Under-recognized factors affecting penile implant satisfaction in patients

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Cite as: Wong J, Witherspoon L, Flannigan R. Underrecognized factors affecting penile implant satisfaction in patients. *Can Urol Assoc J* 2022 March 11; Epub ahead of print. http://dx.doi.org/10.5489/cuaj.7720

Published online March 11, 2022

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Abstract

Introduction: Surgical management via penile prosthesis is an option for patients who have failed medical management. There is a paucity of literature surrounding factors contributing to patient satisfaction after implant surgery. The objective of this study was to characterize patients' and surgeons' attitudes toward factors affecting satisfaction with this procedure.
Methods: Two patient cohorts were identified and contacted via email: a medical management of erectile dysfunction (ED) cohort and a penile implant patient cohort. A third cohort, Canadian urologists who perform penile implant surgeries, was also contacted. The surveys consisted of 5–7 questions, including a rating question regarding the importance of various penile implant factors.
Results: Forty-six ED patients, 45 post-implant patients, and 12 urologists completed the survey. The mean overall satisfaction on a 10-point scale was 6.49 (standard deviation [SD] 2.92). Most (67%) urologists selected patient satisfaction as one of their least favorite aspects of penile implant surgery. Compared to post-implant patients, ED patients reported greater importance in the areas of appearance (p=0.035), soft glans (p=0.040), and concealment of implant (p=0.007). Urologists ranked natural feel (p=0.019) and generating a discrete erection (p=0.022) as less important than patients.
Conclusions: This is the first study that examines which specific variables of penile implant surgery are associated with satisfaction while comparing surgeons' understanding of what patients desire from this surgery. This study identifies several factors deemed important by

patients but under-recognized by urologists. This knowledge can aid urologists in optimizing preoperative counselling and improving patient satisfaction.

Introduction

For patients with erectile dysfunction (ED) that is refractory to medical management, surgical management in the form of penile prosthesis insertion remains the gold standard surgical treatment. Although malleable (non-inflatable), and two-piece inflatable implants are options, the three-piece inflatable penile protheses (IPPs) are the most commonly performed procedure. [1] IPPs are generally well-tolerated with studies reporting an overall patient satisfaction rate of 75-98% and a partner satisfaction rate of 85.4%. [2-5] These satisfaction rates are similar amidst different patient subgroups with different pathologies for their ED. [3] Side effects commonly cited during patient counselling include decreased penile length and girth, change in penile shape, reduced sensation in the penis, chronic pain, mechanical failure, device erosion, infection, bleeding, and injury to adjacent structures. [6]

There is limited literature regarding factors that contribute to patient satisfaction post-implant. Preoperative expectations appear to drive overall satisfaction, as demonstrated by patients with lower expectations pre-operatively being associated with higher patient satisfaction post-operatively. [7] However, to our knowledge there is no existing study that has looked at which specific factors of a penile implant that patients find essential to overall satisfaction. Furthermore, there has not yet been a study comparing surgeons' perceptions to patients' regarding penile implants and factors influencing patient satisfaction.

The objective of this study was to characterize patients' and surgeons' expectations regarding insertion of penile implants. Specifically, we wanted to know perspectives from 3 different cohorts. For patients with erectile dysfunction, we wanted to explore the importance of factors that influence their impression of penile implants. For patients who have received a penile implant, we wanted to explore the most important factors and features surrounding their existing penile implants. For surgeons who insert penile implants, we wanted to explore the factors they perceive to be most important to patients when discussing penile implants.

Methods

This was a prospective survey-based study. Three discrete surveys were created using the Checkbox ™ online survey software. All responses were anonymous. Survey links were emailed out to study participants. This study was approved by the University of British Columbia's Clinical Research Ethics Board (CREB).

One survey was administered to patients who had received a penile implant ("Implant cohort"). We emailed this survey to all patients who had either a penile implant insertion or revision at our centre between January 2016 and March 2021 who had valid emails on clinic

records. This cohort comprised 62 patients. This survey included questions on previous erectile function before implant as well as overall satisfaction and sexual satisfaction (Appendix A).
A second survey was developed for patients currently undergoing treatment for erectile dysfunction with no history of penile implant insertion ("ED cohort"). We emailed this survey to all patients with a referral for ED who had been seen at our centre for management of their erectile dysfunction within the last 6 months who had valid emails on clinic records. We also emailed this survey to patients who were currently on the waitlist for penile implant insertion surgery at our centre as of April 2021 who had valid emails on clinic records. This combined cohort comprised 62 patients. This survey included questions on current strength of erections and what treatment, if any, patients were currently using to manage their erectile dysfunction. It also evaluated patients' willingness to get a penile implant in the future. Both these surveys included questions on aspects of the penile implant based on importance to the patient on a 5-point scale, specifically: maintenance of penile length, ability to use penis for sexual activity, appearance of penis, natural feel of penis, softening of the glans, surgical complications, concealment of the implant, and ability to generate an erection discretely (Appendix B).

A third survey was for urologists who performed penile implant surgery ("Urologist cohort"). We emailed this survey to all Canadian staff urologists and fellowship trainees who routinely participate in penile implant surgery. This list of 23 urologists was collated by our research team based on our knowledge of surgeons' practices across Canada. This survey included questions on surgical experience with penile implants, as well as perception regarding least favourite aspects of penile implant surgery. The survey also asked urologists to select potential impactful innovations to penile implant technology. Finally, the survey included a question on ranking aspects of the penile implant based on perceived importance to the patient on a 5-point scale, specifically: maintenance of penile length, ability to use penis for sexual activity, appearance of penis, natural feel of penis, softening of the glans, surgical complications, concealment of the implant, and ability to generate an erection discretely (Appendix C).

The surveys remained open for 5 weeks. When surveys were not completed in their entirety, the partial responses were still included in the data analysis. Descriptive analysis of the survey results was performed using Microsoft Excel©, including demographics analysis and a comparative analysis between the three surveyed populations. Statistical analysis comparing the three surveyed populations was undertaken using student t-test, with significance of $p<0.05$.

Our centre is a large high-volume tertiary care hospital where penile implant insertion surgery is performed by two urologists. The rest of the urology group refers patients to these implanters, one of whom is fellowship-trained in Andrology. The group performs approximately 20-30 implants per year.

Results

There were 46 responses to the ED cohort survey out of 62 surveys sent, with a 74% response rate. 100% of all responses were completed surveys. When rating the strength of their erection

on a scale of 1-10 (with 10 being the firmest erection), the mean erection strength was 4.15/10 (standard deviation (SD) of 2.83). 35% of patients surveyed were not on any current treatment for erectile dysfunction, while the remainder used a combination of oral phosphodiesterase-5 (PDE-5) inhibitors, intracavernosal injection (ICI) therapy, and constrictive bands. From a scale of 1-10 rating the willingness to undergo a penile implant should all other medical therapies fail (10 being very likely), the mean response was a 7.6/10 (SD 2.98). With regards to penile implant quality factors, from a scale of 1-5 (5 being most important), use of the penis had the highest mean score of 4.76/5 (SD 0.76), followed by maintenance of length with a mean score of 4.39/5 (SD 0.92) and natural feel of implant with a mean score of 4.26/5 (SD 1.05). Surgical complications were rated to be the least important, albeit still rated as important, with a mean score of 4.02/5 (SD 1.26). 54% of patients said that they would be somewhat likely or very likely to use a smartphone app to control a penile implant device (Table 1).

There were 45 responses to the penile implant cohort survey out of 62 surveys sent, with a 73% response rate. 82% of all responses were completed surveys. The mean pre-implant erection, on a scale of 1 to 10 (10 being the firmest erection), was 4.56/10. Overall penile implant satisfaction, on a scale of 1 to 10 (10 being fully satisfied) was a mean of 6.49/10 (SD 2.92) with a mean sexual satisfaction score of 6.62/10 (SD 2.96). The majority (59%) of patients had their penile implant for 1-5 years. 69% of patients said they would undergo penile implant surgery again, with 11% being unsure and 20% stating that they would not undergo this surgery again. With regards to penile implant quality factors, from a scale of 1-5 (5 being most important), use of the penis had the highest mean score of 4.67/5 (SD 0.84), followed by maintenance of length with a mean score of 4.39/5 (SD 1.05) and natural feel of implant with a mean score of 4.05/5 (SD 1.04). Concealment of the penile implant was rated to be the least important, with a mean score of 3.50/5 (SD 1.10). 82% of patients surveyed were either somewhat likely or very likely to use a smartphone app to control a penile implant (Table 2).

There were 12 responses to the urologists survey out of 23 surveys sent, with a 52% response rate. 75% of all responses were complete surveys. Six (55%) had been in practice for less than 5 years, with 3 (27%) having been in practice for over 15 years, 1 (9%) being in practice for 5-10 years, and 1 (9%) being in practice for 10-15 years. Ten (91%) of the urologists were fellowship trained. The majority (67%) performed over 15 penile implants per year, with only 1 respondent performing less than 5 implants per year. When asked about their least favourite aspects of penile implant surgery, patient satisfaction was the most common answer (67% of respondents). When asked which potential innovations would be the most impactful to the next generation of penile implants, the most common response was the elimination of the reservoir (67%), followed by a more natural mechanism (58%). With regards to penile implant quality factors, use of the penis had the highest mean score of 4.67/5 (SD 0.47), followed by maintenance of length with a mean score of 4.33/5 (SD 0.94) and appearance 3.42/5 (SD 0.86).

Surgical complications were rated to be the least important, with a mean score of 3.00/5 (SD 1.22) (Table 3).

When looking at the responses of all three cohorts to the same question about patients' perception on the importance of various penile implant factors, the ED cohort generally rating factors with higher importance than the other cohorts, with the urologist cohort generally rating factors with lower importance than the other cohorts (Figure 1). The factor with the biggest discrepancy between the ED cohort and the implant cohort was the concealment of the penile implant, with a ED cohort mean score of 4.15/5 (SD 1.10) and a post-implant mean score of 3.50/5 (SD 1.10). The factor with the biggest discrepancy between the ED cohort and the urologist cohort was a risk of surgical complications, with a ED cohort mean score of higher importance at 4.02/5 (SD 1.26) and a urologist mean score of 3.00/5 (SD 1.22). The factor with the biggest discrepancy between the implant cohort and the urologist cohort was generation of a discrete erection, with an implant cohort mean score of higher importance at 4.00/5 (SD 1.14) and a urologist mean score of 3.09/5 (SD 1.18). When compared to the implant cohort, the ED cohort reported greater importance in the areas of appearance (p=0.035), soft glans (0=0.040), and concealment of implant (0.007). When compared to the urologist cohort, the implant cohort reported greater importance in the areas of natural feel (p=0.019) and generating a discrete erection (p=0.022).

Discussion

Main findings

Both patient cohorts had similar response rates, with a 74% response rate in the ED cohort and a 73% response rate in the implant cohort. The urologist cohort had a lower response rate of 52%. Most urologists (91%) were fellowship-trained, and the majority were high-volume surgeons as previously defined in the literature, with 92% performing >5 implants per year, and are thus quite familiar with counselling patients regarding penile implants. [8] Analysis of the ED cohort showed heterogeneity of current treatment, with 35% of patients not currently undergoing any treatment for ED. In our centre's experience, men with varying levels of ED choose to not actively pursue treatment for several reasons, including lack of a partner, sexual dysfunction in their partner or unwillingness to proceed to the next level of intervention (i.e. injections, vacuum therapy, or implant). Although some patients from this sample may have mild ED, it is likely that this group of patients represents the full spectrum of ED severity.

The median overall satisfaction score for the penile implant patient cohort was 8/10, which is quite similar to the results of a previous study showing that 79% of patients rated their penile implant as ≥7/10 in overall satisfaction. [9] However, only 69% of patients with a penile implant would definitively get the implant again, if given the choice, while an additional 11% would consider getting the implant again. This is a lower value than when compared to previously stated satisfaction rates of 75-98% seen in the literature. [2, 8, 10-16] However, until

recently, no validated questionnaire existed for satisfaction following penile implant and therefore comparison between studies is difficult due to significant methodologic heterogeneity, and geographic and cultural differences. [17] Our cohort also includes patients undergoing revision surgeries, as well as malleable implants which has been shown to have lower satisfaction. [5] Our results also highlight a potential gap in expectations pre-operatively and post-operative reality. This suggests that there is room for improvement in how patients are counselled pre-operatively to set expectations. Furthermore, patient satisfaction was the most common answer regarding Canadian urologists' least favourite aspect of penile implant surgery with 67% of urologists indicating it as a factor they disliked about the surgery. This signals that patient satisfaction is highly relevant among prominent implanters in Canada and improving patient satisfaction post-operatively is an important and relevant goal for both patients and providers.

When comparing the ED cohort and the implant cohort, there were statistically significant differences in the self-reported importance of penis appearance, softening of the glans, and concealment of the implant. Across the board, the ED cohort patients reported all penile implant factors as being more important than those in the post-implant group, suggesting a pre-emptive concern about the side effect profile of treatment that is stronger than those who have lived experience with the implant. It is possible that some of these factors are deterrents to patients in the ED cohort from pursuing a penile implant, thus the discrepancy. However, another explanation could be that these factors are actually more manageable once patients have their implant than their expectations pre-operatively.

Of all the factors related to penile implant that were investigated through the survey, the ones that had a statistically significant difference in reported importance between patients and providers were natural feel of the penis and ability to generate a discrete erection. In general, the urologist cohort rated most factors, with the exception of the use of the penis, as less important than both patient cohorts. This implies that many of these other implant factors are being underrecognized in their importance to patients, which can affect pre-operative counselling. The top three important factors as rated by urologists were use of the penis, maintenance of penile length, and appearance of the penis. For the implant cohort, the top three most important factors were use of the penis, maintenance of penile length, and ability to generate a discrete erection. Although two of the top three factors are concurrent, this discrepancy does highlight a disconnect between providers' perception of what patients find important and what patients themselves value with regards to side effect considerations of penile implants.

A large majority of patients in both the erectile dysfunction and penile implant cohorts indicated their interest in a penile implant device that could be controlled via a smartphone app. Of note, a higher proportion of patients post-implant (82%) said that they would be somewhat likely or very likely to use a smartphone app, as compared to 54% of the ED cohort.

Interpretation and comparison to other studies

Previous investigations into patient satisfaction with penile implant surgery have identified the importance of good-quality patient counselling pre-operatively and setting patient expectations. Previous research has shown that there is an inverse correlation between patient expectations pre-operatively and post-operative satisfaction, as patients with higher expectations had approximately 24% of variability in decreased satisfaction. [7] A legal database review of malpractice litigation surrounding IPP implantation showed that informed consent was an issue in over 30% of filings, with some commonly alleged complications including known potential side effects like loss of penile length and numbness. [18] Previous reviews in the literature have emphasized the importance of informed consent for IPP and setting realistic patient expectations pre-operatively. [8, 19] This study contributes to the literature by highlighting several penile implant factors that are important to patients but may be de-emphasized by urologists during counselling.

The factors we chose to ask about were collected from expert opinion, but correlate with factors that the literature has identified as being key to patient satisfaction. A review of the literature showed that "key determinants of decreased satisfaction with IPP placement [include] perceived/actual loss of penile length, decreased glanular engorgement, altered penile sensation, decreased sensation during ejaculation, perioperative discomfort, cosmetic outcome/ease of concealment, difficulty with device function, partner dissatisfaction and perception of unnatural feel, and complications". [20] Of these 10 factors identified, our survey covers 7. Upon initiation of this study in March 2021, there were no available validated English-language patient satisfaction questionnaires specific to penile implants. Since then, the Satisfaction Survey for Inflatable Penile Implant has been developed and validated and will serve as a valuable tool in future penile implant patient report outcomes. [17]

There are no other studies comparing surgeon and patient expectations in urology literature, but there are parallels in other surgical specialties like orthopedic surgery. Patients have been shown to be more optimistic about the outcomes of cervical and lumbar spine surgeries than the treating surgeon. [21] This highlights the importance of ensuring that patients have realistic expectations set pre-operatively. In sexual medicine literature, the importance of assessing patient expectations pre-operatively for penile implants has been emphasized. [4] This is especially true in the patient population subset that has been identified with the "CURSED" mnemonic, which stands for "compulsive/obsessive, unrealistic, revision, surgeon shopping, entitled, denial, and psychiatric". [20] This population has been identified to have decreased satisfaction with their penile implants, often citing known side effects as a cause for this. [3] Furthermore, this is the only study in sexual medicine comparing variables of importance regarding penile implant satisfaction between potential prospective penile implant patients to those that have undergone and experienced the procedure, shedding light on the evolution of these factors.

Limitations

This study has some limitations due to its nature as a survey-based study. The survey for the erectile dysfunction cohort was sent out to both patients on the penile implant surgical waitlist as well as patients who were pursuing other treatment strategies for erectile dysfunction, and these two populations may have very differing thoughts regarding penile implants. Since the survey was anonymous and the survey link was personalized, it is possible that a respondent may have filled out the survey more than once, erroneously. Given that penile implant insertion is quite a specialized operation, the sample size for the urologist cohort was quite small. This is also a single-centre study with respect to patient accrual, which limited our sample size, although we believe these results to be generalizable to other high-volume-implant centres. Patient satisfaction was measured in a simple manner using a 10-point Likert scale, with 1 being "not satisfied at all" and 10 being "fully satisfied", as opposed to a complete validated questionnaire, as such an instrument was not available at the time of the study.

Conclusions

This is the first study, to our knowledge, to compare patients' expectations with health care providers' perceptions of penile implant outcomes. The knowledge gained from this study can help tailor health care providers' counselling regarding this procedure, with the goal of improving patient satisfaction. This study also shows several avenues for potential improvement of the penile implant process that could be optimized by further research and innovation.

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Figures and Tables

Figure 1. Mean rating of importance of various penile implant factors to patients among study cohorts.

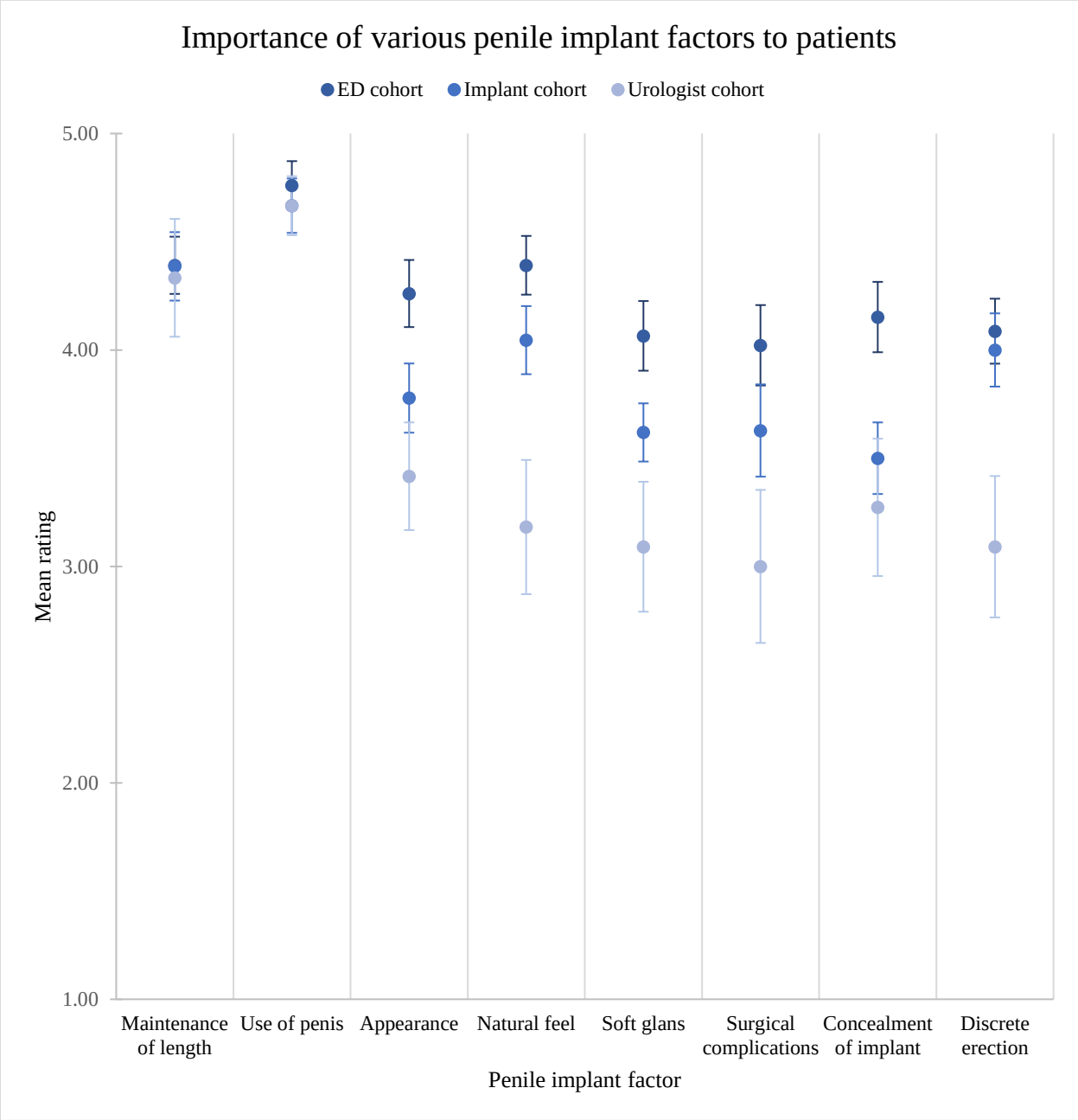

Table 1. Patients with erectile dysfunction		
		Percentage of total (%)
Number of complete responses	46	100%
Current erection, mean (SD)	4.15/10 (2.83)	
Current treatment		
PO meds, n	13	28%
Injection, n	13	28%
Bands, n	7	15%
None, n	16	35%
Implant factors, mean (SD)		
Maintenance of length	4.39/5 (0.90)	
Use of penis	4.76/5 (0.76)	
Appearance	4.26/5 (1.05)	
Natural feel of implant	4.39/5 (0.92)	
Soft glans	4.07/5 (1.09)	
Surgical complications	4.02/5 (1.26)	
Concealment of implant	4.15/5 (1.10)	
Discrete erection	4.09/5 (1.02)	
Willingness to undergo implant, mean, (SD)	7.61/10 (2.98)	
Interest in smartphone app, n (%)		
Very unlikely	11 (24%)	
Somewhat unlikely	10 (22%)	
Somewhat likely	11 (24%)	
Very likely	14 (30%)	

SD: standard deviation.

Table 2. Patients with a penile implant		
		Percentage of total (%)
Number of complete responses, n	37	82%
Pre-implant erection, mean, (SD)	4.56 (3.09)	
Implant satisfaction, overall mean, (SD)	6.49/10 (2.92)	
Implant satisfaction, sexual, mean, (SD)	6.62/10 (2.96)	
Duration of implant, n		
<1 year	10	26%
1–5 years	23	59%
>5 years	6	15%
Would undergo implant again, n		
Yes	31	69%
No	9	20%
Unsure	5	11%
Implant factors, mean (SD)		
Maintenance of length	4.39/5 (1.05)	
Use of penis	4.67/5 (0.84)	
Appearance	3.78/5 (1.07)	
Natural feel of implant	4.05/5 (1.04)	
Soft glans	3.62/5 (0.87)	
Surgical complications	3.63/5 (1.40)	
Concealment of implant	3.50/5 (1.10)	
Discrete erection	4.0/5 (1.14)	
Interest in smartphone app, n (%)		
Very unlikely	3 (7%)	
Somewhat unlikely	5 (11%)	
Somewhat likely	9 (20%)	
Very likely	28 (62%)	

SD: standard deviation.

Table 3. Urologists' responses		
		Percentage of total (%)
Number of complete responses, n	9	75%
Years in practice, n		
<5 years	6	55%
5–10 years	1	9%
10–15 years	1	9%
>15 years	3	27%
Fellowship-trained	10/11	91%
Implants per year, n		
<5	1	8%
5–10	2	17%
10–15	1	8%
>15	8	67%
Least favorite aspects of surgery, n		
Reservoir risk	3	25%
Cylinder risk	1	8%
Patient satisfaction	8	67%
Post-operative infection	5	42%
Surgical time	1	8%
Post-operative teaching and care	4	33%
Cylinder placement	0	0%
Reservoir placement	6	50%
Pump placement	0	0%
Impactful innovations to next generation, n		
Eliminate reservoir	8	67%
Eliminate pump	5	42%
Reduce infection	4	33%
Accurate sizing	2	17%
Better materials	1	8%
Natural feel of materials	5	42%
Natural mechanism	7	58%

Implant factors, mean (SD)		
Maintenance of length	4.33/5 (0.94)	
Use of penis	4.67/5 (0.47)	
Appearance	3.42/5 (0.86)	
Natural feel of implant	3.18/5 (1.03)	
Soft glans	3.09/5 (1.00)	
Surgical complications	3.00/5 (1.22)	
Concealment of implant	3.27/5 (1.05)	
Discrete erection	3.09/5 (1.08)	

SD: standard deviation.

Table 4. Comparison of responses between cohorts regarding importance of penile implant factors

Implant factors (all scores out of 5)	**ED, mean (SD)**	**Post-implant, mean (SD**	**Urologist, mean (SD)**
Maintenance of length	4.39 (0.90)	4.39 (1.05)	4.33 (0.94)
Use of penis	4.76 (0.76)	4.67 (0.84)	4.67 (0.47)
Appearance	4.26 (1.05)	3.78 (1.07)	3.42 (0.86)
Natural feel	4.39 (0.92)	4.05 (1.04)	3.18 (1.03)
Soft glans	4.07 (1.09)	3.62 (0.87)	3.09 (1.00)
Surgical complications	4.02 (1.26)	3.63 (1.40)	3.00 (1.22)
Concealment of implant	4.15 (1.10)	3.50 (1.10)	3.27 (1.05)
Discrete erection	4.09 (1.02)	4.00 (1.14)	3.09 (1.08)

ED: erectile dysfunction; SD: standard deviation.