



# Reimplantation of a Penile Prosthesis with a Modified Immediate Salvage Procedure in Prosthesis Infection: Case Report and Literature Review

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Penile prosthesis implantation has become the most popular and acceptable mode of surgical intervention in the treatment of erectile dysfunction refractory to medical treatment. However, prosthesis infection is the most serious and devastating complication of this type of the surgery, as in other prosthesis surgeries. This complication usually necessitates the removal of infected prosthesis and reimplantation of a new one, therefore causes to significant morbidity for the patient and increases the healthcare cost. In this report a patient who underwent modified immediate salvage procedure for malleable prosthesis infection is presented. In this case, infected prostheses were removed and a 4-step vigorous intraoperative irrigation of implant space with 4 different solutions, including ceftriaxone, amikacin and rifampin was done. After prostheses were cleaned and sterilized with different solutions, simultaneous reimplantation was performed.

**Key Words:** Penile prosthesis; Prosthesis infection; Immediate salvage procedure; Antibiotic therapy; Reimplantation.

## Protez Enfeksiyonunda Penis Protezinin Modifiye Doğrudan Kurtarma İşlemiyle Reimplantasyonu: Olgu Sunumu Ve Literatür Taraması

Penil protez implantasyonu medikal tedaviye dirençli erektil disfonksiyonun tedavisinde en fazla popüler ve kabul edilebilir cerrahi tedavi yöntemi olmuştur. Bununla birlikte protez enfeksiyonu diğer protez cerrahilerinde olduğu gibi bu tip cerrahinin en ciddi ve tahrip edici komplikasyonudur. Bu komplikasyon genellikle enfekte protezin çıkarılması ve yenisinin reimplantasyonunu gerektirir, bu yüzden hasta açısından önemli morbiditeye neden olur ve sağlık giderlerini artırır. Bu raporda bükülebilir protez enfeksiyonu nedeniyle modifiye doğrudan kurtarma işlemi uygulanan bir hasta sunulmuştur. Bu olguda enfekte protez çıkarılıp implant boşluğuna seftriakson, amikasin ve rifampin içeren 4 aşamalı kuvvetli intraoperatif irrigasyon uygulandı. Protez değişik solüsyonlarla temizlenip sterilize edildikten sonra eş zamanlı reimplantasyon uygulandı.

**Anahtar Kelimeler:** Penil protez, Protez enfeksiyonu, Doğrudan kurtarma işlemi, Antibiyotik tedavisi, Reimplantasyon

Despite the recent development of effective oral agents for the treatment of erectile dysfunction, penile prosthesis implantation remains an effective and acceptable treatment for men who fail to respond to nonsurgical therapy. On the other hand, the implant surgery may cause some significant complications. The most devastating complication is the development of infection. This report presents a case of prosthesis infection, who was treated successfully with reimplantation of his original prosthesis by using a modified immediate salvage procedure with 4-step irrigation.

## CASE REPORT

72-year-old male with diabetes mellitus and hypertension presented with erectile dysfunction (complete loss of erection) existing for 2 years. Patient's libido was normal. Physical examination revealed no abnormal findings.

Serum glucose was 168 mg/dL (normal:70-110). Urine analysis and hemogram was normal. Urine culture yielded no

microorganisms. Hormonal evaluation showed normal values for serum total testosterone, FSH, LH, and prolactin. Cavernosography confirmed venous insufficiency defined by penile Doppler ultrasonography.

Administration of sildenafil 100 mg orally ensured no improvement in patient's condition. After discussing different treatment alternatives, patient was planned to undergo penile prosthesis operation. AMS malleable prostheses (American Medical Systems, Minnetonka, Minnesota, USA) were implanted via mid-penile ventral vertical incision. Patient was discharged home at day 5 without any problem, advising oral fluoroquinolone treatment for 7 days.

Fifty days after the operation he was re-hospitalized due to difficult urination, penile pain and abundant purulent drainage. Immediately after culturing the urine and pus, parenteral antibiotic (ceftriaxone 2x1 gr, ampicillin 1x1000 mg, ornidazole 1x500 mg) and insulin were started urgently. Debridements with rifampicin were done twice a day. No microorganism were defined in urine and pus cultures.

Conservative treatment did not control the infection and purulent drainage persisted. Therefore, at the 7<sup>th</sup> day of hospitalization, prostheses were pulled out and corpus cavernosa were irrigated consecutively with 1- antibiotic solution (ceftriaxone 1000 mg and ampicillin 500 mg in 1000 ml 0.9% normal saline), 2- half strength hydrogen peroxide, 3- half strength povidone-iodine, and 4- antibiotic solution containing rifampicin 600 mg in 1000 ml 0.9% normal saline. While cavernosal irrigation was going on, taking the patient's verbal informed consent, prostheses were simultaneously cleaned mechanically with sterile 0.9% saline solution and then kept orderly in 2% glutaraldehyde solution, povidone-iodine, hydrogen peroxide, and antibiotic solution containing rifampicin 600 mg in 500 ml 0.9% normal saline approximately 10 minutes in each one. After changing the gowns, gloves, surgical drapes, and instruments, prostheses were reimplanted.

Ceftriaxone (2x1000 mg) and ampicillin (1x1000 mg) were administered postoperatively. Serous drainage from the 2x1.5 cm skin defect ended at day 5. Skin lesion was recovered with daily rifampicin application (Figure). Patient was discharged at day 19 without any problem, giving oral cefixime (1x400 mg) for 15 days.

Patient's condition was questioned by phone 6

months after the operation. He could achieve first successful coitus 2 months after the operation and totally 5 times within this 6 months period. He had no problem with his prostheses until now.

**Figure:** Appearance of the penis after salvage operation.



## DISCUSSION

Postoperative infection, which results in further surgery, loss of penile tissue, and even the inability to replace penile prosthesis, as well as significant health care costs, is the most serious complication of penile prosthetic surgery. The incidence of infection after the insertion of a penile prosthesis has been reported between 0.7 and 16.7% with most series in the range of 2 to 3%.<sup>1</sup> Reoperation of penile implants has a higher rate of infection, estimated between 10% and 18%.<sup>2</sup>

Staphylococcus epidermidis is the most common cause of infection during the original implantation, accounting for 35% to 80% of all positive cultures.<sup>3</sup> Gram-negative enteric bacteria including Proteus mirabilis, Pseudomonas aeruginosa, Escherichia coli and Serratia marcescens account for 20 % of infections. In more severe infections, a synergism can exist between the gram-negative bacteria and anaerobic microorganisms, such as Bacteroides, which can lead to gangrene of the penis. It typically takes more than 6 weeks for a patient to present with clinical infection. In present case, infection developed approximately 6 weeks after the implantation, as indicated in the literature. However, as different from most of literature, no microorganisms were defined in pus culture, possibly as a result of performing only aerobic culture. Therefore we administered an empirical preoperative wide-spectrum antibiotic regimen, which was effective against staphylococcal species, gram negative and anaerobic microorganisms

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simultaneously.

If infection develops despite a standard sterile technique, perioperative antibiotics, and careful surgical procedures, the standard treatment for this complication involves systemic and local antibiotics, complete removal of all device components and reinsertion of a new prosthesis 3 to 6 months later.<sup>1</sup> However this method makes subsequent reimplantation very difficult because of developing corporeal fibrosis and shortening. Therefore, immediate salvage procedures including aggressive lavage and prosthesis replacement are currently most popular method in urology practice for the management of prostheses infection.

The first salvage success with clinical infections was reported in 1996 by Brant et al<sup>4</sup> In salvage method, the implant and all associated foreign materials are removed, entire capsular space is thoroughly irrigated using sequential lavage with antiseptic solutions and a sterile new prosthesis is immediately reimplanted. The success of salvage procedure has been reported in more than 80% of cases.<sup>5</sup>

One disadvantage of salvage method is the increase of cost due to the use of a new prosthesis, which may be important, especially for the patients in low economical level. An alternative is reimplantation of original prosthesis simultaneously. Literature on this topic is controversial. In a report, all of 8 reimplanted patients had good results.<sup>6</sup> On the other hand, in another study 85 patients underwent implantation with 13 different prosthesis models for the treatment of erectile dysfunction and 15 out of these patients underwent replacement of their penile prosthesis.<sup>7</sup> A total of 32 prosthesis-replacement interventions were carried out mainly due to the mechanical failure (13 cases, 40.62%), infection (10 cases, 31.25%), and corpus cavernosum perforation (five cases, 15.62%). In this series only eight (53.33%) out of 15 reimplanted patients used their prosthesis with normality. Investigators concluded that those patients who underwent replacement of their penile prosthesis were potential sources for later complications. Therefore this method has not gained popularity currently. However we obtained very good and satisfactory results from the reimplantation in present case.

In classic immediate procedure, 7-step irrigation is performed:<sup>8</sup> 1- antibiotic solution (kanamycin-bacitracin), 2- hydrogen peroxide, 3- povidone iodine, 4- pressure irrigation with 1 gm. vancomycin and 80

gm gentamycin in the 5 liters irrigating solution, 5- povidone iodine, 6- hydrogen peroxide, 7- antibiotic solution (kanamycin-bacitracin). Our 4-step irrigation is less time consuming procedure compared to classic method. Types of the antibiotic solutions, which we used for irrigations, were different than the originally described method. On the other hand those antibiotic solutions were containing appropriate antibiotics against most possible microorganisms. Despite the efficacy of 4-step irrigation in the present case, to draw more definitive conclusions on the efficacy, safety and advantages, further studies may be performed.

Mulcahy<sup>5</sup> suggested that immediate salvage procedure is less likely to succeed when the infection is manifest soon (weeks) after the placement procedure, is accompanied by extensive cellulitis and is caused by virulent organisms. He also suggested that sepsis, ketoacidosis, penile necrosis, and bilateral urethral erosion of the cylinders were relative contraindications to salvage. Brant et al<sup>4</sup> listed the relative contraindications to salvage procedures as tissue necrosis, early development of post-implant infection, cylinder erosion and the presence of diabetes with pus in the corpora. Although Bishop<sup>9</sup> reported an increased incidence of prosthesis infections in diabetics (15.7%) compared with nondiabetics, especially if diabetic control was poor, Wilson<sup>10</sup> found no such association between diabetic control and infection. Kaufman<sup>1</sup> pointed out that they would no longer consider a salvage procedure in a poorly controlled diabetic especially if pus is visible. However present case suggests us that meticulous control of serum glucose, careful surgical procedure and appropriate antibiotic treatment may salvage a diabetic patient with visible pus associated with infected prosthesis. Since glycosylated hemoglobin indicates mean serum glucose level within the last three months, it is not useful as an indicator in the meticulous control of serum glucose in acute conditions. But it may be used in followup examination of the patients with diabetes mellitus who underwent prosthesis infection.

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## Editorial Comment

In this article authors presented a single case in which they preserved infected penile prosthesis with a unique salvage procedure. Although success was reported there are major concerns about this procedure.

A biofilm is defined as an accumulation of microorganisms and their secreted glycocalyx to form a structured community on an inert surface. (Silverstein A; 2003, Int J Impot Res) Numerous small microcolonies of bacteria grow within this material. They thrive within this newly created microenvironment. Depending on the species, the layer may be composed of 10% - 25% bacteria and 75% - 90% matrix. (Costerton JW; 1999, Int J Antimicrob Agents) Antimicrobial agents fail to treat biofilms on prosthetic devices because of a variety of reasons. This includes poor diffusion of antibiotics through the glycocalyx layer, the differential growth of bacteria within biofilms, and the intrinsic resistance to antibiotics of bacteria in a biofilm as compared to free floating cells of the same species. (Chong S; 2000, BJU Int) It is very unlikely that the 5 step irrigation procedure described in this case report can detach the whole biofilm from an infected penile prosthesis.

Another concern arises as in this case report salvage procedure was used even though the infection contained pus. Pus containing infection is considered as a contraindication to salvage procedures by the authors who defined it originally.

In this case report, authors also used a new 4 step irrigation for the infected cavernosal cavity. Alstotypes of the antibiotic solutions for irrigation were different than the originally described ones. A randomized trial comparing classical irrigation procedure with the new 4 step procedure is needed.

The efficiency and safety of this unique salvage procedure with preserving the infected penile prosthesis is unknown and it should not be used routinely until data of a larger group is published by the authors or others.

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