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Tunica-sparing Ossified Peyronie's Plaque Excision

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Introduction

Francois de la Peyronie described the disease which now bears his name (Peyronie's disease, PD) in 1743. The penile curvature of PD results from a fibrous plaque affecting the tunica albuginea which distorts the normal contour of the corpora cavernosa during erection. Nesbit pioneered surgical correction of PD by advocating excision of an ellipse of tunica albuginea opposite the defect to straighten the penis.[1] Since then, other authors have described incision or excision of the plaque itself with patch graft repair of the tunica defect.[2-5] Tunica vaginalis, saphenous vein, cadaver pericardium, and porcine small intestinal submucosa have all been described for such repairs.[2-5] Such techniques require dissection of neurovascular bundles or corpus spongiosum and may result in alterations of penile sensation ranging from mild numbness to total loss of penile sensation. While cosmetic success rates range from 86-96%, 10-21% of patients do note alteration of penile sensation after such procedures.[6-8] In addition, no matter what the graft material was used, *de novo* erectile dysfunction has been reported after plaque incision/excision in a number of men from numerous series.[9-11] In a longer term follow up study, Kalsi et al reported an ED rate of 22.5% in men at least 5 years after venous grafting surgery.[12]

Penile plication has also been shown to be effective in the treatment of penile curvature, allowing adequate cosmetic and functional outcomes. Avoidance of the neurovascular bundles diminishes the post-operative effect on erectile function and penile sensation.[13] However, in the case of large heterotopic penile ossification such plication techniques may be insufficient. The standard treatment for such lesions has been excision and grafting. We describe a novel technique of excision of the calcified portion only with simultaneous plication to correct the curvature.

The initial patient in the series complained of constant penile pain, decreased penile sensation as well as the rock-hard penile plaque. Hoping to avoid further compromise in penile sensation and potency from tunical excision and grafting, we offered the patient subtunical excision of the ossified portion of the plaque with sparing of the tunica. The success of the index patient encouraged us to offer this procedure to subsequent patients who presented with ossified plaques with major concerns regarding postoperative erectile dysfunction and penile sensation loss.

Patients and Methods

Twelve men were evaluated and treated for an ossified, palpable penile plaque. All men had failed conservative medical therapies and desired surgical treatment. Office evaluation included a patient captured photograph of his erect phallus, history and physical examination, and penile ultrasonography using high-resolution penile ultrasound (General

Electric LOGIC, 12 MHz probe). The thickness of the tunica above the ossified portion of the plaque was carefully measured to assure there was more than 1.5 mm thickness so that adequate tunica could be preserved at the time of surgery (Fig. 1 & 2).

Pharmacologic erection is induced by means of intracavernous injection of 60 mg of papaverine prior to surgical field preparation. For dorsal curvature, we prefer a ventral longitudinal incision. For ventral curvature, we give patient a choice of either a circumcising incision or vertical dorsal incision. A 16-Dot penile plication technique as has previously been described[13] is then performed to straighten the penis. Attention is then turned to excision of the ossified portion of the plaque. We prefer a lateral approach because it is less traumatic than mobilizing the dorsal neurovascular bundle or the corpus spongiosum. The lateral neurovascular bundles are dissected off the tunica from the spongiosal margin until the 1 or 11 o'clock positions on the ipsilateral corpus cavernosum. Following this, diluted phenylephrine solution is injected into the corpus cavernosum to abort the erection. The ossified plaque is palpated and a lateral, longitudinal tunical incision is made near the plaque. The incision is about 1 cm longer than the length of the ossified plaque to make manipulation easier. A #15 blade is used to shave the erectile tissue from the ossification first. The tunica over the plaque is gently grasped with toothed forceps and the plaque was separated for 3-4 mm using a fresh blade under magnification with a 2.5x surgical loops (Figure 2). The remainder of the removal procedure is performed with a brushing motion of the scalpel which peels the ossified plaque off the undersurface of the tunica/plaque. The tunica/plaque is then closed using an interrupted slow-absorbable suture while the penis is under stretch to ensure a watertight closure without shortening of the suture line. Following corporal closure, erection is induced via intracorporal injectable saline to confirm that the penis is still adequately straightened.

Postoperatively, patients are discouraged from intercourse or masturbation for 8 weeks. Patients are maintained on pentoxifylline for 6 months to decrease the development of new plaque formation.

Follow-up included office evaluations and telephone/email correspondence.

Results

Twelve patients were treated with a mean age of 53 ± 7 years (Table 1). Penile curvature ranged from 10 to 90 degrees (median 60). 10/12 men had a coexistent dorsal penile curvature, while one man had a ventral curvature. Three men also had coexisting lateral curvature. Of 10 patients with available information, 8 men also complained of pain with erections.

No intraoperative complications occurred. In 8 men, a ventral, longitudinal skin incision was used. 3 men had a circumcising incision. One patient had a vertical, dorsal incision. In all cases, plaque location drives incision placement with a preference toward ventral incision. Median plaque size was 2.0 cm (range 1 to 5 cm). One ossified plaque had several spikes imbedded in the septum and required careful shaving of the septum to remove it (Figure 2.C.).

All plaques were sent for pathologic evaluation. All specimens were indistinguishable from bone and several even displayed early bone marrow (Figure 3).

11/12 patients had a follow up ranging from 2.1 to 14.5 months (mean 6.7 months). All men reported maintenance of penile sensation at last follow up. All patients with follow up data beyond the period of sexual abstinence (n=10) are potent and reported adequate erections for penetration and maintenance of penetration most of the time to always. 7/10 men report a

straight phallus at follow up. Of the three patients with recurrent curvatures, one patient was still able to have intercourse despite curvature, one patient was considering an additional repair for a penile base PD recurrence, and one was lost to follow up. One patient who had a circumcising incision developed distal penile edema in the early postoperative period requiring self-administered daily compressive dressings for several months until resolution.

Discussion

Several studies of the epidemiology and natural history of Peyronie's disease have classified a group of patients with a dense, calcified plaque. Such plaques are often palpable, bothersome to patients, and may cause constant penile pain so that plication alone is inadequate treatment. A large heterotopic ossification often mandates surgical extirpation with simultaneous tunical excision. To repair the defect will require a large patch graft with resultant increased incidence of postoperative erectile dysfunction as well as sensory alteration. Using existing knowledge that calcified/ossified Peyronie's plaques usually form on the inner portion of the tunica albuginea bordering penile erectile tissue, we have developed a procedure to excise the ossified portion while sparing the superficial portion of the tunica/plaque.

While other authors have described this technique for plaques, we describe expansion of this principal to include excision of penile heterotopic ossification.[14, 15] In addition, we were able to excise lesions of up to 5 cm as well as those with spikes imbedded in the septum. In our previous experience, excision of the plaque still left a persistent curvature when artificial erection was achieved intraoperatively. Adjuvant straightening therapy was necessary either in the form of penile prosthesis, patch grafting or plication sutures. Therefore, in this series, we elected to straighten the penis first with plication sutures after a full erection was induced with intracavernous injection of papaverine. The erection was then aborted with intracavernous injection of diluted phenylephrine solution. Alternatively, plication can be performed after the ossification has been excised under saline induced erection. However, plication on papaverine induced erection is more accurate and generally easier and is therefore our preferred approach.

Patients with large, ossified plaques are rare, but the morbidity of tunical excision and extensive patch grafting can often be avoided with our approach. To bypass extensive dissection of the neurovascular bundle and postoperative sensory impairment, we prefer a lateral tunica incision that requires minimal mobilization of a few nerves and blood vessels. In the case of multifocal pathology, multiple corporotomies can be made without detriment to potency as long as all are closed in a watertight fashion. In all cases, corporotomies should be made longitudinally in the shaft and closed with interrupted absorbable sutures to avoid shortening of the suture line.

As heterotopic, ossified plaques may represent the most severe end of the spectrum of Peyronie's inflammatory lesions,[16] we sought to determine if tunica sparing excision would yield durable results or if the scarring process would persist. Although our follow up is relatively short, in 70% of our cohort there was no recurrence of the curvature or plaque have resurfaced despite relatively rapid onset at initial presentation. As pentoxifylline has been shown to block the transforming growth factor beta inflammatory pathway, inhibit the deposition of collagen, and reduce the plaque size in tunical fibrosis, likely through its action as a nonspecific phosphodiesterase inhibitor,[17, 18] we have routinely prescribed it to all men who present with Peyronie's disease. For men with ossified plaques, who may be at an increased risk for rapid recurrence, we continue this medication for at least 6 months postoperatively.

The thickness of a normal tunica albuginea of the corpus cavernosum ranges from 0.8 to 2.2 mm.[19] To date, we have performed only on those with more than 1.5 mm tunica/plaque thickness above the calcification as measured on high-resolution ultrasound. We have not performed this procedure on ventral tunica because it is thinner, and we are concerned this may result in penile fracture or venous leakage.

As ossified, Peyronie's plaques represent a rare disorder, patient accrual is slow, leading to our small numbers. In addition, as we continue to follow our patients longitudinally we will be better able to assess the durability of our treatment. Nevertheless, our results suggest that tunica sparing plaque excision represents an effective treatment for removal of large, ossified penile plaques with good maintenance of potency and penile sensation which obviates the need for plaque excision and grafting techniques.

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Figure 1.

Preoperative penile ultrasonograph showing transverse (A) and longitudinal (B) views of the ossified lesion overlying corpus cavernosum with shadowing behind the lesion. In panel A, measurement 1 shows tunical thickness above the plaque, while measurement 2 represents plaque width. In panel B, measurement 1 also shows tunical thickness above the plaque, while measurement 2 represents plaque length.

Figure 2.

The plaque is separated from the interior surface of the tunica with a scalpel via a longitudinal incision. A. Arrow head points to undersurface of ossified lesion. B. Additional view shows the outer surface of the ossified lesion (hollow arrow) being dissected off the “spared” tunica albuginea/plaque. The neurovascular bundle on the dorsal surface is labelled by an arrow. C. Excised penile plaque with several spikes imbedded in the septum from another patient.

Figure 3.
Representative photomicrographic image of fragment of ossified Peyronie's plaque. Note osteophytes and primitive bone marrow.

Table 1

Patient demographics, preoperative assessment, and postoperative outcomes.

Preoperative				Intraoperative			Postoperative			
Age	Duration (yrs)	Pain	Curvature (Degree)	Incision	Size (cm)	Follow up (mos)	Straight	Sensation	When you have erections how often can you penetrate?	During intercourse, how often can you maintain penetration?
42	na	Y	D, L (30)	C	5.0	5.0	Y	Y	5	5
52	1.3	N	D (90)	V	5.0	14.5	N	Y	4	5
51	12	Y	R, D (30)	V	1.0	9.5	Y	Y	5	5
48	na	N	V (na)	C	2.0	14.0	N	Y	5	5
46	na	na	D (na)	V	1.6	9.6	Y	Y	5	5
44	1.5	Y	D (60)	V	1.5	3.3	N	Y	5	5
56	1.5	Y	D (90)	V	1.5	3.3	Y	Y	4	4
56	1	Y	D (10)	V	2.0	2.1	Y	Y	5	5
56	4	Y	D (60)	D	1.0	2.8	na	na	na	na
62	3	Y	D, R (15)	V	4.0	na	na	na	na	na
58	2	Y	D (90)	V	na	4.3	Y	Y	5	5
63	1	na	L (90)	C	2.0	5.8	Y	Y	5	5

(na – not available; Incision – C: circumferential, V: ventral, D: dorsal)