Shaeer's Anti-Scarring Technique: A Preventive Measure Against Corporal Fibrosis Upon Explantation of Infected Penile Implants

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ABSTRACT

Introduction: In cases of explantation and delayed reimplantation of an infected penile prosthesis, the scarring that afflicts the corporal bodies renders reimplantation difficult and risky, with potential loss in penile size.

Aim: Mitomycin C is an antitumor, antibiotic agent with a potent antifibrotic action that can be used to limit corporal scarring following explantation with the aim of achieving easy and safe subsequent reimplantation, in addition to preserving penile size.

Methods: This was a prospective study involving 5 patients with infected penile prostheses who were referred to our tertiary implantation center. The infected prostheses were explanted, followed by corporal washout with antiseptics and antibiotics. Patients were rescrubbed and redraped. Mitomycin C, 10 mg in 250 cc saline, was instilled into the corpora cavernosa (125 cc each), avoiding extracavernous spilling and contact with corporotomy and skin edges. Corporotomy and skin edges were freshened and closed. Reimplantation was performed 10 to 12 weeks later.

Main Outcome Measure: We evaluated the ease of blunt dilatation upon reimplantation and success in implanting cylinders the same size as the ones explanted.

Results: We were able to dilate the corporal bodies with ease in all cases using blunt Hegar dilators. All cases received the same size implant as the one explanted, in terms of length and girth, with the exception of a case where the length was only 1 cm shorter.

Conclusions: Irrigation of the cavernous spaces with mitomycin C upon explantation of an infected penile prosthesis appears to ameliorate corporal scarring and keep the cavernous spaces open. On a larger scale, this approach could render the most feared complication of penile prosthesis implantation surgery much more manageable. **Shaeer O, Abdel Rahman IFS, Shaeer K. Shaeer's Anti-Scarring Technique: A Preventive Measure Against Corporal Fibrosis Upon Explantation of Infected Penile Implants. Sex Med 2019; 7:357–360.**

Key Words: Penile prosthesis infection; Penile implant extrusion; Delayed reimplantation; Salvage; Corporal scarring; Corporal fibrosis

INTRODUCTION

The classic approach to penile prosthesis infection is extraction of all components and follow-up for several weeks until the infection resolves, after which delayed reimplantation is attempted. In the meantime, fibrous tissue develops, occluding the corpora cavernosa (ie, corporal scarring). Implantation of a penile prosthesis into scarred corporal bodies is a challenging procedure that requires special experience and tools. The outcome is often clouded by the possibility of proximal or distal perforation, urethral injury, higher reinfection rates, and up to total failure for corporal dilatation. If reimplantation succeeds, a smaller sized penis is usually the end result. In the current work, we present the first experience with using mitomycin C as an antifibrotic agent to ameliorate corporal scarring following explantation of an infected penile implant. This approach allows for easy and safe subsequent reimplantation, in addition to preserving penile size.

MATERIALS AND METHODS

Five patients with infected penile implants were included in this prospective study; 4 were referred to our tertiary care center,

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and 1 was our own patient. All 5 were diabetic. Four had a malleable implant, and 1 had a 3-piece inflatable. Presentation was 25 ± 7 days after implantation, characterized by severe pain and suppurative discharge through the incision. Due to the toxic manifestations encountered (fever in 5 and hypotension in 2), the patients required urgent implant extraction and delayed reimplantation rather than implant salvage. Resuscitation and pain control measures were performed. An intradermal sensitivity test for mitomycin C was carried out. Ethical approval and patient consent forms were obtained. Complete video of the surgical steps is available.[1]

First Surgery: Explantation of the Infected Implant

Under spinal anesthesia, the incision oozing pus was widened. A sample was obtained from the suppurative discharge and sent for culture. All components of the implant were extracted, including rear-tip extenders, pump, and reservoir (if applicable). The cavernous spaces, pump, and reservoir spaces (if applicable) were washed out under pressure according to the Mulcahy washout protocol.[2] The operative field was resterilized and the patient redraped.

Mitomycin C 10 mg (Naprod Life Science; Mumbai, India) was reconstituted in 250 cc normal saline. The mitomycin solution was instilled into the corpora cavernosa by insertion of a size 14 catheter, both distally and proximally; 125 cc were instilled into each cavernous space. Skin edges were pulled apart and away from the instilled preparation to avoid delayed healing of the edges or skin necrosis (known effects for mitomycin). Suction was maintained throughout instillation to avoid spillage and contact between the mitomycin and extracavernous tissue. Mitomycin can be washed out of the corpora cavernosa 10 minutes later. Suction drains were inserted into both corpora cavernosa. The corporotomies and skin incision were freshened down to a bleeding edge to remove edges that may have accidentally come into contact with the mitomycin. The corporotomies, dartos muscle, and skin incision were closed.

Patient follow-up included monitoring drain output, local signs of infection, signs of systemic toxemia (if any), blood sugar levels, complete blood count, renal functions, and hepatic functions. Drains were removed 3 to 5 days postoperatively after having dried out. Postoperative antibiotic coverage was in the form of vancomycin, gentamicin, and fluconazole, unless culture results dictated otherwise.

Second Surgery: Reimplantation

Reimplantation was attempted after total resolution of local signs of inflammation and blood sugar control, 10 to 12 weeks after the explantation. Four patients elected to have malleable penile prostheses implanted, and 1 patient chose an inflatable prosthesis. The primary target was safe implantation of an implant of the same size as the one the patient initially had before infection set in. The reimplantation procedure was performed through a penoscrotal incision, with no particular modifications to regular primary implantation procedures. Upon incising the corporotomies, thick whitish fibrous tissue was always encountered, although it was easily incised by scalpel. The corporotomy incisions were deepened through this tissue, toward the center of the corpora cavernosa, down to the reddish, possibly bleeding central tissue (Figure 1), after which dilatation commenced.

Metzenbaum scissors or a hemostat was introduced into the central tissue for 1 cm, opened, and then withdrawn. Dilatation of the corpora cavernosa was performed using blunt Hegar dilators. Irrigation with antibiotics was maintained throughout the process (a washout with povidone-iodine and hydrogen peroxide can be added). Four patients received a malleable implant, and 1 received a 3-piece inflatable prosthesis. In the patient receiving the inflatable implant, the reservoir was placed ectopically. Upon closing the corporotomies, minimal debulking of the aforementioned fibrous tissue had to be performed just under the corporotomy edges to enable tension-free closure. This was only required in the 4 cases receiving malleable implants, which were the same size as their previous implants.

Postoperative Management and Follow-Up

Patients were discharged the same day. The patient receiving the inflatable implant was instructed on early cycling and inflation for extended periods of time. Follow-up ranged from 3 months to 9 months.

RESULTS

No local or systemic side-effects were observed following mitomycin instillation in the first session, and no clinically relevant changes were noted in complete blood pictures or renal and hepatic functions. In the second session, dilatation of the corpora cavernosa was easy in all 5 cases, with virtually no resistance. There was no need for any adjuvant tools (cavernotome or urethrotome), fibrous tissue excavation, or corporal reconstruction. No urethral injury or proximal or distal perforations were encountered intraoperatively.

A replacement implant of the same length and girth as the explanted prosthesis was implanted in all cases, with the

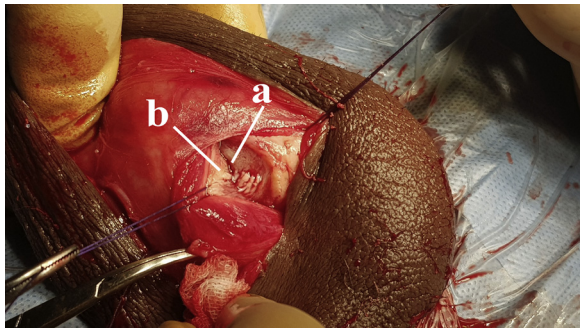

Figure 1. Reimplantation surgery. The corporotomy shows the central cavernous tissue in the maintained cavernous space (a), surrounded by fibrous tissue (b).

exception of a case where the cylinder length was only 1 cm shorter. Three patients received replacement malleable implants with a 13-mm girth, 1 patient received a malleable implant with an 11-mm girth, and 1 patient received a same size 3-piece inflatable implant. Operative time for the implant replacement surgery was 30 ± 5.2 minutes.

Postoperatively, all 5 implants survived adequately, with no reinfections, extrusions, or mechanical failure, throughout the follow-up period. Patients receiving a malleable implant reported some difficulty bending the rods, but this was anticipated and explained to the patients before surgery.

DISCUSSION

Infection of a penile prosthesis is one of the most serious complications of implantation surgery. If infection does occur, the classic approach is delayed reimplantation; however, the scarring that afflicts the corporal bodies renders reimplantation in such cases the most difficult challenge in prosthetic urology.[3] The first preventive measure against corporal scarring was the Carrion cast, which is an intracavernous, antibiotic-impregnated cast of $CaSO_4$ that releases antibiotic into the cavernous spaces as the cast absorbs, keeping the cavernous spaces open for weeks until reimplantation is feasible.[4]

The current work is another tool in the preventive armamentarium against corporal scarring: irrigation of the cavernous spaces with mitomycin C. Mitomycin C is an antitumor antibiotic used as a chemotherapeutic agent in different organ cancers such as prostate, non—muscle invasive bladder cancer, urothelial carcinoma of the upper urinary tract, and non—small cell lung tumors. Furthermore, mitomycin C is an antibiotic, with potent anti-Gram negative and anti-Gram positive activities.[5] Finally, mitomycin has proven antiproliferative effects on fibroblasts by affecting transforming growth factor beta and fibroblast growth factor, resulting in a reduction of collagen synthesis, fibroblast activity, and proliferation.[6] Established applications for this antifibrotic effect include its use in corneal surgery to prevent postoperative scarring and opacification and in the treatment of pharyngoesophageal stenosis and recalcitrant urethral strictures. Recently, an antifibrotic effect for mitomycin C was demonstrated in a rat model for Peyronie's disease.[7]

In the current pilot study, mitomycin C demonstrated high efficacy in amelioration of corporal scarring, keeping the cavernous spaces accessible and easily dilatable up to the same length and girth of the implant previously removed on account of infection. This is despite a time lapse of 10 to 12 weeks. There was no need for any adjuvant excavation measures or sharp tools, nor did we encounter any of the complications notorious for implantation in scarred corporal bodies. In addition to its antifibrotic properties, mitomycin is also an antibacterial, which adds to its benefits in the management of cases of infection. The proof of concept is not limited to the subjective report of lack of resistance upon blunt dilatation but extends to include the shortened operative time of 30 ± 5.2 minutes and the ability to implant the same length and girth prosthesis as the one extracted without the utility of adjuvant techniques or sharp excavation. This is contrary to the customary delayed reimplantation surgery.[3] However, this was an observation limited to 5 cases, so a controlled study on a larger scale would be required to establish the value of mitomycin in such scenarios.

No side effects for mitomycin irrigation were noted in the current series. Adverse effects reported with intravenous use include bone marrow suppression with long-term therapy, as well as hepatic and renal toxicity.[8] However, side-effects with intravesical instillation (more comparable to our approach of endocavitary instillation) are few and insignificant: pruritus, allergic skin rash, contact dermatitis, cystitis, dysuria, nocturia, pollakisuria, hematuria, or local irritation of the bladder wall.[9] A single case report of glans necrosis was reported with intravesical instillation.[10] It is therefore important to avoid contact between mitomycin and extracavernous tissue. If extravasation occurs, immediate infiltration with an 8.4% solution of sodium bicarbonate followed by an injection of 4 mg dexamethasone is recommended. Systemic injection of 200 mg of vitamin B6 may promote regrowth of damaged tissues.[9]

The cost of mitomycin varies widely with the country of origin and region where it is purchased. Where this study was conducted, the cost was around $US20 for a 10-mg vial. An online search revealed a $US199 price point for the 5-mg dose. In any case, application of mitomycin for cases of infection will not add considerable cost to the procedure. It appears to be cost effective when compared to extended operative time, adjuvant procedures, and possible complications common to dilating scarred corporal bodies.

CONCLUSIONS

Irrigation of the cavernous spaces with mitomycin C upon explantation of an infected penile prosthesis has been observed to ameliorate corporal scarring and keep the cavernous spaces open. In the current pilot study, this facilitated easy and safe delayed reimplantation of replacement prostheses of the same length and girth as the explanted ones. We believe that if the high efficacy noted in this pilot study is reproduced in large and case-controlled comparative series, penile prosthesis infection will no longer be the devastating consequence it currently is.

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