

## ORIGINAL RESEARCH—SURGERY

## High Patient Satisfaction of Inflatable Penile Prosthesis Insertion with Synchronous Penile Plication for Erectile Dysfunction and Peyronie's Disease

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DOI: 10.1111/jsm.12530

### ABSTRACT

**Introduction.** Twenty to thirty percent of patients with Peyronie's disease (PD) have erectile dysfunction (ED) refractory to medical therapy and may benefit from a combined procedure addressing both conditions.

**Aim.** The aim of this study was to show the efficacy of inflatable penile prosthesis (IPP) insertion and synchronous penile plication for correcting penile curvature and ED in patients with PD.

**Methods.** A retrospective review was performed of all patients who underwent IPP insertion with synchronous penile plication at our tertiary care center between 2010 and 2013. All patients received an intraoperative saline intracorporal injection to induce an artificial erection. After the tunica albuginea was exposed via a standard transverse scrotal incision over the proximal penile shaft, the incision was retracted distally and/or laterally as needed for plication suture placement. Plication sutures were placed in parallel opposite the angle of greatest curvature. The incision was returned proximally to the standard penoscrotal junction for IPP insertion. Demographic and surgical data were collected from the patients' medical records. Patient satisfaction was assessed postoperatively using a nonvalidated questionnaire.

**Main Outcome Measures.** The focus of this study was surgical outcomes, both technical and patient-reported satisfaction.

**Results.** Eighteen patients with a mean age of 63 years underwent IPP insertion with synchronous penile plication. Patients presented with dorsal (n = 11), lateral (n = 2), and biplanar curvature (n = 5). Mean preoperative curvature was 39 degrees (range 30–60) and was corrected on average to <5 degrees (range <5–12) using a median of four plication sutures (range 3–6). Among 15 patients completing a postoperative satisfaction survey at a mean of 11 months, all reported improvement in their overall condition and penile curvature; one with biplanar deformity reported minor residual curvature. None reported continued pain or required suture release.

**Conclusions.** IPP insertion with synchronous penile plication for the correction of ED and PD is effective and results in high patient satisfaction. **Chung PH, Scott JF, and Morey AF. High patient satisfaction of inflatable penile prosthesis insertion with synchronous penile plication for erectile dysfunction and Peyronie's disease. J Sex Med 2014;11:1593–1598.**

**Key Words.** Peyronie's Disease; Penile Plication; Penile Graft; Erectile Dysfunction; Penile Prosthesis

### Introduction

Peyronie's disease (PD) is a connective tissue disorder of the tunica albuginea, which results in the formation of a fibrous, nonelastic plaque and concomitant penile deformity. For PD patients having concomitant erectile dysfunction (ED) not

responsive to medical therapy, penile prosthesis insertion is an appropriate treatment. However, prosthesis insertion alone may not be sufficient to correct penile curvature. Levine et al. reported that satisfactory correction of PD-related penile deformity was achieved in only 4% of patients with penile prosthesis insertion alone; others required

manual modeling (79%), plaque incision (4%), or incision and grafting (12%) at the time of prosthesis insertion [1].

### Aim

We report our experience performing inflatable penile prosthesis (IPP) insertion with synchronous penile plication for the correction of ED and PD.

### Methods

With institutional review board approval, a retrospective review was conducted of patients who underwent IPP insertion with synchronous penile plication at our tertiary care referral center between 2010 and 2013. All men had both painless, persistent penile curvature, which had been stable for at least 9 months, and ED refractory to medical management. The majority of our patients failed both oral and injectable treatment prior to being offered surgery. Preoperative assessment of the degree of penile curvature and ED was conducted at the time of initial office history and/or documented by patient self-photography. Angle of deformity was documented via intraoperative photographs (i) after initial saline injection; (ii) after plication by repeat saline injection; and (iii) after IPP placement. Patients in this cohort had dorsal, lateral, or biplanar (dorsal and lateral) curvature. Patients were counseled preoperatively to the risks including, but not limited to, decreased penile length, palpable plication sutures, and damage to neurovasculature.

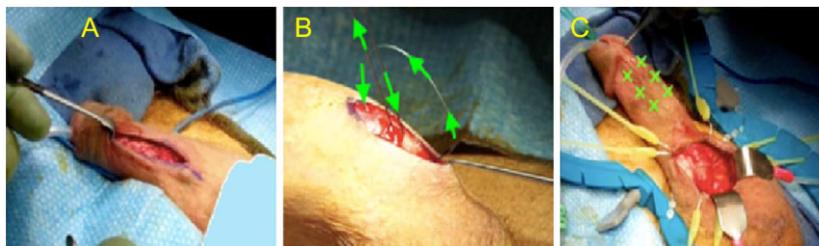
### Surgical Technique

This procedure was a modification of our non-degloving plication technique described previously

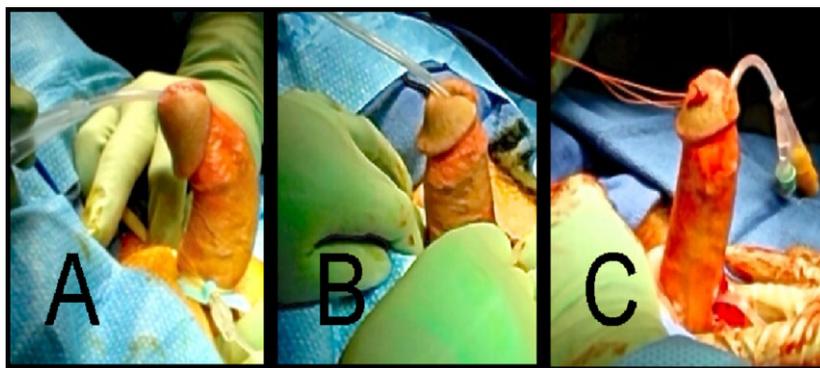
[2,3]. All patients received an artificial erection induced by injectable saline and a tourniquet at the base of the penis. Photographs from lateral and inferior views were taken to calculate degree of curvature of the erect penis.

Plication was performed through manipulation of a standard transverse or vertical upper scrotal incision (Figure 1). After exposure of the tunica albuginea, the incision was mobilized distally and/or laterally deep to Buck's fascia using Senn retractors as needed to reveal the distal penile shaft according to the severity and direction of curvature. A series of parallel, 2-0 Ethibond sutures was placed in the tunica albuginea in an inverting, interrupted fashion. Each inverting suture spanned a total of 15–20 mm and involved two needle passages covering approximately 7–9 mm with a 1 mm gap in between. Each suture was tied at the time of placement. Artificial erection was supplemented by intermittent compression of the corpora cavernosa against the pubic symphysis to enable assessment of curvature and guide suture placement.

After plication, patients then underwent immediate IPP placement through the same penoscrotal incision. The corporotomies were performed well proximal to the plication sutures. Repeat stretched penile length measurements were obtained after IPP placement. Penile plication alone sufficiently corrected penile curvature; therefore, IPP insertion was performed strictly to correct ED in this cohort (Figure 2). The wound was meticulously closed in three layers to prevent skin tethering and ensure robust coverage of the tubing. A compressive Coban™ (3M, St. Paul, MN, USA) dressing was applied, which the patient was instructed to replace daily for 1 week. All patients were observed overnight and discharged home the following morning after successfully completing a voiding trial.



**Figure 1** Surgical steps for penile plication with synchronous inflatable penile prosthesis (IPP) insertion. (A) A Senn retractor is used to mobilize the high scrotal incision distally to allow placement of plication sutures along the area of deformity. (B) A series of 2-0 Ethibond plication sutures are placed using an inverting near-far-far-near technique (arrows). Each suture is tied at the time of placement. (C) Multiple plication sutures are placed opposite the angle of greatest curvature (crosses). IPP insertion is then conducted proximally through the same incision.



**Figure 2** Penile appearance (A) before plication, (B) after plication, and (C) after inflatable penile prosthesis (IPP) insertion reveals complete correction of dorsal Peyronie's curvature with plication and correction of erectile dysfunction (ED) with implant.

**Main Outcome Measures**

*Surgical Outcomes*

Measures related to the surgical procedure were abstracted from the patients' medical records. These included perioperative outcomes such as total operative time, estimated blood loss (EBL), pre- and postoperative angle measurements, and the number of sutures used. Records were also examined for evidence of immediate postoperative complications from pain, wound dehiscence, hematoma, or infection.

*Patient-Reported Outcomes*

Postoperative evaluation and IPP instruction were conducted in clinic 6 weeks after surgery. Patients were assessed at that time for late postoperative complications, including pain related to their plicating sutures. Further clinic follow-up was conducted according to patient's preference or as medically indicated. A research assistant later queried patients via telephone with a nonvalidated questionnaire modified from the Patient Global Impression of Improvement. The survey assessed the patient perception of penile curvature, length, adequacy for intercourse, and overall satisfaction.

**Results**

*Surgical Outcomes*

Eighteen patients with a mean age of 63 years (range 52–79) underwent IPP with synchronous penile plication between 2010 and 2013 (Table 1). All patients had dorsal, lateral, or biplanar (dorsal and lateral) curvature. Sixteen patients received an AMS 700 CX (American Medical Systems, Minnetonka, MN, USA), and two patients received a Coloplast Titan (Coloplast, Minneapolis, MN, USA). Mean duration of surgery was 83 minutes (range 58–138) with a mean EBL of 96 cc (range 50–125). Mean preoperative curvature in the

dominant direction was 39 degrees (range 30–60) corrected to <5 degrees after plication and IPP insertion. A median of four sutures (range 3–6) were used for plication with each suture providing a mean correction of 8 degrees. All patients were discharged home on postoperative day 1. No patient suffered immediate postoperative complications. At the initial 6-week postoperative visit and IPP instruction, no patient reported penile pain or required release of sutures. No devices in this series required delayed removal for infection. Only two patients required further manipulation after the initial postoperative clinic visit. The first patient presented 18 months after surgery with a no-functioning IPP and has not undergone replacement due to financial reasons. The second patient required repair of a herniated space of Retzius reservoir and adjacent tissue transfer for a partially buried penis (body mass index 36 kg/m<sup>2</sup>) 9 months after the initial surgery.

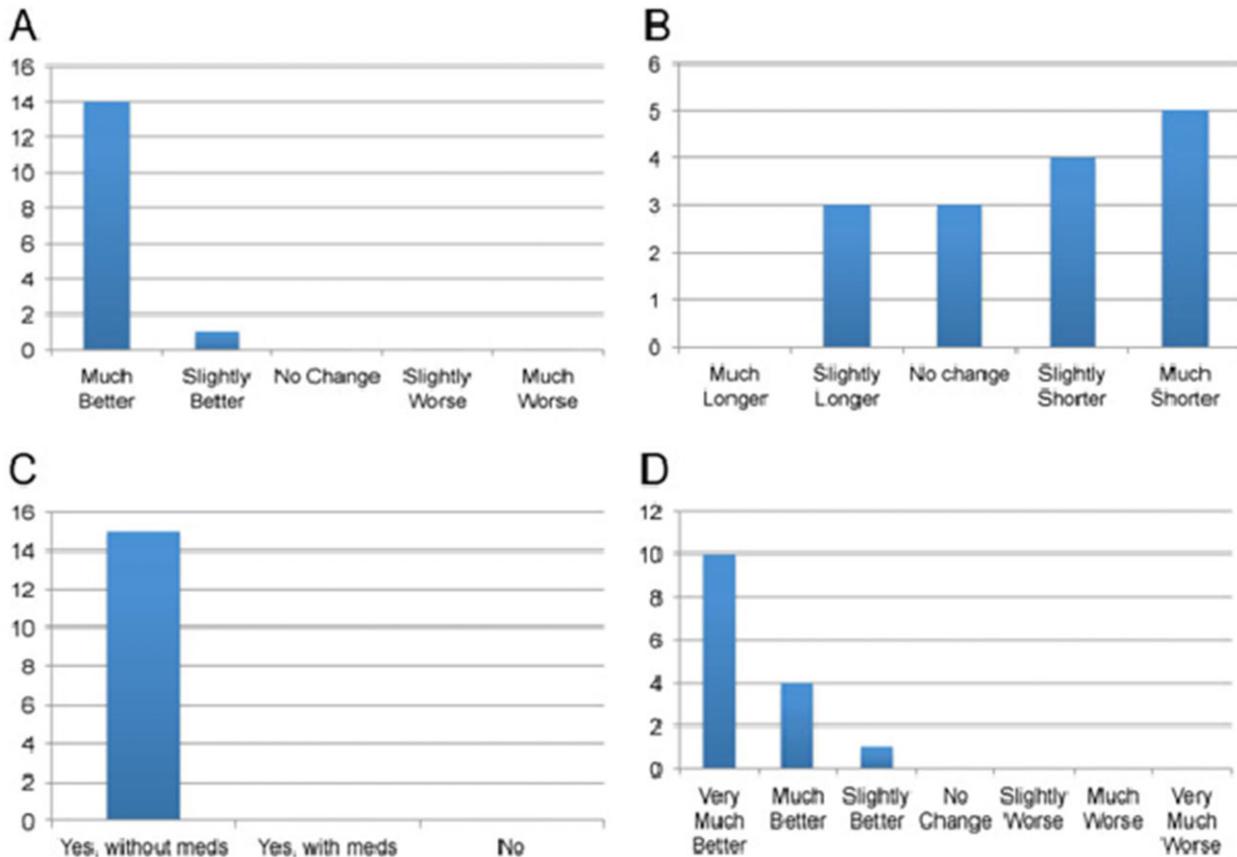
*Patient-Reported Outcomes*

All 18 men were seen at the initial 6-week IPP activation follow-up appointment. Subsequently,

**Table 1** Surgical outcomes of patients undergoing IPP insertion with synchronous penile plication

	Number (Range/%)
Number of patients	18
Age, years	63 (52–79)
Mean preoperative penile curvature, degrees	39 (30–60)
Mean postoperative penile curvature, degrees	<5 (<5–12)
Median number of plication sutures	4 (3–6)
Median degrees corrected per suture	8 (6–12)
Mean OR duration, minutes	83 (58–138)
Mean EBL, cc	96 (50–125)
Patients with continued pain or requiring release of sutures	0 (0%)

EBL = estimated blood loss; IPP = inflatable penile prosthesis; OR = odds ratio



**Figure 3** Patient reported outcomes after inflatable penile prosthesis (IPP) insertion with synchronous penile plication. A) What best describes how your penile curvature is now compared with how it was before you had penile surgery? B) What best describes how the length of your penis appears now compared with how it appeared before you had penile surgery? C) Is your current strength of erections adequate for penetration during sexual intercourse? D) What best describes how your post-operational condition is now compared with how it was before you had penile surgery?

the vast majority of patients (15/18, 83%) completed the questionnaire at a mean of 15.4 months (range 1–32) after surgery (Figure 3); the other three were lost to follow-up. All 15 patients reported improvement in their curvature and erections adequate for sexual intercourse. One patient (7%) who underwent a complex biplanar repair reported minor residual curvature. Although 11/15 (73%) patients reported decreased penile length, all 15 patients reported an improvement in their overall condition.

### Discussion

Wilson and Delk introduced manual modeling in 1994 as an expedient alternative to plaque incision and grafting for correction of penile curvature during placement of an IPP. The modeling technique involves inflating the prosthesis and forcibly bending it in the opposite direction of the curva-

ture causing rupturing of fibrotic plaques [4]. A 2008 survey of prosthetic urologists indicates that modeling has become the predominant method utilized nationwide for penile straightening during IPP [5]. Although long-term follow-up has generally been associated with sustained straightening and no prosthesis malfunction, the published outcomes of modeling remain sparse and this maneuver does carry a 5% risk for urethral injury [6,7].

Published algorithms report a stepwise approach to penile prosthesis placement in men with ED and PD. When penile prosthesis alone does not sufficiently correct the curvature, then manual modeling is recommended, followed by tunical incision and grafting for defects greater than 2 cm as needed sequentially at the time of implantation [8,9]. Others have proposed reassessing erectile function after correcting penile curvature prior to committing a patient to a prosthesis [10].

Penile plication is another minimally invasive method for correcting penile curvature. Penile plication requires less operative time compared with plaque incision with grafting, and men having plication reported greater rigidity, greater ability to have intercourse, more sensation, and fewer palpable nodules compared with those having graft procedures [11]. Plication has recently been successfully utilized for a variety of clinical scenarios, including correction of biplanar or complex ( $\geq 60$  degrees) curvatures [2,12].

The first description of combining an IPP with synchronous plication to correct ED and PD was reported from University of California, San Francisco in 2004; this was a small series of five patients reporting good outcomes and minimal morbidity [13]. The present series, to our knowledge, is the largest reported series of patients undergoing IPP with synchronous plication for correction of ED and PD, and we believe our results are noteworthy in that they demonstrate the simplicity and effectiveness of this technique. We were able to effectively perform both plication and IPP insertion through a single incision via a “reverse degloving” maneuver without circumcising the penis. The total operative time in the series was 83 minutes (range 50–125), which was only minimally longer than the average duration of straightforward IPP cases performed at our teaching center. In all patients, immediate resolution of penile deformity by plication was confirmed prior to cylinder insertion, thus assuring a durable, precise reconstruction and high patient satisfaction.

Our simplified approach with all patients receiving plication and synchronous IPP placement avoids the time and potential problems associated with circumcision, plaque incision and grafting, and possible urethral damage from manual modeling. Our objective assessment identified that patients were very satisfied with both the correction of their penile curvature and postoperative sexual function with our technique. In addition, plication does not appear to have any negative impact on IPP function, safety, or durability due to the lack of revisions required.

Despite being the largest series of patients undergoing IPP and penile plication, this study is limited by a small patient cohort and lack of long-term clinic follow-up. However, we have noted in our extensive plication experience in over 200 potent patients that delayed failures or complications from this technique are vanishingly rare. While our patient-reported outcomes assessment

was limited insofar as it did not specifically address the palpability of or discomfort from the plicating sutures, patient complaints in that regard have been so infrequent among our plication population at large that we consider the problem negligible. Furthermore, the plicating sutures were assessed during postoperative clinic evaluation. None of the patients in this series raised concern with regard to their plicating sutures. The questionnaire used in this study was not validated, although prior PD studies have also used nonvalidated questionnaires [1,11,14]. This questionnaire was a modification of the Patient Global Impression of Improvement, which has been validated and is often used to measure patient satisfaction after anti-incontinence procedures [15]. A 15-question survey assessing bother and distress in patients with PD was recently validated, which may help the urologic community to uniformly assess patients postoperatively and provide better comparison between studies [16].

It is important to note that our preferential use of synchronous plication with IPP insertion is reserved specifically for instances in which ED patients also have a known, prominent ( $>30^\circ$ ) Peyronie’s deformity. Manual modeling still has an important role for patients whose deformity is minor or unknown prior to IPP insertion. However, we prefer plication to modeling in appropriate cases because it enables immediate correction with a higher level of precision and durability.

## Conclusion

IPP insertion with synchronous penile plication is effective for correcting penile curvature and ED in patients with PD.

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*Conflict of Interest:* Allen F. Morey, MD, is a lecturer for American Medical Systems and Coloplast.

## Statement of Authorship

### Category I

#### (a) Conception and Design

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#### (b) Acquisition of Data

Paul H. Chung; J. Francis Scott

**(c) Analysis and Interpretation of Data**

Paul H. Chung; Allen F. Morey

**Category 2****(a) Drafting the Article**

Paul H. Chung

**(b) Revising It for Intellectual Content**

J. Francis Scott; Allen F. Morey

**Category 3****(a) Final Approval of the Completed Article**

Paul H. Chung; J. Francis Scott; Allen F. Morey

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