Key from Kols: Penile prosthesis revision surgery: State of the art by Josep Torremade Barreda

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Inflatable Penile Prosthesis (IPP) is a high efficient therapy in the treatment of refractory erectile dysfunction. Since its introduction in 2013 by F. Brantley Scott (1), IPP treatment has become more and more popular.

But the beginnings were not easy. The first devices had rates of mechanical failure as high as 70% in less than 10 years (2). Manufacturers have made several changes in the IPP mainly intended to improve mechanical survival and to reduce the rate of infection. Regarding the first, we can highlight the use of parylene coating, kink-resistant tubing, polyurethane material and safer connections (3). As regards the second, these improvements are attributed to the use IPP with mynocycline and rifampicin coating (InhibiZone®) (4) or hydrophilic coating that binds antibiotics (5). These advances in technology over the past 40 years have turned the IPP into one of the most reliable devices in prosthetic surgery with a satisfaction rate of around 90% (6).

Despite the overall device survival of these new devices reported after 5 years is superior to the 90%, this decreases to the 60% at 15 years follow up (7). For this reason a large number of patients will request a replacement of its IPP in the coming years. In our hospital, revision surgery for mechanical failure represents 20–30% of IPP surgeries.

This review aims to illustrate the technical aspects to take into account in this type of surgery.

Preoperative care

The same recommendations that have shown effective to decrease the risk of infection in virgin IPP must be applied in the revision surgery by its greater risk of infection. As a reminder, these are:

1) parenteral antibiotics starting one hour prior to the incision,

2) hair removal at the operative site prior to surgery, 3) thorough skin scrub, 4) closed suction drainage or mummy wrap (8).

Complete or partial removal of the IPP

The cause of the mechanical failure can be different depending on the type of virgin IPP. With the use of last generation IPP, the cause of mechanical failure is mainly tubing fracture (67.5%), being less frequent other alterations as the cylinder aneurism, reservoir hernia and pump malfunction (10.4%) (9). In other series, with older devices, the main cause of mechanical failure is the cylinder leak (45%) followed by the tubing leak/break (13%) or the fluid loss not otherwise specified (20%) (10). But in any case, the final diagnosis will be based on the intraoperative findings.

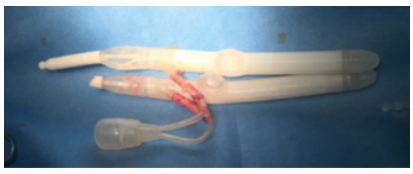

Fig 1. Mechanical malfunction due to bilateral cylinder aneurism

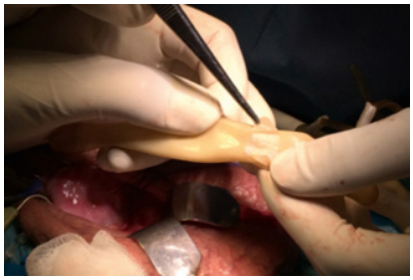

Fig 2. Mechanical malfunction due to cylinder fracture

In case of mechanical failure, the most prudent action is to replace both cylinder and pump. But in case of early dysfunctions of the pump, some authors have proposed changing only the damaged pump by a new one, avoiding the manipulation of those cylinders.

There is also discussion on what to do with the old IPP reservoir. Rajpurkar reports it is safe to leave the old reservoir and place the new one in the contra-lateral side (11). Even though, the retained reservoir and suboptimal washout of the space may increase the risk of infection. For that reason, it remains at the discretion of the surgeon as to decide whether the existing reservoir should be removed at the time of surgery review for a non-infected device (12).

Washout as strategy to decrease infection rates

It has been observed an increased risk of infection (13-18%) when IPP require surgical revision due to mechanical failure (13,14). It is attempted to explain this phenomenon with the implant of bacteria and the subsequent formation of a biofilm during the first surgery. These bacteria will remain protected by a biofilm until reactivated at the time of surgery revision.

Washout of the implant space has been described after component removal as a strategy to disrupt biofilm, to diminish the bacterial load and to facilitate the activity of antibiotics (15). However, there is not a consensus on which is the best system or which solutions to use. A multicentric study with more than 200 revision surgeries demonstrated a significant difference in the rate of infection in those patients who received washout with solution containing different antibiotic solutions versus those who did not receive washout (16). Abouassaly simplifies the washout method to a washing method of 1 L with 50000 units of bacitracin reporting an infection rate of 1.8% for a 32 months follow-up (9). Other authors observed no differences in the

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rate of infection when comparing 2 groups of patients with washout versus the standard sterile technique, but they do observe an increase in the operating time of around 20 minutes (17). Another possibility is to use high pressure washing systems, as described in the salvage procedure of Brant and Mulcahy for penile implant infection (18). With these systems of high pressure we obtain an energetic irrigation from both corpus cavernosum and reduce greatly the surgical time of the irrigation. It is reasonable to hypothesize that the mechanical disruption of the biofilm by vigorous lavage with the chosen solution may be more important than the content of the solution itself (8).

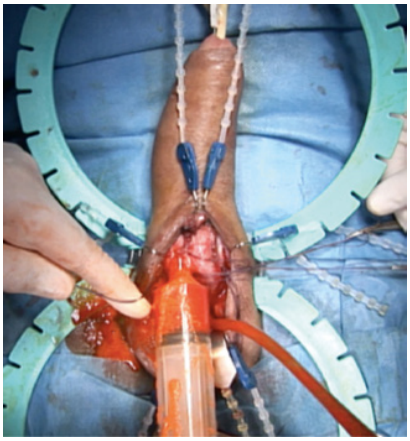
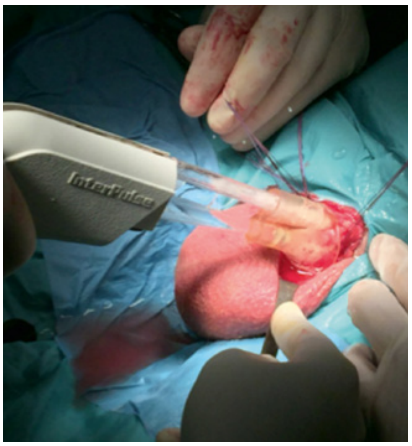


Fig 3. a) Antibiotic washout



b) High pressure saline washout

New device and upsizing

It is widely recognized that antibiotic coated IPP diminish the rates of infection in primary implants (19,20). Nerha shows in its series a greater overlife of antibiotic impregnated IPP independent of the revision cause and a smaller rate of infection in impregnated IPP (3.3%) when comparing it with non impregnated IPP (7.6%) (21). Since many groups use antibiotic coated IPP in virgin cases, it seems mandatory to use them also in cases of revision for the aim of diminishing the number of infections (8).

There is no data published in literature regarding if revision surgery would allow for a larger corporal cylinder to be placed. Some authors have proposed that presence of a working IPP prior to revision can contribute in a progressive corporal expansion after the surgery (22). AMS Ultrex and AMS 700 LGX were introduced to minimize penile shortening following prosthetic surgery (23). Recent data have reported significant differences in penile length between baseline and 6-12 months using these devices (24). This would allow us to make further cylinders upsizing in case of mechanical malfunction. By all previously exposed, when facing a case of revision surgery we will not replace the prosthesis by another one with the same dimensions and we will make new measurements. In many cases we will be able to make an up-sizing from 1 to 2 cm.

Conclusions

Re-operative penile prosthetic cases are always more complex and have a higher infection rate than first-time implantation. More studies are needed in order to prove which is the best strategy. However, those points where there is a greater consensus are focused on the use of antibiotic coated or soaked IPP, preoperative antibiotics, not touch techniques and performing washout procedures. Complete removal of IPP is not always needed and leaving reservoirs in situ does not seem to associate to an increase of the complications.

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