

LENGTHENING SHORTENED PENIS CAUSED BY PEYRONIE'S DISEASE USING CIRCULAR VENOUS GRAFTING AND DAILY STRETCHING WITH A VACUUM ERECTION DEVICE

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ABSTRACT

Purpose: We evaluated the results of chronic intermittent stretching with a vacuum erection device after circumferential tunical incision and circular venous grafting in 4 patients with penile shortening from severe Peyronie's disease.

Materials and Methods: We performed complete circumferential tunical incision and covered the defect with a circular venous graft in 4 patients with shortened penis as a result of Peyronie's disease. Preoperative evaluation included determination of patient and partner expectations, potency status, measurement of penile length after intracavernous injection and color duplex ultrasonography to determine possible vascular communication. Lower saphenous, upper saphenous and deep dorsal veins served as graft materials. We advised patients to use a vacuum device on a daily basis for 6 months starting 1 month after surgery. Postoperative evaluations were done at 6 and 18 months postoperatively.

Results: At 6-month followup 1 patient who did not use the vacuum device gained 1 inch in penile length and was not available for further followup. The other 3 patients each gained 2 inches but had decreased erectile rigidity due to narrowing in the grafted area (hourglass deformity). One patient who wanted a more natural erection elected penile prosthesis implantation about 1 year after grafting. The remaining 2 patients gained 3 inches at 18-month followup and regained partial penile rigidity similar to preoperative erections when the hourglass deformity improved. All patients were satisfied and indicated that surgery improved psychological well-being as well as relationships with partners.

Conclusions: The results in this small group are satisfactory. Our technique offers a reasonable solution for correction of penile shortening in patients with Peyronie's disease.

KEY WORDS: penis, penile induration, graft

Peyronie's disease is characterized by the development of a circumscribed, painless, dense, fibrous plaque toward which the erect penis angulates.¹ In some patients the fibrous plaque is extensive and involves the whole circumference of the penis, and the septum results in penile shortening rather than angulation during erection. Definitive surgical management of Peyronie's disease has long eluded urologists. For certain indications tunica preserving procedures have had reasonable success, the most popular of which are tunical plication and the Nesbit procedure.²⁻⁵ However, these procedures shorten the penis and do not correct the hourglass deformity. Graft replacement has gained wide popularity, and the use of many autologous and synthetic materials has been reported with varying results but notable shortcomings include graft contracture, curvature recurrence and impotence. Ideally a grafting procedure should result in a straight penis without impairing erectile function. The chief indication for surgery in our patients was significant penile shortening. We present the result of our technique of circumferential tunical incision, circular venous patch grafting and daily penile stretching with a vacuum erection device to lengthen the shortened penis in patients with Peyronie's disease.

PATIENTS AND METHODS

We performed circumferential tunical incision and circular venous patch grafting in 4 patients who complained of shortened penis due to Peyronie's disease, partial penile erection,

inability to satisfy the sexual partner and strong dissatisfaction with the shortened penis. The 4 patients ranged in age from 40 to 62 years (average 52) and had significant penile shortening as a result of Peyronie's disease for several years.

Diagnostic approach. Detailed medical and psychosexual history included duration and progression of symptoms, status of penile rigidity, ability to engage in sexual intercourse, history of penile trauma or surgery, history of medication and family history of Peyronie's disease or Dupuytren's contracture. Physical examination included palpation of the penis to locate and outline the extent of the plaque, circumcision status, and measurement of penile length during alprostadil induced erection and size of the saphenous vein. Color duplex ultrasonography after alprostadil injection was performed to evaluate penile vascular function and any communicating arteries among the cavernous, dorsal and spongiosal arteries. To document penile deformity and shortening we draw the deformed penis (dorsal and side views) on the patient chart after intracavernous injection of alprostadil and genital self-stimulation (the combined intracavernous injection and stimulation test).⁶ Erect penile length was also documented on the chart. To avoid postoperative dissatisfaction due to unrealistic expectations patients were informed that surgery will correct the deformity and lengthen the penis but not improve rigidity.

Surgical technique. Circumferential Tunical Incision: Through a circumcised incision the skin and subcutaneous tissue were reflected to the base of the penis. The deep dorsal vein was isolated, resected and stored in normal saline solution. The paired neurovascular bundles were dissected from midline toward the corpus spongiosum under magnification with 5×

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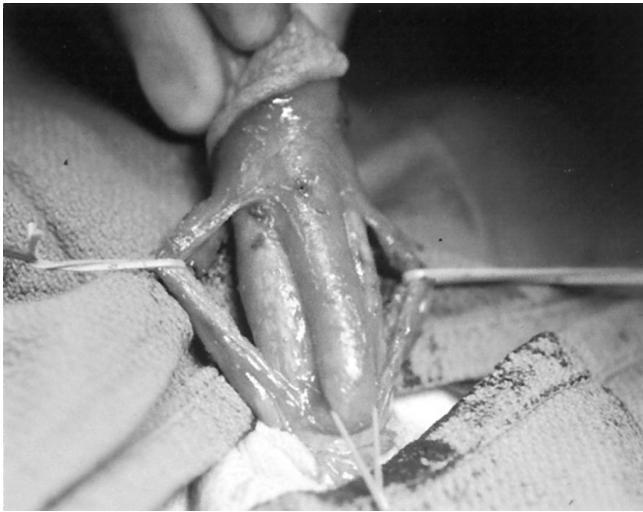


FIG. 1. Dissection of neurovascular bundles and corpus spongiosum off tunica albuginea of corpora cavernosa.



FIG. 2. Circumferential relaxing incision in center of plaque after dissection of neurovascular bundles and spongiosum.

surgical loupes so that the fibrous tissue could be safely removed to restore bundle length (fig. 1). The corpus spongiosum was carefully dissected off the tunica of the corpora cavernosa. The site of the relaxation incision, which was usually the center of the plaque, was marked with a marking pen. A circumferential relaxation incision was made on the tunica albuginea, and the defect was measured with the penis stretched longitudinal and transverse to determine the appropriate size of the graft (fig. 2).

Graft Harvest and Placement: An incision near the ankle was made to isolate a segment of the saphenous vein. If the lower saphenous vein was small, a femoral incision was made to obtain the proximal saphenous vein. The length of the venous segment was determined by the size of the tunical defect. The harvested vein was opened longitudinally and divided into several segments using a nonpenetrating vascular clip applicator for assembly. The clips were applied to the adventitia surface of the vein grafts. The assembled saphenous patch graft was sutured to the defect, endothelial side down, with continuous 4-zero monofilament polyglyconate sutures (fig. 3). Saline solution was injected to induce an erection and assess the deformity. The penile wound was closed with absorbable 4-zero chromic sutures and a Foley catheter was inserted. The leg wound was closed with 4-zero polyglycolic acid suture subcuticularly. The penis was wrapped with a light dressing and checked after 1 hour to ensure adequate blood supply to the glans. The dressing was changed and the Foley catheter was removed the next day. At discharge home the patient was instructed to change the dressing once a day for 10 days and to abstain from sexual intercourse for 6 weeks. We advised all patients to stretch the penis with a vacuum device for 30 minutes daily for 6 months starting 1 month after surgery.

Size of Venous Graft: In 2 patients we used the lower saphenous and dorsal veins (total length 25 and 27, average 0.3 cm.). One patient received a segment of the lower saphenous vein (24 × 0.4 cm.), while another received a segment of the upper saphenous vein (17 × 0.5 cm.). In all patients 1 circular patch graft was enough to provide about 0.75 to 1 inch length intraoperatively (fig. 4).

One patient left the country and was available only for 6-month followup. The other 3 patients were evaluated 6 and 18 months after surgery using a telephone questionnaire administered by one of us (A. I. E.). Two patients subsequently returned to our office for followup and the length gain was confirmed.

RESULTS

The main complaint of all patients was significant penile shortening and 3 also complained of moderate degrees of cur-



FIG. 3. Assembled saphenous patch graft sutured to defect, endothelial side down.

vature during erection. Patients also complained of inability to satisfy sexual partners and were strongly dissatisfied with the shortened penis (table 1). All patients had large palpable plaques and increased echogenicity on ultrasound. Partial (not rigid) erection developed in each patient, and 3 had moderate curvature after intracavernous injection and genital self-stimulation. No significant arterial communications were seen among the cavernous, dorsal and spongiosal arteries on duplex ultrasonography. Of the 4 patients 1 had some degree of cavernous arterial insufficiency and all had penile venous leakage (table 1). All 4 men stated that the penis had become much shorter and smaller during the last several years. Preoperative erect penile length is listed in table 2.

Except slight numbness of the penis from neurovascular dissection and pain during nocturnal erections, no patient had complete anesthesia of the penis, difficult urination, wound infection or hematoma after surgery. At 6-month followup the penis was straight with some indentation at the area of the graft in all patients (table 3). Penile length was 1 inch longer in the patient with only 6-month followup who did not use the vacuum device, and 2 inches longer in the other 3 (table 2). All patients noticed that erections were not as rigid as before surgery because of the hourglass deformity at the graft site but they were able to use the vacuum constriction device to achieve erection sufficient for sexual inter-

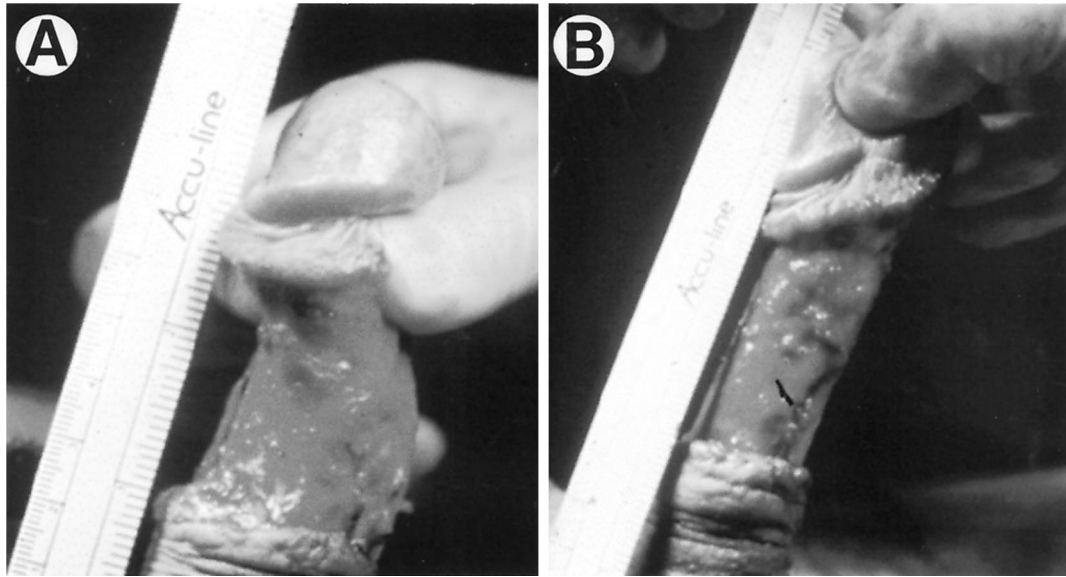


FIG. 4. A, preoperative length about 3.5 inches. B, postoperative length about 4.5 inches.

TABLE 1. Symptoms, clinical examination and duplex ultrasound results

Symptom Category	No. Pts. (%)
Penile symptoms:	
Shortening of penis	4
Shortening + curvature	3
Shortening + nodule	1
Curvature degree:	
Less than 90	4
Greater than 90	0
Erectile dysfunction:	
Yes	4
No	0
Plaque characteristic:	
Moderate (large, multiple)	3 (75)
Severe (calcific)	1 (25)
Echogenicity:	
Increased	3
Calcification	1
Diagnosis:	
Venous leakage	4
No venous leakage	0
Arterial insufficiency	1
No arterial insufficiency	3

TABLE 2. Erect penile length before and after surgery

Pt. No.	Preop. (inch)	6 Mos. Postop. (inch)	18 Mos. Postop. (inch)
1	3.5	5.5	6.5
2	3	5	6
3	5	7	6
4	3	4	?

course. Patient 3 did not like the “unnatural erection” produced by the vacuum constriction device and underwent implantation of an inflatable penile prosthesis about a year after surgery. Six months later he was using the prosthesis regularly for sexual intercourse and was satisfied with the result. No indentation of the penis was noted when the device was inflated and the penis is about 1 inch shorter than the pre-implant length.

Followup was available at 18 months in 2 patients who continued to use vacuum erection devices almost daily to stretch the penis. These 2 patients gained 3 inches compared to the preoperative length (table 2). Penile rigidity during spontaneous erections improved as the hourglass deformity diminished. Both patients were using vacuum constriction devices for sexual intercourse. One patient complained of partial numbness in the glans which did not impair sexual

TABLE 3. Postoperative results

	No. Pts.
Penile straightness:	
Straight	4
Residual curvature	0
Change in penile sensation:	
Yes	1
No	3
Change in penile length:	
Shorter	0
Longer	4
Pain with or without erection:	
Yes	0
No	4
Psychological improvement:	
Yes	4
No	0
Social improvement:	
Yes	3
No	1
Overall satisfaction:	
Yes	4
No	0

pleasure or ejaculation. He admitted a moderate amount of continuous alcohol consumption despite repeated advice to discontinue use until penile sensation returned completely. Overall our patients expressed satisfaction with the results of surgery. They indicated improved psychological well-being as well as stronger relationships with partners. They would not hesitate to advise friends with the same problem to undergo this procedure (table 3).

DISCUSSION

Increasing penile length and girth is the ultimate goal in the treatment of a short penis. For micropenis Kelly and Eraklis reported a technique of detaching the corpora entirely from the ischiopubic rami while preserving the neurovascular structures.⁷ Johnston described lengthening the congenital or short penis in patients with epispadias by partially detaching the crus from the ischial ramus and covering the exposed penis with a split thickness skin graft.⁸ For concealed or buried penis Horton⁹ and Devine¹⁰ et al reported a method of suprapubic lipectomy which includes tacking the suprapubic and proximal penile skin to the pubis, excising the fundiform ligaments or restraining bands of Scarpa's fascia and performing a large lower abdominal Z plasty. Rigaud and Berger lengthened the penis using several approaches, including incision of the tunica albuginea and

patch with a dermal graft, incision of the plaque and implantation of a penile prosthesis without covering the tunical defects, and incision of the plaque, implantation of a penile prosthesis and covering the defect with a synthetic graft.¹¹ Lengthening normal penis with a modified V-Y advancement technique was first reported by Long in 1990.¹² Roos and Lissos subsequently reported their experience with a modification of this technique and claimed an average length increase of 4 cm. with a low complication rate.¹³

A Peyronie's plaque usually leads to fibrosis and penile deviation to the affected side during erection. In patients with multiple, bilateral or septal plaques the erect penis tends to become shorter and narrower. In a subset of patients with trauma and Peyronie's disease associated with impotence Penson et al demonstrated site specific penile venous leakage by cavernosography.¹⁴ All of our patients were impotent (with partial erections) due to the severity of plaque involvement and penile venous leakage. They all had good erections when a vacuum constriction device was applied to the penis and requested penile lengthening. They were given the options of penile prosthesis implantation alone; circular incision of tunica albuginea, implantation of a penile prosthesis and covering the defect with polytetrafluoroethylene or rectus sheath, and circular incision of the tunica, circular saphenous vein graft and daily vacuum erection device stretching for 30 minutes for 6 months starting 1 month after surgery. All 4 patients chose the third option. Because they were all impotent before surgery they were aware that they would need a vacuum constriction device and/or intracavernous injection to function after surgery.

Pregnancy and obesity are the best known examples of physiological tissue expansion. Artificial tissue expansion techniques have been used in various organs, the most notable of which is limb lengthening using the Ilizarov technique.^{15, 16} Similar procedures may apply to the penis but would require the patient to wear a rigid device for months, and would severely interfere with social life and occupation. Wearing penile weights several hours a day has been advocated by some, especially after severing the suspensory ligament to keep the penis from retracting, which may increase flaccid but not erect length by 1 or 2 inches. Because the tunica albuginea consists of dense fibrous layers and is not easy to stretch, we used a saphenous vein graft for the endothelial lining and muscular coat. In theory the endothelial lining of the vein graft provides an endothelial-to-endothelial anastomosis to the cavernosal sinusoidal endothelium, and has the advantages of no hematoma under the graft due to endothelial nitric oxide release, a watertight closure which prevents hematoma and providing nutrients to the vein wall immediately, thus preventing graft contracture. The muscle coat of the vein graft would react to pressure and stretching, increase in size and thickness, and eventually transform into tunica albuginea as shown in a recent animal experiment by Brannigan et al.¹⁷

We prefer daily vacuum erection device (without the constriction ring) stretching for 30 minutes over penile weights because it is easier to use, and expands the length and girth of the grafted area. Patients can also apply the constriction ring on the stretched penis for sexual intercourse. We do not know the optimal duration of stretching. Although patients were told to stop using the device after 6 months of stretching, when 2 inches of length gain was achieved, they all continued daily stretching, which resulted in an additional 1-inch gain in 2 patients at 18 months. The patients were warned about the possibility of recurrent curvature, vascular compromise and hourglass deformity but none of these complications has occurred to date. One patient complained of a small area of numbness in the glans penis which we believe is due to heavy consumption of alcohol, which impairs the recovery of nerve function.

Because all 4 patients were impotent before surgery we do

not know the effects on potency of this procedure in potent men. In addition, penile shortening in all 4 patients was due to Peyronie's disease and, therefore, they have "redundant" corpus spongiosum and neurovascular bundles. We do not know the effects of chronic stretching on the neurovascular bundle and corpus spongiosum in men without Peyronie's disease. However, patients who underwent limb lengthening using the Ilizarov technique had no neurovascular problems as long as lengthening was limited to 1 mm. daily. Theoretically intermittent stretching with a vacuum erection device should have less damaging effects on the neurovascular bundle and penile tissue than constant stretching with a fixed device as in the Ilizarov procedure.

CONCLUSIONS

Chronic intermittent expansion of the penis with a vacuum erection device after circular incision of the tunica albuginea and placement of a saphenous vein graft is effective in lengthening shortened penis due to Peyronie's disease. The preliminary results in this small group were satisfactory, and our technique offers a reasonable solution for patients with severe emotional distress due to penile shortening. However, the effect of such a procedure on potent men with a normal penis is not known.

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