

## Penile Length Loss After Penile Implant Surgery

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## INTRODUCTION

Simply put, size matters. Our culture's obsession with penile length is evident with just a simple search engine query — which will send one into a deep rabbit hole of “scientific studies” published by a potpourri of medical journals, men's magazines, and clickbait-style media aggregators. Correlations are often proposed between penile size parameters and characteristics such as height, ethnicity, and even shoe size. While there are indeed some legitimate studies, the popular—rather than scientific—media-driven stronghold on this topic highlights its cultural significance. When penis size is associated not only with masculinity and virility but with pressures such as relationship satisfaction, it is clear why men continue to fixate on their length. When it comes to the treatment of erectile dysfunction, this fixation becomes even more apparent. Despite the longstanding success and persistent innovation within the field of male prosthetics, one complaint has endured—be it real or perceived, there is loss of penile length after penile implant surgery to treat erectile dysfunction.

This persistent complaint accurately reflects the complex nature of this surgery, as penile shortening can actually occur as a result of pre-operative, intra-operative, and/or post-operative events that can significantly alter both the objectively measured and subjectively perceived length of the penis. In this paper, we describe both patient- and physician-related factors that explain the potential causes for any penile length loss. We describe findings from the published literature and our own experiences in treating these patients. Finally, we will discuss recommended treatment considerations to combat loss of length with implantation.

## CLINICAL PERSPECTIVE

A patient's concern of penile shortening after prosthetic placement is indeed valid, as it has been well-documented in

peer-reviewed literature.<sup>1–3</sup> However, in order to fully understand this phenomenon, we must first consider how we define penile length. There is of course the objective measurement of penile length — which itself encompasses a variety of techniques. The objectivity of this measurement must be viewed critically, as there are many variables in the hands of the measuring observer. For example, some methods to objectively measure penile length include stretched flaccid length, erect length from the base of the penis to the urethral meatus, intra-corporal length, and length from the pubic bone to the edge of the coronal margin. These measurements assume that the penis is straight, in both the vertical and horizontal planes, and have no means of conveying curvature — which further confounds potential measurements. While all the aforementioned measurement techniques have been seen in the published literature, we must also pay attention to subjective measurement, often reported as the patient's own perceived penile length. This may prove to be the most clinically relevant factor, owing to the psychological burden of perceived loss of length even in the setting of increased objective length. In fact, Deveci et al. reported that 71% of patients perceived their penis to be shorter after inflatable penile prosthesis (IPP) surgery even though the authors found no difference in pre- and post-op penile length measurements.<sup>4</sup>

## PATIENT-RELATED FACTORS

It is important to consider that several patient-related clinical factors may contribute to penile length loss. For example, tissue atrophy, hypogonadism, Peyronie's disease, and previous treatments such as radiation or radical prostatectomy have been shown to contribute. The prevailing theory, with respect to penile atrophy, is that corporal tissue is subject to apoptosis without persistent cavernosal blood flow.<sup>3</sup> Thus, as erectile dysfunction worsens and native erections occur less frequently, we can reasonably expect an increase in corporal atrophy leading to loss of length in the flaccid state. Large-scale prospective studies suggest that men suffer from erectile dysfunction for an average of 6.2 years before pursuing IPP surgery.<sup>5</sup> In addition, Peyronie's disease by nature alters the length of the penis through distortion and deflection in multiple planes. However, treatment options for Peyronie's disease, such as tunica albuginea plication, can successfully correct angulation but at the cost of penile length.

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Both pelvic radiation and radical prostatectomy can impact erectile function due to direct damage to the neurovascular bundles adjacent to the prostate, and thus among patients receiving these treatments, we expect some level of corporal atrophy and subsequent loss of length. Statistically significant reduction in length has been previously demonstrated among patients undergoing simultaneous androgen deprivation therapy (ADT) and external beam radiation. Ionizing radiation can also directly affect the corpora cavernosa causing fibrosis and atrophy because of the proximity of these structures to the prostate. Experienced prosthetic surgeons have frequently observed that proximal dilation is more difficult and the corpora are less elastic in the radiated patient. But it must also be noted that the radical prostatectomy procedure itself is associated with a loss of >1 cm in length simply due to surgical technique alone.<sup>3</sup>

Endocrine disorders and comorbidities can also potentially contribute to loss of penile length by way of the aforementioned corporal atrophy following erectile dysfunction. For example, hypogonadal males may experience length loss due to the direct effect of testosterone on penile morphology. This relationship is well understood from the onset of puberty. The vascular impact of diabetes mellitus can also lead to erectile dysfunction, and furthermore to corporal fibrosis which may have multifactorial impacts on penile length. In addition, many patients gain weight with age; obesity results in increased suprapubic fat pad thickness resulting in less external penis exposure.

## PHYSICIAN-RELATED FACTORS

The surgeon has significant influence on penile length as well, based upon decisions made pre-operatively, surgical technique in the operating room, and post-operative recovery instructions. Penile rehabilitation is increasing in popularity, commonly in association with radical prostatectomy in an attempt to mitigate treatment-related ED. An appropriate rehabilitation protocol consists of proactive use of oral phosphodiesterase inhibitors, intraurethral suppositories, intra-cavernosal injections, or vacuum erection devices to stimulate erections at regular intervals and maintain corporal and glanular blood flow. This can be initiated prior to prostatectomy or at least immediately after to maximize the chances of preservation of corporal tissue to maintain penile length. While more rigorous data is needed, what is available in the literature appears to suggest that phosphodiesterase use prior to prostatectomy is a protective factor for penile length preservation and restoration for the aforementioned reasons.

Surgical technique is of utmost importance in preserving length. To illustrate, the predecessor to the inflatable implant was the malleable implant, which had a higher rate of distal erosion than the IPP. Surgeons would routinely downsize 1-2 cm from the measured size to prevent this from happening. Some surgeons continue to apply that same principle to IPPs even though the risk of distal erosion is significantly lower. Implants that are undersized, either due to surgeon preference, incorrect

measurement, or incomplete corporal dilation, can reduce final penile length. Henry et al has shown this to be the case especially for less-experienced surgeons. When comparing the average urologist's performance with that of a Center-of-Excellence designated implant, the authors recorded a 2 cm difference in median cylinder size.<sup>6</sup> Moncada et al also demonstrated that sequential dilation of the corpora cavernosa resulted in decreased penile length, as compared with single pass dilation and measurement with a Furlow instrument.<sup>7</sup> Presumably, sequential dilation is more traumatic than single pass dilation and can result in more corporal scarring post-operatively. This difference was observed only for the flaccid penile length.

The post-operative and recovery phases are also critical periods that can have lasting impact on the ultimate length of the penis. The time at which the implant is fully activated or cycled during recovery is one of the dominant variables in ultimate length outcomes. Other variables include whether the cylinders are left fully or partially inflated after the index procedure, regular cycling outside of sexual intercourse, and maximal inflation protocols. It is our practice to instruct patients to cycle their implants as soon as possible after IPP surgery, with most patients beginning a minimum of twice daily maximum inflation for 30 minutes as soon as one week after surgery. We have not seen any complications from this protocol.

Undersizing and delayed start of inflation not only limit ultimate length when inflated, but also predispose to capsular contracture. Without passive stretch from an inflated cylinder, capsular fibrosis can create a tight, contracted environment in which cylinders ultimately cannot be maximally inflated. This could lead to deformity and curvature, further limiting length. Historically, S-shaped deformity of the penis was thought to be due to oversized cylinder placement or length expanding cylinders. More recently, it has been demonstrated that S-shaped deformity occurs in appropriately sized non-length expanding cylinders when the implants are not cycled adequately post-operatively.<sup>8</sup> Traditional thought is that the first 6 weeks present the most important time in influencing capsular size around the cylinders. However, capsular contraction can occur any time post-operatively, if the implant is left deflated for long periods of time.

## PREVENTING LOSS OF PENILE LENGTH

Despite a complex intersection of both patient-related and physician-related factors dictating penile length after prosthetic implantation, there are fortunately a few proactive measures that can preserve length. The most promising of these is the new length measurement technique (NLMT), proposed by Henry et al., to overcome chronic undersizing observed with virgin implants. Specifically, the NLMT consists of intra-operative maneuvers that ultimately lead to increased implant size such as more aggressive dilation while the penis is on stretch and minimal use of rear-tip extenders. Henry and colleagues prospectively

studied this technique in 40 patients and found that post-operative penile length measurements in the flaccid and erect states were significantly higher than pre-operative measurements. Furthermore, 74% of patients perceived their penis to be the same size or longer after surgery.<sup>9</sup>

We previously mentioned penile rehabilitation as a variable that physicians can control to preserve length. Vacuum erection devices (VED) have indeed shown promise in not only increasing subjective length but also facilitating larger cylinder selection at the time of implantation if performed aggressively prior to surgery.<sup>9</sup> Pre-operative VED use can thus promote corporal expansion, which when combined with the use of the NLMT can have a positive effect on post-operative length. Similarly, pre-operative traction therapy appears to also facilitate lengthening prior to implantation. A prospective study of 10 men demonstrated no loss of length when undergoing 2 – 4 months of traction therapy prior to IPP.<sup>10</sup> There is also a role for traction therapy in the post-prostatectomy recovery phase, which has been shown to significantly increase objective and perceived penile length.

## PENILE PROSTHESIS IMPLANTATION THOUGHTS

The surgeon's ability to incorporate these post-operative protocols in his or her practice will of course be impacted by features of their surgical practice (eg, the availability of ancillary clinic staff to participate in patient education and early cycling), in addition to his or her surgical approach. For example, we find that our use of the infrapubic incision reduces the amount of scrotal dissection and thus decreases scrotal pain and swelling, permitting early activation and cycling of the device. Due to the delayed cycling associated with penoscrotal approach, these patients should probably have their cylinders left 80% inflated for up to 6 weeks to keep the capsule expanded with better length preservation.<sup>9</sup>

The PROPPER study, one of the largest prospective multicenter studies conducted evaluating penile implants from 11 sites in North America exclusive to high-volume surgeons found no difference in pre- and post-operative penile lengths.<sup>5</sup> This interval analysis of 1,135 patients suggests that there is no objective loss in penile length when IPP surgery is done correctly and in experienced hands.

## CONCLUSION

As beauty is in the eye of the beholder, penile length issues after implantation of an IPP are a personal subjective issue that should be addressed in the pre-operative discussion. Patient- and physician-related concerns should be considered. Pre-operative stretching, NLMT, leaving the implant mostly inflated, early cycling and some type of maximum inflation protocol is likely the best way to address this important issue.

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## STATEMENT OF AUTHORSHIP

S.B.M, G.D.H and E.K. were all involved in the writing, reviewing, editing and revision of this manuscript.

## REFERENCES

- Osterberg EC, Maganty A, Ramasamy R, et al. Pharmacologically induced erect penile length and stretched penile length are both good predictors of post-inflatable prosthesis penile length. *Int J Impot Res* 2014;26:128–131. doi: [10.1038/ijir.2013.50](https://doi.org/10.1038/ijir.2013.50).
- Wang R, Howard GE, Hoang A, et al. Prospective and long-term evaluation of erect penile length obtained with inflatable penile prosthesis to that induced by intracavernosal injection. *Asian J Androl* 2009;11:411–415. doi: [10.1038/aja.2009.35](https://doi.org/10.1038/aja.2009.35).
- Wallen J, Madiraju S, Wang R, et al. Implementation of length expanding inflatable penile prosthesis is not sufficient to prevent postsurgical penile shortening. *Asian J Androl* 2019;21:98. doi: [10.4103/aja.aja\\_77\\_18](https://doi.org/10.4103/aja.aja_77_18).
- Deveci S, Martin D, Parker M, et al. Penile length alterations following penile prosthesis surgery. *Eur Urol* 2007;51:1128–1131. doi: [10.1016/j.eururo.2006.10.026](https://doi.org/10.1016/j.eururo.2006.10.026).
- Bennett N, Henry G, Karpman E, et al. Inflatable penile prosthesis implant length with baseline characteristic correlations: preliminary analysis of the PROPPER study. *Transl Androl Urol* 2017;6:1167–1174. doi: [10.21037/tau.2017.12.01](https://doi.org/10.21037/tau.2017.12.01).
- Henry GD, Kansal NS, Callaway M, et al. Centers of excellence concept and penile prostheses: an outcome analysis. *J Urol* 2009;181:1264–1268. doi: [10.1016/j.juro.2008.10.157](https://doi.org/10.1016/j.juro.2008.10.157).
- Moncada I, Martínez-Salamanca JL, Jara J, et al. Inflatable penile prosthesis implantation without corporeal dilation: a cavernous tissue sparing technique. *J Urol* 2010;183:1123–1126. doi: [10.1016/j.juro.2009.11.048](https://doi.org/10.1016/j.juro.2009.11.048).
- Karpman E, Henry G. Capsular contraction with S-Shaped deformity of nonlength-expanding inflatable penile prosthesis cylinders: management and prevention strategies. *Sex Med* 2013;1:95–98. doi: [10.1002/sm2.14](https://doi.org/10.1002/sm2.14).
- Henry GD, Carrion R, Jennermann C, et al. Prospective evaluation of postoperative penile rehabilitation: penile length/girth maintenance 1 year following coloplast Titan inflatable penile prosthesis. *J Sex Med* 2015;12:1298–1304. doi: [10.1111/jsm.12833](https://doi.org/10.1111/jsm.12833).
- Levine LA, Rybak J. Traction therapy for men with shortened penis prior to penile prosthesis implantation: a pilot study. *J Sex Med* 2011;8:2112–2117. doi: [10.1111/j.1743-6109.2011.02285.x](https://doi.org/10.1111/j.1743-6109.2011.02285.x).