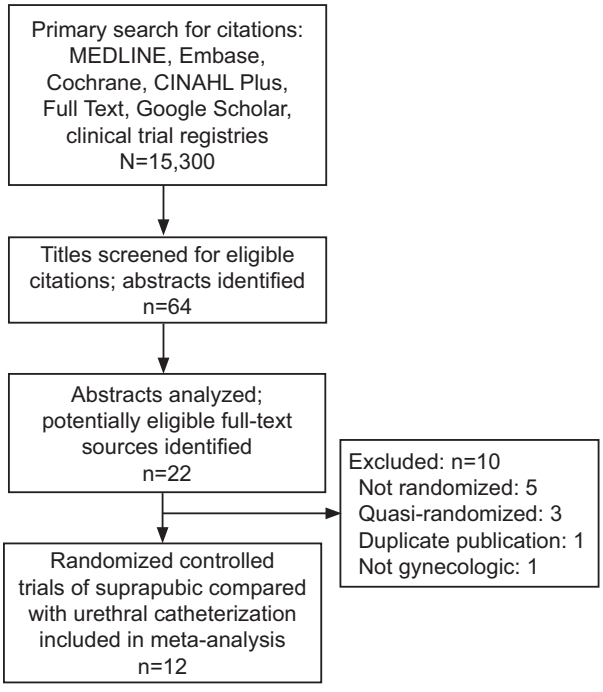

Fig. 1. Flow of studies.

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Given the nature of the intervention in question, none of the included articles reported studies that were appropriately blinded. Thus, the maximum Jadad score available to the trials included here was three. The majority of the RCTs was allocated a Jadad score of 2 or greater, indicating moderate- to high-quality articles (Table 2). Two trials received a score of 1[23,24] because the description of withdrawals was not deemed adequate. Adequate concealment was not the norm with only four trials[7,9,13,19] adequately concealing randomization. Half the trials adequately described their randomization process, and the majority described dropouts (Table 1).

All 12 trials reported the incidence of urinary tract infection. Overall, use of suprapubic catheterization was associated with a significant reduction in the rate of urinary tract infection (20% [120 of 590]) compared with the urinary catheterization group (31% [219 of 710]) (pooled OR 0.31, 95% confidence interval [CI] 0.185–0.512, $P<.01$; Fig. 2). There was evidence of statistical heterogeneity (Cochran Q statistic=27.28, df=11; $P=.01$). There was no statistical evidence of bias (Egger=−1.55, 95% CI −4.1 to 0.99, $P=.2$). However, on visual inspection of the funnel plot (Fig. 3) there was a degree of asymmetry indicating that bias may be present. In this case, the asymmetry is likely to represent publication bias. Other forms of bias such as selection bias may have been more pronounced in earlier studies in which the randomization of patients was poorly described and in which concealment of randomization was deficient (Table 1).

Three studies specifically reported on the rates of recatheterization in each group.[13,22,25] All three compared suprapubic catheterization with indwelling urethral catheterization only. No significant reduction in the rate of recatheterization was found between the suprapubic catheterization group (10% [18 of 175]) and the urethral catheterization group (24% [43 of 181]) (pooled OR 0.38, 95% CI 0.087–1.611, $P=.18$).

Table 2. Trial Details

Author	Year	Jadad Score	n	Procedure	Exclusion Criteria
Stekkinger	2011	3	114	Cystocele repair±other vaginal POP surgery	Concomitant continence procedure Previous urinary retention UTI at randomization Known urological disease or renal impairment Language barrier
Kringel	2010	2	232	Cystocele repair±other vaginal POP surgery	Preoperative UTI or bacteriuria Previous vaginal prolapse surgery
Dixon	2010	3	72	Abdominal or vaginal surgery for SUI or POP	Catheter not routinely used Continuous postoperative bladder drainage needed
Jannelli	2007	3	210	Abdominal or vaginal surgery for SUI or POP	Preoperative bacteriuria Preoperative urinary retention History of voiding dysfunction or urethral trauma
Naik	2005	2	36	Radical hysterectomy	N/A
Nwabineli	1993	2	24	Radical hysterectomy	Older than 56 y Prior voiding dysfunction or radiotherapy Tricyclic antidepressant or anticholinergic use
Schiotz	1987	2	78	Vaginal plastic surgery	Positive preoperative urine cultures
Bergman	1987	2	51	Vaginal retropubic urethropexy (Peyrera)	N/A
Harms	1985	1	157	Vaginal hysterectomy and repair	Preoperative UTI
Andersen	1985	2	92	Abdominal or vaginal surgery for SUI or POP	Recurrent UTI Steroid use Significant preoperative bacteriuria
Barents	1978	1	84	Vaginal hysterectomy and repair	Preoperative UTI Preoperative treatment with antibiotic for other causes other than UTI
Wiser	1974	2	150	Vaginal hysterectomy and repair	Endometriosis, PID, pelvic masses Preoperative bacteriuria Pre-existing diabetes or thyroid disorders Pre-existing urologic or neurologic disorders

POP, pelvic organ prolapse; UTI, urinary tract infection; SUI, stress urinary incontinence; N/A, not applicable; PID, pelvic inflammatory disease.

There was evidence of statistical heterogeneity (Cochran Q=9.88, df=2, P=.01). Because there were only three trials included in this analysis, we used the I^2 index, which confirmed heterogeneity (I^2=79.7%, 95% CI 0–91.7%). The Horbold-Egger test for bias was not significant (Horbold-Egger 1.73, P=.89).

Six trials addressed duration of catheterization as a specific outcome.[7,9,10,12,19,20] Overall, no significant difference was found between groups (weighted mean difference −0.52 days, 95% CI −2.47 to 1.43 days, P=.59). There was evidence of heterogeneity (Cochran Q statistic=31.53, df=5, P<.01) but not bias (Egger=0.71, 95% CI −2.958 to 4.372, P=.62).

Only three trials provided sufficient data to compare generate a pooled effect size estimate for hospital stay.[9,13,21] There was no significant difference between the groups (weighted mean difference −0.22 days, 95% CI −1.239 to 0.795, P=.67). There were insufficient trials to test for bias. There was evidence of heterogeneity (Cochran Q=6 77, 2 df, P=.03).

Five trials reported specific data for the complication rate associated with each intervention.[7,12,13,20,25] In general, more complications were reported in the suprapubic catheterization group. Common complications reported included urine leakage, catheter blockage, hematuria, spontaneous loss of the catheter, and urinary retention. Our analysis reveals a significantly higher rate of complications in the suprapubic catheterization group (29% [94 of 321]) compared with the urinary catheterization group (11% [53 of 475]) (pooled OR 4.14, 95% CI 1.327–12.912, P=.01; Fig. 4). There was evidence of statistical heterogeneity (Cochran Q statistic=17.8,

Table 3. Trial Outcomes

Author	Randomization	Outcomes		Conclusion
Stekkinger	Suprapubic catheterization compared with urethral catheterization for 80–88 h	Length of hospital stay Recatheterization Frequency of UTI	Proportion with urinary retention Prolonged catheterization Proportion with postvoid residual bladder volumes greater than 500 mL	Suprapubic catheterization did not reduce postoperative voiding dysfunction and was associated with increased complications compared to urethral catheterization
Kringel	Suprapubic catheterization×96 h compared with urethral catheterization×24/96 h	PVR on day 4	Rate of UTI on postoperative day 4	Optimal postoperative bladder drainage post anterior colporrhaphy is urethral catheterization×24 h
		Hospital stay Subjective well-being	Catheter-related complications Duration catheterization	High rate of complications with suprapubic catheterization
Dixon	Suprapubic catheterization×48 h compared with CISC until PVR less than 100 mL	Rate of symptomatic UTI Patient experience	Length of hospital stay Time to normal voiding Duration of catheterization	CISC allows faster return to normal micturition and shorter hospital stay
Jannelli	Suprapubic catheterization compared with urethral catheterization×24 h then CISC	Days until return to spontaneous voiding	Bacteruria greater than 10^5 CFU/mL Patient satisfaction Duration of catheterization	No significant difference in bacteriuria, but significant patient dissatisfaction and pain with CISC compared with suprapubic catheterization
Naik	Suprapubic catheterization×5 d compared with urethral catheterization×5 d then CISC	Duration of catheterization Suprapubic catheterization site infection	Patient attitude and perception UTI	The higher rate of UTI in the urethral catheterization group was offset by the suprapubic catheterization site infection
Nwabineli	Suprapubic catheterization compared with urethral catheterization	Rate of UTI	Duration of catheterization	No clinically relevant differences between groups
Schiotz	Suprapubic catheterization×3 d compared with Urethral catheterization×3 d±CISC	Rates of mechanical complications	Rates of UTI and bacteriuria Duration of catheterization	Similar risk or UTI in both groups with mechanical complications more frequent with suprapubic catheterization
Bergman	Suprapubic catheterization×3 d compared with Urethral catheterization×3 d	Rate of UTI Return to normal voiding	Duration of catheterization Length of hospital stay	Quicker resumption of normal bladder function in the suprapubic catheterization group
Harms	Suprapubic catheterization compared with urethral catheterization	Length of hospital stay	Rate of UTI Return to normal voiding	Reduced hospital stay and increased patient acceptance with suprapubic catheterization but more hematuria

(*continued*)

Table 3. Trial Outcomes (*continued*)

Author	Randomization	Outcomes		Conclusion
Andersen	Suprapubic catheterization×3 d compared with urethral catheterization×5 d	Recatheterization Asymptomatic bacteriuria	Postoperative voiding dysfunction	Suprapubic catheterization is associated with reduced postoperative bacteriuria and reduced impaired bladder-emptying
Barents	Suprapubic catheterization compared with urethral catheterization	Rate of UTI	Types of organism Return to normal voiding	Shorter period of catheterization with suprapubic catheterization, which allows for the optimal time to removal of catheter
Wiser	Suprapubic catheterization×4 d compared with urethral catheterization×4 d	Length of hospital stay Recatheterization	Rate of UTI Complications	Suprapubic catheterization reduces postoperative bacteriuria

UTI, urinary tract infection; PVR, postvoid residual; CISC, clean intermittent self-catheterization; CFU, colony-forming units.

df=3, *P*=.01) but no evidence of bias (Egger test: bias=5.54, 95% CI −0.726 to 11.810, *P*=.06).

Antibiotic prophylaxis may influence the development of urinary tract infection after catheterization. Antibiotic prophylaxis practice varied between the trials included in this meta-analysis. To account for this potential confounding influence on the primary outcome, a sensitivity analysis was conducted with the analysis restricted to those trials that specifically stated that all patients received antibiotic prophylaxis. Six trials were eligible (suprapubic catheterization n=295 compared with urinary catheterization, n=430). The apparent benefit with suprapubic catheterization persisted (pooled OR 0.29, 95% CI 0.11–0.82, *P*=.02). There was evidence of heterogeneity (Cochran's Q=17.32, *P*=.01) but no evidence of bias (Egger=−1.74, *P*=.59).

CONCLUSION

Although suprapubic bladder drainage was originally described in gynecologic patients, recent general surgical studies suggest it leads to increased patient satisfaction and reduced infective morbidity.[6] After a 2006 Cochrane review of catheterization options after urogenital surgery,[11] four RCTs examining this issue specifically in gynecologic patients have been pub-

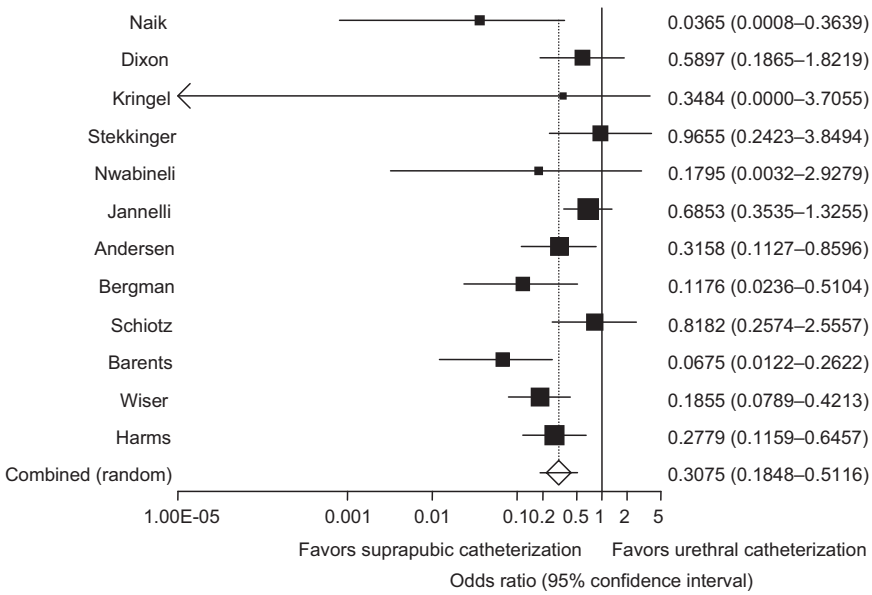

Fig. 2. Forest plot (odds ratio meta-analysis plot [random effects]) for urinary tract infections.

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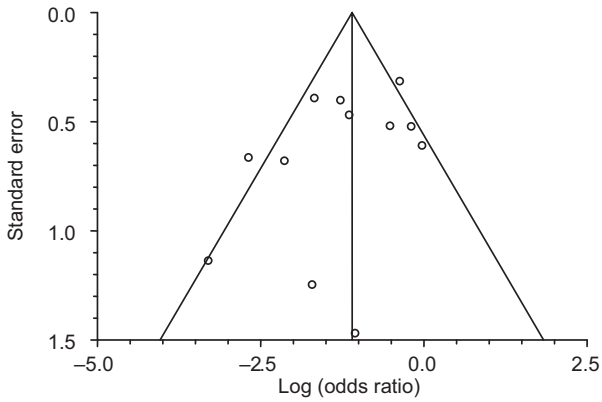

Fig. 3. Funnel plot (bias assessment) for urinary tract infections.

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lished.[7,9,12,13] Recent studies[7,12,13] conclude that suprapubic catheterization confers no advantage, contrasting with earlier publications,[21,22] which reported significant benefits to suprapubic catheterization (Table 3). Given this inconsistency, we undertook this meta-analysis to provide health care practitioners with evidence-based data to guide clinical practice.

The present analysis finds that suprapubic catheterization significantly reduces postoperative urinary tract infection. All 12 eligible trials provided urinary tract infection data, emphasizing its clinical importance. There was evidence of statistical heterogeneity, indicated by the Cochran Q-test yielding $P<.05$. This suggests significant differences among the trials such that data pooling may be inappropriate. However, surgical populations are inherently heterogeneous. Patients have differing levels of comorbidities, whereas surgeons often undertake similar procedures in different ways, introducing unavoidable clinical heterogeneity. To address this, random-effects modeling is recommended for meta-analyses of surgical trials.[16] The effect size estimates for all meta-analyses presented here were calculated using random-effects models. It can be argued that the urinary tract infection definition used for the primary end point is arbitrary. Urinary tract infection up to postoperative day 7 was selected to maximize data inclusion from inpatients undergoing postoperative catheterization. Some trials reported longer follow-up but did not differentiate robustly between asymptomatic bacteriuria and clinical urinary tract infection. Moreover, the distribution of urinary tract infection and asymptomatic bacteriuria patients between trial arms was generally not reported for late follow-up. Antibiotic prophylaxis was not always used, which may have influenced the results. However, when the meta-analysis was restricted to those trials using antibiotic prophylaxis, suprapubic catheterization's beneficial effect on urinary tract infection rates persisted, suggesting suprapubic catheterization's effect is independent of antibiotic use.

The largest trial we identified reported increased catheter-related complications with suprapubic catheterization,[12] a finding confirmed by our meta-analysis. However, although serious suprapubic catheterization-related iatrogenic injury, notably a 2% bowel injury rate, has been reported,[26,27] most suprapubic catheterization-related complications included here were catheter tube malfunctions, eg, catheter block-

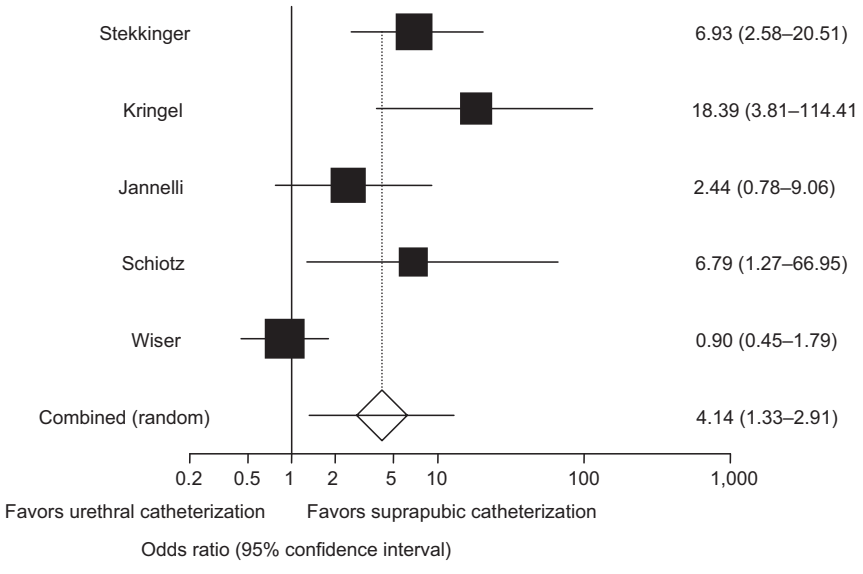

Fig. 4. Forest plot (odds ratio meta-analysis plot [random effects]) for complications.

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age. No visceral injuries were reported. We further investigated quasirandomized trials and cohort studies regarding serious complications.[28–33] None reported bowel perforation although bladder perforation occurred once in 430 suprapubic catheterization insertions.[23] Wiser[25] reported two instances of inadvertent removal of an inflated indwelling urethral catheter causing hematoma and damage to the vaginal repair. It is important to differentiate perioperative suprapubic catheterization insertion with insertion in the acute setting. Most suprapubic catheterization complications appear related to catheter tube malfunctions, although complications were not uniformly reported and serious complications such as visceral perforation may have been omitted. There was no significant difference in recatheterization rates between the groups. The sample was small (suprapubic catheterization n=175 compared with urethral catheterization n=181) and there was evidence of heterogeneity. It is difficult to draw robust conclusions from such a small sample and we must conclude suprapubic catheterization's effect on recatheterization remains unclear.

Patient satisfaction and cost-effectiveness data with suprapubic catheterization compared with urethral catheterization are lacking. The suprapubic route is more acceptable to general surgical patients.[6] However, there are gender differences in satisfaction rates with urethral catheterization,[34] limiting the applicability of general surgical data to gynecologic populations. Further studies addressing patient satisfaction with catheterization after gynecologic surgery are warranted.

Recent studies have begun to examine the elimination of routine postoperative bladder drainage or use of intermittent catheterization techniques. Hakvoort et al[8] found reduced bacteriuria and urinary tract infection rates in patients undergoing clean intermittent catheterization compared with indwelling urethral catheterization (14% compared with 38%, P=.02). Minimally invasive surgery techniques may obviate the need for prolonged catheterization in most cases, so intermittent urethral catheterization or a trial without catheter may be reasonable options. One study in the present review[7] reported no difference in significant bacteriuria rates between suprapubic catheterization and clean intermittent self-catheterization, although there were increased levels of pain, frustration and difficultly with intermittent urethral catheterization. Safety concerns regarding suprapubic catheterization may be overstated because we found only one incidence of visceral perforation in a retrospective section of one of the published studies.[23] Where prolonged postoperative catheterization is required, suprapubic catheterization appears to reduce infective morbidity while avoiding repeated potentially painful catheter insertions[7] and minimizing nursing workload.[35] Ghezzi et al[3] reported voiding dysfunction in 21% of women not catheterized after vaginal or laparoscopic hysterectomy. Noncatheterization increases postoperative urinary retention in women after laparoscopic-assisted vaginal hysterectomy, although urinary tract infection rates were lower.[36] Future studies should examine the noncatheterization option, particularly in combination with minimally invasive procedures.

Neither suprapubic catheterization nor urinary catheterization is clearly superior after gynecologic surgery. Reduced infective morbidity with suprapubic catheterization may be offset by complication rates arising from catheter tube malfunction. There was no difference in hospital stay. Data regarding patient preference among women undergoing gynecologic surgery and the cost implications of different strategies for bladder drainage are needed. Currently, both suprapubic and urethral bladder drainage are appropriate choices for postoperative gynecologic patients.

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