A rapid evidence assessment for extracorporeal magnetic stimulation to treat urinary incontinence in men

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ABSTRACT

INTRODUCTION: Extracorporeal magnetic stimulation (EMS) is a non-invasive treatment for urinary incontinence (UI) in women, but its effectiveness in men is not well known. This review identifies and evaluates the evidence supporting EMS for treating UI in adult men.

METHODS: We systematically searched the MEDLINE, CINAHL, and PEDro databases up to November 2024. Studies included EMS alone or compared to other treatments in men with UI. A qualitative assessment of the evidence was carried out. Study quality was assessed using the Downs and Black checklist for randomized and non-randomized studies and the Cochrane Risk of Bias 2 tool for randomized controlled trials (RCTs).

RESULTS: Of 285 studies screened, nine met the inclusion criteria, encompassing 181 men treated with EMS, mostly post-prostatectomy. Four RCTs, with qualities ranging from fair to good, and small sample sizes (n=16–36), found EMS led to earlier continence compared to pelvic floor muscle therapy (PFMT) and was superior to sham treatment. One study reported significant improvements in urodynamic measures after EMS, and another showed a 48% reduction in 24-hour pad usage, sustained at 12.5 months. Several studies indicated that EMS accelerated symptom improvement compared to PFMT but had similar long-term outcomes. All studies using validated quality-of-life measures reported significant improvements after EMS.

CONCLUSIONS: Evidence for EMS in treating male UI is limited but generally positive. EMS may promote faster continence recovery than PFMT, with similar long-term outcomes. Larger, high-quality studies are needed to confirm these findings and guide clinical practice and recommendations for different subgroups.

INTRODUCTION

Incontinence is a common and impactful complication after prostate cancer treatment. Approximately 8–25% of patients will experience persistent post-prostatectomy incontinence at 12 months postoperatively,[1] and this is a major contributor to decreased general health-related quality of life.[2]

Current American Urological Association/Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction (AUA/SUFU) guidelines for post-prostatectomy incontinence suggest the use of conservative options, such as pelvic floor muscle therapy (PFMT), and surgical interventions, such as implantation of a male sling or an artificial urinary sphincter (AUS).[3,4] These options have known limitations. For instance, traditional PFMT often has poor patient compliance,[5] and there are complications associated with the AUS, such as infection, mechanical failure, erosion, and persistent leakage.[4]

Electromagnetic stimulation (EMS) was first described by Galloway et al in 1998 as a non-invasive alternative to functional electrical stimulation (FES).[6] During EMS treatment, patients sit in a special chair equipped with an electromagnetic coil located in the seat. The activated coil stimulates contractions in pelvic floor muscles, and in some dual-coil chairs, depolarizations in motor nerves in the sacral root. These magnetic currents can penetrate through the body tissue without significant alteration, allowing a patient to be treated in a non-invasive manner.[6,7]

KEY MESSAGES

- Across nine studies (181 men treated with extracorporeal magnetic stimulation [EMS]), EMS led to earlier continence recovery and was superior to sham treatment; one study showed a 48% reduction in 24-hour pad usage sustained for over a year.
- Evidence quality is limited by small sample sizes, methodologic concerns, and lack of standardized protocols; most studies were rated as fair, with some risk of bias.
- Larger, high-quality studies are needed to confirm the benefits of EMS and to better define its role in managing male urinary incontinence.

This was a major improvement over FES, which required the insertion of a transrectal probe to stimulate deeper structures in the pelvis.[8] EMS has been shown to be safe and effective for incontinence in women and treats both overactive bladder symptoms and stress incontinence.[9] In this population, it is a non-invasive, well-tolerated treatment option with very rare potential adverse effects and limited contraindications.[9,10]

In a 2015 systematic review of conservative management for postprostatectomy incontinence, Anderson et al concluded that while EMS was beneficial in recovery, the evidence was still limited.[11] In this rapid literature review, we identified evidence for the use of EMS in men with urinary incontinence and identified the therapeutic benefits, gaps in current knowledge, and areas for future research.

METHODS

This rapid literature review was performed according to the structure of rapid reviews outlined by the World Health Organization,[12] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[13]

Identification of studies

We searched MEDLINE, CINAHL, and PEDro from inception to November 2024. Literature search strategies were developed with the expertise of a reference librarian; search terms and the PICO statement are included in the online Appendix (available at *cuaj.ca*). The reference lists of the identified studies were also checked to find additional articles relevant to our research question. All references were imported into Covidence, and duplicates were removed. Studies were then screened in duplicate by two independent reviewers (RW and BW).

We included all original research articles evaluating the outcomes of men being treated with EMS for urinary incontinence. We also included studies that compared EMS with other methods of pelvic floor rehabilitation, such as PFMT, or FES. We excluded abstracts, editorials, commentaries, and other non-experimental studies. We excluded studies that had male and female participants without a subgroup analysis for only male participants. Studies screened at the title and abstract stage were excluded if they did not meet one or more of these inclusion criteria. Rationales for exclusions were recorded at the full-text screening stage.

Data extraction and quality assessment

Data was extracted by two authors independently (RW, BW) and included primary author, year of article publication, study design, inclusion and exclusion criteria for study sample, number of patients analyzed, type of pelvic floor therapies, frequency of treatments, and outcome measures. All studies were assessed for methodologic quality using the Downs and Black scale, consisting of 27 questions that assessed: reporting, external validity, internal validity/bias, and internal validity/confounders.[14] Based on scoring on the Downs and Black scale, studies were classified as excellent, good, fair, or poor (Table 1).[15] Randomized controlled trials (RCTs) included in this review were evaluated using the Cochrane Risk of Bias tool (RoB2) that assesses the quality of studies on the basis of methods of randomization, deviations from intended intervention, missing outcome data, measurement of outcomes, and reporting of results.[16,17]

Table 1. Categorization of total scores of the Downs and Black Criteria, adapted from Hooper, Jutai, Strong, & Russell-Minda

Quality index	Quality score (n=27)
Excellent	26–27
Good	20–25
Fair	15–19
Poor	≤14

Analysis

Due to the limited studies and the heterogeneity in treatment protocols, EMS device, and patient populations, a qualitative analysis of the results was performed, and no meta-analysis was carried out.

RESULTS

We identified 285 studies in the initial search of three databases. After removing duplicates and applying our inclusion criteria, 31 studies were eligible for full-text screening. After detailed review and snowball searches of other systematic reviews, nine studies were included in the present review (Figure 1).

Study details

Out of nine studies included in this review, four were RCTs,[18-21] four were cohort studies,[22-25] and one was a quasi-experimental study.[26] All studies reported data at baseline and after interventions. Table 2 summarizes the studies, their design, and their objective. Seven of the nine studies were specifically in men after radical prostatectomy. Three studies originated from Japan, two from Italy, and one each from Germany, Korea, China, and Taiwan.

The most common comparison groups were FES or PFMT. Out of the studies included, three examined the effect of EMS alone,[22,23,25] two compared the effects of EMS with PFMT,[20,21] and one compared a group of patients that received no treatment to those who received EMS and PFMT.[26] One study compared EMS to FES,[24] and another compared FES, EMS, and no treatment.[19] Lastly, one study employed a crossover design, where patients were either assigned a sham group first, followed by EMS treatment, or vice versa.[18]

Participants

There was a total of 390 male participants studied, of which 181 were treated with EMS (Table 3). The number of participants in each study ranged from 10–178. Of the RCTs included, total sample sizes ranged from 16–36. In the one study by Suzuki et al that did not specifically recruit men with postprostatectomy incontinence, all participants were diagnosed with idiopathic urgency incontinence based on urodynamic studies, and 16 of 39 participants were male.[18]

Three studies included participants with stress (SUI), urgency (UUI), and mixed incontinence (MUI).[22,25,26] Yokoyama et al included only those with SUI,[23] and Terzoni et al included those with SUI and UUI.[24] Three studies did not specify the type of incontinence being treated.[19-21]

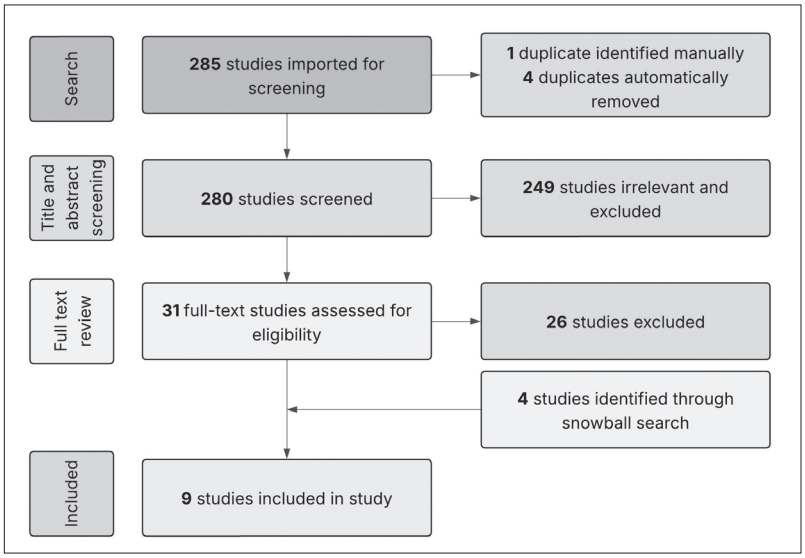

Figure 1. Process of study selection according to PRISMA flow diagram.

Table 2. Characteristics of the included studies

Study	Country	Design	Type of incontinence	Study objective
Yokoyama et al, 2003[19]	Japan	RCT	Not specifically reported	To compare the efficacy of EMS vs. FES on incontinence after retropubic RP
Yokoyama et al, 2005[23]	Japan	Cohort	SUI, UUI	To understand the clinical effects of EMS on incontinence after retropubic RP
Suzuki et al, 2007[18]	Japan	RCT	UUI	To understand if there are sex differences in therapeutic outcomes when using EMS
Liu et al, 2008[21]	China	RCT	Not specifically reported	To compare EMS vs. PFMT in post-RP incontinence
Koo et al, 2009[20]	Korea	RCT	Not specifically reported	To compare the efficacy of EMS vs. PFMT on urinary incontinence after RP
Wöllner et al, 2012[22]	Germany	Cohort	SUI, UUI, MUI	To investigate the effectiveness and adverse events of EMS in the treatment of urinary incontinence
Terzoni et al, 2013[26]	Italy	Quasi-experimental	SUI, UUI, MUI	To compare the efficacy of PFMT and EMS to treat post-RP incontinence
Terzoni et al, 2013[24]	Italy	Cohort	SUI	To compare the effects of EMS and FES on involuntary leakages of urine in patients who underwent RP
Chang et al, 2015[25]	Taiwan	Cohort	SUI, UUI, MUI	To investigate the effect of EMS health-related QoL in patients with post-RP incontinence

EMS: extracorporeal magnetic stimulation; FES: functional electrical stimulation; min: minutes; MUI: mixed urinary incontinence; PFMT: pelvic floor muscle therapy; RCT: randomized controlled trial; RP: radical prostatectomy; SUI: stress urinary incontinence; UUI: urgency urinary incontinence.

Table 3. Summary of the studies identified in this systematic review

Study	Assigned groups	Types of intervention	Total EMS dose	Outcome measures	Results
Yokoyama et al, 2003[19]	EMS: 12 FES: 12 Control: 12	FES: anal electrode pulses of 20 Hz square waves at a 300 µs pulse duration and a maximal output current of 24 mA were used for 15 minutes twice a day for 1 month EMS: 10 Hz, intermittently for 10 minutes, followed by a rest period of 2 minutes, and a second treatment at 50 Hz intermittently for 10 minutes; 2x per week for 2 months Control: PFMT supine, anal muscle contracture with verbal instruction to selectively contract anal sphincter	576 000 contractions in 8 weeks	Primary: 24h pad weight Secondary: IQoL adverse events	No significant differences were noted between either FES or EMS group, and the control group after 3 months of treatment, and no statistical differences in 24h pad weight between FES and EMS.
Yokoyama et al, 2005[23]	EMS 10	EMS: 10 Hz for 10 min + 50 Hz for 10 min; 2 sessions/week for 2 months	576 000 contractions in 8 weeks	Primary: Daily urinary frequency, 1-h pad weight, UDS Secondary: IQoL	EMS improves urodynamic parameters and I-QoL scores from baseline at the end of treatment. However, 30% of participants returned to baseline IQoL scores by 12 months post-treatment.
Suzuki et al, 2007[18]	EMS to Sham: 9 Sham to EMS: 7	EMS: 10 Hz continuously with a stimulating pulse width of 300µs for 20 min; 1 session/week for 10 weeks Sham: 1 Hz in 5-sec "on"–5-sec "off" pulsing manner with 300µs-width and 20%, or less, of the maximum output for 20 min; 1 session/week for 10 weeks	120 000 contractions in 10 weeks	Primary: Leaks/ week Secondary: ICIQ-SF, UDS	There were no significant sex differences in reductions of number of leaks/weeks, or total ICIQ-SF score. EMS decreased leak frequency by 35.2%.
Liu et al, 2008[21]	EMS: 12 PFMT: 12	EMS: 10 Hz for 10 minutes, followed by a 3-minute rest and a second treatment at 50 Hz for 20 minutes; 30 minutes 2x/week for 6 weeks PFMT: Contraction for 3 seconds followed by a 3-second rest, 20 minutes once, 3x/day for 6 weeks	792 000 contractions in 6 weeks	Primary: IQoL, ICIQ-SF	After 3 and 6 months of treatment, participants treated with EMS had significantly lower QoL and ICIQ-SF scores than those receiving PFMT.
Koo et al, 2009[20]	EMS: 16 PFMT: 16	EMS: 10hz for 10 min, 50hz for 10 min; 20 minutes 2x/week for 8 weeks - Total of 16 Sessions PFMT: pelvic floor muscle contractions held for 10 seconds and relaxed for 10 seconds. 10 reps per session, 10 sessions daily	576 000 contractions in 8 weeks	Primary: 24-hour pad weight and pad usage Secondary: IQoL	EMS significantly decreased 24h pad weight and pad usage compared to PFMT at 2 and 3 months after the start of treatment. There were no significant differences between treatment groups at 6 months.

EMS: extracorporeal magnetic stimulation; FES: functional electrical stimulation; ICIQ-UI SF: International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form; IPSS-QoL: International Prostate Symptom Score-QoL Index; I-QOL: Urinary Incontinence Quality of Life Scale for female patients; min: minutes; MUI: mixed urinary incontinence; PFMT: pelvic floor muscle therapy; SUI: stress urinary incontinence; UDI-6: Urogenital Distress Inventory; UDS: urodynamic studies; UUI: urgency urinary incontinence.

In the seven studies that reported baseline incontinence measures, there was an average of 3.85 episodes of incontinence per day,[18,23,25] 24-hour pad weights of 477.7g,[19,20,24] and use of 5.4 pads per day.[22] No studies excluded patients based on incontinence severity.

Intervention

Participants who received EMS had treatment spanning from 4–10 weeks, with 2–3 sessions per week that each lasted 10–20 minutes. To administer EMS, three studies used the NeoControl® therapy system,[19,22,23] three used the BioCon 2000W™,[20,21] one used a magnetic stimulator from Nihon Kohden,[18] and two did not specify the device used. Each study had its own treat-

Table 3 (cont'd). Summary of the studies identified in this systematic review

Study	Assigned groups	Types of intervention	Total EMS dose	Outcome measures	Results
Wöllner et al, 2012[22]	EMS: 57	EMS: 25 Hz for 10 min, 50hz for 10 min at; 2–3 times per week for a total of 12 sessions	540 000 contractions in 4-6 weeks	Primary: Pads used/24h Secondary: Patient satisfaction, duration of therapy, and adverse events	EMS decreases pads used/24h with persistent or further reductions at 12.5 months.
Terzoni et al, 2013[26]	EMS: 69 PFMT: 87 Control: 22	EMS: SUI & MUI: 50Hz, 5s on, 5s off 10 minutes for First treatment, 20 minutes subsequent. 2x/week for 6 weeks UUI: 5Hz, 5s on, 5s off. 10 minutes for First treatment, 20 minutes subsequent. 2x/week for 6 weeks PFMT: 7 exercise schemes of progressively increasing difficulty; 2x daily after bladder emptying for 6 months Control: No treatment	Stress & mixed: 345 000 contractions in 6 weeks UUI: 34 500 contractions in 6 weeks	Primary: IPSS at 1 month Secondary: 24h pad weight	EMS reduces urine leakage quicker than PFMT within the first 6 weeks of treatment, however, there was no difference to recovery at 6 months of treatment.
Terzoni et al, 2013[24]	EMS: 22 FES: 18	EMS: 50 Hz, 5s on, 5s off. 10 min for the first session and 20 min in subsequent sessions, 2x per week for 6 weeks FES: biphasic currents at 50 Hz; 6 s of stimulation and 12 s of recovery time 10 min in first session or 15 min for the second, 2x per week for 6 weeks	345 000 contractions in 6 weeks	Primary: Leakage (grams/day)	At 6 weeks of treatment, EMS resulted in quicker reductions in urine leakage compared to FES.
Chang et al, 2015[25]	EMS: 13	EMS: Pulse-field frequency was 10 Hz applied intermittently for 10 minutes, followed by a 1-minute rest period, then a second treatment at 50 Hz applied intermittently for 10 minutes; 20 minutes, 2x/week, 2 months	576 000 contractions in 8 weeks	Primary: Incontinence episodes, 3-day dairy outcomes Secondary: UDI6, IIQ-7, IPSS-QoL	EMS resulted in significantly decreased incontinence episodes, improved urodynamic parameters and significantly lower UDI 6 scores.

EMS: extracorporeal magnetic stimulation; FES: functional electrical stimulation; ICIQ-UI SF: International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form; IPSS-QoL: International Prostate Symptom Score-QoL Index; I-QOL: Urinary Incontinence Quality of Life Scale for female patients; min: minutes; MUI: mixed urinary incontinence; PFMT: pelvic floor muscle therapy; SUI: stress urinary incontinence; UDI-6: Urogenital Distress Inventory; UDS: urodynamic studies; UUI: urgency urinary incontinence.

ment protocol, which generally consisted of multiple short treatments over the course of 4–10 weeks. An estimate of the total number of treatment contractions was calculated for each study, with most protocols delivering approximately 500 000 contractions.

Outcomes

The studies used various tests, such as pad weights, pad usage, bladder diaries, and urodynamic studies (UDS). All studies except for two also evaluated quality of life (QoL) with validated and reliable questionnaires such as the Urinary Incontinence Quality of Life Scale (I-QoL), the Urogenital Distress Inventory (UDI-6), the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF), the International Prostate Symptom Score (IPSS), Incontinence Impact Questionnaire (IIQ-7).[18-21,23,25,26]

There were two small cohort studies that included UDS; one found that EMS significantly increased mean maximum cystometric capacity and Valsalva leak point pressure,[23] and in the other, functional bladder capacity.[25] Two small studies (a cohort study and a crossover study) found that EMS decreased the number of episodes of incontinence by 35–36% by the conclusion of treatment.[18,25] In one of the larger cohort studies, EMS reduced 24-hour pad usage by 48%, with persistent reductions at 12.5 months without maintenance therapy in men who had undergone radical prostatec-

Table 4. Quality assessment scores based on the modified Downs and Black checklist

Study	Score	Quality index
Yokoyama et al, 2003[19]	16/27	Fair
Yokoyama et al, 2005[23]	16/27	Fair
Suzuki et al, 2007[18]	23/27	Good
Liu et al, 2008[21]	19/27	Fair
Koo et al, 2009[20]	17/27	Fair
Wöllner et al, 2012[22]	14/27	Poor
Terzoni et al, 2013[26]	18/27	Fair
Terzoni et al, 2013[24]	16/27	Fair
Chang et al, 2015[25]	19/27	Fair

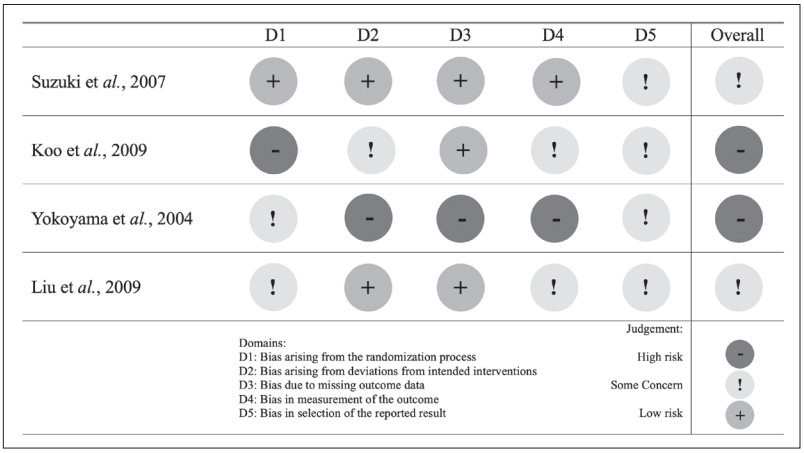

Figure 2. Visual representation of Cochrane risk of bias (RoB)2 assessment.

tomy;[22] however, other authors reported less durable success, with Yokoyama et al finding that 3/6 patients who had significant improvements in their I-QoL scores had returned to baseline within 12 months.[23]

Two studies showed that EMS improved lower urinary tract symptoms (LUTS) and urinary leakage quicker than PFMT; however, at the end of the studies, both groups reached similar levels of improvement.[19,26] Terzoni et al also found that EMS resulted in quicker reductions in urine leakage compared to FES.[24] All seven studies that used validated QoL questionnaires found that the use of EMS significantly improved QoL measures compared to baseline;[18-21,23,25,26] however, when compared to the PFMT in one study, there was no difference in the improvement of QoL measures.[26]

Critical appraisal

All studies were assessed using the Downs and Black checklist, which allowed the quality assessment of comparative and non-comparative studies (Table 4). The mean score of all studies in this review was 17.6/27, with non-RCTs averaging 16.6/27, and RCTs averaging a score of 18.8/27. Seven studies were assessed as being methodologically fair,[19-21,23-26] and one was methodologically poor.[22] The one study assessed as methodologically good was a small crossover RCT of EMS and sham; it had a critical score of 23/27 due to the use of blinding, randomization, and a sham comparator.[18] The study that was assessed as methodologically poor was a cohort study and scored 14/27.[22]

Notably, none of the studies reported power calculations to indicate that they had a sufficient sample size to detect a clinically significant result. Moreover, none of the studies stated the proportion of patients asked who agreed to participate in each study (and there was no flow diagram of participants through the various phases of a trial, as recommended by the CONSORT statement for RCTs).[27]

RCTs were also assessed using the Cochrane RoB2. Two of four RCTs included in this review showed an overall "high" risk of bias, and two showed "some concern." None of the RCTs were enrolled in a clinical trial registry, and therefore, it was impossible to ascertain if studies were analyzed according to a prespecified plan. As such, all studies were scored as "some concern" in the domain of "Selection of Reported Results." Visual representations of risk of bias assessments are shown in Figure 2.

DISCUSSION

There is currently limited literature exploring the impact of EMS in the treatment of incontinence in men. To our knowledge, this review represents the first to evaluate the therapeutic benefits of EMS for treating incontinence in men. Much of the foundational research in EMS has focused on women. The more recent literature on EMS therapy in women has reported a consistent benefit; for example, a recent systematic review concluded that EMS was effective at treating incontinence and improving patients' QoL;[9] the authors identified 11 studies published over the last 15 years (four with a strong quality score), and the majority of these studies demonstrated a benefit with EMS for women with incontinence. These results are similar to another recent systematic review of EMS for women.[10]

This aligns with our key finding that in men, EMS appears to improve QoL and may be effective at treat-

ing incontinence; however, our conclusions should be tempered by the quality of the literature identified: we only identified four RCTs, representing 108 patients, and all had at least some concern of bias. Additionally, the studies used a variety of treatment protocols and devices; most of the devices were not "high-frequency" devices that use a higher-intensity magnetic field and produce "supramaximal" contractions, as seen with most contemporary devices.

The studies in this review showed that, in general, men treated with EMS have improvements in incontinence episodes, LUTS, and QoL measures, as well as in some urodynamic parameters; however, it is still uncertain as to how long these improvements last due to conflicting study results: one small study showed that some patients returned to baseline I-QoL scores within 12 months,[23] while another study showed lasting reductions in pad usage at 12.5 months of followup.[22] This speaks to the lack of long-term followup for the majority of these studies (with most limited to less than six months).

It is also uncertain if EMS is more effective than PFMT. Authors have both shown an advantage with EMS vs. PFMT in QoL,[21] and similar outcomes at six months (with a quicker initial recovery with EMS).[20,26] An advantage of EMS over PFMT may be attributed to adherence in the real world due to the passive nature of the treatment. The identified studies used a variety of both qualitative evaluations, such as the I-QoL questionnaire, in addition to quantitative evaluations, such as 24-hour pad weights or urodynamic studies. Therefore, it was challenging to compare the efficacy of EMS between studies that used different outcome measures of incontinence.

RCTs unsurprisingly scored higher on the Downs and Black checklist than non-RCTs; however, this was largely due to a single RCT that scored 23/27. The quality of the remaining RCTs was moderate, with studies rated between 16/27 to 19/27. These scores were impacted by a lack of blinding and limitations as to how data were reported across the studies. For instance, half of the RCTs in this review did not report on the number and characteristics of participants who were lost to followup. Reporting of these characteristics is important in understanding the bias of the included results of a study. Among non-RCTs, the gaps in quality were mainly due to the lack of adverse event reporting. Moreover, no study reported power calculations, and several studies were missing key information, such as how patients were recruited. As a result of these gaps in study design, the quality of most studies in this review limits the extrapolation of results to widespread clinical practice.

While this review did not use post-prostatectomy incontinence as part of the study inclusion criteria, seven of nine articles studied only patients with post-prostatectomy incontinence. Therefore, the strongest support from the literature is specific to this patient population. This is appropriate, as radical prostatectomy is a common cause of incontinence in men.

In the final stages of completion of this project, one newly published study was identified. The publication date precluded formal inclusion in our systematic review; however, it is relevant to include a summary of the study. In a randomized, quadruple–blind, sham–controlled clinical trial, Unal et al found that EMS is superior to sham treatment at improving QoL and rates of incontinence episodes in those with post-prostatectomy incontinence.[28] They also found that EMS improved clinical parameters, such as anxiety and sexual function. From a methodologic perspective, this study included well-described inclusion and exclusion of patients, description of participants lost to followup, adverse events, and both qualitative and quantitative assessments of incontinence. This study adds to the evidence supporting EMS for male incontinence; however, it is still a small study (n=20 men/arm), and used a unique treatment protocol and device. Our study conclusions are not altered

Limitations

This review had a few limitations. We identified a small number of studies, most of a moderate quality, that were conducted over a decade ago. The patient populations, intervention parameters, and outcomes were variable, and it was not possible to formally meta-analyse these study results. None of the studies had a sample size large enough to look at potential subgroups that may benefit, such as those with less severe incontinence or those who were unable/unwilling to do PFMT. Importantly, to our knowledge, none of the studies used an EMS system that is commercially available in North America; this limits the generalizability of these previous studies.

CONCLUSIONS

Preliminary studies suggest that EMS may be effective in treating men with urinary incontinence. Men may derive a benefit similar to PFMT, with improvements in the amount of urinary incontinence and in incontinence-related QoL; however, each of these studies has methodologic limitations and a risk of bias. Given the

need for more low-risk treatment options for post-prostatectomy incontinence, larger, methodologically sound, appropriately controlled randomized trials are needed to evaluate the efficacy of EMS.

COMPETING INTERESTS: The authors do not report any competing personal or financial interests related to this work.

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