

# Effectiveness of midurethral slings in recurrent stress urinary incontinence: a systematic review and meta-analysis

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## Abstract

**Introduction and hypothesis** Midurethral slings (MUS) are the gold standard primary procedure for the surgical treatment of stress urinary incontinence (SUI). There is no robust evidence on the success with MUS in the treatment of recurrent SUI. Our objective was to evaluate the effectiveness and complications of MUS in women with recurrent SUI by systematic review and meta-analysis of the literature.

**Methods** A systematic literature search was carried out (up to August 2011) using relevant search terms in MEDLINE, EMBASE, CENTRAL and Google Scholar. Relevant randomised controlled trials (RCT) and prospective studies were selected and then analysed by two independent reviewers. Meta-analysis of cure stated in prospective cohort studies was performed with a random effects model using Stata 8.

**Results** There was 1 randomised trial and 11 good quality prospective studies included in this systematic review. The overall subjective cure rate per meta-analysis of prospective cohort studies following MUS for recurrent SUI after any previous surgery was found to be 78.5 % [95 % confidence interval (CI) 69–88] at the follow-up of 29.72±29.49 months. The subjective cure rate following MUS after previous failed

MUS was 73.3 % (95 % CI 55–97) at the follow-up of 15.7±7.7 months.

**Conclusions** The studies report good cure rates of SUI after MUS surgery following previous incontinence surgery (62–100 %). There seems to be a lower cure rate with transobturator compared to the retropubic tape for recurrent SUI after previous surgery.

**Keywords** Midurethral slings · Stress urinary incontinence · Tension-free tape · Transobturator tape · Recurrent urinary incontinence

## Abbreviations

MUS	Midurethral sling
SUI	Stress urinary incontinence
TVT	Tension-free vaginal tape
TOT	Transobturator tape
KHQ	King's Health Questionnaire
PISQ-12	Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire
PGI-I	Patient Global Impression of Improvement
ICIQ-SF	International Consultation on Incontinence Questionnaire-Short Form
ISI	Incontinence Severity Index
MMK	Marshall-Marchetti-Krantz procedure
DIS	Detrusor instability score
VAS	Visual analogue scale
UDI	Urogenital Distress Inventory
IIQ	Incontinence Impact Questionnaire
UISS	Urinary Incontinence Severity Score
VLPP	Valsalva leak point pressure
MUCP	Mean urethral closure pressure
ICIQ	International Consultation on Incontinence Questionnaire
PVR	Post-void residual

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ISD	Intrinsic sphincter deficiency
UDS	Urodynamics
UPP	Urethral pressure profilometry

## Introduction

Stress urinary incontinence (SUI) is estimated to affect 50 % of women presenting with urinary incontinence (UI) [1]. Patients with SUI are treated with conservative measures such as pelvic floor exercises initially. Those who do not respond to conservative measures are offered surgery. Mid-urethral slings (MUS) are the primary gold standard procedure for treating SUI with long-term cure rates of 77–90 % [2]. Recurrent SUI after failed incontinence surgery is a challenging problem.

The reoperation rate for incontinence within 5 years following surgery for prolapse and incontinence has been reported to be 8 % [3]. There is no consensus on the procedure of choice for treating recurrent SUI. There are variable data available regarding the cure rate of SUI with MUS after persistence or recurrence of SUI following previous surgery. We aimed to evaluate the effectiveness of MUS in women with persistent or recurrent SUI after previous surgery. We also wanted to study the complication rates following repeat surgery.

## Methods

### Sources

All prospective studies describing effectiveness of MUS in women with recurrent SUI were included in this review. They were identified by searching the MEDLINE, EMBASE, CINAHL, CENTRAL (The Cochrane Library, Issue 2, 2009), National Library for Health, *metaRegister* of Controlled Trials and Google Scholar (up to August 2011). The conference proceedings and abstracts from the International Continence Society and the International Urogynecological Association annual meetings for the last 3 years were also searched. The following keywords were used for the search as text word or subject headings without language restriction: ‘stress urinary incontinence, midurethral sling, tension-free tape, transobturator tape and recurrent stress urinary incontinence’. Hand searches of the bibliographies and citation list of all relevant articles were also carried out. The first or corresponding authors of included trials were contacted for additional information if necessary. No ethical approval was sought for this study, as it was a systematic review and meta-analysis of published manuscripts.

### Study selection

Randomised controlled trials (RCTs) and prospective studies of women who underwent retropubic and transobturator vaginal tapes [TVT, outside in transobturator tape (TOT), inside out transobturator tape (TVT-O)] for recurrent SUI following previous surgeries were included. Two reviewers (AP and PJ) independently selected the articles for inclusion by assessing the eligibility of full papers against the review inclusion criteria, with disagreements resolved by discussion, if necessary, with a third reviewer (PL) per a priori protocol. In cases of duplication, the study that reported most recent data was included.

Participants: women with recurrent SUI following failed stress continence surgery

Intervention: synthetic MUS TVT/ TOT/TVT-O

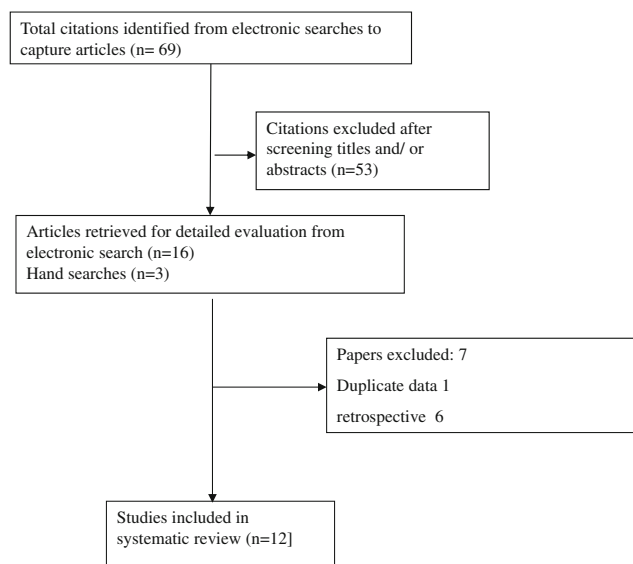
Outcome measures: subjective/objective cure/improvement

### Data extraction and quality assessment

Two independent reviewers (AP and PJ) extracted data for quality and results independently. Data included characteristics of participants, intervention, comparisons if any, outcome assessment tools and results of the studies. The Jadad score was used to assess quality of RCT and the Newcastle-Ottawa Scale was used for the prospective cohort studies.

### Statistical analysis

Regression rates from individual prospective studies were meta-analysed using a random effects model. Statistical



**Fig. 1** Selection process for the systematic review of MUS surgery in recurrent SUI

**Table 1** Details of studies included in the systematic review of MUS for the treatment of recurrent SUI

Randomised controlled trial		Prospective studies with patients who had previous colposuspension, MMK, paraurethral bulking agents, Stamey's procedures, MUS	
Author, year, country	Participants	Methods and duration of follow-up	Intervention ± comparison
1 Abdel-Fattah et al. [4], 2011, UK	n=46 Age group: 55.8 years (range 29–78), previous incontinence surgeries, colposuspension, retropubic TVT, transobturator tapes Interval between primary and repeat surgery 4.8 years (range 6 months–12 years)	Randomization: using opaque sealed envelope Blinding: single Follow-up: 12 months  Pre-op: UDS, urethral pressure profile Validated questionnaires: KHQ, Birmingham Bowel and Urinary Symptoms Questionnaire, PISQ-12. Exclusion criteria: concomitant surgery, pelvic organ prolapse stage II or greater	Intervention ± comparison TVT-O 28  TOT 18
			Outcome measures Subjective cure 69.6 % TVT-O 78.6 %, TOT 55.6 %, P value .104.  Objective assessment: Validated questionnaires: KHQ, PISQ-12, PGI-I, ICIQ-SF, satisfaction scale  Objective assessment: 1-h pad test  Objective cure defined as negative finding on standard 1-h pad test.  Subjective cure as very much/much improved on PGI-I  Objective Cure 76.5%, TVT-O 86.5%, TOT 58.3%, P value .077  Complications: dissection-related urinary tract injury 2/46, vaginal angle perforation 4/46, de novo urgency 2/35
			Effectiveness and complications
1 Rezapour and Ulmsten [5], 2001, Sweden	n=34 Mean age: 58.9±10 years  Previous incontinence surgeries, Burch colposuspension, MMK, paraurethral bulking agents, classic slings, IVS	Methods and duration of follow-up Follow-up: 4 years (range 3–5) Pre-op: 24-h pad test, micturition diary, UDS, including urethral pressure profile, QOL evaluation Exclusion criteria: patients with ISD, i.e. urethral closure pressure <20 mmH <sub>2</sub> O	Intervention ± comparison TVT
			Outcome measures Subjective assessment: QOL evaluation  Objective assessment: 24-h pad test, UDS, cure described as: <10 g/24-h pad test, satisfaction >90 %, no leakage during cough stress test  Improvement: no leakage during cough stress test, QOL improved > 75 % but <90 %  Subjective assessment Subjective symptoms analysis
			Effectiveness Cure rate 82 % Improvement 9 % Complications: bladder perforation with trocar 1/34
2 Lo et al. [6], 2002, Taiwan	n=41 Age group: 49.6 years (range 37–66), previous incontinence surgeries, retropubic urethropexy, lap. Burch colposus., needle suspension, TVT, collagen injection Interval between primary and repeat surgery 12 months (range 6–25)	Follow-up: 12 months Pre-op: 72-h voiding diary, 1-h pad test, UDS, cotton swab test, subjective symptoms analysis	TVT
			Subjective assessment Subjective symptoms analysis  Objective assessment: PVR, UDS, pad test  Cure rate 82.9 % Improvement 4.9 %  Complications: bladder perforation 4/41, de novo urgency 2/36

Table 1 (continued)

3	Sivaslioglu et al. [8], 2011, Turkey	<i>n</i> =29 Mean age: 48.6 ±7.8 years, previous incontinence surgeries, Burch colposuspension Interval between primary and repeat surgery 8.4 ±2.7 months	Follow-up: 80 % 12 months Pre-op: stress test, Q-tip test, pad test, UDS, VLPP and pelvic ultrasonography. Exclusion criteria: patients with urodynamic detrusor overactivity or genital prolapse of POP-Q stage II or more Prospective comparative study Follow-up: 8 years (range 6–10)	TVT, <i>n</i> =23 TOT, <i>n</i> =6	Cure described as pad test <2 g/h, no leakage on cough stress test Improvement Pad test 2–5 g/h Pad test >5 g/h considered as failure Subjective assessment: patient-reported symptoms Objective assessment Overall cure 62.1 % Cure after TVT 61 % Clinical: negative cough stress test Objective cure defined as no leakage on cough stress test Subjective cure as the absence of any episodes of involuntary urine loss Subjective assessment Questionnaire at 3 years to evaluate the operation success and any urinary symptoms At 3 years 93 % At 8 years 86 % Complications: bladder perforation with trocar 2/60, intraoperative bleeding >500 ml 4/60, retropubic haematoma 1/60, voiding difficulties 5/60, DVT 1/60, UTI 8/60, de novo urgency 20 % Cure 81 % Improvement 6 % Complications: bladder perforation with trocar 13/67, UTI 5/67, de novo urgency 2/67, voiding disorder 2/67
4	Ala-Nissilä et al. [9], 2010, Finland	<i>n</i> =60 Age: 61 years (range 40–87) Previous incontinence surgeries, open colposuspension, endoscopic colposuspension, perirethral injections, MMK operation, Percyra's operation, conventional sling operation, TVT procedure	Pre-op: cough stress test, UISS questionnaire, UDS, only if history not suggestive Exclusion criteria: fixed urethra Comparison group: 70 women having primary TVT procedure	TVT	Subjective assessment Questionnaire at 3 years to evaluate the operation success and any urinary symptoms At 3 years 93 % At 8 years 86 % Complications: bladder perforation with trocar 2/60, intraoperative bleeding >500 ml 4/60, retropubic haematoma 1/60, voiding difficulties 5/60, DVT 1/60, UTI 8/60, de novo urgency 20 % Cure 81 % Improvement 6 % Complications: bladder perforation with trocar 13/67, UTI 5/67, de novo urgency 2/67, voiding disorder 2/67
5	Azam et al. [10], 2001, UK	<i>n</i> =67 Median age: 49 years (range 38–78), previous incontinence surgeries, colposuspension, MMK, Stamey needle suspension, suburethral sling, urethral buttressing	Follow-up: 12 months Pre-op: ISI, 1-h pad test, UDS	TVT	Subjective assessment Validated ISI, patient satisfaction Objective assessment at 3/12 UDS, 1-h pad test, objective cure defined as no leakage on provocative cystometry, 1-h pad test <1 g Subjective cure as no leakage & satisfaction with surgical outcome. Significant

Table 1 (continued)

6	Kuuva and Nilsson [11], 2003, Finland	n=51	Mean age: 57 years (range 38–76), previous incontinence surgeries, Burch colposuspension, Kelly placcation, MMK, bladder sling, needle suspension, suprapubic urethrocytostomy	Follow-up: mean 25.3 months	TVT	improvement as no urine loss on provocative cystometry, a pad loss improvement of at least 75 % after surgery and patient report of some leakage but overall satisfaction with surgery	Subjective cure 80.4 %, improvement 15.7 % Objective cure 89.6 %, improvement 6.2 %
			Pre-op: cough stress test, 24-h pad test, micturition diary, VAS, multichannel UDS Exclusion criteria: urge predominant mixed incontinence, prolapse not protruding beyond introitus			Subjective assessment	Complications: bladder perforation 3/51, voiding difficulty 3/51, UTI 3/51, de novo urgency 3/48
7	Liapis et al. [7], 2004, Greece	n=33	Age group: 60 years (range 39–81), previous surgeries: Burch colposuspension, MMK, anterior colporrhaphy, Staney	Follow-up: 20.5 months (range 12–29)	TVT	Objective assessment 24-h pad test, cough stress, UDS. Objective cure defined as no leakage during cough stress test & 24-h pad test <10 g/24 h Subjective cure as score of <10 on the VAS, improvement as negative stress test, 24-h pad test showed >80 % reduction in leakage & VAS	
			Pre-op: bladder diary, UDS including UPP, cough stress test and Q-tip test			Subjective assessment: more than 50 % improvement in leakage	Cure rate 70 %, improvement 6 %
1	Prospective studies with patients who had previous MUS surgery Van Baelen and Delaere [12], 2009, The Netherlands	n=19	Mean age: 56 years (range 33–77), previous incontinence surgeries TVT, TOT Mean interval between primary and repeat surgery 18 months	Follow-up: mean 16 months (range 3–38) Pre-op: UDS, cystourethroscopy, ICIQ stress test	TOT	Objective assessment: 1-h pad test Cure described as leakage <1 g/1-h pad test and improvement of urine loss to less than 50 % before operation	Complications: bladder perforation with trocar 2/33, urinary retention requiring tape lowering 3/33, de novo instability 2/33, UTI 6 %
						Subjective assessment	Subjective cure 53 %, improvement 5 % Objective cure 55 %, improvement 15 %
						ICIQ	Complications: infection requiring sling excision 1/5 (Oblique), de novo urgency 2/19
						Objective assessment: stress test, PVR Objective cure defined as absence of urinary incontinence during stressful activities, subjective cure as leakage of urine once a week or less often Improvement as significant reduction of leakage during	

Table 1 (continued)

2	Liapis et al. [13], 2009, Greece	$n=31$ Mean age: 57.26±11.47 years (range 36–78) Previous incontinence surgeries: TVT, TOT, TVT-O, TVT Secur	Follow-up: mean 18.6 months (range 12–28) Pre-op: physical examination, bladder diary, Q-tip test, UDS, urethral pressure profile, 1-h pad test Exclusion criteria: need for concomitant pelvic floor surgery, mixed urinary incontinence, immobile urethra, peak flow rate < 15 ml/s	TVT	stressful activities or ICIQ score > 50 % Subjective assessment: bladder diary Objective assessment: Q-tip test, UDS, urethral pressure profile, 1-h pad test Objective cure defined as no leakage on cough stress test, 1-h pad test < 1 g Subjective cure as the absence of any episodes of involuntary urine loss during stressful activities, improvement as a reduction of urine loss to < 50 %	Subjective cure 71 % Objective cure 74 % Improvement 6.5 % Complications: bladder perforation with trocar 1/31, significant bleeding 1/31, de novo urge incontinence 9.6 %, de novo urgency 13 %, post-op dysuria 16.1 %, incomplete emptying 5/31, UTI 6.4 % Subjective cure rate 91.7 %
3	Tsivian et al. [14], 2007, Israel	$n=12$ Age group: 64.3 years (range 47–80) Previous surgeries: TVT, TOT, IVS Interval between primary and repeat surgery 1–48 months	Follow-up: 23.2 months (range 14–44) Pre-op: UDS, cystoscopy, cough stress test, Q-tip test Post-op: subjective symptoms questionnaire, UDI-6 short form	TVT 5 TOT 3 IVS 4	Subjective assessment: clinical examination, symptoms on questioning, UDI-6 short form Objective assessment Cough stress test Cure described as complete continence, freedom from pad protection and ability to void naturally Subjective assessment: patient reporting no leakage Objective assessment: cough stress test—no leakage Cure described as objective with cough test and no leakage	Cure rate according to type of slings TVT 100 % IVS 100 % TOT 33.33 % Complications: de novo urgency 1/12 Cure rate 100 % Complications: none
4	Moore et al. [15], 2007, USA	$n=5$ Age group: 56–76 years Previous surgery: TOT Interval between primary and repeat surgery 6–30 weeks	Follow-up: 5 months (range 1–8) Pre-op: UDS, UPP	TVT	Subjective assessment: patient reporting no leakage Objective assessment: cough stress test—no leakage Cure described as objective with cough test and no leakage	Cure rate 100 % Complications: none

*KHQ* King's Health Questionnaire, *PISQ-12* Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire, *PGI-I* Patient Global Impression of Improvement, *QOL* quality of life, *ICIQ-SF* International Consultation on Incontinence Questionnaire-Short Form, *ISI* Incontinence Severity Index, *MAMK* Marshall-Marchetti-Krantz, *DIS* detrusor instability score, *VAS* visual analogue scale, *UDI* Urogenital Distress Inventory, *I/Q* Incontinence Impact Questionnaire, *UISS* Urinary Incontinence Severity Score, *VLPP* Valsalva leak point pressure, *POP-Q* Pelvic Organ Prolapse Quantification, *MUCP* mean urethral closure pressure, *ICIQ* International Consultation on Incontinence Questionnaire, *PVR* post-void residual, *ISD* intrinsic sphincter deficiency, *UDS* urodynamics, *UPP* urethral pressure profilometry, *UTI* urinary tract infection

analysis was performed using Stata 8.0 (StataCorp, College Station, TX, USA).

## Results

We included 12 studies in total; Fig. 1 summarises the flow for study selection in this systematic review. There was 1 RCT [4] and 11 prospective studies [5–15] with a total of 430 participants between 23 and 87 years of age (see Table 1 for details of included studies). There were nine non-comparative studies, eight of which described effectiveness of TVT and one used TOT (see Table 1). Three comparative studies that described comparison between different sling procedures in the management of recurrent SUI included TVT vs TOT [8], TVT-O vs TOT [4] and TVT vs TOT vs intravaginal sling (IVS) [14]. The interval between primary and repeat surgery ranged from 6 weeks to 48 months. Previous surgery included Burch colposuspension, Kelly plication, Marshall-Marchetti-Krantz procedure (MMK), Stamey needle suspension, Pereyra's operation, MUS, conventional slings and paraurethral collagen injection in eight studies [4–11], while four studies [12–15] included women with previous failed MUS only.

### Methodological quality

For the RCT, the Jadad score was 3, randomisation was done using opaque sealed envelope and follow-up was adequate. Power calculation was done and blinding was described.

The quality of the non-randomised prospective studies is shown in Fig. 2. The recruitment was consecutive in two studies [5, 9]. The diagnosis was ascertained both clinically and urodynamically in ten studies, and clinically [with urodynamics (UDS) if history not suggestive] in one study [9]. The instruments used to assess outcomes were satisfactorily described in ten studies. The outcome was assessed as

overall cure in the majority of studies [5–10, 14, 15], while subjective and objective components were assessed separately in some studies [4, 11–13]. The follow-up was described in all of them and ranged from 1 month to 12 years and it was adequate (>80 %) in all 11 studies.

### Outcomes

The studies used different parameters for subjective/objective cure and improvement. Subjective parameters used were bladder diary, patient satisfaction, subjective symptoms analysis, quality of life (QOL) evaluation, King's Health Questionnaire (KHQ), Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire (PISQ-12), Patient Global Impression of Improvement (PGI-I), International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF), Incontinence Severity Index (ISI), Urogenital Distress Inventory (UDI), Incontinence Impact Questionnaire (IIQ), Urinary Incontinence Severity Score (UISS), visual analogue scale (VAS) and absence of complaint of leakage.

The objective outcomes measured in these studies were UDS, cough stress test and pad test (which included 1-h pad test <2 g/h, <1 g/h, 24-h pad test <10 g/24 h).

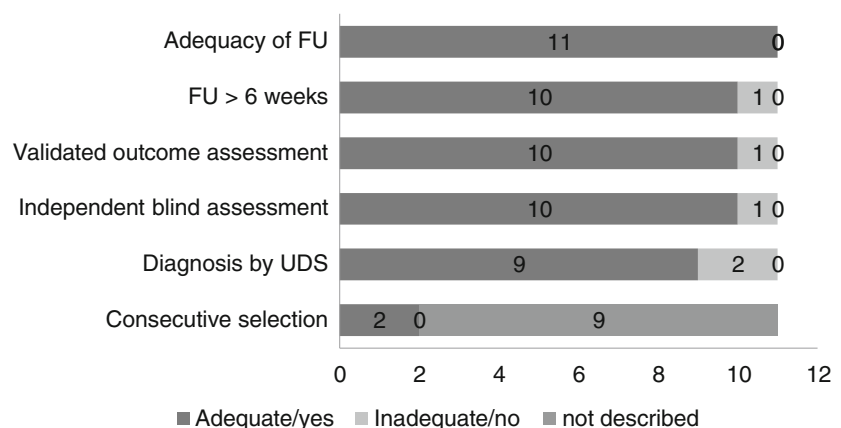
Criteria used for improvement were 1-h pad test <5 g, 24-h pad test showed >80 % reduction in leakage, reduction in urine leakage to less than 50 % and QOL improvement >75 % but less than <90 %.

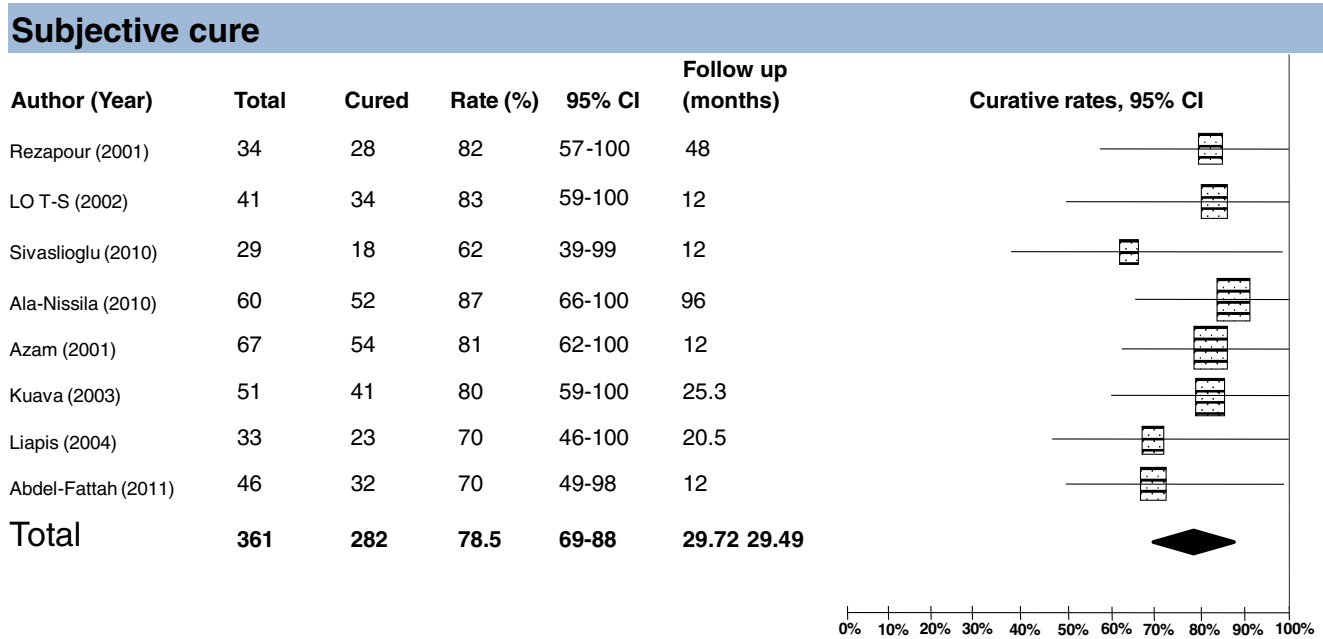
### Overall subjective cure

On meta-analysis the subjective cure rate following MUS for recurrent SUI after any previous surgery was found to be 78.5 % [95 % confidence interval (CI) 69–88] at the follow-up of 29.72±29.49 months (Fig. 3).

**Fig. 2** Quality of prospective studies in the meta-analysis of MUS in recurrent SUI

Quality of prospective studies in the meta-analysis of MUS in recurrent stress urinary incontinence.





**Fig. 3** Meta-analysis for MUS after recurrent SUI with any previous incontinence surgery

There were four studies looking at cure rate of MUS after previous MUS surgery for SUI [12–15]. The subjective cure rate was 73.3 % (95 % CI 55–97) at 15.7±7.7 months follow-up (Fig. 4).

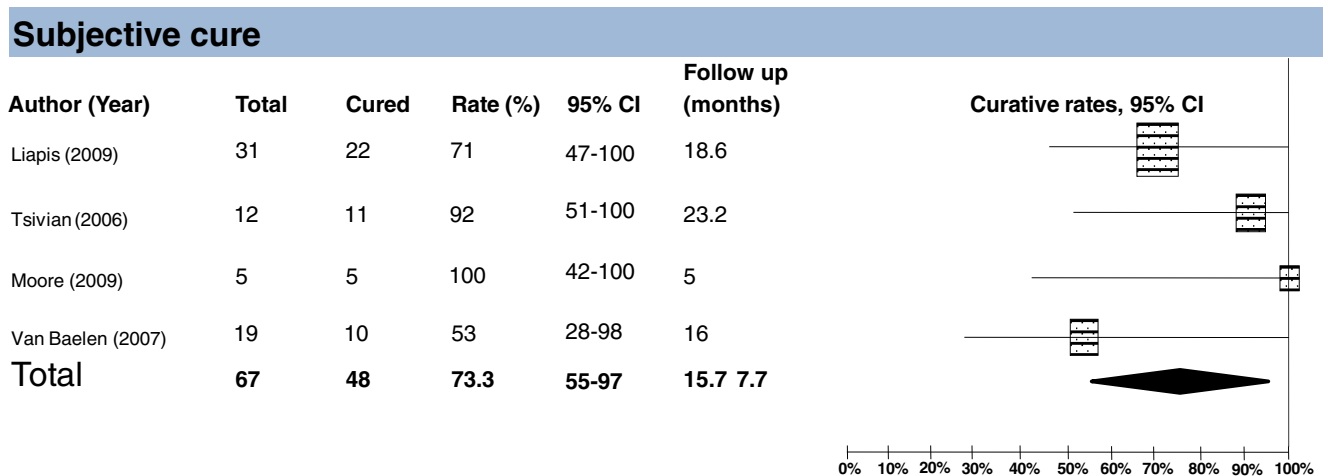
Outcome after TVT

The subjective cure rate following retropubic MUS (TVT) was 79.8 % (95 % CI 71–89) at a follow-up of 27.26±26.85 months (Fig. 5). There were ten studies looking at outcome after retropubic MUS following any previous failed incontinence surgery. Three of these ten studies looked at outcome with repeat retropubic MUS after previous failed

MUS [13–15]. Seven of these ten studies had a success rate of over 80 %. One study reported a cure rate of 61 % and two others had a cure rate ≥ 70 %.

Outcome after TOT

There were four studies looking at outcome after TOT following any previous surgery and the collated subjective cure was 54 % (Fig. 6). Two of these four looked at outcome of repeat TOT after previous failed MUS [12, 14]. The highest cure rate reported after TOT was 66.7 % (95 % CI 25–100) [8]. One study had a cure rate of 33.3 % [14] and the other two studies had cure rates of 52.6 % [12] and 55.6 % [4].



**Fig. 4** Meta-analysis for MUS after recurrent SUI with previous MUS



### Subjective cure

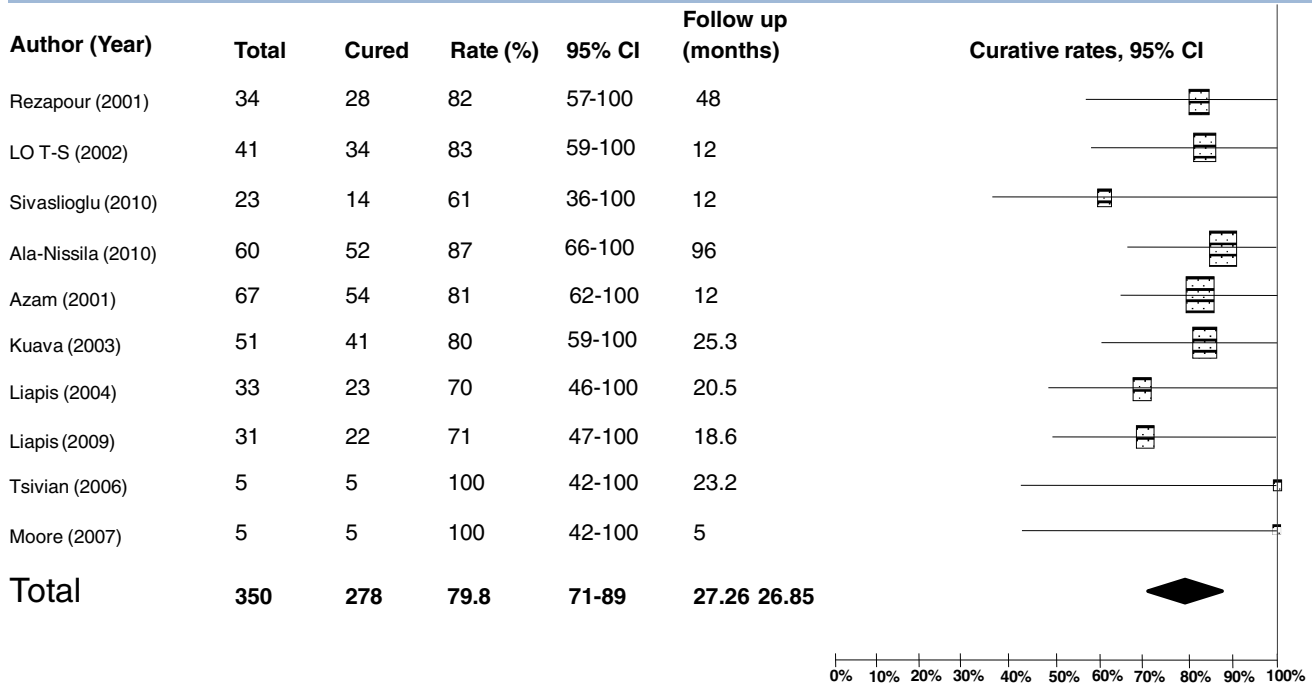


Fig. 5 Meta-analysis for TVT after recurrent SUI with any previous incontinence surgery

#### Complications

In this systematic review, there were 28 urinary tract injuries during 363 retropubic sling procedures (7.7 %) during repeat continence surgery. This compares favourably with a previous systematic review showing bladder injury in 10 of 238 procedures (4.2 %) during primary retropubic sling procedures [16]. The incidence of de novo urgency was 5.5–20 %. Voiding dysfunction was found in 4–16 % and urinary tract infection in 5.9–13 %. Excess bleeding (1.7–6.7 %) and urinary retention needing loosening of tape (9 %) were the other complications seen in some studies [7, 9, 13].

#### Discussion

The studies report good cure rates for recurrent SUI with MUS following previous failed incontinence surgery (62–100 %). There seems to be a lower cure rate with TOT (33–67 %) compared to the retropubic tape (61–100 %) for recurrent SUI after previous surgery for this condition. The rate of urinary tract injuries is around 7.7 % with retropubic slings.

The search was thorough and not restricted by language. The manuscript adheres to the 27-item PRISMA checklist [17]. The latest joint International Urogynecological Association/International Continence Society terminology for female pelvic floor dysfunction was used [18]. The

### Subjective cure

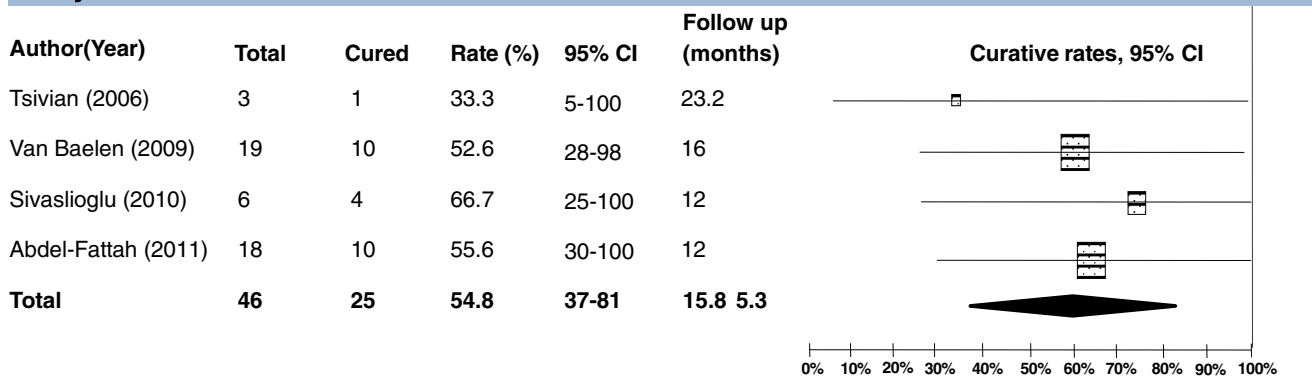


Fig. 6 Meta-analysis for TOT after recurrent SUI with any previous incontinence surgery

definition of cure varied between studies and this can also account for the variable success rates described. The drawbacks of this piece of work are not weaknesses of the systematic review itself but the dearth of primary RCTs in this area. The long-term success of MUS has been reported between 78.9 and 84.7 % [19, 20]. The common reason for failure of initial sling is either anatomical or functional [21]. A correctly placed MUS mimics the effect of the pubourethral ligament. [22].

Repeat continence surgery is often difficult as a result of scarring and adhesions with the distortion in anatomy from previous surgeries, thereby increasing intraoperative complications [5]. Retropubic MUS has a good success rate after any type of previous surgery for SUI including previous MUS surgery with bladder perforation rates quoted between 2.9 and 19 %. Our view is that, as long as bladder perforation is recognised and the tape is repositioned, it may not have long-term implications. A retropubic approach is preferred over a transobturator approach for repeat surgery [12]. The axis of the transobturator is less acute to the urethral axis as compared to the retropubic route, thereby creating a platform sling with less circumferential compression of the urethra [23]. Another reason could be the need for wider dissection of the periurethral area with the transobturator approach resulting in migration of the tape [24].

The retropubic sling has been used successfully to treat recurrent SUI due to intrinsic sphincter deficiency (ISD) [15]. The rationale proposed for this is the greater acute angle which may be more obstructive than the transobturator and, therefore, more successful in treating incontinence due to ISD. The main mechanism of MUS relies on dynamic kinking of the proximal urethra and compression of the midurethra at the level of the sling. This procedure requires adequate mobility of the urethra. The success rate of repeat surgery was 90 % in women with sufficient preoperative mobility of the urethra, while it was only 33 % in women with a fixed urethra [7].

It would be ideal to collect data on repeat surgery on failed incontinence surgery prospectively via national databases (e.g. British Society of Urogynaecology, BSUG in the UK) to build up a further evidence base and perform individual patient data meta-analysis.

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**Conflicts of interest** None.

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