

# The comparison of success status and complications in peyronie disease patients: penile plication versus plaque incision and grating techniques

Çağrı Doğan, Murat Akgül, Cenk Murat Yazıcı, Serkan Şeramet, Hulusi Sıtkı Dayısoylu, Erdem Can Topkaç

Department of Urology Faculty of Medicine, Namık Kemal University, Tekirdağ, Turkey

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## ABSTRACT

**Aims:** This study aimed to evaluate and compare the outcomes of tunical lengthening and shortening techniques for the surgical management of Peyronie's disease (PD) in terms of penile length, patient satisfaction, and complications.

**Methods:** A retrospective analysis was conducted on PD patients who underwent surgical procedures between January 2017 and May 2023 at a single institute. Patient demographics, comorbidities, penile curvature, penile length, and surgical techniques were evaluated. The surgical procedures included plaque incision and grafting, and tunical plication. Post-operative data, including penile length, residual curvature, patient satisfaction, adverse events, and erectile function, were collected at 1-12 months of surgery.

**Results:** A total of 36 patients (mean follow-up period: 432.25±121.14 days) underwent surgical procedures for PD. Penile length in the tunical lengthening group (13.04±1.62 cm) was significantly longer than in the tunical shortening group (10.85±1.24 cm, p=0.001). Tunical shortening procedures were associated with a higher rate of penile shortening (57.1% vs. 6.7%, p=0.001) and suture-related discomfort (38.1% vs. 6.7%, p=0.031) compared to tunical lengthening procedures. Patient satisfaction was higher in the tunical lengthening group (80% vs. 66.7%, p=0.378). There was no significant difference in painful erection during penetrations or incapability of intercourse between the groups. The average length of hospital stay was longer for tunical shortening surgery compared to tunical lengthening surgery (1.27±0.27 vs. 1.79±0.39, p=0.023).

**Conclusion:** Tunical lengthening procedures demonstrated superior outcomes in terms of penile length and suture-related discomfort compared to tunical shortening procedures for the surgical management of PD. Patient satisfaction was also higher in the tunical lengthening group. Clinicians should consider various factors when selecting the appropriate surgical technique for PD, including penile length, the degree of penile curvature, and surgeon experience. Prospective randomized studies are needed to further validate these findings and assess long-term outcomes.

**Keywords:** Peyronie, plication, grafting, penile length, satisfaction

## INTRODUCTION

Peyronie's disease (PD) is a connective tissue disorder of the tunica albuginea, often caused by repeated microvascular trauma during intercourse. Its prevalence rates have been observed up to 20.3% in epidemiological studies.<sup>1</sup> In 1743, François Gigot de La Peyronie, a French surgeon, provided the first detailed description of PD. It was described as a disorder that is characterized by penile curvature and hardening, leading to pain during erection and sexual intercourse.<sup>2</sup> This progressive fibrotic process can cause anatomical and functional changes, including narrowing of the penis diameter, shortening of penis length, and difficulty of maintaining

erectile function.<sup>3</sup> Shortening of the penis due to PD caused a significant physiologic stress on the patients.<sup>4,5</sup>

Many treatment modalities including intralesional injections and surgical procedures have been performed for the chronic phase of PD. Conservative treatment modalities for PD were associated with poor outcomes and current guidelines recommended that it can be only performed to the patients who are not eligible for the surgery.<sup>1</sup> For this reason surgery is the main treatment modality for clinically significant PD. There are various surgical procedures including tunical lengthening techniques such as plaque incision and

**Corresponding Author:** Çağrı Doğan, drcagridogan@gmail.com



grafting, as well as tunical shortening techniques like tunical plication. The type of surgery depends on several factors including the degree of curvature, presence of complex deformity, plaque size, penis length, and side of penile deformity. There is currently no worldwide-accepted standard surgical procedure for PD, and these surgical procedures may carry risks of serious adverse events. For example, tunical plication techniques may lead to penile shortening, while plaque incision and grafting procedures may lead to reduced penile sensitivity and erectile dysfunction. Careful evaluation and individualized treatment planning are necessary to minimize risks and optimize outcomes in the surgical management of PD.

Deciding the best surgical technique is the main point for the treatment of PD. Each surgical procedure has advantages and disadvantages. For this reason, analyzing the surgical outcomes of different surgical techniques is very important. The primary aim of the study was to present the outcomes of surgical procedures of PD at our clinic. The secondary aim of the study was to compare the satisfaction and efficacy of tunical lengthening techniques with tunical shortening procedures.

## METHODS

The study was carried out with the permission of Tekirdağ Namık Kemal University Non-interventional Clinical Researches Ethics Committee (Date: 16.02.2022, Decision No: 2022-02). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The patients who underwent surgical procedures for PD between January 2017 and May 2023 at a single center were retrospectively included in the study. The patients with penile curvature were evaluated with a full medical history and physical examination. Possible risk factors for erectile dysfunction including diabetes, hypertension, hyperlipidemia, frequency of exercise, and tobacco, and alcohol consumption were also assessed. The erectile function was evaluated via the short form of the International Index of Erectile Function Questionnaire-5 (IIEF-5).<sup>6</sup> Penile curvature was evaluated after the intracavernosal alprostadil injection or self-photos during the erection. Stretched penile length in detumescence phase was measured as the distance from the tip of the glans penis to the symphysis pubis and penile diameter was also measured at the circumcision line 1cm below the glans penis. Patients were excluded from the study if they were at the acute phase of PD, had the presence of penile trauma history, had previous penile curvature surgery or had congenital chordee.

Surgical procedures were only performed on patients who were at the chronic phase of PD (>1 year). The type of surgical procedure was selected according to the defined criteria mentioned in previous studies.<sup>7</sup> Patients with more than 60 degrees of penile curvature or complex penile deformity underwent plaque incision and grafting (double Y or H incision), whereas patients with less than 60 degrees of penile curvature underwent Yachia plication procedures. Two types of grafts including saphenous venous patch and bovine pericardium (Dutapech, Coloplast) were used for the filling defect in the corpus cavernosum. Phosphodiesterase type 5 inhibitors were applied to patients after post-operative 2 weeks of surgery and traction exercises were recommended to prevent contraction of graft material for tunical lengthening surgeries. Post-operative data including post-operative penile length, residual curvature, patient satisfaction, adverse events, and erectile function were obtained through face-to-face conversation or teleconference system at 1-12 months of the surgery.

## Statistical Analysis

SPSS software version 25 (IBM, Armonk, NY, USA) was performed with all statistical tests. The sample mean and standard deviations were used to determine the average of collected data as quantitative variables met the normal distribution; otherwise, the sample median and min.-max. value was used for abnormal distribution. For nominal variables in the groups, a chi-square test was used. When the normality assumption was met for both groups, a Student's t-test was used to allow for group comparison. If the normality assumptions for groups were not met, the corresponding nonparametric Mann-Whitney U test was used.

## RESULTS

A total of 36 patients were included in the study. The most common complaint of patients was inability to perform intercourse followed by penile pain during erection. The penile curvature was to the dorsal direction at 21 (58.3%) patients and to the lateral direction at 7 (19.4%) patients. The mean follow-up period for PD was 432.25±121.14 days and the mean duration of PD was 21.52±7.65 months. Comorbidities were also common, with 12 (33.3%) of patients having a history of diabetes, 7 (19.4%) having hypertension, and 5 (13.9%) having coronary artery disease (CAD). Clinico-demographic properties of patients were shown in [Table 1](#).

There were no significant differences between preoperatively in penile length at tunical shortening and lengthening groups. (11,98±1,27cm , 12,21±1,44cm, respectively; p=0.621) Post operative penile length in PD who underwent penile plications was significantly shorter compared to tunical lengthening surgeries. (10.85±1.24,

13.04±1.62; respectively, p=0.001) It was observed that the average change in penis length was -1.13 cm in the tunic shortening methods, while it was +0.83 cm in tunic lengthening procedures. The differences in PD surgery-related penile length were shown in Table -2. Additionally, 12 (57.1%) of 21 patients in the tunic shortening group reported penile shortening, compared to 1 (6.7%) in the tunic lengthening group (p=0.001). Patient satisfaction was also higher in the tunic lengthening group, with 12 (80%) of 15 of patients reporting satisfaction with the surgical outcome, compared to 14 (66.7%) of 21 of patients in the tunic shortening group (p=0.378).

**Table 1.** Clinico demographic properties of patients with Peyronie disease

	Patients with PD
Symptoms of patients at admission	
Difficulty during intercourse due to penile curvature	17 (47.2%)
Penile pain during erection	7 (19.4%)
Erectile dysfunction	3 (8.3%)
Penile lump	4 (11.1%)
Multiple complaints	5 (13.8%)
Side of penile curvature	
Dorsal	21 (58.3%)
Ventral	2 (5.6%)
Lateral	7 (19.4%)
Dorsolateral	6 (16.7%)
The presence of complex deformity	
Hour glass	2 (5,6%)
Pincer deformity	-
Co-morbidities	
DM	12 (33.3%)
HT	7 (19.4%)
CAD	5 (13.9%)
Age (year)	46.58±17.61
BMI (kg/m <sup>2</sup> )	21.14±11.47
The degree of penile curvature	49.21±21.76
Mean follow up period (day)	432.25±121.14
Duration of PD (month)	21.52±7.65
Stretched penile length (cm)	10.27±1.34
Penil diameter (cm)	9.19±0.83
Preoperavite IIEF scores	14.53±4.73
Mean operative time (min)	117.61±50.38
Patients satisfactions	
Yes	26 (72.2%)
No	10 (28.8%)

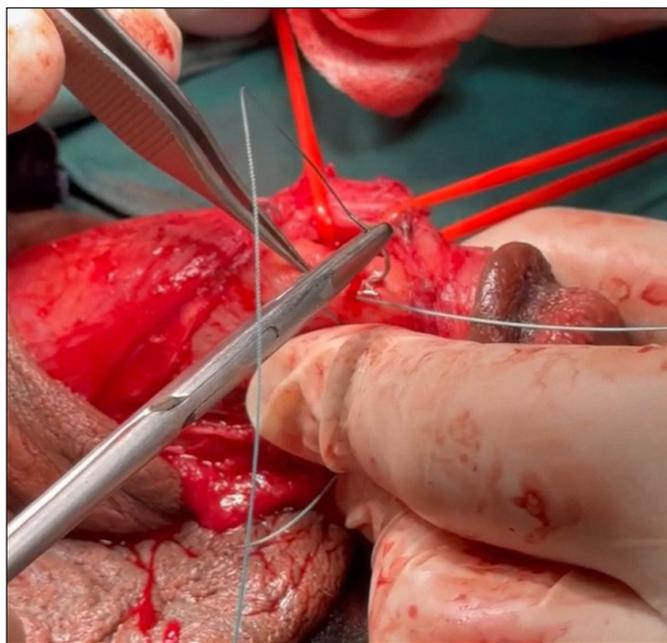
**Table 2.** The outcomes of stretched penile length between tunic lengthening and shortening procedures

	Penile plications	Plaque incision+grafting procedures	p value
Penile length preoperative (cm)	11,98±1,27	12,21±1,44	0,621
Penile length postoperative (cm)	10,85±1,24	13,04±1,62	0.001
p value	0.781	0.478	

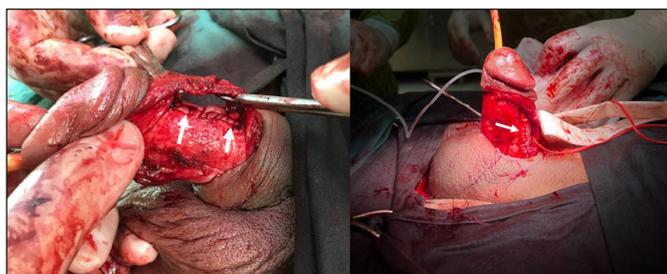
A total of 8 (38.1%) patients who underwent tunic shortening reported suture-related discomfort or pain (painful knots in the penis) whereas 1 (6.7%) patient in the tunic lengthening group reported this side effect (p=0.031). Pain during vaginal penetrations and incapability of intercourse were observed with higher rates in penile shortening group but there was no statistical difference between groups. (p=0.651, p=0.289 respectively) The average length of hospital stay was longer for patients who underwent tunic shortening surgery (1.27±0.27) than for those who underwent tunic lengthening surgery (1.79±0.39) (p=0.023) The comparisons of tunic lengthening technique and tunic shortening techniques at PD patients were shown at **Table 3**.

**Table 3.** Comparisons of tunic lengthening techniques and tunic shortening techniques in Peyronie's disease patients

	Penile plications (n:21)	Plaque incision+grafting procedures (n:15)	p value
Age (year)	47.31±18.61	52.36±7.57	0.248
BMI	20.14±8.14	21.98±9.76	0.785
The degree of penile curvature	49.25±18.23	68.49±29.14	0.001
Mean hospital stay (day)	1.27±0.27	1.79±0.39	0.023
Mean operative time (min)	61.47±19.28	131.69±22.43	0.001
Residual curvature			0.371
< 30 degree	2	3	
30-60 degree	-	-	
Reduced penile sensation			0.151
Yes	1	3	
No	20	12	
Painful erection during intercourse			0.651
Yes	4	2	
No	17	13	
Incapability of Intercourse			0.289
Yes	4	1	
No	17	14	
Painful knots			0.031
Yes	8 (38.1%)	1 (6.7%)	
No	13 (61.9%)	14 (93.3%)	
Complaints about penile shortening			0.001
Yes	12 (57.1%)	1 (93.3%)	
No	9 (42.9%)	14 (6.7%)	
Patients satisfaction			0.378
Good	14 (66.7%)	12 (80.0%)	
Poor	7 (33.3%)	3 (20.0%)	
Penile hematoma			0.579
Yes	2	2	
No	19	13	
De nova ED			0.719
Yes	2	2	
No	19	13	



**Figure 1.** Penile plication techniques for PD patients



**Figure 2.** Plaque incision+ grafting technique

## DISCUSSION

Many surgical treatment modalities with varying success rates were described for the treatment of PD.<sup>8</sup> As it was relatively easy to perform, tunica albuginea plication was commonly performed, in which the convex side of the penile curvature was shortened. This technique may lead to esthetically unsatisfying results. Furthermore, decreasing the penis length with this technique definitely caused patient disappointment. Peyronie's plaque incision and the grafting procedure was known to potentially result in penile elongation. However, it is important to note that this procedure is not without risks. There was a higher likelihood of decreasing penile sensation and the occurrence of postoperative erectile dysfunction at plaque incision technique.<sup>7</sup>

There is limited data in the literature evaluating the complaints of PD patients. We observed that the most common complaint reported by PD patients was difficulty in engaging in sexual intercourse due to penile curvature followed by penile pain during erection. However, a study conducted by Akkus et al.<sup>9</sup> stated that the most frequent complaint among PD patients was discomfort associated with penile plaques. It is worth noting that many articles focusing on Peyronie's

disease often emphasize complications and patient satisfaction while neglecting to address the specific complaints reported by patients. The improvement in patients' complaints at admission is directly related to post-surgery satisfaction and success, so recording complaints during admission is critical. The regression of their problems is associated with the success of the procedure and patient satisfaction. For this reason, the complaints of Peyronie's patients should be documented, and questioned whether their complaints regressed after the intervention.

Plaque incision with graft procedure had a longer operation time compared to the tunical plication technique. This finding was consistent with studies that have utilized buccal mucosa as a graft material, which have reported similar operation durations ranging from 121 min to 145 min.<sup>10-12</sup> While surgical techniques were compared based on hospital stay, it was observed that tunical lengthening procedure had a longer hospital stay compared to the tunical shortening techniques. In our study, saphenous vein and bovine pericardium were used as a graft material and hospital stay (1-4 days) was determined lower compared to the Ainayev et al.<sup>10,11</sup> studies in which buccal mucosal graft was used for PD. (9-10 days)

Our results revealed that the plication technique led to a reduction of approximately 1 cm in penile length, whereas the graft and incision technique resulted in an increase of 0.6 cm. These findings were consistent with previous studies. These studies reported a mean of 1.5 to 3.2 cm penile lengthening during plaque incision and grafting techniques. It is worth noting that long-term follow-up studies have indicated a more modest increase of 0.5 cm.<sup>13-15</sup> There are also publications in the literature reporting that the length of the penis is shortened after plaque incision and grafting procedure.<sup>16,17</sup> Therefore, patients should carefully consider their options when choosing a surgical method. It is important for individuals to consult with their healthcare providers to discuss their specific condition, personal preferences, and expectations in order to make an informed decision regarding the preferred surgical approach.

Patients who underwent plaque incision with graft procedure complained of less penile shortening compared to those in the penile plication group. Additionally, the penile plication group reported higher suture-related discomfort on the suturing side. There was a statistical difference between the groups. Based on the evaluation of patient satisfaction, it is evident that the penile plication group had a lower satisfaction rate compared to the plaque incision with graft group. These findings were consistent with existing literature.<sup>8</sup> We believe that patient satisfaction is directly related to postoperative penile length. De nova ED and reduced

penile sensation was more common in plaque incision with grafting procedure compared to penile plications but there was no significant difference between groups.

### Study Limitations

Our study had some limitations. Main limitation of study was the retrospective design of study. However, the data of the study was obtained during surgery in the operation theatre, which might decrease the bias that may possibly result from retrospective evaluation. The second limitation; there was no penile prostheses implantation treatment modalities in our study for PD. Further randomized studies are needed to confirm these findings and determine the long-term outcomes of these surgical techniques.

### CONCLUSION

In Conclusion, tunical lengthening procedures are more effective and safer than tunical shortening procedures for the treatment of Peyronie's disease in terms of penile length and suture related discomfort. Clinicians should consider many factors including penile length, the degree of penil curvature and surgeon experience when selecting the appropriate surgical technique for Peyronie's disease.

### ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Tekirdağ Namık Kemal University Non-interventional Clinical Researches Ethics Committee (Date: 16.02.2022, Decision No: 2022-02).

**Informed Consent:** Because the study was designed retrospectively, no written informed consent form was obtained from patients.

**Referee Evaluation Process:** Externally peer reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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**Author Contributions:** All the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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