

# Surgical management: saphenous vein grafts

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**Peyronie's disease is a medically and surgically challenging condition to manage. Most surgical techniques to correct the penile deformity often shorten the penis and do not address the issue of hourglass deformity when present. We describe our indications, rationale and technique for the use of a saphenous vein graft after a curvature correcting plaque incision. In reviewing multiple series, this approach yields similar results—incidence of residual curvature: 4–20%, decreased potency: 5–20%, penile shortening: 17–40%. While harvesting the vein would require a second incision, the use of autologous vein appears to be associated with the least amount of intracavernosal fibrosis. We propose that saphenous vein is currently the best material available for tunical patching. The technique and results of circular venous grafting for patients with severe penile shortening secondary to Peyronie's disease is also discussed.**

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## Introduction

Reconstructive surgery for Peyronie's disease continues to be a challenge for urologists and plastic surgeons. Two major types of repair have evolved over the last two decades. The tunical shortening procedures, including plication and the Nesbit wedge resection, have had their successes for mild to moderate deformities. These techniques do have the drawback of penile shortening and the inability to correct the hourglass deformity.<sup>1,2</sup> Grafting procedures, which are able to lengthen the contracted area, have been performed with diverse results.<sup>3</sup> The goals of surgical repair for Peyronie's disease are a straight phallus without constriction and avoidance of worsening of erectile function. While several different materials (synthetic, autologous and cadaveric) have been tried for the grafting procedure,<sup>4</sup> we believe that saphenous vein grafts provide the best physiological substitute for the tunica albuginea. We will describe and report our experience with this technique for penile curvature, narrowing or shortening due to severe Peyronie's disease.

## Evaluation

A full history and physical examination is performed with particular emphasis on the onset and duration of symptoms, erectile function, and history of genital trauma or surgery, relatives with Peyronie's disease or Dupuytren's contracture. Examination should reveal the number, size, and location of the plaques, amount of foreskin present and penile length in the flaccid and erect state (both the long and short side). Intracavernous injection (ICI) with a vasodilator to produce an erection is mandatory to allow inspection of curvature or indentation of the penis. We also routinely perform color duplex ultrasound to evaluate penile vascular function and detect communications between the cavernous, dorsal and spongiosal arteries. If a major communication between the dorsal and cavernous artery is located at or near the plaque, the possibility of postoperative erectile dysfunction is increased and we would recommend plication procedure instead.<sup>1</sup>

## Rationale for saphenous vein graft

In essence, the penis is a blood vessel and the tunica albuginea is equivalent to a vessel wall. The saphenous vein, therefore, has the following theoretical advantages as a substitute for the diseased tunica: (1) The endothelium, by releasing anti-coagulation factor such as nitric oxide, prevents hematoma formation under the graft; (2) the thick-

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ness of venous wall is similar to the tunica; (3) its muscle coat and elastic fibers provide excellent elasticity; (4) since the wall of saphenous vein is less than 1 mm in thickness, it can establish blood supply at once from the lumen of the corpus cavernosum and thus prevents graft contracture from ischemia. The disadvantages include the need for a second incision, hematoma or lymphocele formation in the thigh or leg, and shortage of graft for coronary artery disease if the patient requires one in the future.<sup>3,5</sup>

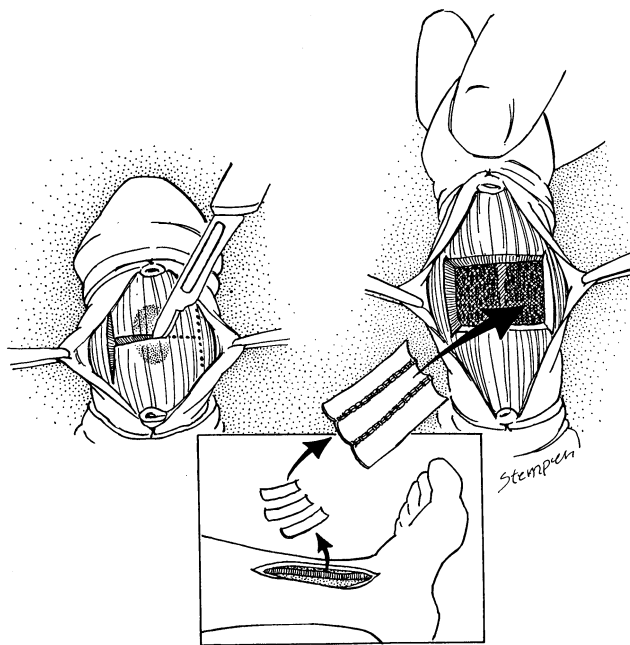
## Surgical technique

### *For penile curvature*

A circumcising incision is made and the penile shaft skin is dissected in a degloving manner down to the penile base. In the case of a dorsally located plaque, the Buck's fascia is opened and the deep dorsal vein is resected. The dorsal arteries and nerves on both sides are carefully dissected away from the tunica and the plaque leaving the fibrous tissue behind. This step restores the length of the neurovascular bundle and is the most important part of the entire surgery. To avoid injury to the dorsal nerve and artery, dissection under optical magnification is highly recommended. In the case of a ventrally

located plaque, the corpus spongiosum is dissected from the ventral surface of the corpora cavernosa. An artificial erection is induced by infusing normal saline via a scalp vein needle with simultaneous compression of the penile base. The apex of the curvature is marked out horizontally. This mark forms the middle bar of the H-shaped relaxing incision (Figure 1). It should extend at least 1 cm beyond the plaque. Once the H-shaped incision is made, the penis is stretched longitudinally and transversely to measure the dimensions for the tunical defect. The length of the saphenous vein needed to cover the defect can thus be determined.

Either the distal or proximal saphenous vein can be used for the graft material. We prefer the femoral portion of the saphenous vein as this affords a thicker graft and fewer separate segments needed to form the final graft. The harvested vein is detubularized and divided into equal length segments. Vascular clips are used to assemble the segments on their adventitial surface to make the final patch (Figure 1). The patch is then sutured with the endothelial side facing the erectile tissue using a running 4-0 polyglycolic acid suture. Intracavernosal saline injection is used to check for leakage and to determine whether another patch or possibly a compensating plication stitch is necessary. Once there is no significant leakage and the penis is straight with artificial erection, the Buck's fascia is closed with 4-0 polyglycolic acid sutures and the skin with 4-0 chromic sutures. A urethral catheter is inserted and a noncompression circumferential dressing is applied. The glans should be checked 1–2 h later to ensure good perfusion. On post-operative day one, the catheter is removed and the dressing is changed. The patient is taught to change the dressing once daily for 10 days and told to abstain from sexual activity for 6 weeks.<sup>3</sup>



**Figure 1** The H-incision is made through the plaque (upper left diagram) after dissection and lateral reflection of the neurovascular bundles. Stretching of the penis will reveal the area of defect and the amount of coverage needed (upper right diagram). The saphenous vein is harvested, detubularized, cut, and reformed into a graft with vascular clips on the adventitial surface (bottom diagram). The endothelial surface should face into the corpora.

### *For penile indentation or hourglass deformity*

The procedure is similar to the previous one except for the following: (1) the neurovascular bundle is dissected from the paraurethral ridge toward the dorsal aspect; (2) a tunical incision is made on the lateral aspect of the penis with the middle bar of the H placed longitudinally; (3) a longitudinal graft is used for unilateral indentation; (4) two separate longitudinal grafts are needed for an hourglass deformity.<sup>4</sup>

### *For penile curvature with hourglass deformity*

A capital 'H' type incision is made and an H-shaped graft is constructed to expand the tunica albuginea both longitudinally and transversely.

## Results

We previously reported performing this operation on 145 patients with follow-up available for 112 patients. We achieved complete correction of the curvature in 96% with preservation of penile length in 83%. Thirteen per cent of preoperative potent patients developed erectile dysfunction (ED) while 45% of the preoperative ED patients complained of worsening erectile function. Improvement in social and psychological well-being which resulted in overall satisfaction occurred in 90% of patients postoperatively. The side effects include: impotence, numbness, penile pain, incomplete correction, recurrence, lymphocele and wound infection in the leg, etc.

## Discussion

There are no established absolute indications for performing venous grafting to correct Peyronie's curvature versus using other techniques. Because plication procedures can shorten the penis, patient preference against this possibility would sway us toward venous grafting. While other materials have been used, venous grafting has led to the least amount of intracavernosal fibrosis.<sup>6</sup> We do not recommend venous grafting for patients with erectile dysfunction even if they are satisfied with medical therapy for their ED because of an almost 50% probability of worsening erection in these patients. For patients with normal erectile function, a 13% incidence of postoperative ED occurred in our patients and therefore careful preoperative counseling of risks and complications is mandatory. Patients should be made aware that the postoperative length will be equal to, or slightly shorter than the long side of the erect penis (except with circular grafting) and those with unrealistic expectations should not undergo this operation.<sup>5</sup>

Various investigators have reported their successes with this technique since the first report by Lue *et al*.<sup>5</sup> Montorsi *et al* reported their series of 50 consecutive patients who received plaque incision with saphenous vein grafting. Minor residual curvature was reported at 14% and significant recurrence was 6%. Slight penile shortening was present in 40%. No patients had significant shortening. Decreased potency postoperatively was present in 6%.<sup>7</sup> Other investigators have had very similar results (see Table 1).<sup>5,7-10</sup>

Montorsi *et al* suggested these inclusion criteria for venous patch grafting: 45 degrees or greater curvature, stable disease for 6 months, inability to penetrate, normal subjective penile rigidity (by patient report), normal Doppler penile study, normal Rigiscan test.<sup>7</sup> Our indications for this proce-

**Table 1** Results of plaque incision and venous patch to correct Peyronie's curvature

	<i>Residual curvature</i>	<i>Decreased potency</i>	<i>Penile shortening</i>
El-Sakka <i>et al</i> <sup>5</sup>	4%	12%	17%
Montorsi <i>et al</i> <sup>7</sup>	20%	6%	40%
Ralph <sup>8</sup>	15%	20%	25%
Akkus <i>et al</i> <sup>9</sup>	7%	9%	26%
Kadioglu <i>et al</i> <sup>10</sup>	20%	5%	0%

cedure included penile shortening, severe curvature, penile narrowing and/or a failed previous attempt at correction. We suggest that erectile dysfunction refractory to ICI, which can be secondary to the Peyronie's disease process, would be an indication for penile prosthesis placement at the time of grafting.<sup>3</sup>

## Circular grafting

For patients with severe penile shortening due to Peyronie's disease, we have previously reported our experience with performing circumferential grafting using saphenous vein graft.<sup>11</sup>

## Technique

A similar approach is used to obtain exposure for circumferential grafting as previously described for venous patch grafting. After a circumcising incision is made and a degloving dissection performed to the penile base, the deep dorsal vein is also resected. With loupe magnification, the dorsal arteries and nerves, and the corpus spongiosum are carefully dissected off the corpora cavernosa. A horizontal relaxing incision is then made through the middle of the plaque and extended for the circumference of the tunica albuginea. The septum is also transected. The circumference and the longitudinal gap are measured so the length of the saphenous vein required can be estimated. A circular graft is constructed and sutured to the tunica albuginea to cover the defect. Following surgery, the patient is instructed to use a vacuum erection device (VED) to stretch the penis daily for 6 months beginning at the second postoperative month. Because of the severity of the disease and the extent of surgery, these patients are unlikely to regain full erection after surgery. Therefore, the patient should be made aware that a vacuum erection device will be required to produce adequate erection for sexual intercourse after surgery.<sup>11</sup>

## Results

We have performed this procedure on seven patients with moderate erectile dysfunction and severe penile shortening from Peyronie's disease. One patient who did not use the VED gained 1 inch of length while all the others who did use the VED gained 2 inches at 6 months.

All patients reported decreased rigidity with erections, but the VED was effective in inducing erections adequate for intercourse. All patients were satisfied with the regained length achieved by the surgery. Two patients subsequently underwent implantation of an inflatable penile prosthesis without difficulty.

## Discussion

Successful artificial tissue expansion has been described in the orthopedic literature (Ilizarov technique).<sup>12</sup> Attempts to lengthen the penis have for the most part failed in the past with the use of weights, severing the suspensory ligament, etc. These procedures have improved flaccid length in some cases but not erectile length. Since the tunica tissue is fibrous and rigid, use of a VED to stretch this tissue does not result in long-term gains in erectile length.<sup>13</sup>

We have described the use of circular grafting with a venous patch for severe penile shortening secondary to Peyronie's disease. With continuous postoperative use of VED beginning at 6 weeks, we have had satisfactory results in achieving recovery of penile length. The vein graft is likely the tissue which is most responsive to stretching forces (applied by the VED in this cases). We expect the vein tissue to thicken, lengthen and eventually become tunica albuginea.<sup>6</sup> Since the patients in our series who used the VED showed no neurovas-

cular compromise, the application of the VED once daily should be safe.

More patients with a longer follow-up are needed to assess the long-term effect of this procedure. Also, since all of the men in our series were impotent preoperatively, the sequelae of this procedure on potent men with normal penises is not known.

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