Penile Corporoplasty Using Tunica Albuginea Free Graft from Proximal Corpus Cavernosum—A New Technique for Treatment of Penile Curvature in Peyronie’s Disease

J. Ullrich Schwarzer*, Bärbel Mühlen, Olaf Schukai
Department of Urology, Klinikum Freising, Mainburger Str. 29, D-85356, Freising, Germany
Accepted 17 July 2003

Abstract
Objectives: In Peyronie’s disease, any kind of plication technique for correcting penile deformities is associated with penile shortening in addition to the disease-related shrinkage. To minimize penile shortening we describe a new technique of penile corporoplasty using a free graft from the tunica albuginea.

Patients and Methods: From 10/01 to 2/03 we treated 18 patients with the new technique. All patients had stable Peyronie’s disease with relevant curvature and sufficient erectile rigidity without any signs of inflammatory disease. Penile corporoplasty was performed by incision of the plaques to produce straightening. The resulting gap was covered with a free graft of tunica albuginea removed from the crural segment of the corpora cavernosa.

Results: In a preliminary follow-up of 16 patients, 12 penises were straight and 4 had a residual curvature less than 20°. Two patients needed sildenafil for sufficient penile rigidity. Forteen of 16 patients were satisfactory with the result of penile straightening. No severe perioperative complication was noted.

Conclusion: The technique of penile straightening using a free tunica albuginea graft is effective and avoids additional shortening of the penis. As the results are preliminary, the study is continued to gain experience with a larger number of patients.

© 2003 Published by Elsevier B.V.

Keywords: Peyronie’s disease; Penile corporoplasty; Tunica albuginea graft

1. Introduction
The etiology and pathophysiology of Peyronie’s disease is largely unknown and there is ongoing discussion about the natural history of the disease [1]. It is well accepted that most patients suffer an inflammatory phase of the disease, followed by a stable phase with no change of symptoms. After stabilization of symptoms, penile curvature is the major inconvenience to the patients, which can only be treated by surgical reconstruction. The variety of surgical techniques of penile corporoplasty reflect the lack of a gold standard procedure. Most common are the plication techniques which have the main disadvantage of penile shortening [2,3]. We present a new technique of an autologous grafting procedure for patients with Peyronie’s disease, using a free graft from the proximal corpus cavernosum.

Fig. 1.

2. Material and methods
2.1. Patients
From 10/01 to 2/03 we operated 18 patients with Peyronie’s disease by means of the new technique. The mean age ranged between 48 and 69 years. All patients had a disease history of more than 18 months and at least four months of stable disease with unchanged penile curvature. Three patients underwent X-ray therapy during the inflammatory phase of the disease. All men had a sufficient erection without pain. In 15/18 cases, vaginal penetration was painful to the patient or his partner. All patients underwent preoperative physical examination and color Doppler assessment of the penis with measurement of plaque dimension and penile length.

* Corresponding author. Present address: Abteilung für Urologie, Klinikum Freising, Mainburger Str. 31, D-85356 Freising, Germany. Tel. +49-8161-22122; Fax: +49-8161-22555.
E-mail address: j.u.schwarzer@gmx.de (J. Ullrich Schwarzer).
All of them presented an autophotography of the erect penis to determine the degree of penile deviation, which ranged between 40° and 90°.

2.2. Operative technique

With the patient in supine position, a subtotal circumcision is made and the penis is completely degloved to expose the corpora cavernosa. Applying a proximal tourniquet, saline solution is infused intracorporeally through a 21-gauge butterfly needle. The resultant erection shows the curved area where the dorsal neurovascular bundle is now dissected from the tunica albuginea on both sides laterally of the corpora cavernosa and the plaque. Prior to and at the end of the operation, penile length and deviation angle were measured and documented in the surgical report. After complete exposition of the plaque it is abraded by means of a drill normally used in traumatic surgery. Then the plaque is incised horizontally to the penis. The resultant defect in the tunica albuginea is measured to determine an appropriate graft size. Then a 5-cm horizontal infrapubic incision is made to access the proximal corpora cavernosa. The segment of corpus cavernosum to be removed is delimited with methylene blue. On the lateral side an oval strip of tissue is removed in longitudinal direction unilaterally or bilaterally as needed for one or two patches. The maximal size of the oval patch (up to two can be taken) is 1 × 4 cm. The corpus cavernosum is closed with a running suture of Panacryl-0. The skin is closed with intracutaneous suture using vicryl rapid 4-0. Then the graft is sutured into the gap created in the penis with a continuous suture of PDS 4-0. The whole procedure is carried out using magnifying glasses. A penile dressing and a transurethral catheter (14 Charr.) are applied for one day. The duration of hospital stay is about one week. On the third postoperative day, penile tumescence training is started as a daily procedure, using vacuum device, intracorporeal injections of prostaglandin E1 (10–20 μg) and visual stimulation.

3. Results

Two grafts were used in 11/18 patients and one graft in 7/18 patients. The size of the oval grafts varied from 0.5 × 3 cm to 1 × 4 cm. In 5 cases, a plication technique (Miculicz technique with absorbable sutures of Panacryl-0) was additionally performed to correct minor residual curvature after grafting. The operating time was 2–2.5 hours in all cases. Perioperative complications occurred in 2/18 men with mild penile hematoma. In a preliminary follow-up ranging between 2 and 17 months, the data of 16 patients could be analyzed. Eight of these 16 patients underwent physical examination with intracorporeal injection of prostaglandin and measurement of penile length, 8 patients presented a postoperative autophotography of the penis. Complete correction of the curvature was seen in 12, and mild residual curvature (<20°) in 4 of the 16 patients. Regarding the subjective satisfaction of the patients, 14 were very content and would decide on the operation again, two patients were unsatisfactory because of subjectively reduced penile length. These two patients belonged to the group in whom penile length was not objectively measured but determined subjectively and based on the autophotography.

Two patients needed sildenafil or intracavernous injection therapy after the operation, but were content with the operation (see Table 1). These two patients underwent color duplex examination with intracavernous injection of Prostaglandin E1, and one in fact was found to have pathological end-diastolic flow in the deep arteries of the penis (7 cm/sec), indicating venous leakage. With 27 cm/sec, arterial flow in this patient was at the lower limit of normal both before and after the operation. This man was one of three patients who

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Objective and subjective results regarding correction of curvature and penile rigidity after tunica albuginea patch technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correction of curvature</td>
<td>Complete</td>
</tr>
<tr>
<td>Patients (n)</td>
<td>12</td>
</tr>
<tr>
<td>Patient contentment</td>
<td>content</td>
</tr>
<tr>
<td>Patients (n)</td>
<td>14</td>
</tr>
</tbody>
</table>
had preoperative plaque irradiation. The other patient had normal end-diastolic flow (2 cm/sec) and normal arterial flow rates (30 cm/sec). In this case, impaired erection is presumably caused by psychogenic problems. The suggested performance of pharmacocavernosography and cavernosometry was refused by both patients, probably because this examination would not have had therapeutic consequences and they were content with intracavernous injection therapy or taking of sildenafil.

4. Discussion

The objective of surgical treatment of acquired penile deformity caused by Peyronie’s disease is to restore a painless, straight and natural erection sufficient for sexual intercourse. Penile plication techniques are able to correct the curvature with a high success rate but cannot correct penile strangulation. The principle of these techniques is based on plication of the convex side of the curvature, through which relevant shortening of the penis is inevitable [2,3]. However, it is this severe penile shortening that most patients would like to avoid. Therefore, different techniques of incision of the plaque with consecutive grafting of the resultant gap have become popular over the past years [4,5,7].

Operating on the concave side of the curvature has the decisive advantage that penile shortening does not occur. Two of our patients felt to have penile shortening after the operation; however, this could not be verified as they had not undergone objective Doppler examination with artificial erection and measurement of the penis, but instead only presented an autophotography and their subjective impression. From the authors’ experience, patients do often not differentiate between disease-related penile shortening and operation-related change in penile length. Independently of curvature, Peyronie’s disease commonly causes penile shortening because of reduced longitudinal expansion of the fibrotic tunica albuginea. This shortening cannot be corrected, neither by plication techniques nor by grafting techniques. But during the patch procedure the convex side of the curvature is straightened, which results in elongation rather than shortening of the penis. The patient’s subjective expectation is then falsely based on the length of the penis before the disease.

None of the patients who were postoperatively examined by Doppler and intracavernous injection was found to have penile shortening as a result of the operation.

A variety of alloplastic materials, autologous vein, foreskin and deepithelialized skin have been used for grafting the corpus cavernosum, with different results [5]. Searching for the ideal graft material we used autologous tunica albuginea, as it is identical to the tissue to be grafted. Teloken published this technique [6] taking the graft through a perineal approach. We also take the patch from the proximal corpus cavernosum, however, through an infrapubic approach, so that there is no need for a second operating field and operative time may be saved.

Infracubic incision has the advantage that the patient can remain in supine position throughout the procedure and no change of position is necessary. For the technique described by Teleoken (patch taken from the perineum) the patient has initially to be placed in supine position, followed by extended lithotomy position, and finally position with lowered legs. So the operative field has to be changed twice and possibly needs repeated sterile coverage. This technique requires more organizational effort than our method. Whether a significant reduction in operative time is achieved cannot be answered, as there is no direct comparison; presumably the time difference is not pronounced. The morbidity of the infracubic approach is low (experience with implant operation), while perineal incision is more likely to cause postoperative pain on sitting and possibly also disturbed wound healing. This variant of the tunica patch technique is reported for the first time. The idea to use tunica albuginea graft was based on the consideration that original tissue would be less likely to shrink than dermal graft, and less likely to bulge than foreskin graft. Intraoperative artificial erection confirmed that the tunica patch did not show any bulging, in contrast to dermal, foreskin and vein grafts which the authors had used before. Another important consideration was to reduce veno-occlusive insufficiency at the site of the graft [8]. The occlusive sufficiency of the original tissue should be at least equal to or even better than that of skin or vein.

Using the same organ tissue may also decrease the risk of graft fibrosis. In two of our patients we observed reduced rigidity, which in one case was demonstrated by venous leakage identified during Doppler ultrasound. This patient had limited arterial perfusion levels before the operation and underwent radiotherapy, but insufficient postoperative rigidity results from the operation. In principle, all grafting techniques affecting the integrity of the tunica albuginea are associated with the risk of veno-occlusive insufficiency and impaired rigidity. This problem exists with all procedures in which the tunica albuginea is not only plicated but incised and grafted, including patching techniques using other graft material.
An argument against the use of tunica albuginea could be that the whole tunica albuginea might be affected by the underlying disease [1], e.g., also at the site of patch removal. Therefore we arranged for a histological examination of small pieces of the patch in 4 cases; none of them showed any evidence of the typical fibroblastic activity of Peyronie’s disease. But even if the graft was affected with Peyronie’s disease, this would have no major importance, because operations are only performed in the postinflammatory phase. Five of 18 patients required additional plication of the tunica albuginea (on the convex side of the penis) because of persistent mild deviation after insertion of the patch, a situation that is also encountered when other grafts are used. All these 5 patients had a prior deviation angle over 70°.

The presented results of our technique are preliminary; however, it was demonstrated that penile straightening by lengthening the shortened portion of the penis by means of tunica albuginea free graft is effective. Our immediate follow-up results have encouraged us to continue performing this procedure.

References