

ORIGINAL ARTICLE

Medium-long-term outcomes of saphenous vein graft in Peyronie surgery: Is there a need for new graft material?



Yavuz Güler

Private Safa Hospital, Urology Clinics, Istanbul, Turkey

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KEYWORDS

Peyronie's;
Saphenous vein graft;
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Abstract

Aim: We present our results of tunical incision and saphenous graft surgery for men with short penis and who cannot have sexual relations due to curvature linked to chronic Peyronie plaques.

Introduction: Peyronie disease is a chronic process where fibrotic plaques form in the tunica albuginea. The plaques cause pain in the acute period and cause the penis to bend after inflammation ends. Surgical procedures are required for curvature $> 30^\circ$. Saphenous vein graft (SVG) replacement is an alternative method for tunical plaque incision defect.

Material-method: The outcomes for 71 patients with TI+SVG surgery were retrospectively assessed. Plaque features (curvature angle, location, direction of curve and tunical defect diameter), operative and postoperative properties (surgery duration, recurrent curvature, penis shortening, glans hypoesthesia, satisfaction score, follow-up duration), preoperative–postoperative penis length and IIEF-5 score differences were assessed.

Results: Mean age was 61.12 ± 7.9 (45–75) years, mean curvature angle was 62.0 ± 14.7 (50–90), location was mid-penile for 46 (65%), with angulation direction toward the dorsal for 37 (52%), and the defect area after tunical incision was 15.5 ± 3.9 (10–23) cm². With mean follow-up duration of 37 ± 9.4 months, 9 patients had re-curvature (13.2%), 8 had short penis (11.3%) and 7 had ED identified (9.4%). Total penis straightening was present for 86.8%, with patient satisfaction score of 21.1 ± 4.4 (8–25).

Conclusion: The TI + SVG method is an effective method for Peyronie surgery in the medium-long term.

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E-mail address: yavuzguler1976@gmail.com

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PALABRAS CLAVE

Enfermedad de Peyronie;
Injerto de vena safena;
Disfunción eréctil

Resultados a medio-largo plazo del injerto de vena safena en la cirugía de Peyronie: ¿Es necesario un nuevo material para injerto?

Resumen

Objetivo: Presentamos nuestros resultados sobre incisión de la túnica y cirugía de injerto de vena safena para varones con cortedad de pene y que no pueden tener relaciones sexuales debido a la curvatura vinculada a las placas por enfermedad de Peyronie crónica.

Introducción: La enfermedad de Peyronie es un proceso crónico en el que se forman placas fibróticas en la túnica albugínea. Dichas placas originan dolor en el periodo agudo y causan la curvatura del pene tras finalizar la inflamación. Son necesarios procedimientos quirúrgicos para conseguir una curvatura $>30^\circ$. El reemplazo con injerto de vena safena (SVG) es un método alternativo para el defecto de la incisión de la placa de la túnica.

Material-Método: Se evaluaron retrospectivamente los resultados de 71 pacientes con cirugía TI + SVG. Se evaluaron las características de la placa (ángulo de curvatura, localización, dirección de la curva y diámetro del defecto de la túnica), propiedades operativas y postoperatorias (duración de la cirugía, curvatura recurrente, acortamiento del pene, hipoestesia del glande, puntuación de satisfacción, duración del seguimiento), longitud preoperatoria-postoperatoria del pene y diferencias de puntuación IIEF-5.

Resultados: La edad media fue de $61,12 \pm 7,9$ (45-75) años, el ángulo medio de curvatura fue de $62 \pm 14,7$ (50-90), la localización fue a mitad de pene en 46 (65%) pacientes, con dirección de angulación dorsal en 37 (52%) pacientes, siendo el área de defecto tras la incisión de la túnica de $15,5 \pm 3,9$ (10-23) cm^2 . Con una duración de seguimiento medio de $37 \pm 9,4$ meses, 9 pacientes presentaron re-curvatura (13,2%), 8 pene corto (11,3%) y 7 DE identificado (9,4%). El enderezamiento total del pene estuvo presente en el 86,8%, con una puntuación de satisfacción del paciente de $21,1 \pm 4,4$ (8-25).

Conclusión: El método TI + SVG es efectivo para la cirugía de Peyronie a medio-largo plazo.

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Introduction

In Peyronie disease, fibrosis occurs in the penis tunica albuginea fascia as a result of a chronic inflammation process causing loss of elasticity of the tunica. After a painful acute inflammation phase lasting mean 6–12 months, palpable nodules and finally curvature preventing entry into the vagina occur in some patients. The etiopathogenesis is not fully understood. Initially, microvascular trauma was blamed. Additionally, diabetes mellitus (DM), smoking, hyperlipidemia and elevated body mass index (BMI) were proposed to play a role in triggering this disease. The prevalence is 3–5% in society and the disease peaks at ages from 50 to 60 years.¹

The disease has two stages of acute and chronic phases. The acute phase generally lasts 6–12 months and pain may be felt in the penis during erection or at rest. In this stage, the inflammation process in the tunica albuginea continues.² Treatment of the acute phase is conservative and some preparations to reduce inflammation led by anti-inflammatories may be used. However, guidelines still do not have a recommended oral medical treatment with high evidence level.³

After the acute phase ends, the period of active inflammation ends and fibrosis takes its final form. In patients, generally hard nodules can be felt in the penis and erection is observed to bend toward the side with fibrosis.

Problems entering the vagina are not experienced by patients with curvature less than 30° . However, patients with curves above 30° may require treatment to ease vaginal entry. Some oral medical and injection treatments for the plaque and shockwave therapy used up to the present day have not provided removal of the plaque. As a result, only surgical treatments have been successful for fibrotic plaque treatment to date. Surgical treatments use tunica albuginea plication, tunica albuginea incision/excision and graft replacement (autograft, allograft, xenograft and synthetic). For curvature below 60° , penile plication techniques provide satisfactory outcomes, but for curvature above 60° , the plication technique causes more than 20% shortening of the penis so graft methods appear to be more satisfactory treatment methods.⁴

Graft to fill the tunica incision defect should be easy to obtain, flexible but thin and be resistant against the increase in intracavernosal pressure. To date, autograft (dermis, tunic vaginalis, tunica albuginea, temporalis fascia, fascia lata, rectus fascia, vein), allograft (cadaver pericardium and dura mater), xenograft (like bovine small intestine submucosa, pericardium) and synthetic grafts (dacron, dextron mesh, gortex, silastic sheets) have been used.⁵ Additionally, tachosyl graft (human fibrinogen + thrombin) is one of the most widely used grafts nowadays.⁶

If we consider the penis corpus cavernosa as being like a vein, it appears vein grafts are the most bioavailable choice

among all these grafts. As a result, for nearly the last 20 years, there has been higher use of saphenous vein for Peyronie surgery compared to other graft materials.⁷

Material-method

The records of 92 patients with penile plaque incision and saphenous vein grafting surgery due to Peyronie disease from January 2008–December 2017 in our clinic were retrospectively assessed. The study included 71 patients. The study included patients without erectile dysfunction or erection problems resolved with phosphodiesterase-5 (PDE-5) inhibitors-intracavernosal agents and vacuum erection devices (VED), with curvature above 45° and only saphenous vein used for graft. Patients with only tunical plication or other graft material used and with missing records were excluded from the study.

Patients were recommended surgery after the painful and acute inflammation process (6–12 months) of Peyronie disease had passed with plaque fixed for at least 3 months. With full erection obtained with 10 micrograms intracavernosal prostaglandin E₁, maximum curvature angle was measured as described. Patients with curvature above 45° were suitable for graft. Demographic data were assessed as age, ASA score, smoking, history of penis trauma, Dupuytren disease and metabolic syndrome (metS) components (BMI, HDL cholesterol, DM and HT) and duration of Peyronie disease.

Preoperative plaque and penis anatomy characteristics were assessed as penis length, curvature degree, location of curvature, angulation, preoperative and postoperative IIEF-5 surveys. All patients had penile vascular sufficiency levels assessed with penile Doppler Ultrasonography (usg).

From peroperative and postoperative data, tunical defect area (length, width, cm²), surgery duration, postoperative retracted penis length, follow-up duration, re-curvature rate, glans hypoesthesia, penis shortening rate, penis excessive straightening, erectile dysfunction (ED) and satisfaction with surgery were included in the study.

All patients attended the clinic 1 month, 3 months and 1 year after surgery. Patients with complaints about curvature and shortening of the penis had full erection induced with intracavernosal 10 mg PGE₂ injection at every appointment to assess penis anatomy. Patients without complaints had penis length measurements performed by inducing erection with the same method in the 3rd month. Patients beginning to have erectile dysfunction complaints additionally had penis Doppler USG performed.

Patients with IIEF-5 score above 21 were accepted as sufficient in terms of erection. Questioning of surgical satisfaction was completed with a 5 question non-validated survey form with a total of 25 points. This form was completed over the phone for most patients within mean 37-month duration. Points above 18 were sufficient for total satisfaction score, 12–18 were moderate satisfaction, and score below 12 was interpreted as dissatisfaction (Table 1).

Surgical method

The penis skin was incised in a circle 0.5 cm distal of the corona and the penis was degloved between the dartos fascia and buck fascia to the base. Then the buck fascia was

elevated lateral of the corpus spongiosum, turned toward the dorsal and the nerve-vein packet was removed and preserved. Saline injection was administered into the corpus cavernosum with scalp needle and erection was obtained by compression of the proximal corpora cavernosa. Maximum angle of curvature was marked. Then a plaque incision was performed in H shape (according to the depth of the plaque). The prepared saphenous vein graft was turned so the endothelial layer was inward and continuously anastomosed with 6/0 vicryl. Artificial erection was induced again with repeated saline injection and the anastomosis line was checked for leaks and curvature. The buck fascia was replaced and sutured and skin was brought together with 4/0 vicryl. Compression bandage with mild pressure was used and the procedure was ended. Patients had urethral Foley catheter inserted for 1 night and the catheter was removed the following morning. Bandages were opened 24 h later and changed with daily dressings. Sexual relations were permitted 6 weeks later.

Preparation of saphenous vein graft

A vascular surgeon assisted with preparation of saphenous vein graft, working simultaneously to the urology team. Skin incision was performed from 3 to 5 cm proximal of the medial malleolus bone at distal to 1 cm posterior of the tibial edge at proximal. After the saphenous vein was identified, the lateral side branches were bound and cut and after the vein was removed from the bed, it was bound proximal and distal. Then the vein was detubularized. The pieces of the vein, separated according to size of the Peyronie plaque, were anastomosed side-by-side with 4/0 SAS to expand the graft area.

Statistical method

Statistics used the SPSS 22.0 (IBM Co., New York, USA) computer program. Categorical data are shown as number and percentage. Continuous data are given as mean $\pm$ standard deviation (minimum–maximum value). Differences between preoperative and postoperative 'stretched penis length' and 'IIEF-5' values were assessed with the independent *T* test. $p < 0.005$ was interpreted as significant.

Results

Of the 71 patients who underwent surgery, mean age was 61.12 ± 7.9 (45–75) years and mean BMI was 28.6 ± 3.0 (22–34). The mean duration of disease before surgery was 7.3 ± 3.2 (2–15) years. Comorbid diseases included DM in 37.7%, HT in 39.4% and smoking in 32.4%. Mean HDL cholesterol was 37.2 ± 7.7 (26–55) mg/dL. Penis trauma history was present in 9.8%, with Dupuytren contracture in 14.1% (Table 2).

Before surgery, the stretched penis mean length (on the side without curvature) was 12.8 ± 1.3 (10.9–15.2) cm and mean curvature degree was 62.3 ± 10.7 (45–90). Of patients, 65% had Peyronie plaque in the central shaft region of the penis. The curvature was toward the dorsal in 52%. The mean tunical defect measured after H-shaped incision

Table 1 Non-validated questionnaire to measure surgical satisfaction.

Point	Not satisfied at all 1	Less satisfied 2	Mild satisfied 3	Guite satisfied 4	Very satisfied 5
Aesthetical aspect					
Rigidity					
Length					
Straight of the penis					
Glans					
hypoesthesia					
Total score					
Satisfaction status according to total score.					
>18 sufficient.					
12–18 moderate.					
<12 dissatisfaction.					

Table 2 Demographic data's.

Age, (year)	61.12 ± 7.9 (45–75)
ASA	1.61 ± 0.66 (1–3)
<i>Metabolic syndrome component's</i>	
HDL (pg/dL)	37.2 ± 7.7 (26–55)
DM (no, %)	20 (37.7%)
HT (no, %)	28 (39.4%)
BMI	28.6 ± 3.0 (22–34)
Smoking (no, %)	23 (32.4%)
ED (no, %)	22 (31%)
<i>Penil trauma (no, %)</i>	
Yes	7 (9.8%)
No	46 (90.2%)
<i>Dupuytren disease (no, %)</i>	
Yes	10 (14.1%)
No	47 (82.4%)
Length of disease time	7.3 ± 3.2 (2–15)

ASA; American Society of Anesthesia, HDL; high density lipoprotein, HT; hypertension, BMI; body mass index, ED; erectile dysfunction.

Age, ASA, HDL, BMI, length of disease time; it was given as mean ± Sd (range; min–max).

to the tunica was 15.5 ± 3.9 (10–23) cm² and preoperative validated erectile dysfunction scoring (IIEF-5) was 23.4 ± 1.6 (21–26) (Table 3).

Mean duration of surgery was 128 ± 19.0 (95–170) min. Patients were followed for a mean of 37 ± 9.4 (21–56) months (Table 3). Our penis straightening rate during erection was 86% (62 patients). After 21–56-month follow-up durations, patients were requested to fill in the satisfaction form by telephone or face-to-face. The non-validated satisfaction score was obtained from 5 questions with points above 18 considered sufficient. The mean score was 21.1 ± 4.4 .^{8–25} While 6 patients reported moderate satisfaction (12–18 points), 3 patients reported low satisfaction with 8 points. As a result, we observed that 86% of our patients were satisfied with this surgery in the long term (Table 4).

Table 3 Plaque and penis feature's.

Angle of curvature (°)	68.3 ± 10.7 (60–90)
<i>Location of curvature (no, %)</i>	
Proximal	11 (15%)
Middle	46 (65%)
Distal	14 (20%)
<i>Angulation of curvature (no, %)</i>	
Dorsal	37 (52%)
Dorso-lateral	10 (14%)
Ventral	5 (7%)
Ventro-lateral	5 (7%)
Lateral	14 (20%)
Defect length of tunica (DLT) (cm)	5.5 ± 1.5 (3–8.5)
Defect width of tunica (DWT) (cm)	2.8 ± 0.5 (2–3.7)
Defect area of tunica (DAT) (cm ²)	15.5 ± 3.9 (10–23)
DLT, DWT and DAT; it was given mean ± Sd (range; min–max).	

After surgery, the stretched penis length was mean 12.6 ± 1.4 (9.5–15.2) cm, with mean 0.2 cm shortening, though this was not significant ($p=0.970$). In a total of 8 patients (11.3%), penis shortening was identified with 5 cases < 1 cm and 3 cases from 1–2 cm. We identified re-curvature in a total of 9 patients (13.2%) with 4 cases at 10–20°, and 5 case < 10°, but re-curvature did not prevent vaginal entry in any patient. At the end of the first month postoperative, 16 patients (22.6%) complained of hypoesthesia in penis glans, but by 1 year, this hypoesthesia of glans penis was completely resolved. In 5 patients (7.5%), we observed overcorrection at the 1st month check-up, but within 1 year all overcorrecting had resolved on its own. In 7 patients (9.4%) we identified ED or worsening of erectile function postoperatively which did not require penis prosthesis but resolved with PDE-5 inhibitors-intracavernosal vasoactive agents and VED. Of the 22 patients receiving support treatment for ED preoperatively, there was no change in erection status, apart from 2 patients. These 2 patients (2.8%) required penile prosthesis after surgery (Tables 4 and 5).

Table 4 Postoperative results and complications.

Operation time (min)	128 ± 19.0 (95–170)
Follow-up (month)	37 ± 9.4 (21–56)
Re-curvature (°)	9 (13.2%)
10–20	4
<10	5
Glans hypoesthesia (no, %)	16 (22.6%)
Shortening of penis, cm (no, %)	8 (11.3%)
<1 cm	5
1–2 cm	3
Overcorrecting (no, %)	5 (7.5%)
ED/Worsening of erectile function (no, %)	7 (9.4%)
Penile prosthesis (no, %)	2 (2.8%)
Satisfaction	21.1 ± 4.4 (8–25)
Operation time, follow-up, satisfaction; it was given mean ± Sd (range; min–max). ED; erectile dysfunction.	

Discussion

In spite of increasing clinical experience and definition of a variety of surgical methods, currently there is no gold standard method for surgical treatment of Peyronie disease. Levine and Lenting developed a surgical treatment algorithm according to the degree of deformity and significance of type in Peyronie disease.⁸ Accordingly, they decided that the plication method was more suitable for patients with angle less than 60° and sufficient erection capability. Contrary to this, they recommended patients with complex, bidimensional curvature, hourglass deformity, hinge effects and curvature larger than 60° be treated with incisional and excisional methods.

The first surgical intervention using graft for Peyronie patients was performed by Lowsley and Gentile in 1947.⁹ These two authors filled the excised plaque defect with free fat plaques. In later years autograft and allografts (e.g., free dermis, tunica vaginalis, lyophilized dura mater, human cadaver dura) and synthetic (dacron, dextron mesh, gortex, silastic sheets) material were used to fill the excised plaque defect area. Initially, these substitution tissues were used to close the excised plaque defect. However, when it was understood that tunica albuginea excision had a negative effect on postoperative erectile dysfunction, Gelbard and Hyden defined tunical incision for the first time in 1991.¹⁰ In later years, temporalis fascia, bovine small intestine submucosa, bovine/porcine pericardium and deep dorsal vein grafts were used.

Carrier and Lue defined the saphenous vein graft method.⁴ Material to be used for grafting should be compatible with tissue, flexible, resistant, as thin as the tunica

albuginea and easy to obtain. Animal studies found fibrosis rates 4 and 6 months after vein grafting were similar to control groups. Additionally, though the normal tunica albuginea has relatively thin distribution of circular and longitudinal elastic connective tissue it can sustain vein grafting; in other words, within 6 months vein grafting transforms into tunica albuginea.¹¹ Vein grafting additionally (i) reduces thrombus formation due to endothelial NO synthesis, (ii) is sufficiently flexible and resistant to blood pressure due to containing muscle tissue and elastin connective tissue in the wall, and (iii) can be easily nourished from the cavernous sinus due to vein diameter being below 1 mm. As a result, though a second surgical incision is opened to obtain saphenous vein grafting from the patient, it is a grafting material that is easily obtained and provides effective results for Peyronie patients. Since definition by Lue and El-Sakka in 1998, it is still used as the most optimal substitution material currently.⁴ Additionally, another reason for selection is that the lumen width and wall thickness of the saphenous vein has sufficient tissue to close the tunical incision better than the penis deep dorsal vein. Different to plication and/or commercial/readymade grafts, a second incision is required to obtain autologous saphenous vein graft and this situation appears to be a disadvantage increasing surgery duration. In the literature, mean surgical durations are reported as 108–234 min.¹² De Stefani reported they obtained saphenous vein with the 'stripping' technique and as a result lowered the surgical duration to mean 108 min.¹³ We worked as two teams of penile and graft surgical teams simultaneously, and finished our operations in a short duration of 128 min.

Straightening of the penis during erection is the most objective finding showing postoperative success of this surgery. With postoperative 10–19-month follow-up and patients with curvature degrees of 56–75.5°, in the postoperative period 73–93% obtained full penile straightening in erection.^{7,13–20} After long-term follow-up of 41.7 months, Kadioğlu²¹ obtained complete penis straightening in 75.7%, while Backhaus²² obtained full penile straightening in 65% of patients with high mean angulation of 86° at the end of 19 months. In our study, after medium-long-term follow-up (37 months) and mean 62° curvature, 86.8% of our patients obtained total penis straightening, which is within reported limits for surgical success in the literature. Some patients with high degree of curvature may still have curvature after the graft replacement.¹⁶ To provide sufficient penis straightening, placing plication sutures on the convex side (contralateral to curvature) of the penis in these patients will increase surgical success.¹⁶ We placed a plication suture in the same session after grafting to obtain complete penis straightening in 17 of our patients (23.4%) and obtained full penis straightening peroperatively. J. Kalsi used additional plication suture in 38% of patients to obtain sufficient straightening and reported the curvature degrees

Table 5 Preop and postop comparison of length of penis and IIEF-5 score.

	Preoperative	Postoperative	P
Strength penis length (cm)	12.8 ± 1.3 (10.9–15.2)	12.6 ± 1.4 (9.5–15.2)	0.970
IIEF-5	22.4 ± 2.8 (15–25)	21.2 ± 5.7 (6–25)	<0.001

The results was given mean ± Sd (range; min–max).

for patients requiring plication suture were mean 5° higher.²³ In the literature, it appears plication sutures are used at rates of 12–88%.^{14,16,24}

Some patients with full penile straightening during surgery reported they began to identify curvature from the 6th week. The development of curvature again is thought to be caused by graft contraction, necrosis and/or development of fibrosis over time. Additionally, patients with higher degree of curvature in the preoperative period appear to have higher incidence of postoperative residual and/or re-curvature deformity.²² In this study, our patients had mean preoperative curvature of 62°, and after long-term follow-up (37 months), we identified a total of 9 patients (13.2%) had asymptomatic re-curvature not affecting vaginal intromission. Similar to our study, in the literature re-curvature development is reported at mean rates of 7–20% after IVP.^{2,14,21,24,25} Additionally, as in our study, most recurrent curvature remains at clinically insignificant dimensions that does not prevent entry of the penis into the vagina (<30°).^{7,13–15,19} Recurrence of large and symptomatic curvature >30° unfortunately requires repeat operation. Adeniyi¹⁶ and Backhaus²² observed recurrent curvature of >50° and 70° in one patient each. Adeniyi performed a re-Leu procedure 9 months later and reported full penile straightening was obtained.¹⁶

Though some authors have proposed they obtained lengthening of the penis with the IVP technique,²⁶ it does not appear possible to obtain lengthened penis after this operation. As a result, the best possible explanation is that penis length in the postoperative period is the same as the convex side or a little bit shorter.¹⁹ In the literature, there are studies reporting 0–40% penis shortening.^{2,24,25,27} Though saphenous vein graft is the graft material with highest biocompatibility, in advancing periods different to the early period an amount of penis shortening is unavoidable due to graft contraction and minimal fibrosis. Chang reported 1-inch longer penis length in patients using VED everyday beginning 6 weeks after surgery for a total of 6 months compared to patients who did not use VED. Additionally, some authors have recommended using PDE-5 inhibitors from the early period to prevent graft contraction.¹⁹ However, as in our study, general penis shortening occurring with the IVP technique does not reach levels that affect the patient's sexual life.²³ Interestingly, it appears that objective data about penis length and patient statements do not match each other for the most part. A study with 32-month follow-up reported that though no objective difference was observed in preoperative and postoperative penis lengths, 40% of patients complained about penis shortening.²⁸ A way to resolve this situation lowering patient satisfaction scores in the late follow-up period is to ensure that patients do not have fantastic expectations about penis length after this surgery in the preoperative period.

The penis dorsal neurovascular bundle (NVB) is found below the buck fascia and above the tunica albuginea. Fibrosis in dorsal Peyronie plaques may involve the NVB especially. As a result, it is also important to dissect the NVB from the fibrotic plaque in this stage for restoration of the NVB. However, during dissection of the plaque from the NVB, there is benefit in taking care that the penile artery and cavernous artery collaterals and nerve branches are not harmed. In this stage of the surgery, the use of microscope or loupe is

recommended to prevent damage to the NVB branches. Some authors have cited that it is more reliable to elevate the NVB with part of the fibrotic tissue. Lue recommended a medial approach for complete restoration of the NVB.⁴ Accordingly, with longitudinal incision of the buck fascia from the periurethral region and then continuing with dissection toward the dorsal between the buck fascia and tunica albuginea, it is recommended that elevation of the NVB with the buck fascia is safe. Additionally, postoperatively the veno-occlusive mechanism mainly responsible for the tunica albuginea may be disrupted after surgery. All these reasons may cause postoperative ED development.

Lue reported newly-developing erectile dysfunction at rates of 5–20% postoperatively in the literature.^{2,7,14,24,25,29} Studies have reported that patients with larger curvature angle and plaque diameter, using larger grafts, with long duration of Peyronie disease, and with history of DM, HT and cardiovascular diseases have greater risk of postoperative ED.¹⁶ At the same time, patients with erection defects treated with oral sildenafil and/or intracavernosal injections in the preoperative period are reported to have increased erection problems in the postoperative period. Chang reported that in Peyronie patients with erection induced by sildenafil, intracavernosal agents or VED in the preoperative period, 50% reported worsening erection in the postoperative period.²⁹ In our study, though 7 patients developing ED had preoperative IIEF-5 scores above 22, all had plaque with dorsal localization which was larger compared to other patients, with at least one comorbid disease. Penis Doppler USG postoperatively found that 7 patients had peak systolic arterial rate below 35 mL/s and 4 had peak diastolic venous flow above 5 mL/s; as a result, it was identified the veno-occlusive mechanism was disrupted. Apart from these 7 new ED patients, of the 22 patients with erection problems resolved with sildenafil and intracavernosal agent injection in the preoperative period, 2 had worsened erection disorder and required penis prosthesis within the 1st year.

Neuropaxia occurring due to NVB dissection is reported to cause temporary sensation loss in penis skin especially in the glans penis.¹⁷ Metin²⁰ reported that 33.3% of patients experienced temporary variations in penile sensation within 4 months, while El-Sakka¹⁴ reported sensation variations lasting 6 months in 10%. In our study, in parallel with the literature, 16 patients (22.6%) had glans hypoesthesia resolving within 1 year.

In the literature, though there are studies providing long-term saphenous vein graft substitution surgery results like 13 years,¹⁸ we see short- and medium-term outcomes in most studies.^{7,13,15–17} Some studies with long duration follow-up reported operation success in the early period reduced in later years. A 5-year follow-up study reported rates of erectile dysfunction and penis shortening rose to 22.5% and 30%, while patient satisfaction rates fell from 86% to 60%.^{23,28} As seen in our study, among complications only glans hypoesthesia appears to completely resolve in the long term. As a result, we think our mean 37-month patient follow-up duration is very sufficient to determine the quality of this operation.

Even though patients with postoperative ED and penis shortening gave low points for satisfaction, 86% of our patients were understood to be satisfied with this

operation even during long-term follow-up. In the literature, there appear to be similar rates in validated and unvalidated satisfaction survey scoring.^{19,26}

The greatest limitation of our study is that it is retrospective and though the mean is good compared to the literature, we think the sample number is low. The lack of any patient with hourglass defect may affect the surgery outcomes. The other limitation of the study the use of a unvalidated tool to assess satisfaction. However, we think our study will contribute to meta-analyses performed and guidelines to be prepared in the future.

In conclusion, there is still no gold standard graft method for Peyronie disease at present. The saphenous vein graft method obtains autograft without cost, though it requires a second incision and team to obtain the graft. With patient satisfaction score of mean 21.1 ± 4.4 , it is a good alternative graft method for Peyronie disease with acceptable success and complication rates.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Conflict of interest

The authors declare that they have no conflict of interest.

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