

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

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## 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. Fourteen 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.

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**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.

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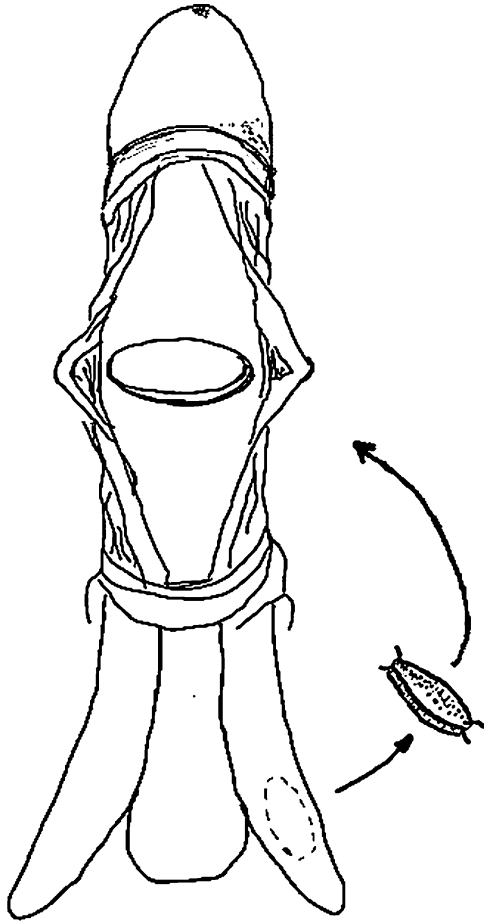


Fig. 1. Operative principle: incising curved corpus cavernosum creates gap that is then covered with graft removed from crural corpus cavernosum.

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  $0.5 \times 3$  cm to  $1 \times 4$  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 ( $<20^\circ$ ) 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 1**

Objective and subjective results regarding correction of curvature and penile rigidity after tunica albuginea patch technique

|                                      | Complete | Not complete ( $<20^\circ$ ) |
|--------------------------------------|----------|------------------------------|
| Correction of curvature Patients (n) | 12       | 4                            |
| Patient contentment content          | content  | discontent                   |
| Patients (n)                         | 14       | 2                            |

59 All of them presented an autophotography of the erect penis to  
60 determine the degree of penile deviation, which ranged between 40  
61 and  $90^\circ$ .

#### 62 2.2. Operative technique

63 With the patient in supine position, a subtotal circumcision is  
64 made and the penis is completely degloved to expose the corpora  
65 cavernosa. Applying a proximal tourniquet, saline solution is  
66 infused intracorporeally through a 21-gauge butterfly needle.  
67 The resultant erection shows the curved area where the dorsal  
68 neurovascular bundle is now dissected from the tunica albuginea on  
69 both sides laterally of the corpora cavernosa and the plaque.

70 Prior to and at the end of the operation, penile length and  
71 deviation angle were measured and documented in the surgical  
72 report. After complete exposition of the plaque it is abraded by  
73 means of a drill normally used in traumatic surgery. Then the  
74 plaque is incised horizontally to the penis. The resultant defect in  
75 the tunica albuginea is measured to determine an appropriate graft  
76 size. Then a 5-cm horizontal infrapubic incision is made to access  
77 the proximal corpora cavernosa. The segment of corpus cavernosum  
78 to be removed is delimited with methylene blue. On the lateral  
79 side an oval strip of tissue is removed in longitudinal direction  
80 unilaterally or bilaterally as needed for one or two patches.  
81 The maximal size of the oval patch (up to two can be taken) is  
82  $1 \times 4$  cm. The corpus cavernosum is closed with a running suture

126 had preoperative plaque irradiation. The other patient  
 127 had normal end-diastolic flow (2 cm/sec) and normal  
 128 arterial flow rates (30 cm/sec). In this case, impaired  
 129 erection is presumably caused by psychogenic prob-  
 130 lems. The suggested performance of pharmacocaver-  
 131 nosography and cavernosometry was refused by both  
 132 patients, probably because this examination would not  
 133 have had therapeutic consequences and they were  
 134 content with intracavernous injection therapy or taking  
 135 of sildenafil.

#### 136 4. Discussion

137 The objective of surgical treatment of acquired  
 138 penile deformity caused by Peyronie's disease is to  
 139 restore a painless, straight and natural erection suffi-  
 140 cient for sexual intercourse. Penile plication techniques  
 141 are able to correct the curvature with a high success rate  
 142 but cannot correct penile strangulation. The principle  
 143 of these techniques is based on plication of the convex  
 144 side of the curvature, through which relevant short-  
 145 ening of the penis is inevitable [2,3]. However, it is this  
 146 severe penile shortening that most patients would like  
 147 to avoid. Therefore, different techniques of incision of  
 148 the plaque with consecutive grafting of the resultant  
 149 gap have become popular over the past years [4,5,7].  
 150 Operating on the concave side of the curvature has the  
 151 decisive advantage that penile shortening does not  
 152 occur. Two of our patients felt to have penile shortening  
 153 after the operation; however, this could not be verified  
 154 as they had not undergone objective Doppler examina-  
 155 tion with artificial erection and measurement of the  
 156 penis, but instead only presented an autophotography  
 157 and their subjective impression. From the authors'  
 158 experience, patients do often not differentiate between  
 159 disease-related penile shortening and operation-related  
 160 change in penile length. Independently of curvature,  
 161 Peyronie's disease commonly causes penile shortening  
 162 because of reduced longitudinal expansion of the  
 163 fibrotic tunica albuginea. This shortening cannot be  
 164 corrected, neither by plication techniques nor by graft-  
 165 ing techniques. But during the patch procedure the  
 166 convex side of the curvature is straightened, which  
 167 results in elongation rather than shortening of the penis.  
 168 The patient's subjective expectation is then falsely  
 169 based on the length of the penis before the disease.  
 170 None of the patients who were postoperatively exam-  
 171 ined by Doppler and intracavernous injection was  
 172 found to have penile shortening as a result of the  
 173 operation.

174 A variety of alloplastic materials, autologous vein,  
 175 foreskin and deepithelialized skin have been used for

grafting the corpus cavernosum, with different results 176  
 [5]. Searching for the ideal graft material we used 177  
 autologous tunica albuginea, as it is identical to the 178  
 tissue to be grafted. Teloken published this technique 179  
 [6] taking the graft through a perineal approach. We 180  
 also take the patch from the proximal corpus caverno- 181  
 sum, however, through an infrapubic approach, so that 182  
 there is no need for a second operating field and 183  
 operative time may be saved. 184

Infrapubic incision has the advantage that the patient 185  
 can remain in supine position throughout the procedure 186  
 and no change of position is necessary. For the techni- 187  
 que described by Teloeken (patch taken from the 188  
 perineum) the patient has initially to be placed in 189  
 supine position, followed by extended lithotomy posi- 190  
 tion, and finally position with lowered legs. So the 191  
 operative field has to be changed twice and possibly 192  
 needs repeated sterile coverage. This technique 193  
 requires more organizational effort than our method. 194  
 Whether a significant reduction in operative time is 195  
 achieved cannot be answered, as there is no direct 196  
 comparison; presumably the time difference is not 197  
 pronounced. The morbidity of the intrapubic approach 198  
 is low (experience with implant operation), while 199  
 perineal incision is more likely to cause postoperative 200  
 pain on sitting and possibly also disturbed wound 201  
 healing. This variant of the tunica patch technique is 202  
 reported for the first time. The idea to use tunica 203  
 albuginea graft was based on the consideration that 204  
 original tissue would be less likely to shrink than 205  
 dermal graft, and less likely to bulge than foreskin 206  
 graft. Intraoperative artificial erection confirmed that 207  
 the tunica patch did not show any bulging, in contrast to 208  
 dermal, foreskin and vein grafts which the authors had 209  
 used before. Another important consideration was to 210  
 reduce veno-occlusive insufficiency at the site of the 211  
 graft [8]. The occlusive sufficiency of the original 212  
 tissue should be at least equal to or even better than 213  
 that of skin or vein. 214

Using the same organ tissue may also decrease the 215  
 risk of graft fibrosis. In two of our patients we observed 216  
 reduced rigidity, which in one case was demonstrated 217  
 by venous leakage identified during Doppler ultra- 218  
 sound. This patient had limited arterial perfusion levels 219  
 before the operation and underwent radiotherapy, but 220  
 insufficient postoperative rigidity results from the 221  
 operation. In principle, all grafting techniques affecting 222  
 the integrity of the tunica albuginea are associated with 223  
 the risk of veno-occlusive insufficiency and impaired 224  
 rigidity. This problem exists with all procedures in 225  
 which the tunica albuginea is not only plicated but 226  
 incised and grafted, including patching techniques 227  
 using other graft material. 228

229 An argument against the use of tunica albuginea  
 230 could be that the whole tunica albuginea might be  
 231 affected by the underlying disease [1], e.g., also at the  
 232 site of patch removal. Therefore we arranged for a  
 233 histological examination of small pieces of the patch in  
 234 4 cases; none of them showed any evidence of the  
 235 typical fibroblastic activity of Peyronie's disease. But  
 236 even if the graft was affected with Peyronie's disease,  
 237 this would have no major importance, because opera-  
 238 tions are only performed in the postinflammatory  
 239 phase. Five of 18 patients required additional plication  
 251

of the tunica albuginea (on the convex side of the penis) 240  
 because of persistent mild deviation after insertion of 241  
 the patch, a situation that is also encountered when 242  
 other grafts are used. All these 5 patients had a prior 243  
 deviation angle over 70°. 244

The presented results of our technique are prelimin- 245  
 ary; however, it was demonstrated that penile straight- 246  
 ening by lengthening the shortened portion of the 247  
 penis by means of tunica albuginea free graft is effec- 248  
 tive. Our immediate follow-up results have encouraged 249  
 us to continue performing this procedure. 250

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