

PEYRONIE'S DISEASE

Salvage Penile Plication Is an Effective Modality for Resolving Residual Curvature After Surgery for Peyronie's Disease



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ABSTRACT

Introduction: Penile plication is highly successful in appropriately selected patients with Peyronie's disease; however, a minority of patients experience residual curvature or delayed recurrence of curvature. Revision surgery outcomes are seldomly reported.

Aim: To determine the efficacy of salvage penile plication for the correction of residual and recurrent curvature.

Methods: Our institutional review board–approved prospective single-surgeon database of patients with Peyronie's disease was reviewed for cases performed from 2011 to 2019. Patients requiring salvage procedures were analyzed. A successful salvage was defined by residual curvature $<20^\circ$ with patient-reported satisfaction. Potential etiologies for initial plication failure were examined.

Main outcome measure: The outcomes of this study are subjective and patient-reported success of salvage plication.

Results: Data analysis identified 134 men treated surgically for Peyronie's disease. Management involved plication in 105 (78.4%), incision and grafting in 14 (10.4%), excision and grafting with inflatable penile prosthesis in 7 (5.2%), plication with inflatable penile prosthesis in 6 (4.5%), or grafting, plication, and inflatable penile prosthesis in 2 (1.5%). Mean preoperative degree of curvature before initial surgery was 55° (30° – 90°). Of this cohort, 5.2% ($n=7$) required salvage plication for a median residual or recurrent curvature of 45° (35° – 90°). Initially, 3 men (43%) received an 8-dot plication, 3 (43%) underwent 16-dot plication, and 1 (14%) received plaque incision and grafting. Among salvage patients, 4 (57%) had initially satisfying results followed by recurrence of curvature and 3 (43%) desired correction of residual curvature. Salvage plication entailed an 8-dot plication in 3 (42.9%) and a 16-dot plication procedure in 4 (57.1%). The median time to salvage surgery was 9 (3–15) months, with all patients showing intraoperative resolution of curvature. At a median follow-up of 12 (1–20) months, 6 (85.7%) patients reported satisfaction with residual curvature $<20^\circ$.

Conclusion: Patients with residual or delayed recurrence of curvature after plication for Peyronie's disease can be effectively managed with salvage plication. **Deebel NA, Scarberry K, Dutta R, et al. Salvage Penile Plication Is an Effective Modality for Resolving Residual Curvature After Surgery for Peyronie's Disease. Sex Med 2020;8:686–690.**

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Key Words: Peyronie's Disease; Penile Plication; Salvage Surgery; Sexual Dysfunction

INTRODUCTION

Peyronie's disease (PD) is estimated to affect 9–13% of men.^{1,2} Progressive fibrosis of the tunica albuginea may result in pain and/or erectile deformities that may compromise penetrative sexual

activity.² Physical and psychological ramifications may involve both patients and partners, as decline in sexual function is associated with depression, anxiety, decreased self-esteem, and strained relationships.^{2,3} Studies that have assessed surgeon case logs suggest the rate of surgical intervention for PD is increasing.⁴ Although more conservative options exist, plication and grafting procedures have historically been used and are highly effective.⁵

Penile plication is performed at a higher frequency than grafting procedures and is generally offered to patients with PD with mild to moderate curvature and intact erectile function.⁴ While the definition of success is not standardized, American Urological Association guidelines define “functional straightness”

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as $\leq 20^\circ$ of curvature.² Results may vary by technique, and the reported need for revision surgery has been as high as 29% but typically ranges from 2 to 15%.^{1,6–10} Most contemporary series describe revision rates of 2–3% after plication involving an 8- or 16-dot technique.^{1,6,7,11,12}

There is a paucity of literature examining potent patients requiring repeat surgery for PD, such as salvage plication, likely due to the high success rate of penile plication and lack of long-term follow-up of these patients. The largest series of 340 men surgically managed for PD reported outcomes for salvage plication in only 7 men (2.1%).¹ The authors noted that failure of the initial plication may have been due to varied etiologies including undercorrection related to inadequate erection at the time of curvature assessment, multiplanar deformity, extreme curvature ($>60^\circ$), and/or subsequent development of additional tunical plaque consistent with PD progression.

The goal of the present study was to determine the incidence and outcomes of salvage plication among our patients managed surgically for PD.

MATERIALS AND METHODS

Our institutional review board—approved single-surgeon database of patients with PD was reviewed for cases of operative intervention from January 2011 to August 2019. All surgeries were performed by a single fellowship-trained reconstructive urologist. Patients undergoing salvage plication after a failed initial operation were identified. Success was defined as the combination of residual curvature less than 20° and patient satisfaction with the repair. Preoperative variables for which data were collected included history of erectile dysfunction (ED), use of phosphodiesterase-5 inhibitors, degree of curvature, and direction of curvature. Erections were characterized via preoperative photography and intraoperative saline-induced erection, with measurements made using a goniometer.

At the beginning of each plication, intracavernosal saline injection is performed to assess erectile curvature. All corrections in this series involved an 8-dot or a 16-dot procedure as described by Gholami et al.^{7,13} Essentially, the center point of the repair is opposite the point and direction of maximal curvature (thus, plication for dorsal curvature is performed on the ventral tunica albuginea). Each plication suture represents 4 dots, which are typically placed 6–8 mm apart. The ends to be tied exit the middle 2 dots. After placement of the 2-0 Ethibond sutures, mosquito clamps with suture booties are used to hold the sutures down, while another artificial erection is performed to confirm the desired level of correction. Once achieved, the sutures are tied, and the incision is closed in a multilayered fashion. All patients are discharged from the recovery room with follow-up of 4–6 weeks postoperatively. Repeat or “salvage” procedures were performed in a similar fashion.

In follow-up, patients were assessed for symptoms, return to sexual activity, overall satisfaction, and subjective estimate of

postoperative curvature. If residual curvature was reported, patients were asked to provide photographs alongside a goniometer.

RESULTS

From 2011 to 2019, 134 patients underwent surgery for PD. Management involved plication in 105 (78.4%), incision and grafting in 14 (10.4%), excision and grafting with placement of an inflatable penile prosthesis (IPP) in 7 (5.2%), plication with IPP in 6 (4.5%), or combination of grafting with plication and IPP in 2 (1.5%). Of the 105 patients undergoing plication, 46.7% ($n = 49$) and 29.5% ($n = 31$) of patients had severe curvature and multiplanar deformities, respectively. Among the overall cohort, 7 patients (5.2%) required repeat surgical intervention, uniformly consisting of salvage plication. The median age at time of revision was 57 years (range 46–67 years). Median follow-up was 12 months (range 1–20 months).

The median time from initial surgery to revision was 9 (range 3–15) months for a median residual curvature of 45° (range 35° – 90°). Initial treatment involved an 8-dot plication in 3 (43%), 16-dot plication in 3 (43%), and plaque incision and grafting in 1 (14%). The latter patient initially had 60° dorsal curvature and was repaired with plaque excision followed by the placement of TachoSil (Baxter, CA). Among those undergoing salvage plication, 4 (57%) had reported success of initial correction followed by delayed recurrence, whereas 3 (43%) noted bothersome residual curvature after the primary intervention (Table 1). All patients receiving salvage plication for residual curvature reported baseline ED requiring phosphodiesterase-5 inhibitors.

Salvage plications involved an 8-dot technique in 3 (42.9%) and 16-dot technique in 4 (57.1%). Intraoperative correction was appreciated and documented in all cases. At a median follow-up of 12 (range 1–20) months, 6 (85.7%) patients reported satisfaction with residual curvature $<20^\circ$. The single patient who failed was the only one to have initially received plaque incision and grafting, rather than primary plication. After salvage plication, no patient reported worsened erectile function or a newly required need for phosphodiesterase-5 inhibitors for sexual activity. Postoperatively, 2 patients experienced superficial skin separation at the incisional site, which was managed conservatively with antibiotic ointment (Clavien-Dindo grade 1). There were no significant (Clavien-Dindo $> II$) complications identified. One patient reported mild decrease in sensation postoperatively.

DISCUSSION

While most patients undergoing surgical correction for PD were successfully managed with a single procedure, 5.2% of the men in the present series required repeat intervention, all of whom underwent salvage plication. Our revision rate is within the 2.1–29% range reported by existing case series (Table 2).^{1,6–9,11,14,15} In the largest series to date, Ralph et al.⁶

Table 1. Characteristics and outcomes of patients undergoing salvage plication

Patient	Age (y)	Initial DOC	Initial direction of curvature	Initial procedure	Time to failure (mo)	Initial resolution of curvature	DOC at failure	Salvage technique	Success of salvage
1	49	45	Left + dorsal	8-dot procedure	13	No	45	8-dot procedure	Yes
2	46	50	Left + dorsal	8-dot procedure	5	Yes	35	8-dot procedure	Yes
3	54	60	Dorsal	Incision and grafting	4	No	45	16-dot procedure	No
4	67	80	Left + dorsal	16-dot procedure	3	Yes	30	16-dot procedure	Yes
5	57	45	Dorsal	16-dot procedure	15	No	45	16-dot procedure	Yes
6	58	45	Ventral	16-dot procedure	12	Yes	45	8-dot procedure	Yes
7	61	45	Left	8-dot procedure	9	Yes	90	16-dot procedure	Yes

DOC = degree of curvature.

reported a 10% failure rate. However, a modern series by Cordon et al¹ demonstrated a salvage plication rate of only 2.1%. Conversely, a series of 132 men undergoing 16-dot plication reported by Gholami and Lue⁷ noted 100% success at 6 months. However, there was a 15% recurrence rate at 2 years, with no detailed description of subsequent management. Although the overall incidence seems small, it is important for the reconstructive urologist to understand the potential etiologies and options for plication failure.

Salvage procedures for PD may be due to underestimation of curvature at the initial procedure. In our series, 63% (n = 5) of patients undergoing salvage plication had baseline ED. It has been observed that curvature severity can be underestimated in men with ED, even when using vasoactive agents to induce erection, as the curvature will appear most severe with full rigidity.¹ In addition to inadequate rigidity, patient-provided photographs may fail to demonstrate the full degree of curvature owing to inadequate positioning of the camera to provide ideal positioning of the penis on the appropriate plane for assessment. Despite our use of both preoperative photographs and intraoperative saline-induced erections, a small number of patients experienced residual curvature that they found unacceptable. One of them initially had an 8-dot procedure, later salvaged by a repeat 8-dot plication. While it is possible that an initial 16-dot procedure could have avoided additional surgery, intraoperative curvature at the end of the first repair did not seem significant, and we err on placing as few sutures as necessary to obtain what we would interpret as functionally straight erections.

Table 2. Summary of the failure or revision rates after penile plication for Peyronie's disease

Study	Cohort size	Failure/revision rate (% , n)
Cordon et al	340	2.1%, n = 7
Ralph et al	359	10%, n = 36
Gholami and Lue	132	0%, 15%, n = 20
Thiounn et al	29	19%, n = 6
Geertsen et al	28	29%, n = 8
Licht et al	28	7%, n = 2

This is part of an effort to minimize the perception or degree of length loss. One case notably had a repeat 16-dot plication after initial 16-dot procedure with a successful outcome, suggesting that some men may undergo extensive suture-based correction instead of grafting.

A subset of patients in this series noted initial success followed by either delayed recurrence or development of a new form of curvature. 2 men noted new onset curvature contralateral to the initial direction (eg, left to right and ventral to dorsal), which may have been the product of overcorrection that was not appreciated on the initial return to sexual activity, or development of a new fibrotic insult. Another 2 patients experienced gradual increase in curvature of the same direction, suggestive of disease progression. Significantly, both men reported absence of pain or change in curvature for multiple months before their initial operation, suggesting they were beyond the active phase of the disease at the time of initial surgery.

Allowing for varied definitions of "success," penile plication has been associated with rates of success reportedly as high as 99%.^{2,16} However, multiple publications attest to recurrence rates around 10% of cases.^{17,18} Outcome metrics may include subjective improvement in curvature, reduction of curvature lower than a cutoff value, or complete resolution of curvature.^{1,2,7,16,19} Although guidelines may support the notion of functional straightness with a degree of curvature at or less than 20°, this is not synonymous with patient satisfaction. Ideally, a "successful" surgery would produce a satisfied patient. Although subjective, patient-reported satisfaction after salvage was high. Use of validated questionnaires in future cases would bolster the quality and interpretability of subsequent reporting.

In addition to varied definitions of success, the length and type of follow-up can influence rates of success and recurrence. Similar to our series, Cordon et al¹ noted a median time to revision surgery of 6 months. However, Gholami and Lue⁷ followed up their cohort for a mean of 2.6 years using telephone interview or office examination and reported recurrence in 15% of patients. Early identification seems more likely to represent undercorrection. Deformities presenting a year or more after the initial repair may reflect new lesions. Another possibility for delayed recurrence

could be suture failure, especially with small changes in curvature in the ipsilateral direction after a prolonged interval.²⁰ In addition, improved erectile rigidity, possibly from pharmacologic therapy, could result in increased detection of curvature.

Severe curvature (eg, $>60^\circ$) and multiplanar deformities are often viewed as relative contraindications to plication.¹¹ However, multiple authors have shown efficacy of plication in this setting. Hudak et al¹² compared plication outcomes in men with simple ($<60^\circ$) and complex (biplanar, or $>/=60^\circ$) deformities. There was no significant difference in subsequent impressions of penile length or improvement of curvature. However, the more complex defects required a greater number of sutures.¹² Similarly, in our series of 105 men undergoing initial penile plication, 49 (46.7%) and 31 (29.5%) had severe curvature and multiplanar deformities, respectively. While most ($n = 4$; 57.1%) of those requiring salvage plication had 1 or both of these complexities, it is reassuring that 85.7% of achieved functional straightness after a salvage procedure, similar to others' experience.¹

Patients being considered for salvage plication represent a minority of patients with PD. Nonetheless, detailed preoperative discussion to set reasonable patient expectations is essential and should involve identification of potential risk factors for surgical failure (eg, severe curvature, multiplanar defects). All patients undergoing a salvage procedure are examined and submit a new image of their curvature before surgery so that the appropriate recommendations can be made. Although not featured in this study, validated instruments such as the Peyronie's Disease Questionnaire and the Sexual Health Inventory for Men can provide objective measures to better report outcomes. This may allow comparison of subjective and objective metrics to determine how to improve quality of care.³

This study has several limitations. The retrospective nature and the low incidence of men undergoing salvage repairs precludes the performance of descriptive statistics. Although patients were asked about postoperative curvature, symptoms, and satisfaction, these items were not addressed with a validated questionnaire. Many men with PD may suffer from depression, and the Peyronie's Disease Questionnaire allows assessment of both physical and psychological domains.^{3,21,22} However, improvement in physical and psychological symptoms has been shown to parallel percentage improvement in degree of curvature.²³ Thus, it can be inferred that the patients with improved curvature in our series were likely to benefit in these other parameters as well. Patients who reported satisfaction were not asked to provide photographs, and they were more apt to have shorter follow-up. It is possible that these men were content despite curvature that may have been in excess of 20° or that some may have sought care at other institutions. Thus, overall success may be overestimated.

CONCLUSIONS

Approximately 5% of men treated via surgical intervention for PD will undergo a subsequent salvage procedure. Salvage

plication allows for curvature correction and subjective satisfaction in the majority of treated patients. Care should be taken by providers to help patients set reasonable preoperative expectations and to identify risk factors for surgical failure including severe and/or multiplanar curvature, as well as baseline ED. Longer follow-up and multicenter collaboration with use of validated questionnaires seem warranted.

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STATEMENT OF AUTHORSHIP

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