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REVIEW ARTICLE

Pelvic floor symptoms 5 to 14 years after total versus subtotal hysterectomy for benign conditions: a systematic review and meta-analysis

Gabriel Francisco Aleixo[1] · Marcelo C. M. Fonseca[2] · Maria Augusta Tezelli Bortolini[2] · Luiz Gustavo O. Brito[3] · Rodrigo A. Castro[2]

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Abstract

Introduction and hypothesis We aim to compare total versus subtotal abdominal hysterectomy regarding urinary and bowel symptoms and pelvic organ prolapse at long-term follow-up.

Methods A systematic literature search was performed on the MEDLINE, LILACS, Cochrane CENTRAL and SCOPUS databases and conference abstracts (AAGL, AUGS, ICS) from inception up to November 2017. We included randomized trials comparing total versus subtotal hysterectomy for benign conditions that evaluated pelvic floor symptoms over 5 years of follow-up. Risk of bias and GRADE assessment for quality of evidence were performed.

Results We included four studies involving 566 participants with follow-up ranging from 5 to 14 years. Women who underwent total hysterectomy presented lower risk of reported urinary incontinence [RR 0.74 (CI = 0.58, 0.94) i^2 0%; $p = 0.02$] and stress urinary incontinence [RR 0.84 (CI = 0.71, 0.99) i^2 0%; $p = 0.04$] than those who had subtotal hysterectomy. The events urinary frequency, urge incontinence, incomplete bladder emptying, pelvic organ prolapse, incontinence of stool and constipation did not favor one procedure over another in the long term ($P > 0.05$).

Conclusions Patient-reported urinary incontinence and stress urinary incontinence events favored total hysterectomy over subtotal hysterectomy up to 14-year long-term follow-up.

Keywords Total · Subtotal · Supracervical · Hysterectomy · Long-term · Meta-analysis · Review

Introduction

Hysterectomy is one of the most commonly performed gynecologic surgeries in the USA [1]. It is used for many benign conditions such as leiomyoma and abnormal uterine bleeding. Surgery may involve the removal of the cervix (total hysterectomy, TH) or its preservation (supracervical or subtotal hysterectomy, SH). Whether TH or SH is the best procedure for benign conditions is a matter of debate. Some studies suggest that SH may cause less injury to nerves, muscles and other pelvic structures, leading to fewer adverse pelvic events [2, 3].

Previous systematic reviews have compared the two techniques regarding pelvic symptoms. Gimbel et al. (2006) [4] observed that the sub-analyses of only the RCTs included in their review revealed that urinary incontinence but not pelvic organ prolapse favored TH over SH up to 2 years postoperatively, suggesting that urinary incontinence was less likely to occur post TH than SH in the midterm. However, those results were not confirmed in the more recent Cochrane meta-analysis by Lethaby et al. (2012) [5], which presented the outcomes according to time frame. This study was the first to report long-term results comparing TH and SH. The authors failed to find differences between the procedures regarding risk of stress urinary incontinence, incomplete bladder

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✉ Maria Augusta Tezelli Bortolini
maria.augusta@gmail.com

[1] Universidade do Oeste Paulista, UNOESTE, Presidente Prudente, São Paulo, Brazil

[2] Sector of Urogynecology, Department of Gynecology, Federal University of São Paulo, UNIFESP, Rua Barão do Triunfo, 427/1206, São Paulo, SP CEP: 04602-001, Brazil

[3] Department of Obstetrics & Gynecology, University of Campinas, Campinas, Brazil

emptying, urinary urgency, constipation and incontinence of stools in the short-, medium- or long-term (> 2 years) follow-up.

Pelvic floor symptoms can affect women who undergo hysterectomy and cause great morbidity throughout their lives. In addition, these symptoms may increase with aging and/or over a longer postoperative time. As previous systematic reviews date back 6 years, there is a need for an updated meta-analysis especially addressing pelvic floor symptoms after a longer period post-hysterectomy. Therefore, we aimed to perform a systematic review and meta-analysis of RCTs that evaluate pelvic outcomes (urinary and bowel symptoms and pelvic organ prolapse) with a minimum 5-year follow-up after TH and SH. We believe that both techniques lead to similar rates of pelvic symptoms in the long term following the trends of previous meta-analyses [5].

Materials and methods

The present review and meta-analysis is registered on PROSPERO (CRD42016053217) and is reported according to the PRISMA guidelines [6]. We searched the following databases: (PubMed/MEDLINE, LILACS, Cochrane CENTRAL Register for Clinical Trials, SCOPUS) and conference abstracts (2010–2017: American Association for Gynecological Laparoscopists, AAGL; International Continence Society, ICS; American Urogynecologic Society, AUGS) from inception until November 2017. We also reviewed all references from previously published meta-analyses [4, 5, 7]. Language was not considered a barrier to retrieving the results from studies. The search strategy (available in Supplementary Material) followed the PICOS questions, and to be eligible the studies had to meet the following criteria:

1. Population: women who had undergone hysterectomy for benign conditions.
2. Intervention: total abdominal laparoscopic hysterectomy.
3. Comparator: subtotal abdominal laparoscopic hysterectomy.
4. Outcomes: patient-reported urinary incontinence, stress urinary incontinence, urge incontinence urinary frequency, incomplete bladder emptying, pelvic organ prolapse, incontinence of stools and constipation.
5. Study design: randomized controlled trial.
6. Timing: outcomes reported at least 5 years after surgery.

Study selection

Two reviewers (G.F.A. and M.C.M.F.) independently selected and then combined the articles. Both investigators extracted the data using a previously tested standardized form. Any divergence was resolved by consensus between the reviewers or after discussion with a third author (R.C. or M.A.B.). Extracted data included details on the study design, inclusion and exclusion criteria, randomization, patients' characteristics, outcome measurements and their results. We also extracted the risk ratios (RRs) with 95% confidence intervals (CIs) from the studies. All articles were evaluated using the Cochrane Collaboration tool to assess the risk of bias within the clinical trials by three reviewers (G.F.A., M. A. T. B. and L.G.O.B.) [8]. Quality of evidence was assessed by the GRADE recommendation. Table 1 summarizes the study characteristics.

Selected outcomes

We analyzed the studies with long-term outcomes (≥ 5 years from surgery). As there were no laparoscopic studies, there was no subsequent subdivision of the outcomes. Urinary symptoms were the primary outcomes: patient-reported urinary incontinence, stress urinary incontinence, urge incontinence, urinary frequency and incomplete bladder emptying. Pelvic organ prolapse and bowel symptoms such as incontinence of stools and constipation were selected as secondary outcomes.

Statistical analysis

We applied a random-effects meta-analytic model because of the heterogeneity of most results and inverse variance weighting to pool estimates from selected studies. To combine the results across the studies, we used RevMan 5.3 (Cochrane Collaboration). Heterogeneity was evaluated using the Q test (χ^2 test) and i^2 statistic [15]. The thresholds for the interpretation of i^2 can be misleading since the importance of inconsistency depends on several factors. Our interpretation of heterogeneity was guided by the Cochrane handbook [8] as follows: 0 to 40%: might not be important; 30 to 60%, may represent moderate heterogeneity; 50% to 90%: may represent substantial heterogeneity; 75 to 100%: considerable heterogeneity. Statistical significance was defined at the 0.05 level. As we included four studies in the meta-analysis, we did not perform the funnel plots or any test for funnel plot asymmetry as the power of these tests is very low to discriminate chance from real asymmetry when there are fewer than ten studies [6, 8, 16].

Results

Figure 1 explains the flowchart used by the reviewers. A total of 3636 results were retrieved after searching all databases and

Table 1 Characteristics of the included studies

Study	Inclusion and exclusion	Participants	Interventions	*n*	Participant characteristics	Outcomes	Methods of outcome measure	Follow-up
Andersen, 2015 [9–11]	Inclusion: women scheduled for hysterectomy for benign conditions. Exclusion: laparoscopic/vaginal hysterectomy, cervical dysplasia, uterine prolapse, malignant disease, diabetes, participation in other projects, unable to read/write Danish, previous urologic operation, cervical problems, psychologic problems, poor mental function, neurologic disease, chronic alcoholism	Randomization method: restricted computer--generated block Centers: 11 Design: parallel group Power calculation: yes Intention to treat: yes	Total abdominal hysterecto-my	100	Age 50.3 (5.5) years Parity 1.7 (0–4) Smoking 33.6% Alcohol 9.2% BMI > 25 46.9%	Perceived urinary incontinence Urge incontinence Stress incontinence Urinary frequency Incomplete bladder emptying Dysuria Constipation Prolapse	Used non-validated questionnaires to address each of the outcomes	Follow-up 14 years
			Subtotal abdominal hysterecto-my	97	Age 51.6 (6.4) years Parity 1.8 (0–5) Smoking 25.2% Alcohol 10.4% BMI > 25 58.8%			
Thakar 2008 [12]	Inclusion: women offered abdominal hysterectomy for a benign indication Exclusion: > 60 years; suspected carcinoma; body weight > 100 kg; previous pelvic surgery; known endometriosis; abnormal cervical smears; symptomatic uterine prolapse; symptomatic urinary incontinence	Randomization method: computer--generated numbers and sealed opaque envelopes opened after surgical incision made No. of centers: 2 Design: parallel Power calculation: yes Intention to treat: yes	Total abdominal hysterecto-my	90	Age 44 (6) years Parity 2 (0–6) Weight 72 (15)	Urge incontinence Stress incontinence Urinary frequency Incomplete bladder emptying Dysuria POP Incontinence of stools Constipation	Women completed questionnaires used in the previous study to assess urinary and bowel function. Used a non-validated method of analysis	Follow-up 7–11 years (mean: 9)
			Subtotal abdominal hysterecto-my	91	Age: 43 (6) years Parity 2 (0–6) Weight 70 (15)			
Persson, 2013 [13]	Inclusion: women admitted for hysterectomy due to benign conditions such as uterine fibroids with bleeding or mechanical symptoms; after operation at least one ovary must be intact Exclusion: malignancy in genital organs, cervical dysplasia, rapidly growing fibroids, pretreatment with GNRH analogs, postmenopausal women without hormonal therapy and severe psychiatric disorder	Randomization method: 8 blocks Centers: 7 Design: prospective open randomized multicenter trial Power calculation: yes Intention to treat: yes	Total abdominal hysterecto-my	71	Age 57.1 (5.3) years Parity 2.1 (1.0) BMI 27.1 (4.6)	Perceived urinary incontinence Urge incontinence Stress incontinence Incomplete bladder emptying POP Constipation	Postal questionnaire concerning PFD and quality of life To assess the symptoms and impact on quality of life (QoL) of PFD The answers were given on a Likert-type scale	Follow-up time 10.8 ye-ars (1.7) Follow-up time 10.8 ye-ars (1.6)
			Subtotal abdominal hysterecto-my	80	Age 56.9 (5.6) Parity 2.2 (1.0) BMI 26.6 (3.9)			
Greer, 2003 [14]	Inclusion: premenopausal women with fibroids (symptoms present) who decided to undergo abdominal hysterectomy or premenopausal women with abnormal bleed and minimum 3-month trial of hormonal therapy and want hysterectomy; if ≥ 45 years old, FSH < 30 mIU/ml and negative biopsy within 6 months for hyperplasia or cancer	Randomizations method: generated by computer in blocks Centers: 4 Design: questionnaires Power calculation: yes Intention to treat: yes	Total abdominal hysterecto-my	19	Age 41.8 (5.2) years Weight 83.5 (19.8) > 100 kg 19% Parity 2 (0–6)	Urge incontinence Stress incontinence Urinary frequency Incomplete bladder emptying Urinary urgency POP Pelvic pressure	Used questionnaires that addressed demographics and gynecologic history, pelvic floor symptoms and several domains of HRQOL	Mean follow--up was 9.1 (0.7) years
			Subtotal abdominal hysterecto-my	18	Age 41.8 (5.1) Weight 82.8 (24.3) > 100 kg 26% Parity 2 (0–5)			

Table 1 (continued)

Study	Inclusion and exclusion	Participants	Interventions	*n*	Participant characteristics	Outcomes	Methods of outcome measure	Follow-up
	Exclusion: > 50 years, pregnant, want future child bearing; genital cancer, cervical dysplasia, endometrial hyperplasia (atypical or complex), candidate for vaginal hysterectomy, not geographically accessible for 4 years							

conference abstracts [17]. Five hundred thirty-four duplicates were removed, and after screening for 3102 articles, 4 studies [9, 12–14] were selected. Complement data from those studies were obtained from two other publications [10, 11] in a total of 566 participants. All the patients underwent abdominal hysterectomy. The patient ages ranged from 42 to 65 years old.

Urinary symptoms

The urinary symptoms were assessed subjectively by using questionnaires. Thakar et al. [12] used institutional non-validated standardized questionnaires and considered the urinary frequency as urination > 7 times a day; incomplete emptying of the bladder, urge incontinence, stress incontinence and urgency were defined as a score ≥ 2 on a 4-point scale (1, never; 2, occasionally; 3, weekly; 4, always).

Person et al. [13] used a modified version of the short-form version of the Pelvic Floor Distress Inventory (PFDI-20) containing 33 questions addressing pelvic floor dysfunction. The answers were given on a Likert-type scale with the options 'No' (0), 'Yes, but it does not bother me at all' (1), 'Yes, and it bothers me somewhat' (2), 'Yes, it bothers me moderately' (3) 'Yes, it bothers me quite a bit' (4) used on the outcomes urinary incontinence, urge incontinence and incomplete bladder emptying. For frequency of urine leakage, the options were 'Never' (0), 'Sometimes yearly' (1), 'Sometimes monthly' (2), 'Sometimes weekly' (3) or 'Daily' (4). We considered two or more as a positive result for our statistical analysis.

Greer et al. [14] used the questionnaires of the TOSH trial [18] containing pelvic floor symptoms with checklists and Likert-type scales: urinary urgency, urinary frequency and incomplete bladder emptying were categorized as (1) never, rarely or sometimes versus (2) often or always, while stress urinary incontinence and urge incontinence were measured by (1) never or less than once per week versus (2) more than once per week or daily. We also considered two or more as a positive result for our statistical analysis.

Andersen et al. [10] used their own validated questionnaire consisting of 67 questions. They defined urinary incontinence as a subjective complaint from which the woman suffered 'always' or 'often.' Subjective complaints of incontinence being present 'rarely' and 'never' were defined as no incontinence [19]. The type of incontinence (stress, urge and mixed) was derived from the question "In which situations do you usually experience urinary incontinence?": always, during intercourse, urgency, stress incontinence (cough, sneeze, laugh, sports/physical activity), never or a combination of the above. Urinary frequency was defined as > 10 times/day; insufficient bladder emptying was defined as not feeling the bladder was still full after micturition.

Reported urinary incontinence: three studies involving 384 women evaluated patient-reported urinary incontinence with follow-up ranging from 9 to 14 years [9, 13, 14]. Overall, patients submitted to TH had less urinary incontinence [31.0% versus 42.7%, RR 0.74 95% CI (0.58, 0.94), $p = 0.02$ $i^2 = 0\%$] (Fig. 2a) [9, 13, 14] in the long term than those submitted to SH. Individually, each study consistently reached the same result: favored TH over SH regarding urinary incontinence (Fig. 2a).

Stress urinary incontinence: four studies including 450 women concluded that SUI events favored TH in the long-term (mean follow-up around 10 years), being more frequent after the SH procedure [44.3% versus 52.5%, RR 0.84 95% CI (0.71, 0.99), $p = 0.04$, $i^2 = 0\%$] (Table 1) (Fig. 2b) [9, 12–14].

Urinary frequency: urinary frequency events were very similar after both procedures in the long term [49% for TH and 46.8% for SH, RR 1.0 95% CI (0.75, 1.33), $p = 0.98$, $i^2 = 34\%$, 3 studies, 386 women] (Fig. 2c) [10, 12, 14].

Urge incontinence: there were no differences in the urge incontinence rate between the two surgeries [30% for TH versus 29.5% SH, RR 1.01 95% CI (0.78, 1.30), $p = 0.95$, four studies, $i^2 = 0\%$, 534 women] (Fig. 2d) [11–14].

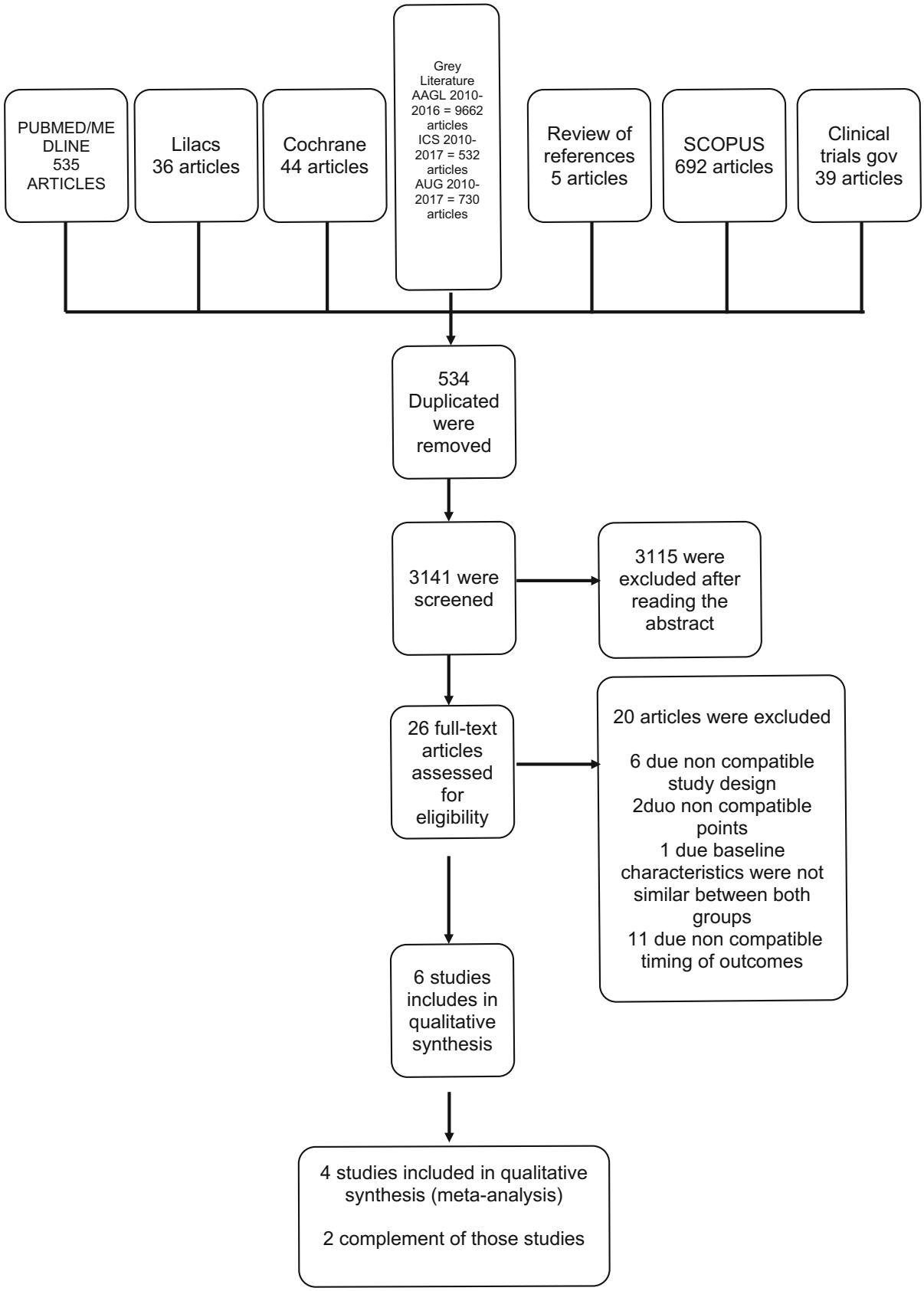

Fig. 1 PRISMA flowchart of the selected studies

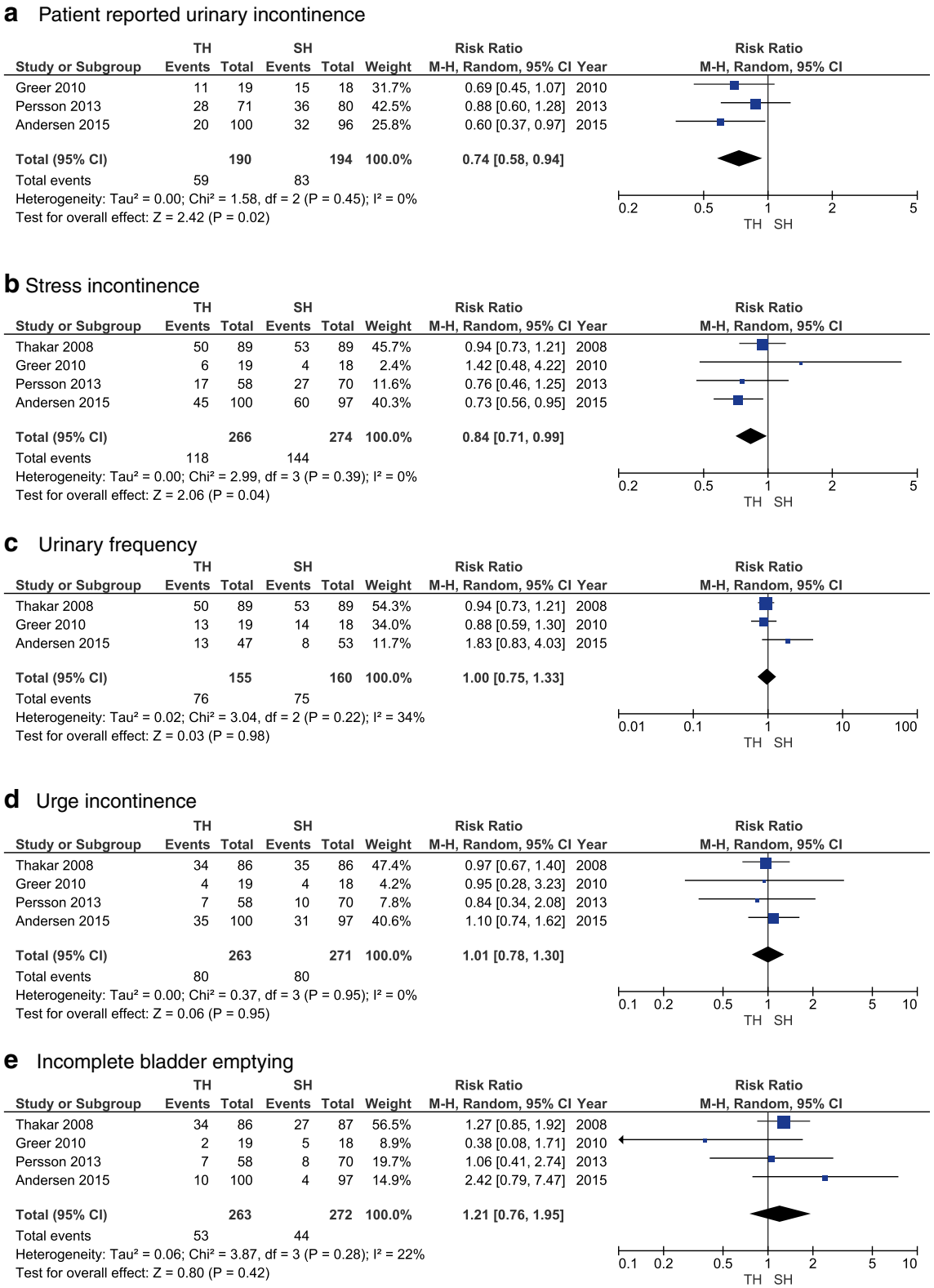

Fig. 2 **a** Perceived urinary incontinence; **b** stress urinary incontinence; **c** urinary frequency; **d** urge incontinence; **e** incomplete bladder emptying

Incomplete bladder emptying: we did not detect a difference in incomplete bladder emptying between TH and SH in the long term [20.1% versus. 16.1%, respectively, RR 1.21, 95% CI (0.76, 1.95), $p = 0.42$, $i^2 = 22\%$, 4 studies, 535 women] (Fig. 2e) [11–14].

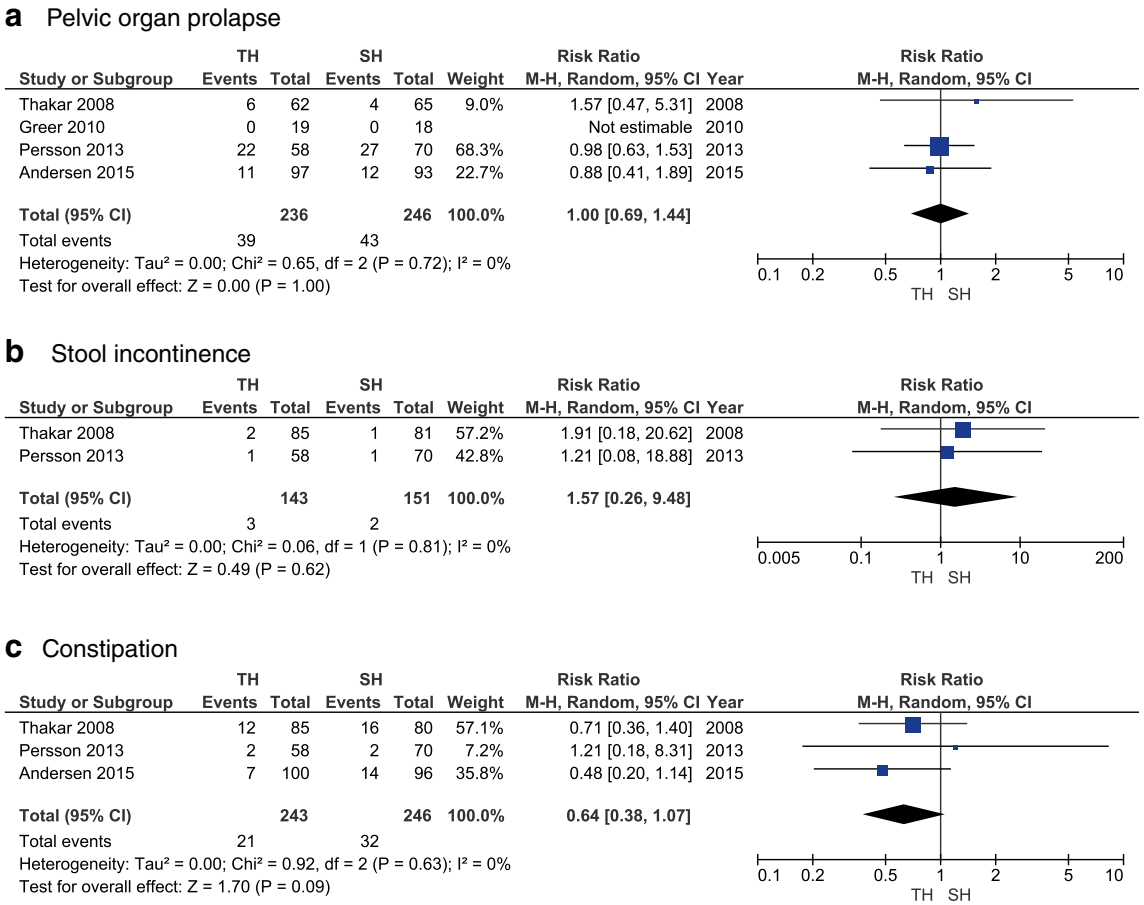

Fig. 3 **a** Pelvic organ prolapse: subjetive analysis; **b** pelvic organ prolapse: objective analysis; **c** incontinence of stools; **d** constipation

Pelvic organ prolapse

Pelvic organ prolapse (POP) was assessed by all four authors [20–23]. Subjective outcomes were obtained by Greer et al. [14] that categorized vaginal bulging out as (1) never, rarely or sometimes versus (2) often or always. Option 2 was considered positive for POP and used in our analysis. Andersen et al. [9] considered patient-reported "prolapse of the vaginal top/cervical."

The incidence of POP was not different between total and subtotal hysterectomy [9.4% for total and 10.8% for subtotal hysterectomies, RR 0.88, 95% CI (0.41, 1.89), $p = 0.74$, two studies, 227 women] (Fig. 3a1) [9, 14].

Objective measurement by POP-Q was evaluated by Thakar et al. [12], Andersen et al. [9] and Persson et al. [13], and we considered the outcome POP-Q ≥ stage 2 as positive for POP. The incidence of POP was not different between total and subtotal hysterectomy after at least 5 years from surgery [36.5% for total and 32.9% for subtotal hysterectomies, RR 1.14, 95% CI (0.90, 1.45), $p = 0.27$, three studies, 355 women] (Fig. 3a2) [10, 12, 13].

Bowel symptoms

Incontinence of stools: there was no difference between SH and TH related to reported incontinence of stools after 5 years postoperatively [2% versus 1.3%, respectively, RR 1.57 95% CI (0.26, 9.48), $p = 0.62$, $i^2 = 0\%$, two studies, 294 women] (Fig. 3b) [12, 13].

Constipation: Andersen et al. [9] considered patient-reported hard stools as constipation. Thakar et al. [12] and Persson et al. [13] considered constipation as having fewer than three bowel movements per week. Although the incidence of constipation is higher among the patients submitted to SH, it did not reach a statistical difference after 5 years postoperatively [8.6% vs. 13%, RR 0.64, 95% CI (0.38, 1.07), $p = 0.09$, three studies, 489 women] (Fig. 3c) [9, 12, 13].

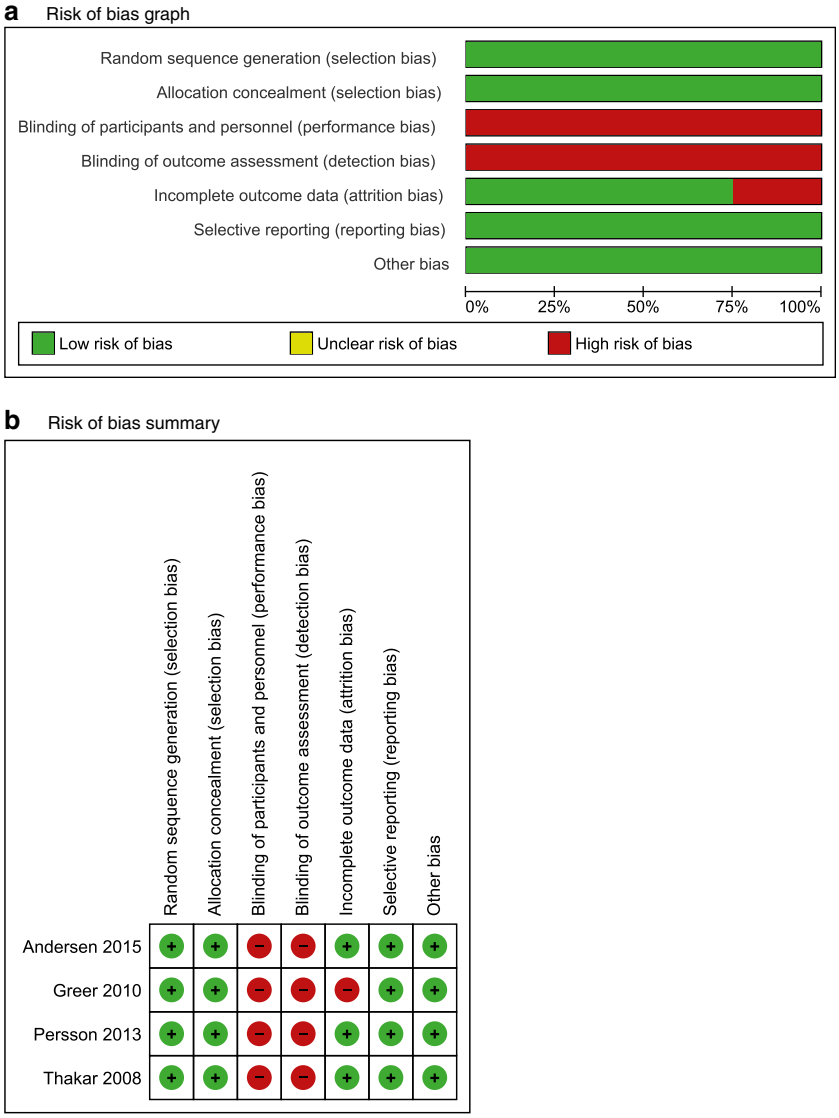

Fig. 4 **a** Risk of bias graph; **b** risk of bias summary

Quality assessment and qualitative risk of bias

All studies were not blinded, and this could lead to a higher risk of bias. Half of the studies had low-risk bias; additionally, the extensive loss of follow-up raised concern about attrition bias [8, 15, 24] (Fig. 4a, b). GRADE assessment showed high certainty for patient-reported urinary incontinence, with an absolute effect of reducing incontinence in 111 women out of 1000; for the other outcomes, quality of evidence was moderate (Table 2), with imprecision as the variable with more need for downgrading—most of the events had low sampling. Heterogeneity was low among the outcomes, and indirectness was not perceived.

Discussion

Since the 1990s, SH has become more popular for women in the western world [25]. It was suggested that this was because SH is easier to perform on laparoscopy [7] and also because general medical thought is that this intervention would lead to less impact on the nerves, vessels and pelvic structure and, subsequently, better outcomes in urinary symptoms, pelvic support and quality of life for those patients [26–28]. However, when the first RCTs were released at the beginning of the 2000s, those were not proven, and the meta-analysis by Gimbel et al. [4] pointed to total hysterectomy as the best approach to urinary incontinence. Lately, some good-quality RCTs released their long-term results making it possible to see how women had lived years after surgery and how that

Table 2 GRADE assessment of the pelvic outcomes

Certainty assessment							No. of patients		Effect		Certainty (GRADE)	Importance
Number of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Total hysterectomy	Subtotal hysterectomy	Relative (95% CI)	Absolute (95% CI)		
Patient-reported urinary incontinence												
3	Randomized controlled trials	Not serious	Not serious	Not serious	Not serious[a]	None	59/190 (31.1%)	83/194 (42.8%)	RR 0.74 (0.58 to 0.94)	Minus 111 per 1000 (from minus 26 to minus180)	⊕⊕⊕⊕ HIGH	
Stress incontinence												
4	Randomized controlled trials	Not serious	Not serious	Not serious	Not serious[a]	None	118/266 (44.3%)	144/274 (52.5%)	RR 0.84 (0.71, 0.99)	Minus 100 per 1000 (from minus 36 to minus160)	⊕⊕⊕⊕ HIGH	
Urge incontinence												
4	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[a]	None	80/263 (30.4%)	80/271 (29.5%)	RR 1.01 (0.78 to 1.30)	Plus 3 per 1000 (from minus 65 to plus 89)	⊕⊕⊕○ MODERATE	
Urinary frequency												
3	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[a]	None	76/155 (49.0%)	75/160 (46.8%)	RR 1.0 (0.75 to 1.33)	Plus 8 per 1000 (from minus 52 to plus 94)	⊕⊕⊕○ MODERATE	
Incomplete bladder emptying												
4	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[a]	None	53/263 (20.2%)	44/272 (16.2%)	RR 1.21 (0.76 to 1.95)	Plus 34 per 1000 (from minus 39 per plus 154)	⊕⊕⊕○ MODERATE	
Prolapse of any pelvic structure: subjective analysis												
2	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[a]	None	11/1116 (9.4%)	12/111 (10.8%)	RR 0.88 (0.41 to 1.89)	48 minus per 1000 (from plus 17 to minus 82)	⊕⊕⊕○ MODERATE	
Prolapse of any pelvic structure: objective analysis												
3	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[a]	None	61/167 (36.5%)	62/188 (39.9%)	RR 1.14 (0.90 to 1.45)	0 minus per 1000 (from minus 54 to plus 77)	⊕⊕⊕○ MODERATE	
Fecal incontinence > 5 years												
2	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[b]	None	3/143 (2.1%)	2/151 (1.3%)	RR 1.57 (0.26 to 9.48)	8 more per 1000 (from minus 10 to plus 112)	⊕⊕⊕○ MODERATE	
Constipation > 5 years												
3	Randomized controlled trials	Not serious	Not serious	Not serious	Serious[b]	None	21/243 (8.6%)	32/246 (13.0%)	RR 0.64 (0.38 to 1.07)	47 less per 1000 (from plus 9 to minus 81)	⊕⊕⊕○ MODERATE	

CI confidence interval; *RR* risk ratio

[a] Total number of events < 300

[b] Reduced number of events

affected their quality of life. Unfortunately, long-term studies may lose some participants, causing a risk of attrition bias.

Our systematic review with a meta-analysis involved 566 participants and compared pelvic floor symptoms after TH and SH in long-term (5- to 14-year) follow-up. Urinary symptom outcomes were reported at around 10-year follow-up, while POP and bowel symptoms were described at least 5 years postoperatively. Previous reviews on this subject did not include most of the studies used in our analysis [9, 13]. Even though this meta-analysis has fewer participants compared with the latest reviews [4, 5, 7, 29], this is the first systematic review including all studies > 5 years after surgery. The latest Cochrane review [5] involved 1533 patients, and long-term results were described as > 2 years; only two studies [12, 14] had a follow-up longer than 5 years; no differences regarding pelvic floor symptoms were noted between TH and SH that could favor one procedure over another.

Contrarily to our initial hypothesis, this review showed that both patient-reported urinary incontinence and stress urinary incontinence favored TH over SH in the long term. Also the outcomes most indicative of damage to neuroanatomical structures (urinary and bowel symptoms) have shown no evidence of benefits in women undergoing SH that might theoretically cause less damage according to some authors' beliefs [3, 28, 30].

Those results led to a debate about the role of the apical level of support in the mechanism of continence. Gimbel et al. hypothesized the suspension of the vaginal apex performed during total hysterectomy and not on subtotal hysterectomy might be the cause of better outcomes on TH [4]. This idea is supported by Mouritsen et al. [2] and Penntinen et al. [3], which suggested the suspension of the cervical stump would avoid those adverse outcomes. Persson et al. [13] raised a question about whether this phenomenon reflects a true difference or is a matter of cultural, dietary or functional differences [13, 31, 32]. The study by Andersen et al. [9] was the first to show a relevant difference on perceived urinary incontinence and stress urinary incontinence favoring TH. Among the RCTs, only Greer et al. [14] had SUI favoring SH over TH. Urinary symptoms can affect women's lives negatively, and despite the need for more research on this subject, it is up to the physician to expose them in a way that the patient understands and makes the decision according to their needs [33].

Pelvic organ prolapse arises because of abnormalities in the muscle, fascial and neural support leading to a mechanical failure [34]. A large observational study by Lauridsen et al. [30] supports total hysterectomy as the best procedure with lower risk for postoperative POP. In their meta-analysis, Gimbel et al. [4] reported benefits of TH related to POP development, but the results were made mainly based on two observational studies. However, the superiority of TH was not proven when only RCTs were evaluated [4]. In accordance with our study, other reviews also failed to demonstrate the advantage of one technique over another regarding postoperative POP [7, 29], and this is true both when we analyze the symptoms of prolapse referred to by the patients and with the objective analysis performed by gynecologists using the POP-Q system. On the other hand, what we can truly state is, according to the available data, the supposed lesser damage caused by SH does not make any difference in POP development compared with TH.

As the surgical approach changes the pelvic structure, it may affect intestinal symptoms. Like previous publications [4, 5], we also did not observe differences between TH and SH regarding constipation and incontinence of stools. There was a tendency to favor TH regarding constipation with low heterogeneity among the studies included. However, additional studies are required to possibly confirm the advantage of TH over SH.

This systematic review included only RCTs and focused on the long-term results of urinary, bowel and pelvic symptoms after TH and SH for benign conditions. The size of our pooled meta-analysis of four studies is still relatively small but of good quality, with very low heterogeneity among them and singularly analyzed long-term events. With that, we trust that our findings are reliable and consistent, and the methodology is valid. Although the sampling size is sufficient to detect differences between procedures, we still have limited power for certain outcomes (less frequent outcomes), probably because some of the studies did not perform a power calculation for those variables, considering them as secondary outcomes. The analysis of heterogeneity from those studies may give a hint about the need for future studies focusing on urinary and pelvic symptoms. Most of the long-term RCTs included had a significant loss of participants. In all studies, both groups maintained a balance to avoid attrition bias. Moreover, it is difficult to maintain blinding of patients and the physicians that assessed them; thus, it could potentially create a high risk of detection and performance bias. Nevertheless, the quality of evidence was not low in any of the studies analyzed.

Conclusion

We concluded that both operations are very similar regarding the postoperative long-term pelvic symptoms rate, with patient-reported urinary incontinence and stress urinary incontinence events favoring TH over SH. A substantial increase in the number of participants with high-quality RCTs would increase the strength of this comparison, and the results would be more reliable.

Compliance with ethical standards

Conflicts of interest None.

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