Temporarily implanted nitinol device versus prostatic urethral lift for minimally invasive surgical treatment of benign prostatic hyperplasia with lower urinary tract symptoms: a matching-adjusted indirect comparison

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KERNEN KM, OMAR S, GOODNIGHT B, SKODNY P, BRUCE S, YU TM. Temporarily implanted nitinol device versus prostatic urethral lift for minimally invasive surgical treatment of benign prostatic hyperplasia with lower urinary tract symptoms: a matching-adjusted indirect comparison. *Can J Urol* 2023;30(5):11676-11685.

Introduction: *To evaluate the safety and efficacy of the temporarily implanted nitinol device (iTind) versus prostatic urethral lift (PUL) for minimally invasive surgical treatment of lower urinary tract symptoms secondary to benign prostatic hyperplasia in a matching-adjusted indirect comparison (MAIC).*

Materials and methods: *Seven clinical trials were identified via a systematic literature review. Individual patient data from iTind trials and aggregated data from PUL trials were used in the MAIC. Safety and efficacy outcomes at 12 months post-treatment were compared between the adjusted iTind population and the pooled PUL population.*

Results: *iTind patients were significantly less likely than PUL patients to experience treatment-related adverse events within 3 months (25.0% vs. 79.8%; p < 0.001), including dysuria (17.8% vs. 34.7%; p = 0.001), hematuria (12.0% vs. 25.9%; p = 0.002), and pain (9.5% vs. 18.7%; p = 0.023). Rates of treatment-related adverse events from 3 to 12 months were also significantly lower among iTind than PUL patients (2.6% vs. 24.4%; p < 0.001). iTind and PUL efficacy outcomes were statistically equivalent on changes from baseline to 12 months on the International Prostate Symptom Score, quality of life, Qmax, post-void residual volume, and the Sexual Health Inventory for Men (all p > 0.05).*

Conclusions: *This MAIC found superior safety and reduced risks of early and later treatment-related adverse events with iTind versus PUL. The 12-month efficacy was equivalent on subjective and objective urinary and sexual health metrics. This study finds that the iTind temporary device provides equivalent efficacy with lower adverse event risks versus the PUL permanent implants for patients with benign prostatic hyperplasia with lower urinary tract symptoms.*

Key Words: benign prostatic hyperplasia, minimally invasive surgical procedures, lower urinary tract symptoms

Accepted for publication August 2023

Acknowledgement
Presented at the AUA 2023 in Chicago, Illinois.

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Introduction

Benign prostatic hyperplasia (BPH) is a common chronic health condition estimated to impact 70% of men aged 60-69 years and 80% of men aged 70 years or older in the United States (US).[1] BPH is a benign overgrowth of

prostate tissue that can lead to obstruction of the urethra and bladder. This may lead to uncomfortable lower urinary tract symptoms (LUTS) such as frequent urge to urinate, weak urine flow, and incomplete voiding of the bladder. In addition, BPH is associated with other serious medical outcomes, including renal failure, depression, diminished health-related quality of life, and billions of dollars in annual health care costs.

For the majority of BPH patients, symptoms can be managed by medication. However, for some patients, medical therapy is insufficient to provide adequate efficacy and relief or may be associated with adverse events (AEs).[2] In cases where medication does not suffice, BPH patients often turn to surgical treatments. Invasive surgical treatment options such as transurethral prostatectomy (TURP) have been available for decades but are associated with a higher incidence of lasting AEs, including erectile dysfunction, retrograde ejaculation, and urinary incontinence.[3]

More recently, minimally invasive surgical treatments options have been developed, including device-based treatments like the prostatic urethral lift (PUL; UroLift; Teleflex, Inc.; Wayne, PA, USA) and the temporarily implanted nitinol device (iTind; Olympus Corporation of the Americas, Center Valley, PA, USA). These medical devices are inserted into the prostatic urethra in outpatient procedures to relieve the obstruction caused by the prostate and alleviate LUTS symptoms. The iTind treatment involves the insertion of a single folded device into the prostatic urethra. The device expands and exerts continuous gentle ischemic pressure on the prostatic urethra and the bladder neck at the 5, 7, and 12 o'clock positions over the next 5-7 days. This causes ischemic necrosis resulting in the creation of three longitudinal channels, facilitating improved urine flow.[4,5] The device is removed in a second outpatient procedure. In contrast, PUL treatment uses multiple permanent intraprostatic implants. Typically, four to six PUL implants are placed per procedure, with a recommended maximum of 10 implants to retract the enlarged prostate tissue away from blocking the urethra.[6]

The efficacy and safety of both PUL and iTind have been evaluated in randomized-controlled trials (RCTs) and single-arm clinical trials. However, there is yet to be a head-to-head RCT directly comparing these treatments. In the absence of head-to-head comparisons, meta-analytical and indirect comparison methodologies can be employed to compare the safety and efficacy of PUL and iTind procedures.

The present study employed a matching-adjusted indirect comparison (MAIC) methodology to adjust for the significant differences in baseline characteristics and reliably compare the results from both RCTs and single-arm trials for iTind and PUL. MAIC is an indirect treatment comparison that balances baseline study population characteristics to enable comparability of intervention arms across trials and has been recognized by health technology assessment (HTA) groups as a valid analytical approach.[7] Standard network meta-analysis methods for indirect treatment comparisons of RCTs rely on random assignment in the original trials against a common comparator arm to standardize treatment effects across studies. However, while both PUL and iTind have been evaluated against sham in RCTs, the sham comparator arm in both treatments' RCTs continued only through 3 months, precluding the use of traditional indirect treatment comparison methods to evaluate outcomes beyond 3 months. MAIC methodologies allow for comparison of 12-month outcomes with iTind vs. PUL in the absence of a common comparator at longer-term follow up. As BPH is a chronic and progressive disease, longer-term follow up is essential in assessing the efficacy and safety of treatment options. This analysis aimed to compare the efficacy and safety of iTind and PUL for treating LUTS secondary to BPH 12 months after treatment using an MAIC approach.

Materials and methods

Literature review

A systematic literature review (SLR) was conducted using PubMed to identify prospective interventional clinical trials of PUL and iTind for treatment of LUTS secondary to BPH using the search string "(urolift) OR (prostatic urethral lift) OR (iTind) OR (Temporarily Implanted Nitinol Device) AND ((benign prostatic hyperplasia) OR (BPH))". Records were restricted to English language studies published from January 2011 through January 2022. Studies outcomes at 12 months post-treatment were included. Further study inclusion criteria were prespecified to maximize the similarity in the study designs: clinical trials only; interventional study arm(s) that directed patients to iTind or PUL treatment without additional procedures at the time of placement; patients had to have BPH with LUTS, be at least 45 years old with a baseline prostate volume < 80 mL, baseline IPSS ≥ 10, and with no obstructive median lobe. Data were extracted from included PUL studies by two researchers independently. Individual patient data from included iTind clinical trial intervention arms were requested from the manufacturer. The data analysis set included all available baseline values and results measuring efficacy and safety.

Matching-adjusted indirect comparison and statistical analyses

The UK's National Institute for Health and Care Excellence (NICE) Decisions Support Unit (DSU) published a technical document on the use of MAIC as an indirect comparison methodology in 2017,[7,8] and MAIC analyses have been accepted by HTA bodies.[9-11] To adjust for potential bias due to population differences in cross-trial comparisons of two interventional treatments, MAIC adjusts for baseline characteristics using individual patient data (IPD) from trial intervention arms of one treatment, and published aggregate data (AD) from trial intervention arms of a second treatment. For this analysis, de-identified IPD for the iTind treatment was provided by the manufacturer, and AD for PUL treatment was taken from the published literature. As a secondary retrospective study conducted using published literature and de-identified data, institutional review board approval was not required for this research.

Because MAIC adjusts for differences in baseline values across treatment populations, t-tests were conducted in R to compare mean baseline values between iTind and PUL populations to determine whether they were statistically significantly different. For each outcome assessed in this study, we conducted the MAIC calculating weights for the iTind IPD population evaluated against the PUL AD using methods previously published by Phillippo et al.[12] Through this process, a propensity score model is used to estimate weights for the IPD so that the weighted mean baseline characteristics across the IPD set of one treatment match the baseline values of the AD of the other treatment.

The R packages meta and metafor were used for the meta-analysis comparing the PUL AD and the matching-adjusted iTind IPD results for each outcome comparison. Random effects models with subgroup analysis were conducted with treatment type as the modifier.

Outcomes assessed

This analysis used MAIC to compare iTind and PUL on outcome measures in the first 12 months following treatment reported in common across their clinical trials. Safety was evaluated as the percentage of patients with treatment-related adverse effects (AEs). Reported changes in BPH outcome measures from baseline to 12 months such as International Prostate Symptom Score (IPSS), quality of life (QoL) via the IPSS-QoL score, peak urinary flow (Qmax), post-void residual volume (PVR), and sexual health as measured by the Sexual Health Inventory for Men (SHIM) were evaluated for efficacy. The number of days to return to preoperative activity level after the procedure was also assessed.

All measures were defined in accordance with definitions in the original clinical trials. This MAIC used the definition of days to return to preoperative activity level as described by the clinical trial publications. As PUL implants are permanent, the procedure is complete after implantation, and days to return to preoperative activity were counted from the implantation date. The iTind device is a temporary implant, so the procedure is complete after device retrieval, and days to return to preoperative activity was counted from the retrieval date. As such, iTind patients could return to preoperative activity levels before the procedure was completed (negative days), while PUL patients could not.

Inclusion for matching adjustment

Baseline characteristic comparisons and matching-adjustments were performed separately for each evaluated outcome based on the studies and per-protocol study populations available to inform each outcome. For each outcome, the AD extracted from the PUL publications were pooled across PUL trials that reported values in sufficient detail to support analysis. iTind IPD was included for matching if baseline data was available to support matching and the outcome was collected at 12 months for that patient.

Baseline values for measures reported in common across included trials were adjusted for in the MAIC: age, prostate volume, IPSS, QoL, Qmax, PVR, and SHIM at time of enrollment. For each outcome analysis, the IPD used are comprised of iTind-treated patients with valid values for baseline characteristics and the outcome being assessed. A voiding volume of at least 125 mL is necessary for a valid Qmax or PVR measurement, and was therefore required for IPD inclusion for the analyses of these baseline or outcomes measures. Analyses of the change from baseline at 12 months in IPSS, QoL, Qmax, PVR, and SHIM used the per-protocol (PP; patients who remained in the study for all 12 months) population from the iTind IPD. Analyses of days to return to preoperative activity level and treatment-related AEs used the intent-to-treat (ITT; patients who were enrolled in the study) population from the iTind IPD to reduce potential bias caused by AE-related dropout.

Results

Literature review

Seven clinical trials were included in this analysis. The PRISMA flow diagram for the SLR is described

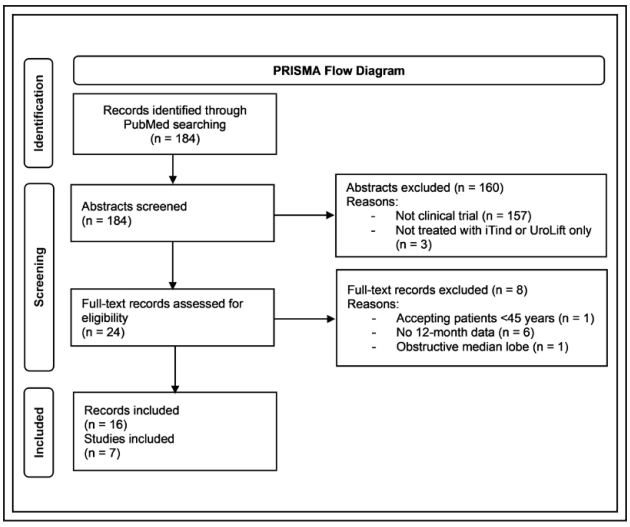

Figure 1. PRISMA flow diagram.

iTind = temporarily implanted nitinol device; PUL = prostatic urethral lift

in Figure 1. This included published data from two RCTs (LIFT/LIFT Crossover [NCT01294150] and BPH6 [NCT01533038])[13-19] and two single-arm clinical trials (Chin/Woo et al and Kim et al)[20-23] pooled in the AD for PUL. For iTind, two trials with 12-months follow up were included: the intervention arm of the MT-03 randomized clinical trial (NCT02506465),[24] and the MT-02 single-arm trial (NCT02145208).[4,25,26] The manufacturer provided the IPD for both iTind studies. The included studies and publications are described in Table 1, along with the commonly reported outcome measures available for further evaluation via MAIC.

Where reported, the majority of the PUL studies published a mean number of implants greater than 4. The exception was the Kim et al study, a single-center single-arm trial in Korea, which reported a mean of 2.2 implants per patient. Larger multinational multi-center RCTs (BPH6: Denmark, Germany, and the United Kingdom; LIFT/LIFT Crossover: Australia, Canada, and the US) reported means between 4.4 and 4.9 implants, with a range of up to 11 total implants per patient.

TABLE 1. **Studies used for comparison by outcome based on data availability**

	iTind trials (IPD)*		**PUL trials (AD)**				
	MT02	**MT03**	**LIFT**	**LIFT Crossover**	**BPH6**	**Chin/Woo**	**Kim**
Publications	Porpiglia (2019) Kadner (2020) Amparore (2021)	Chughtai (2021)	Roehrborn (2013) McVary (2014) Roehrborn (2015) Roehrborn (2017)	Cantwell (2014) Rukstalis (2016)	Sønksen (2015) Gratzke (2017)	Woo (2011) Woo (2012) Chin (2012)	Kim (2020)
Study type	Single-arm	RCT	RCT	RCT	RCT	Single-arm	Single-arm
Patients in iTind or PUL treatment arms	**n = 81**	**n = 118**	**n = 140**	**n = 66**	**n = 45**	**n = 64**	**n = 32**
Mean number of PUL implants			4.9	4.4	4.7	Not reported	2.2
Mode	NA	NA	4	4	Not reported	4	2
Range			2-11	2-8	2-6	2-9	Not reported
Reported safety or efficacy measures							
Treatment-related AEs (% patients, 0-3 or 3-12 months)	✓	✓	✓	✓	NA†	NA	NA
Δ IPSS at 12 months	✓	✓	✓	✓	✓	✓	✓
Δ IPSS QoL at 12 months	✓	✓	✓	✓	✓	✓	✓
Δ Qmax at 12 months	✓	✓	✓	✓	✓	✓	✓
Δ PVR at 12 months	✓	✓	✓	✓	✓	✓	NA
Δ SHIM at 12 months	NA	✓	✓	✓	✓	✓	✓
Days to return to preoperative activity level	NA	✓	✓	✓	✓	NA	NA

*IPD were requested from and provided de-identified by manufacturer.

†reported AEs using the Clavien-Dindo rating system categorizations for the first 0-12 months following treatment and therefore could not be pooled with or compared to other included studies on safety outcomes.

AD = aggregated data; AE = adverse event; IPD = individual patient data; IPSS = International Prostate Symptom Score; iTind = temporarily implanted nitinol device; NA = not available; PUL = prostatic urethral lift; PVR = post-void residual volume; QoL = quality of life; Qmax = peak urinary flow; RCT = randomized clinical trial; SHIM = Sexual Health Inventory for Men.

TABLE 2. **Baseline values for the pooled PUL and iTind populations before matching**

Baseline values	12-month change from baseline in IPSS or QoL			12-month change from baseline in Qmax		
	Means before matching-adjustment			Means before matching-adjustment		
	iTind N = 118	PUL (N)	p value	iTind N = 107	PUL (N)	p value
Age (years)	63.5	66.0 (328)	**0.0057**	63.3	66.0 (328)	**0.0040**
Prostate vol (mL)	41.4	44.8 (328)	0.0158	40.3	44.8 (328)	**0.0017**
IPSS	21.5	22.4 (300)	0.1240	21.7	22.4 (300)	0.2858
QoL	4.2	4.6 (299)	**0.0001**	4.2	4.6 (299)	**0.0001**
Qmax	8.1	8.8 (248)	**0.0083**	8.1	8.8 (248)	**0.0119**
PVR	72.7	86.4 (264)	**0.0430**	76.5	86.4 (264)	0.1621

Baseline values	12-month change from baseline in PVR			12-month change from baseline in SHIM		
	Means before matching-adjustment			Means before matching-adjustment		
	iTind N = 107	PUL (N)	p value	iTind N = 48	PUL (N)	p value
Age (years)	63.3	65.9 (296)	**0.0064**	62.8	66.0 (328)	**0.0079**
Prostate vol (mL)	40.3	44.3 (296)	**0.0075**	43.3	44.8 (328)	0.4431
IPSS	21.7	22.8 (268)	0.1103	20.9	22.4 (300)	0.1007
QoL	4.2	4.7 (267)	**<0.0001**	4.3	4.6 (299)	0.0736
Qmax	8.1	8.3 (216)	0.4604	8.7	8.8 (248)	0.6655
PVR	76.5	86.4 (264)	0.1621	56.5	86.4 (264)	**0.0019**
SHIM		N/A		15.1	17.6 (211)	**0.0205**

Baseline values	Days to return to preoperative activity level			Adverse events		
	Means before matching-adjustment			Means before matching-adjustment		
	iTind N = 84	PUL (N)	p value	iTind N = 163	PUL (N)	p value
Age (years)	62.8	65.6 (232)	**0.0023**	62.9	66.2 (188)	**0.0002**
Prostate vol (mL)	43.2	42.4 (232)	0.6506	41.8	43.5 (188)	0.2536
IPSS	21.3	22.9 (232)	0.0594	21.6	23.2 (188)	**0.0168**
QoL	4.5	4.6 (237)	0.5504	4.3	4.6 (193)	**0.0127**
Qmax	8.7	8.1 (226)	0.0743	8.4	7.9 (187)	0.0878
PVR	70.2	86.4 (232)	**0.0448**	75.2	86.5 (188)	0.0931
SHIM	13.0	16.0 (232)	**0.0015**		N/A	

IPSS = International Prostate Symptom Score; iTind = temporarily implanted nitinol device; NA = not available; PUL = prostatic urethral lift; PVR = post-void residual volume; QoL = quality of life; Qmax = peak urinary flow; SHIM = Sexual Health Inventory for Men

Unadjusted population baseline characteristics

The commonly reported baseline characteristics across the included trials were age, prostate volume, IPSS, QoL, Qmax, PVR, while the SHIM questionnaire was less commonly collected in clinical trials. The pooled PUL values for baseline IPSS, QoL, Qmax, PVR, and the SHIM were extracted from the reported per-protocol values. However, age and prostate volume were only reported for the intent-to-treat populations. Prior to matching adjustment, several baseline characteristics were significantly different between the iTind IPD and PUL study populations for each outcome comparison, as shown in Table 2. On average, the iTind populations tended to be younger and healthier, commonly having significantly smaller prostate volume, better QoL rating, and lower PVR at baseline.

Matching-adjustment was performed to account for baseline age, prostate volume, IPSS, QoL, Qmax, PVR for every outcome analysis. SHIM was less commonly reported and was used as a matching-adjustment baseline characteristic only in the analyses of the 12-month change from baseline in SHIM and the days to return to preoperative activity level. After matching-adjustment through propensity score weighting of the IPD, none of the baseline characteristics were significantly different between the two groups. The aggregated weighted iTind baseline characteristic values matched the pooled PUL values up to at least three decimal points (p = 1.000) for every outcome analysis.

Comparisons of outcomes

The overall percentage of patients in the intent-to-treat populations who experienced any treatment-related AEs, or serious treatment-related AEs, as well as seven specific types of treatment-related AEs, were reported in common by several iTind and PUL trials included in the MAIC. The treatment-related AEs that were reported in common were dysuria, hematuria, pain, urgency, urinary incontinence, urinary retention, and urinary tract infection. In addition, the percentage of patients who experienced any treatment-related AEs was reported by the PUL LIFT trials at zero to 3 months and 3 to 12 months,

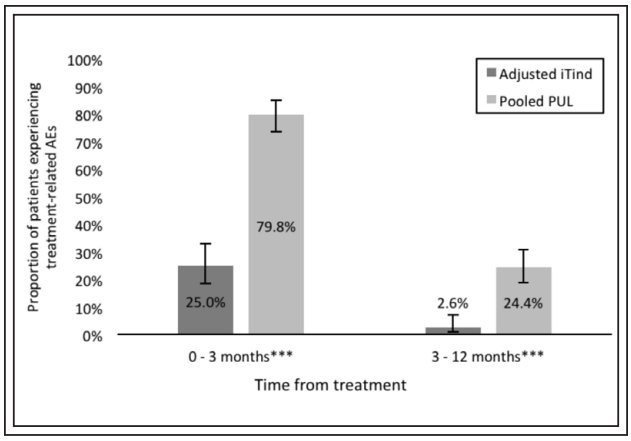

Figure 2. Proportion of patients experiencing any treatment-related AEs after iTind (intent-to-treat n = 163) or PUL (intent-to-treat N = 140) treatment after matching-adjustment. Reprinted with permission. *J Urol* 2023;209(Suppl 4):e699.

***indicates significant (p < 0.0001) chi-square difference by timepoint (0-3, 3-12 months) between patients experiencing treatment-related AEs in adjusted iTind and pooled PUL.
AE = adverse event; iTind = temporarily implanted nitinol device; PUL = prostatic urethral lift.

TABLE 3. **Types of treatment-related AEs following iTind or PUL procedure**

Adverse Event	0-3 months, % patients			3-12 months, % patients		
	Adjusted iTind	Pooled PUL	P value	Adjusted iTind	Pooled PUL	p value
Treatment related AEs	25.0	79.8	**<0.001**	2.6	24.4	**<0.001**
Dysuria	17.8	34.7	**<0.001**	0.0	1.0	1.000
Hematuria	12.0	25.9	**0.002**	0.0	0.5	1.000
Pain	9.5	18.7	**0.023**	0.0	1.0	1.000
Urgency	4.6	7.3	0.322	0.0	2.6	1.000
Urinary incontinence	0.5	3.1	0.143	0.0	1.6	1.000
Urinary retention	4.6	2.6	0.506	0.0	0.5	1.000
Urinary tract infection	0.1	2.6	0.201	0.0	0.5	1.000
Serious treatment-related AEs	2.2	0.5	0.211	0.0	1.0	0.448

AE = adverse event; iTind = temporarily implanted nitinol device; PUL = prostatic urethral lift.

and so AEs were analyzed as such using the IPD from the iTind MT-02 and MT-03 studies.

In the first 3 months following treatment, the proportion of patients experiencing treatment-related AEs was significantly lower in the matching-adjusted iTind population than the pooled PUL population, both overall (25.0% vs. 79.8%, respectively, $p < 0.001$) as well as for several specific types of treatment-related AEs, Figure 2. The proportions of patients experiencing treatment-related dysuria (17.8% iTind vs. 34.7% PUL; $p = 0.001$), hematuria (12.0% iTind vs. 25.9% PUL; $p = 0.002$), and pain (9.5% iTind vs. 18.7% PUL; $p = 0.023$) were significantly lower in the matching-adjusted iTind population than the pooled PUL population, Table 3. The probability of experiencing treatment-related AEs later in the 3 to 12 months post-treatment timeframe was also significantly lower in the adjusted iTind population than the pooled PUL population (2.6% vs. 24.4%; $p < 0.001$).

On efficacy measures, the meta-analyses found no significant differences between the matching-adjusted iTind and pooled PUL populations on change from baseline in IPSS, QOL, Qmax, PVR, and SHIM at 12 months (all $p > 0.05$, Figure 3A-3E). The MAIC analysis found that the average number of days to return to preoperative activity levels after procedure completion was significantly lower in the matching-adjusted iTind population than in the pooled PUL population by 4.35 days (95% CI 0.09-9.62; $p = 0.046$; Figure 3F).

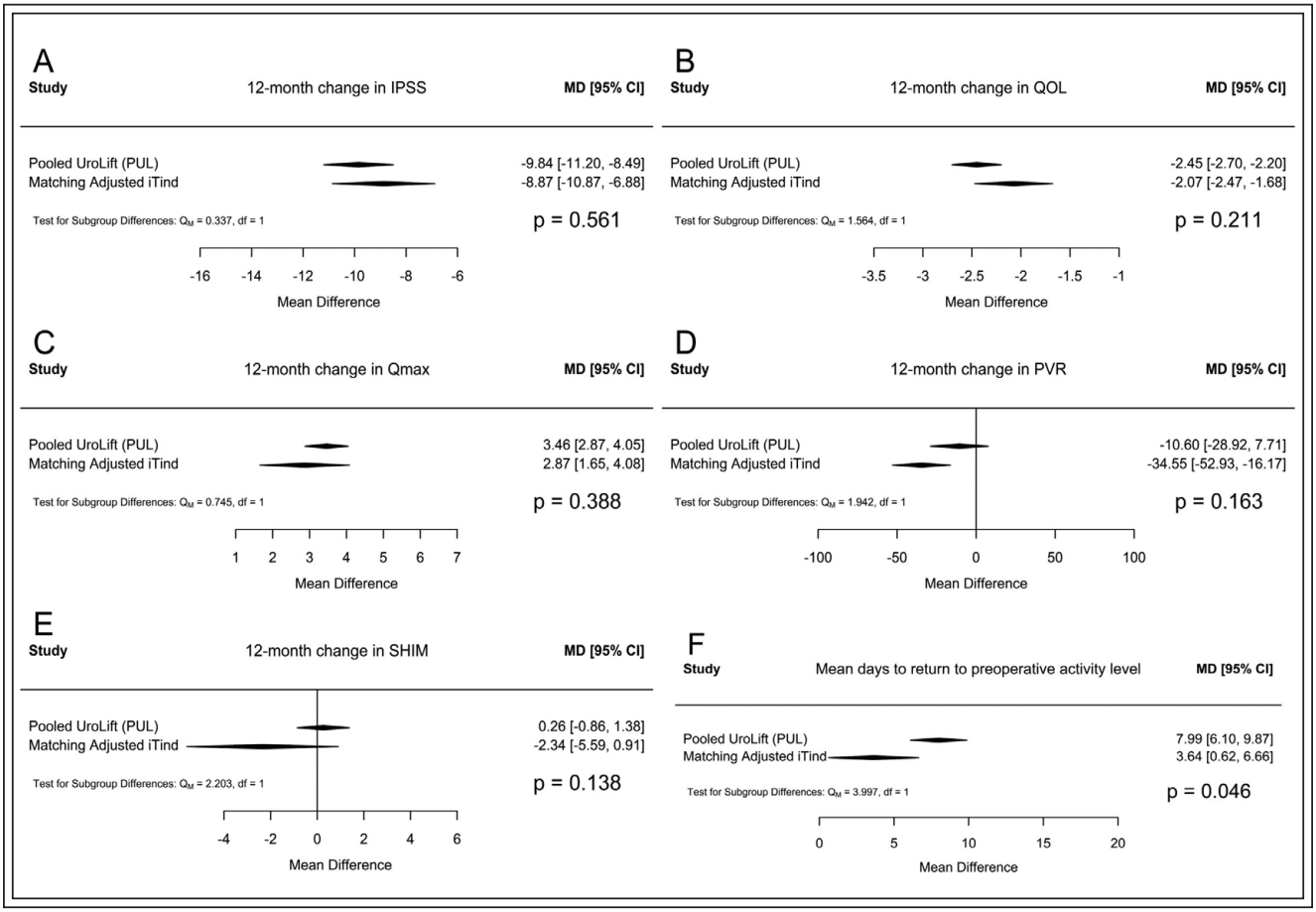

Figure 3. A) MAIC of 12-month change in IPSS between matching-adjusted iTind and pooled PUL populations, $p = 0.561$. **B)** MAIC of 12-month change in QoL between matching-adjusted iTind and pooled PUL populations, $p = 0.211$. **C)** MAIC of 12-month change in Qmax between matching-adjusted iTind and pooled PUL populations, $p = 0.388$. **D)** MAIC of 12-month change in PVR between matching-adjusted iTind and pooled PUL populations, $p = 0.163$. **E)** MAIC of 12-month change in SHIM between matching-adjusted iTind and pooled PUL populations, $p = 0.138$. **F)** MAIC of days to return to preoperative activity level between matching-adjusted iTind and pooled PUL populations, $p = 0.046$.

Discussion

The MAIC findings showed that iTind was associated with superior safety outcomes compared to PUL with significantly lower risk of treatment-related adverse events in both the short and long term (up to 12 months) following treatment ($p < 0.001$). Overall, 79.8% of PUL patients experienced a treatment-related adverse event in the first 3 months, significantly and substantially higher than the only 25.0% of the matching-adjusted iTind patients during the same time frame. In the initial 3-month period following the procedures, PUL patients were significantly more likely to experience treatment-related dysuria, hematuria, and pain ($p < 0.05$).

The risk of experiencing treatment-related adverse events is elevated in the PUL-treated patients compared to those treated with iTind 3 to 12 months following treatment, with nearly one-quarter (24.4%) of the PUL patients experiencing a treatment-related adverse event compared to just 2.6% of iTind patients. However, unlike in the 0-to-3-month period, no significant differences were found in the reported types of adverse events (dysuria, hematuria, pain, urgency, urinary incontinence, urinary retention, and urinary tract infection) during the 3-to-12-month period, so it was not clear from published clinical trial reports which specific adverse events following PUL contributed to this higher treatment-related adverse event rate in later months.

No significant differences between the iTind and PUL groups were observed in the proportions of patients experiencing urinary retention within the first year following treatment. Due to differences in measurement methods across trials, post-operative catheterization rates could not be compared between the iTind and PUL groups. It should be noted though, that the PUL BPH6 study reported that 45% of patients required catheterization for over 24 hours following the procedure.[18] The iTind MT-02 study reported that all patients were discharged on the same day of the procedure without a catheter,[26] demonstrating these outcomes are in the context of procedural differences with more catheterization among PUL patients than iTind patients.

Regarding efficacy of treatment, the MAIC findings showed that iTind and PUL had equivalent efficacy as measured by patient-reported urinary symptoms and sexual health as well as by objective voiding measurements. No statistically significant differences were found between the matching-adjusted iTind population and the pooled PUL population in mean change from baseline IPSS or QoL at 12 months. Both populations exhibited mean changes that exceeded the minimal clinically important difference thresholds for IPSS and QoL (a change of at least -3.0 points for IPSS and -0.5 points for QoL).[27] These findings indicate that iTind and PUL treatments each provide similar clinically meaningful improvements in urinary symptoms and related QoL as reported by BPH with LUTS patients, and this equivalent efficacy is durable through at least 12 months following treatment.

Comparisons of mean change from baseline in Qmax, PVR and SHIM at 12 months also showed no significant differences between iTind and PUL results. The efficacies of iTind and PUL were therefore equivalent in their impact on objective measures of urinary function, and preservation of sexual function among patients with BPH with LUTS.

None of the included iTind or PUL studies reported any instances of sustained de novo erectile dysfunction or retrograde ejaculation, and therefore this analysis did not include a quantitative matching-adjusted comparison of these sexual health complications. The days to return to preoperative activity levels after the procedure was evaluated quantitatively and was significantly shorter with iTind than PUL treatment, though again this is in the context of procedural differences. iTind is a single temporarily implanted device and the procedure is considered complete upon device retrieval several days after implantation. Meanwhile PUL is intended to place multiple permanent implants in a single implantation procedure. Both of these device-based minimally invasive surgical treatments for BPH with LUTS allow patients to return to preoperative activities within approximately a week on average (8.0 days PUL; 3.6 days iTind), without sexual function complications that have been reported with invasive treatments like TURP.[3]

This MAIC of prospective clinical trials found that patients treated with the temporary iTind implant achieved equivalent long term improvements in urinary symptoms and QoL as those treated with the permanent PUL implants, while having significantly and substantially lower risks of treatment-related adverse events in both the first 3 months and through 12 months following treatment. While both iTind and PUL are minimally invasive options, they are procedurally distinct; in particular, the iTind implant is single and temporary while the PUL implants are multiple and permanent. The temporary nature of the iTind implant and procedure may contribute to its favorable safety profile, as there are fewer opportunities for adverse events related to the presence of a permanent foreign body. The lack of permanent implant also eliminates the possibility of that implant interfering with future treatments.

Limitations

In the absence of an RCT directly comparing iTind and PUL, this MAIC analysis uses established and HTA-accepted methods to provide a comparative assessment of two minimally invasive surgical treatment options available in the US to help inform patient and physician treatment decision-making for BPH with LUTS. All patient characteristics that were reported in common were used in the matching adjustment to improve comparability, but it is possible that unobserved characteristics confounded the results.

Matching adjustments for baseline characteristics were limited by the data reported in the PUL publications. Specifically, for the 12-month outcomes analyses, values for MAIC matching were taken from the PP population whenever possible, but baseline age and prostate volume were only reported by PUL publications from the ITT population and not for the PP subpopulation. This is important if the reasons for dropout from the PP in the PUL trials were affected by age or prostate volume.

This analysis of trial evidence focused on the clinical outcomes reported by the clinical trials of iTind and PUL implant procedures for BPH treatment. Future research to assess the comparative health economics of these two procedures to health systems would be valuable to further inform health technology assessments.

Conclusions

Minimally invasive surgical treatment options can provide relief to patients with BPH with LUTS who may not obtain adequate relief of symptoms or improvement in objective voiding measures from medical therapy, while avoiding the higher rates of adverse events, sexual functioning impact and recovery difficulty associated with invasive surgeries like TURP. Both iTind and PUL are efficacious minimally invasive surgical treatments using implants, but they have distinct procedural and safety implications. iTind treatment uses a single temporary implant removed after 5-7 days, while PUL uses multiple permanent implants. This MAIC of published clinical trials showed that iTind treatment had a significantly better safety profile while maintaining equivalent efficacy compared to PUL treatment for LUTS secondary to BPH three months following treatment and continuing up to one year after treatment.

Mean improvements in subjective urinary symptoms (IPSS, QoL), objective urinary symptoms (Qmax, PVR) and preservation of sexual function (SHIM) at 12 months were equivalent with iTind and PUL treatment, and both showed IPSS and QoL improvements that met clinically meaningful thresholds. These findings support the iTind procedure as a key minimally invasive surgical treatment option for BPH with LUTS that offers patients and physicians the advantages of a temporary implant with improved safety profile while still providing similar efficacy to permanent PUL implants.

Disclosures

KMK reports having been a consultant for Olympus Corporation of the Americas, Bayer, Pfizer, Astellas Pharma, Merck Sharp & Dohme, and Janssen Pharmaceuticals. SO, BG, and TMY are employees of Guidehouse Inc. which received financial support for this research. PS and SB are employees of Olympus Corporation of the Americas.

Funding

Financial support for this research was provided by Olympus Corporation of the Americas. □

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