Porcine Small Intestinal Submucosa is Not an Ideal Graft Material for Peyronie's Disease Surgery

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Purpose: The incidence of Peyronie's disease is up to 7% in some series. While there are numerous nonsurgical methods of treatment, they do not have a high rate of success. Nesbit plication was once the accepted surgery for Peyronie's disease. Tunical lengthening procedures became popular because they avoided penile shortening caused by the Nesbit procedure. More urologists now perform plaque incision or excision, followed by grafting with different materials. Small intestinal submucosa offered promise as an ideal graft material. It is available off the shelf as 1 or 4-ply graft material. In several studies it appeared to function as a collagen based scaffold with graft incorporation in host tissue.

Materials and Methods: A single reconstructive urologist performed plaque incision and small intestinal submucosa grafting in 4 cases of Peyronie's disease using the same surgical technique.

Results: Although early results were positive, we have achieved less than satisfactory results with this material. The penis was straight in the immediate postoperative period but there was recurrent curvature in 3 of the 4 patients, of whom 2 had recurrence within 4 months of the procedure.

Conclusions: We observed disappointing results with small intestinal submucosa for Peyronie's disease surgery with a high percent of recurrent curvature. Further studies are needed to determine if 1 or 4-ply small intestinal submucosa is an ideal graft material for the tunica albuginea.

Key Words: penis, penile induration, swine, transplants, small intestine

Peyronie's disease is a condition characterized by fibrotic plaques in the tunica albuginea. Estimates of the prevalence of this condition vary from 0.3% to 7.1% in middle-aged men.[1–3] Clinical presentations include penile deformity, pain on erection and a palpable plaque on the penis. Medical management is usually the initial modality of treatment, although the efficacy of these treatments has come into question.[4]

Surgical procedures are offered only after penile curvature and plaque have stabilized and in men in whom curvature interferes with intercourse. Nesbit plication used to be the standard surgery for correcting curvature in Peyronie's disease. This is an acceptable procedure if curvature is simple with good erectile function and adequate penile length.[5] However, this can cause significant penile shortening. Hence, tunical lengthening procedures have been adopted for inadequate penile length, large plaques and complex deformities such as hourglass deformity. These procedures involve plaque incision or excision, followed by grafting with suitable material.[5] Various materials have been used for grafting, including autografts of dermis, saphenous vein, tunica vaginalis and fascia lata, synthetic grafts of polytetrafluoroethylene and Dacron®, allografts and xenografts, such as Tutoplast® preparation of bovine pericardium or human cadaveric dermis, and 1 or 4-ply porcine SIS.[5]

SIS is a xenograft prepared from the intestinal submucosa of pigs. We report our results with SIS grafts in 4 patients.

MATERIALS AND METHODS

We sought to validate the results of SIS graft material for Peyronie's disease. Patients with significant penile curvature who elected surgical correction of Peyronie's disease underwent plaque incision and SIS grafting. We present 4 cases performed by a single reconstructive urologist (RAS) using the same surgical technique.

In each case the ply of the SIS graft was chosen so that the thickness of the graft material corresponded to the thickness of the tunica albuginea. Grafts were sized to be 10% larger than the defect to accommodate postoperative graft contraction. Patients were followed to determine the status of curvature. Followup was 3 to 36 months (mean 11.8).

CASE HISTORIES

Case 1

A 46-year-old black man had a preoperative penile curvature of 80 degrees to the left side at the base. Examination revealed a 2 × 1 cm plaque at the left base of the penile shaft. The plaque was incised and patched with 4-ply 1 × 0.5 cm Stratasis® SIS. The postoperative course was complicated by a 2 cm soft hematoma at the base of the penis, which resolved. There was no penile curvature in the short term but penile curvature recurred after 3 years.

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Case 2

A 61-year-old black man originally had 90-degree curvature, which was treated with plaque incision and a Gore-Tex® patch graft elsewhere in 1999. Curvature of 45 degrees persisted, which was associated with difficulty with intercourse (fig. 1, *A*). In August 2002 he underwent plaque incision and SIS patch grafting (fig. 1, *B*). A 4-ply Stratasis® SIS graft was used. The penis was straight after grafting and during the postoperative period (fig. 1, *C*). However, curvature recurred to the left side after 3 months (fig. 1, *D*). He underwent insertion of a penile prosthesis and penile molding in February 2004.

Case 3

This 58-year-old man had only 20-degree curvature dorsally and to the right side but a significant hourglass deformity was painful during intercourse. He underwent plaque incision with SIS patch grafting in September 2002. Two incisions were made in the penile plaque. A 3 × 4 cm graft was used proximal and a 2 × 3 cm graft was used distal. A 4-ply Stratasis® graft was used at each site. Penile curvature was decreased and the penis was almost straight after the procedure at a followup of 4 months.

Case 4

This 57-year-old Hispanic man presented in 2003 with dorsal penile plaque in the midline and hourglass deformity. There was 45-degree dorsal curvature on erection (fig. 2, *A*). Plaque incision was done and a 1-ply Surgisis® SIS graft was used to cover the 2.5 × 2 cm defect (fig. 2, *B* and *C*). The penis was straight at the end of surgery and in the immediate postoperative period but 45-degree dorsal curvature recurred at 4 months (fig. 2, *D* and *E*). He underwent plaque excision and received a Tutoplast® dermis graft in May 2004, after which curvature did not recur.

DISCUSSION

Because of initial reports in the literature of success using SIS to repair Peyronie's disease,[6,7] we believe that it is important to report our poor results in this small series. Two of 4 patients had recurrence within 4 months of surgery. In an unmatched group of patients who underwent excision of Peyronie's plaque excision and grafting using Tutoplast® cadaveric dermis graft at our institution there was no recurrent curvature that was sufficient enough to interfere with sexual intercourse.[8]

SIS Characteristics

SIS has a distinct advantage over autografts, in that it is readily available off the shelf. It is marketed as 1 layer as Surgisis®, and as 4 layers as Stratasis®. SIS is a graft material that is produced by mechanical processing of porcine small intestine. The tunica mucosa is mechanically removed from the inner surface, and the serosa and tunica muscularis are removed from the outer surface. The resultant graft material is composed mainly of the submucosal layer of the small intestine, resulting in an acellular matrix

FIG. 1. Case 2. *A*, preoperative curvature before SIS graft. *B*, SIS patch grafting after plaque incision. *C*, after SIS grafting penis is straight. Note SIS graft (short arrow) and persistence of previously placed Gore-Tex® graft (long arrow). *D*, during followup curvature recurred to left side.