

Medical College of Wisconsin Department of Urology



Intra-operative complications of penile prosthesis- Part 2

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Post operative complications- due to intraoperative errors

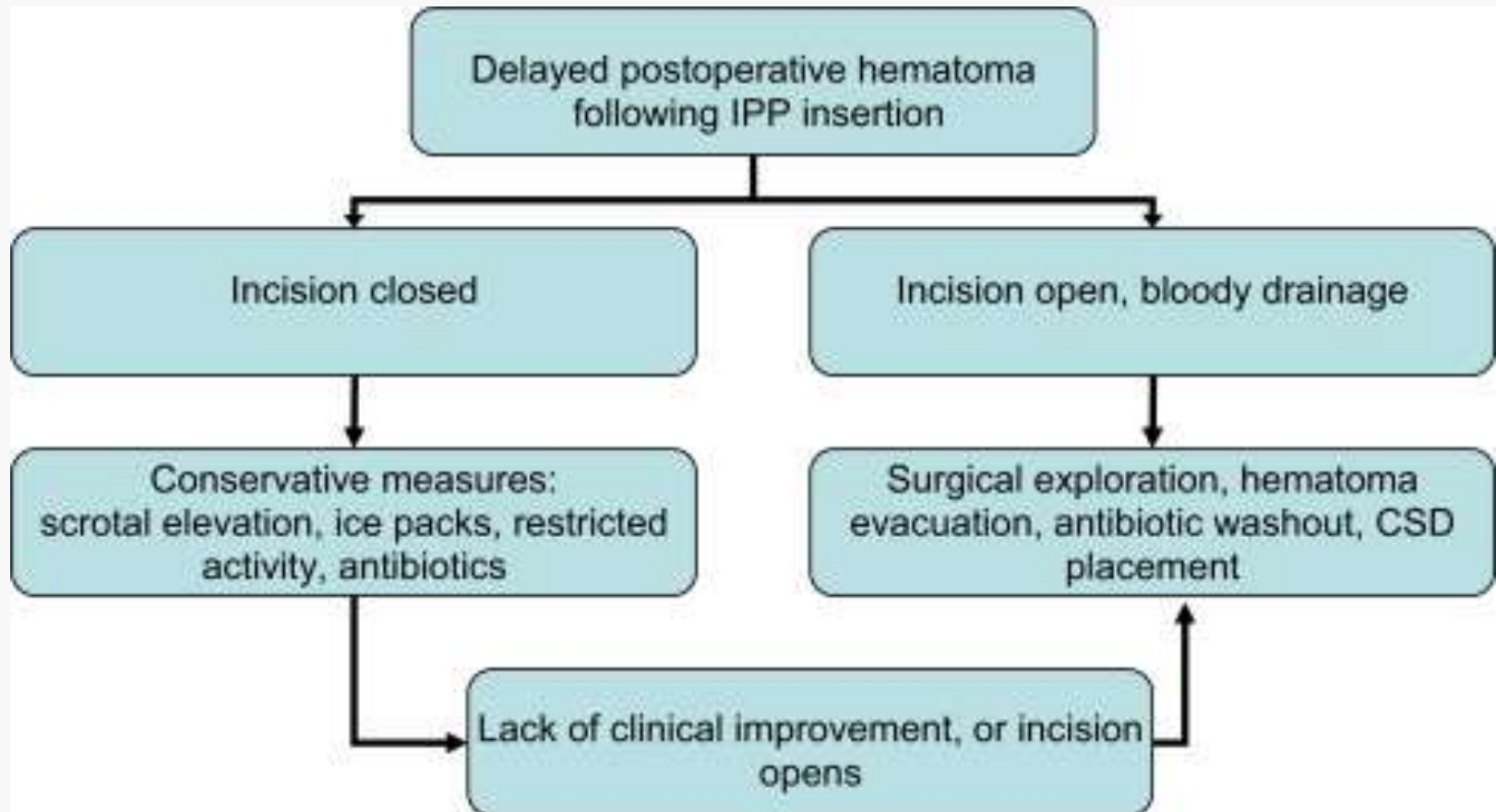
- Scrotal hematoma
- Reservoir Misplacement
- SST deformity
- Infection
 - Biofilms
 - Common pathogens in modern era
 - No touch techniques
 - Salvage techniques, “Carrion Cast”
- Glans necrosis

Scrotal Hematoma

- Risk 0.2-3.6%
- Due to inadequate hemostasis at time of surgery
 - nonvascular causes of ED with well vascularized corpora, and revision cases where the capsule has developed neovascularity
- Rarely need for re-operation



Scrotal Hematoma



Hematoma- management

- Prevention
 - Watertight closure of corporotomy
 - Compressive scrotal dressing
 - “mummy penis”
 - Partial cylinder inflation
 - Drain
 - Data is inconclusive
- Manage conservatively
 - Ice, compression, elevation, bedrest
 - Retrospective reviews on utility of evacuation are inconclusive due to very small numbers in each series

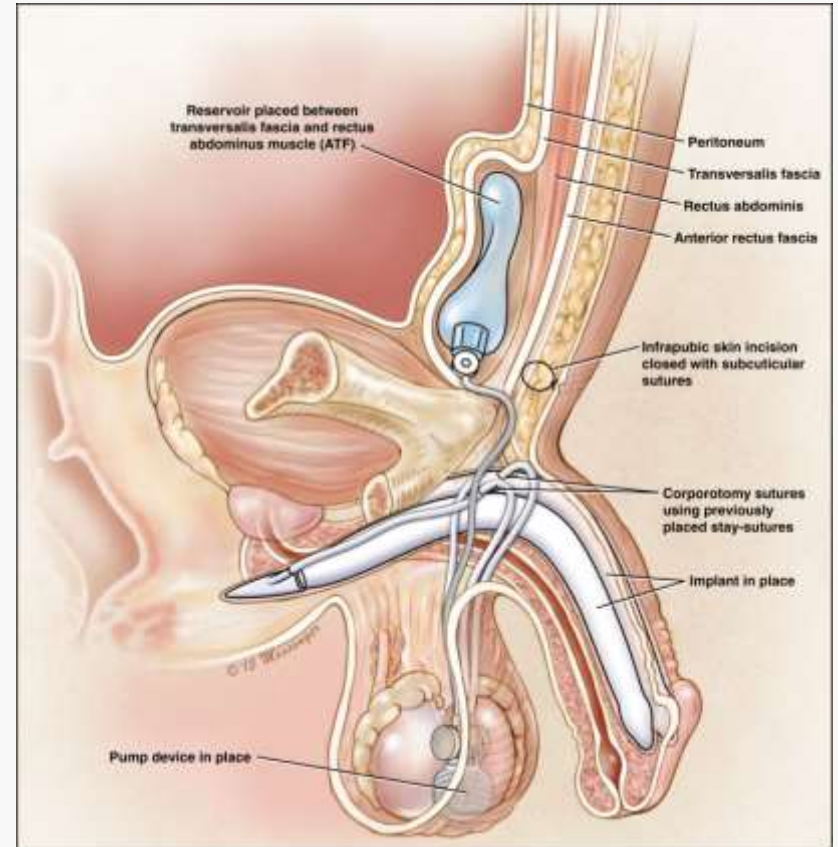
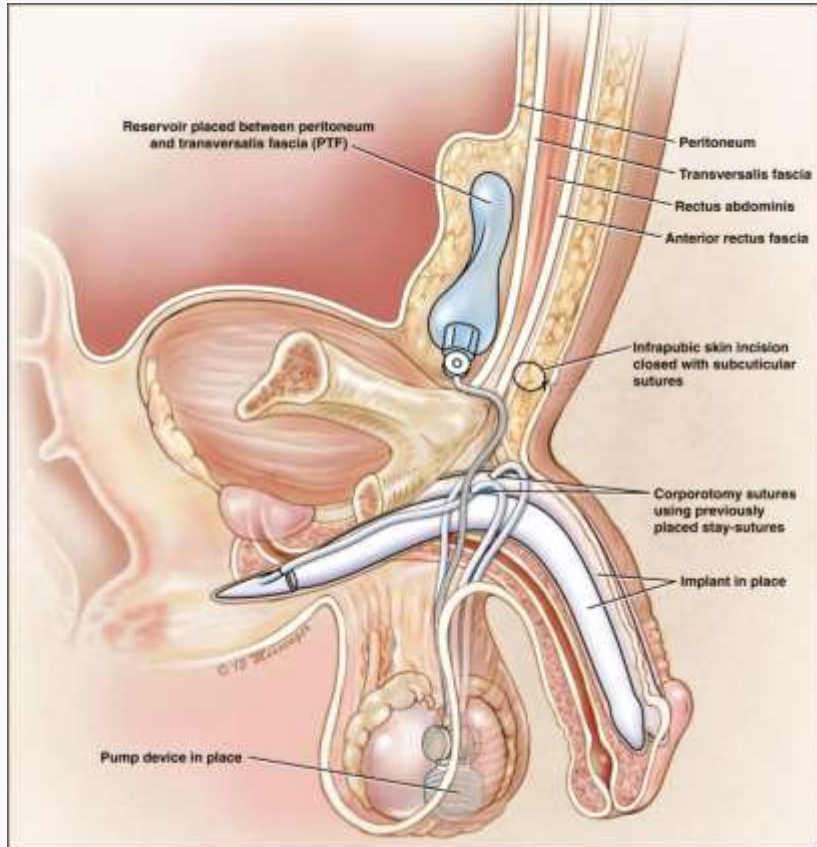


Reservoir Complications

- Incidence of reservoir related complications is <1%
- 27 % of all implants in US placed in patients who had a previous radical prostatectomy
 - The space of retzius has been previously violated during that procedure
- Error in initial placement
 - Inguinal ring to space of retzius
 - Did you make it there
 - Did you make the ring too big
 - Did you underfill the device
 - High sub-muscular/ectopic

Important Steps for Reservoir Placement

- Drain the bladder completely
- Use the pubic tubercle to locate the inguinal ring
- Penetrate the floor of the canal in a posterior direction
 - Finger, Kelly clamp, long nasal speculum
- Dissection of space of Retzius in a cephalad direction
- For placement anterior to transversalis fascia
 - Do not penetrate floor of the ring
 - Use ring forceps or long nasal speculum to dissect between muscle layers cephalad
 - Pass the reservoir as cephalad as possible



The anatomy

- External inguinal ring to external iliac vein 2.5-4cm
- External inguinal ring to decompressed bladder 5.3-8cm
- External inguinal ring to full bladder 2-4cm



Ectopic Reservoir Placement

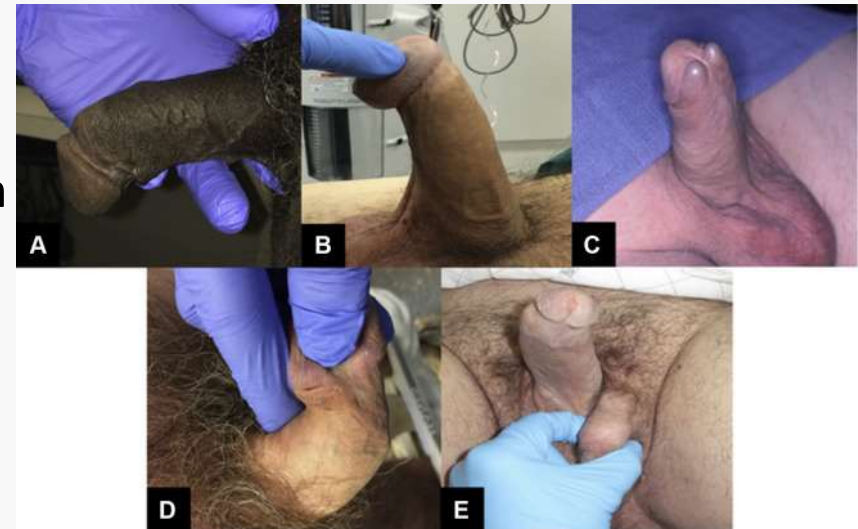
- PROPPER registry- 136 patients with submuscular placement of reservoir their database
 - 5 patients with adverse events related to reservoir placement
 - 4 herniated into scrotum- required revision surgery
 - 1 capsular contracture
- Perito series (J Sex Med 2014) of 447 ectopic placements (of 2687 total implants)
 - 2 cases of immediate post op herniation of reservoir with coughing
 - 2 patients revised for palpable reservoir
 - 15 patients (3.4%) c/o palpable reservoir but did not seek revision
 - 6 patients (1.34%) delayed herniation requiring revision
 - 6 infections

Rare Reservoir Complications

- Erosion into intestinal lumen
- Vascular compression causing DVT
- Migration of retained reservoir to sub-hepatic space
- Bladder laceration
- Unintended ectopic placement above skin
- Vascular injury
- Ureteral injury

SST deformity (hypermobile glans)

- SST= supersonic transport
- Causes
 - Improper sizing of implant
 - Inadequate dilation proximally or distally
 - Unrecognized proximal perforation

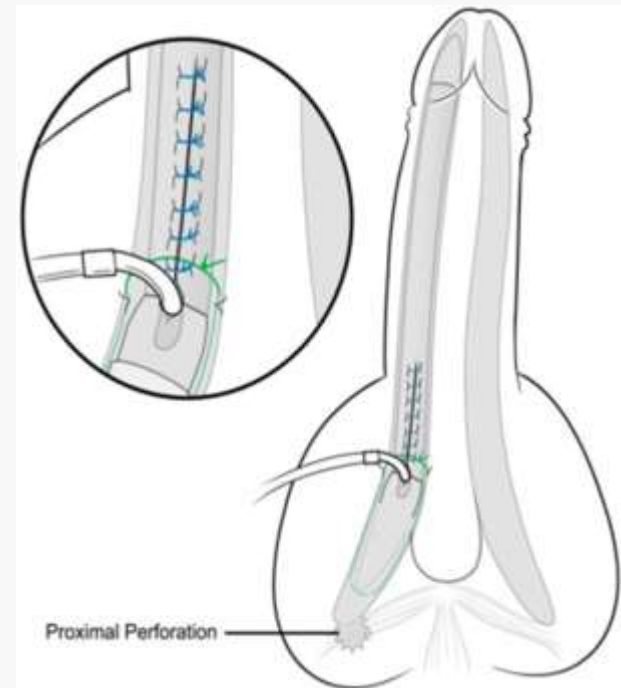
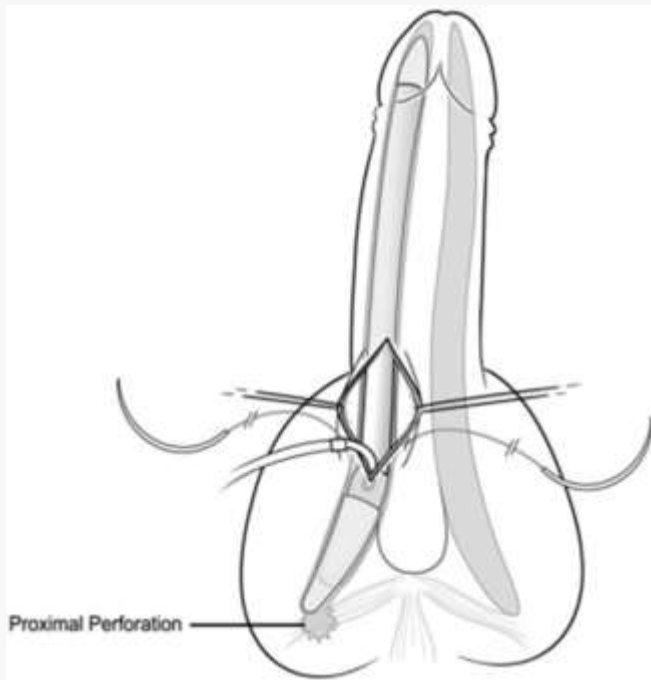


Correction of SST deformity

- At time of implant
 - Upsize with rear tip extenders
 - Re-dilate distally
 - For proximal perforation- perform a “sling”
 - Glans fixations
 - True glans hypermobility with a properly sized implant

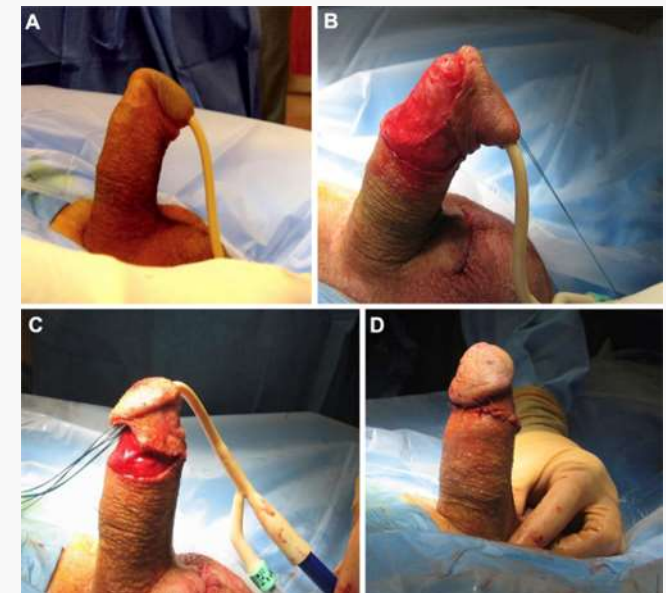
Correction of SST Deformity

- Sling for proximal perforation

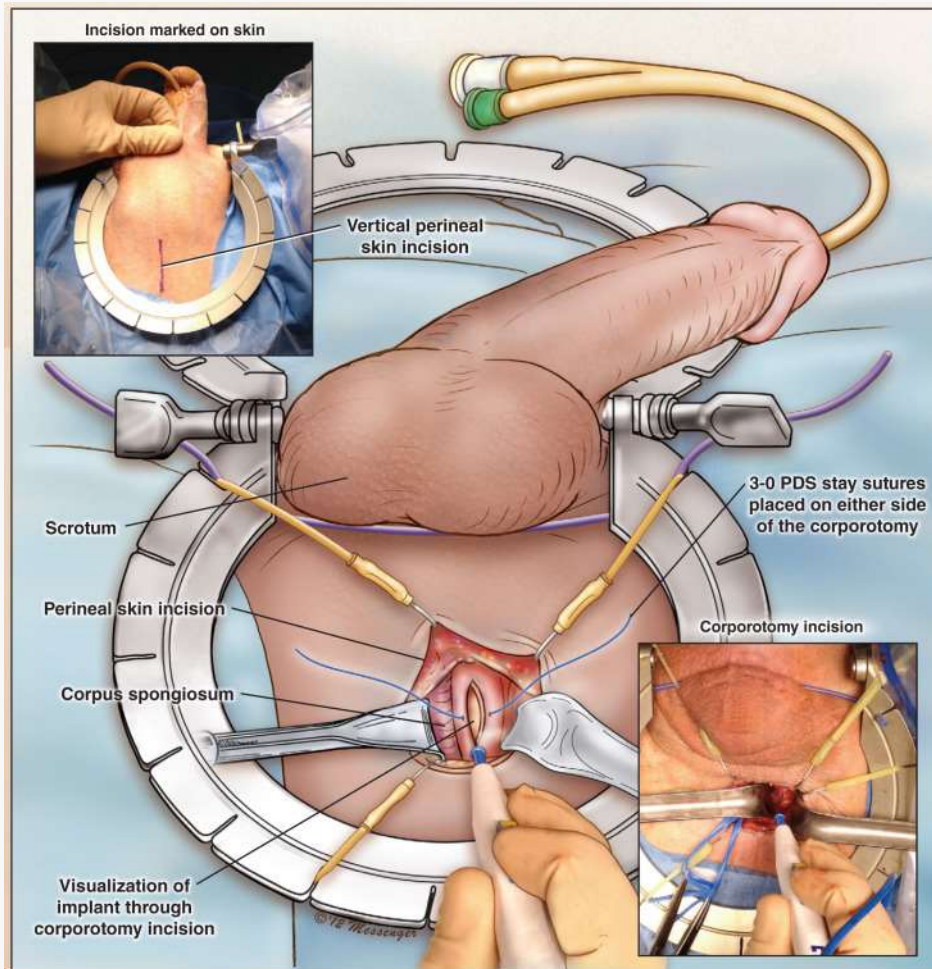
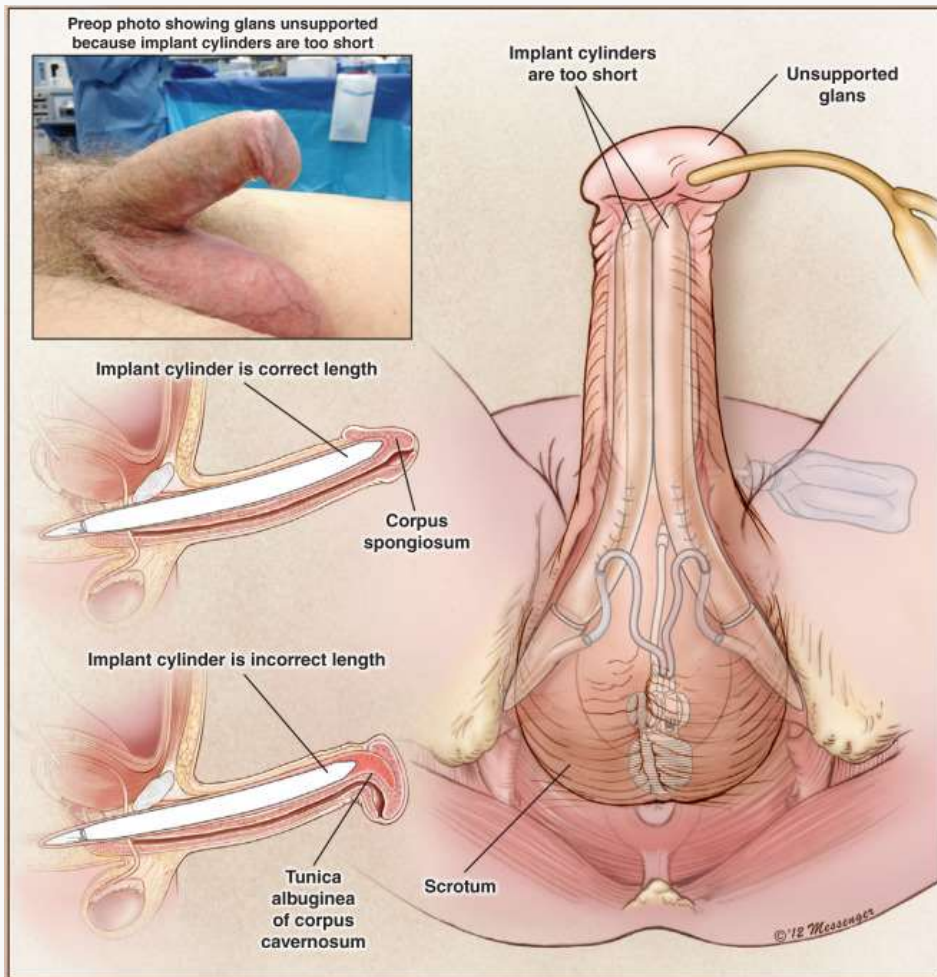


Correction of SST Deformity- Glans Fixation

- True hypermobile glans at time if implant is rare
- Poster at this meeting from Dr. Ralph's group
 - Of 1018 implants, 21 glans pexy
 - 4 at time of implant
 - 17 as a secondary surgery
 - 4-0 polydioxanone suture
 - 75% satisfaction
 - 21% c/o decrease glans sensation



Correction of SST at a later date

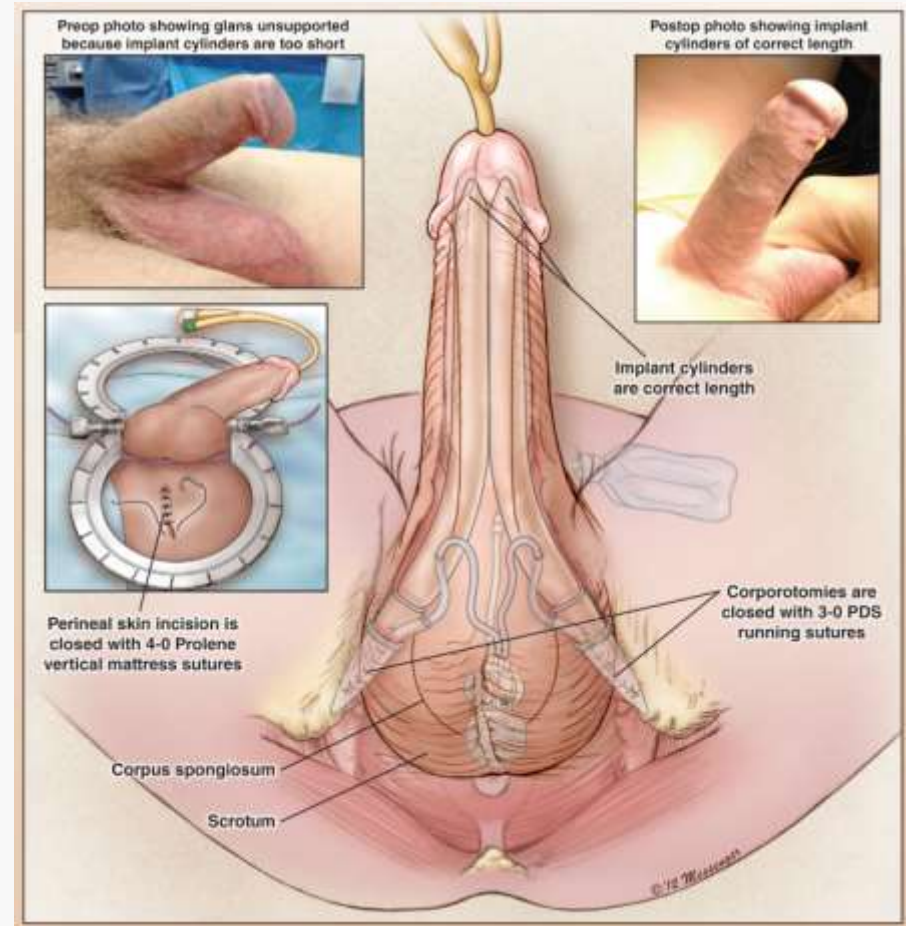
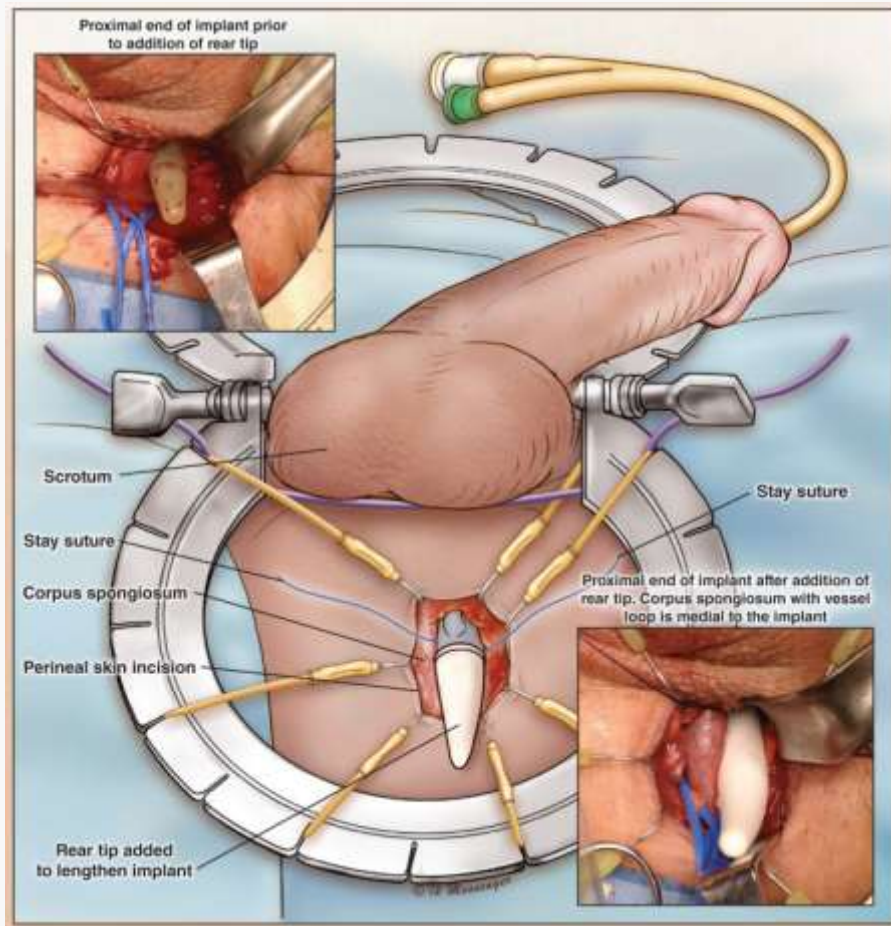


Perineal Minimally Invasive Technique for Cylinder Length Adjustment

Seth Cohen, Jean-Francois Eid

Journal of Sexual Medicine [November 2012](#) Volume 9, Issue 11, Pages 2738–2741

Correction of SST at a later date



Perineal Minimally Invasive Technique for Cylinder Length Adjustment

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Infection

- Almost all implant infections come from bacterial contamination at the time of surgery
- With introduction of antibiotic resistant coating- infection rate has declined from 4% to 1% in high volume implanters.
- Infection distant from time of implant from a blood borne pathogen is very rare
 - No prophylaxis recommended for dental procedures, etc.

Risk Factors for Infection

- Smoking
- Staph aureus inoculation of nares
- Revision surgery
- Diabetes
- Spinal cord injury
- Prolonged operative time

(in decreasing order of level of evidence)

Factors that decrease risk of infection

- Smoking cessation >4wks prior to surgery
- Chlorhexidine-alcohol based surgical prep (superior to iodine)
- Treatment of staph aureus in nares
 - Mupirocin and chlorhexidine scrub 5 days pre op
- Infection retardant coated implants
- Peri-operative antibiotics
 - Aminoglycoside + vancomycin or cephalosporin x 24 hrs.
- “No touch” technique
- Surgeon experience
- Standardized technique (same process/team each time)
- Shorter operative time

(in decreasing order of level of evidence)

Things you might be doing that don't make a difference....

- Pre operative home chlorhexidine scrub in the absence of staph aureus
- HIV status
- Shaving
- How you scrub you hands (chlorhexidine scrub versus waterless solution)
- Radiation
- Obesity
- Concomitant circumcision
- Drain placement
- Age >75
- Self cath
- Surgical approach (peno-scrotal versus infrapubic)

Biofilms

- A biofilm can be defined as bacteria irreversibly adhered to a surface, enclosed in a self-made extracellular polysaccharide matrix
- Resistance to antibiotic therapy, sometimes requiring up to 1,000 times the concentration of antibiotics to kill bacteria in biofilms when compared to their planktonic (not adhered) counterparts
- *Staphylococcal epidermidis* is the most common bacterium causing medical device infections, in large part due to its ability to form a biofilm [18], and was notably the most commonly cultured bacteria on penile prostheses
 - Other organisms include *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Candida albicans*

Biofilms

- Plays a more significant role in revision surgery
- Henry et al. cultured clinically uninfected implants removed for revision and found that 70 % of the implants were culture positive, and 90 % were positive for at least one of ten staphylococcal species.
 - In some cases, biofilms were visibly apparent on the surface of these implants
- Washout during revision surgery decreases device infection rate from 11.6 to 2.9%
 - “Dilution is the solution to the pollution.” – John Mulcahy

Common Pathogens in the Modern Era

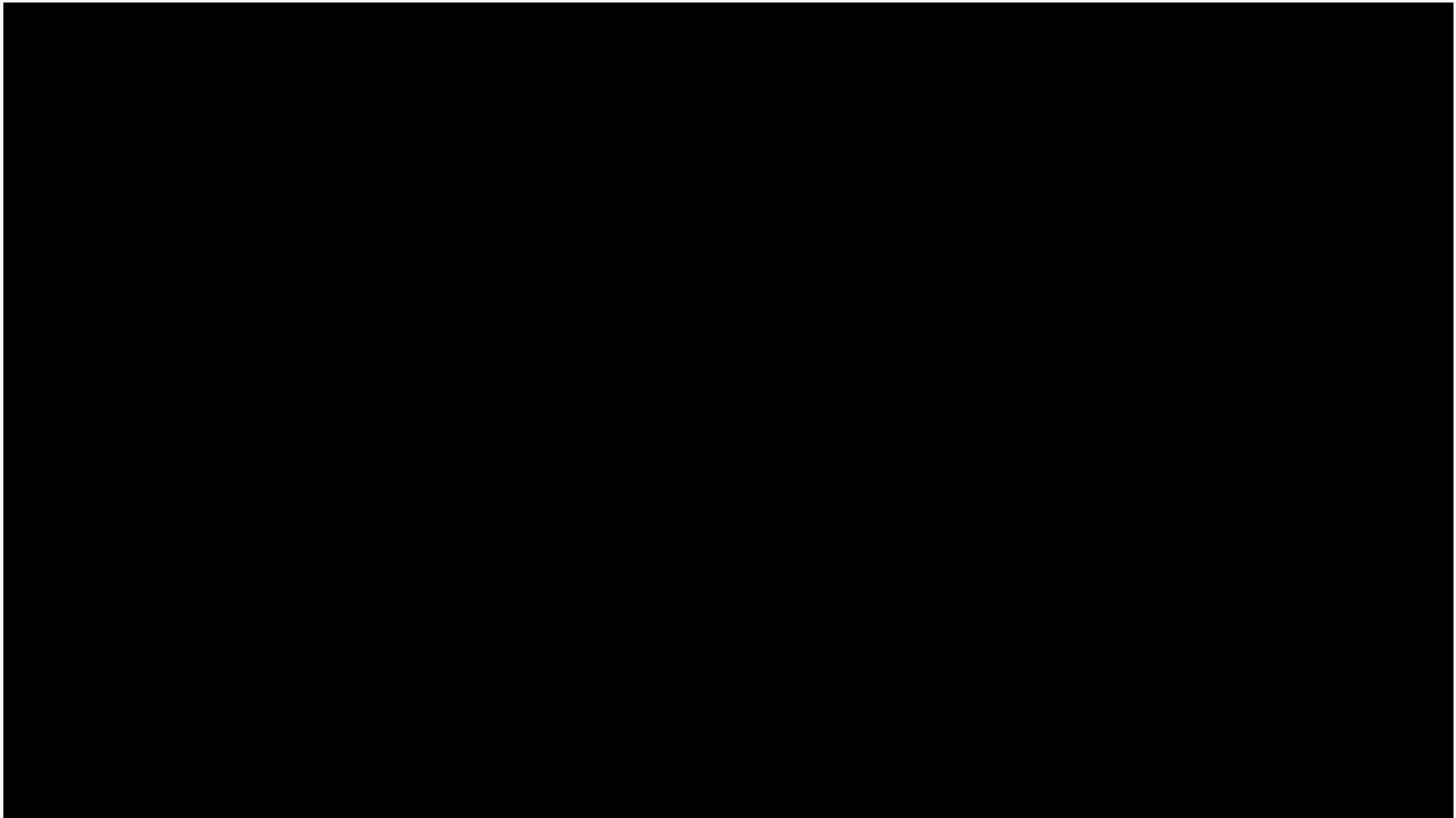
- *S. epidermidis* remained the most common organism reported on cultures of primary and revision implant infections
- Group B streptococci
- *Staphylococcus*
- Less commonly- gram negatives, yeast
- Rare- anaerobes, mycobacteria, and gonococci
- Single surgeon series from Kava et al in 2011 showed only 10% of infection in antimicrobial coated devices were coag negative staph
 - *S. aureus* and *Enterobacter aerogenes* most common pathogens
- Multi-institutional study by Henry et al 2011 also showed coag neg staph to be <25% of pathogens in infections of newly implanted antimicrobial coated devices

“No touch” technique

- Based on the belief that eliminating all direct and indirect contact between the implant and the skin reduces the contamination that causes most infections
- Dr. JF Eid based on orthopedic surgery and plastic surgery protocols
- Infection rate 0.49%

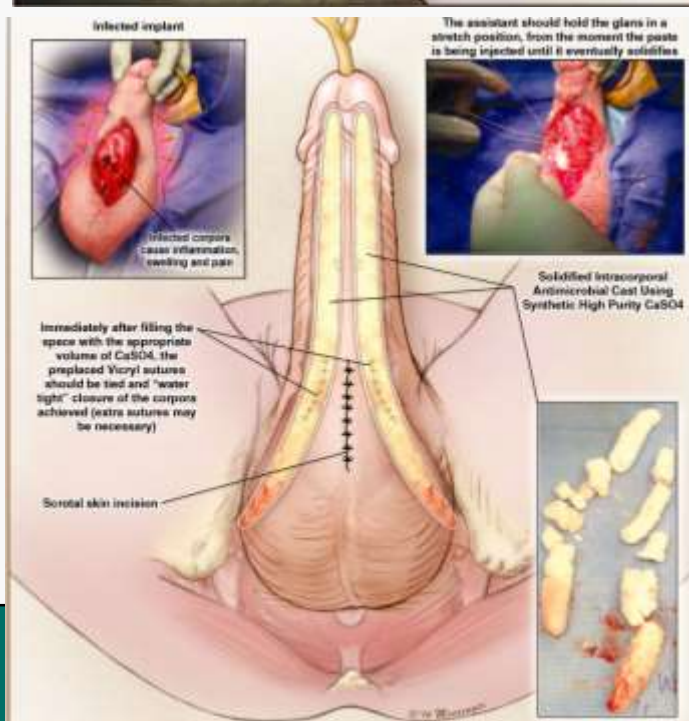
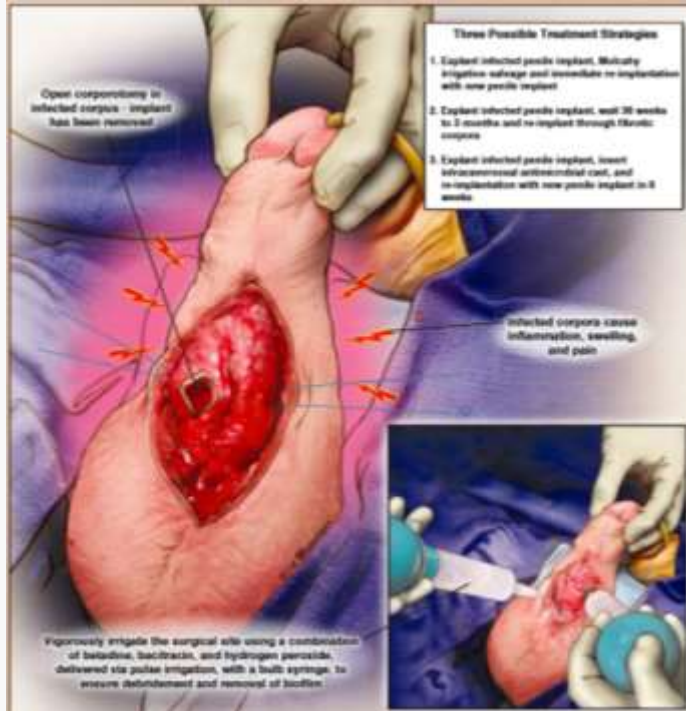
“No Touch” technique

- Adhesive backed, iodine coated plastic drape covers the usual sterile draping.
- A hole is cut in it to deliver the penis and scrotum.
- A bladder catheter and ring retractor are placed, and a scrotal incision is made.
- All instruments used up to this point are passed off the table. The team changes their outer pair of gloves.
- A second (non-adhesive) sterile plastic drape then covers the iodine drape. (Only the ring retractor, catheter, penis and scrotum lie sandwiched between the 2 plastic drapes).
- A small incision in this top drape matches the underlying scrotal skin incision.
- The implant is placed in a routine fashion
- The entire procedure occurs above this drape, the IPP gets placed without ever having contacted the skin flora of the patient, the surgical team or instruments that touched either.



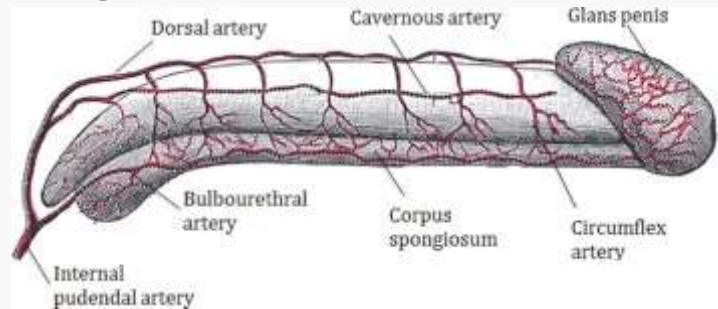
Salvage Techniques

- Mulcahy or modified Mulcahy washout
 - Remove all components
 - Irrigate corporal spaces, reservoir and pump spaces
 - H2O2, betadine, Vancomycin/Gentamycin solutions (3L total)
 - 84% success
- Carrion Cast
 - Not a candidate for immediate salvage due to purulence, sepsis or failed salvage
 - Prepackaged calcium sulfate, 1 gram of vancomycin and 1.2 grams of tobramycin- mixed to a paste and injected to fill corporal space



Glans Necrosis

- Blood supply to glans penis is the dorsal arteries and terminal branches of spongiosal arteries



- Both blood supplies must be severely compromised to cause glans ischemia
- Presents initially as dusky, +/- blisters on POD#1



Glans Necrosis

- Risk Factors

- Poorly controlled DM
- End stage renal disease
- Severe atherosclerotic vascular disease
- Severe coronary artery disease

And possibly...

- Smoking
- h/o radiation

All reported cases had at least 2 of the above comorbidities

Number of Comorbidities	
2	3 (14%)
3	6 (29%)
4	9 (43%)
5	3 (14%)

Glans Necrosis

- Wilson et al (J Sex Med 2017) case series of 21 cases
 - Preoperative Risk Factors
 - CV disease 90%
 - DM 81%
 - Smoking 81%
 - Previous prosthesis explant 57%
 - h/o radiation therapy 48%
 - Intraoperative and post operative risk factors
 - Subcoronal incision 86%
 - Penile wrapping with elastic bandage 62%
 - Use of sliding technique for lengthening 33%
 - Repair of urethra injury 29%

Glans Necrosis

- 81% of patients managed “conservatively”
 - Retained the prosthesis
 - All sustained significant glandular loss



Table 1. Characteristics of 21 patients with suspected glans necrosis

Pre-operative	
Age, mean years (SD)	61.8 (11.1)
Diabetes mellitus	17 (81%)
Smoking history	17 (81%)
Arteriosclerotic cardiovascular disease	19 (90%)
Previous penile prosthesis explantation	12 (57%)
Previous radiation therapy	10 (48%)
Number of comorbidities	
2	3 (14%)
3	6 (29%)
4	9 (43%)
5	3 (14%)
Penile duplex Doppler ultrasound	
Not performed	12 (57%)
No arterial insufficiency	9 (43%)
Perioperative	
Penile prosthesis	
Malleable	9 (43%)
Inflatable	12 (57%)
Surgical approach	
Subcoronal	14 (67%)
Penoscrotal	6 (29%)
Infrapubic	1 (5%)
Concomitant circumcision	8 (38%)
Sliding procedure	7 (33%)
Repair of urethral injury	6 (29%)
Compressive elastic penile dressing	13 (62%)
Subcoronal incision, concomitant circumcision, or penile degloving performed	18 (86%)
Postoperative	
Immediate penile prosthesis explantation	4 (19%)
Immediate complications	0 (0%)
Significant glandular loss	0 (0%)
Expectant management with observation	17 (81%)
Significant glandular loss	17 (100%)

Glans Necrosis

- Immediate explant in 5 patients
 - 0% glans loss
 - 0% long term complications
- Do NOT offer these patients a re-implant at any time under any circumstances!!!



Conclusions

- Many intra-operative complications are avoidable
 - But also repairable intraoperatively if you recognize them and are equipped with the proper surgical skills
- Biofilms are ubiquitous
 - Antibiotic coated prosthesis do decrease infection rate
 - Options for salvage include washout and carrion case
- Glans necrosis is a true urologic emergency necessitating immediate explantation to save the glans

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