

## **APPENDIX A**

### **Description of Clitoroplasty Technique**

#### **Overview**

Penile-inversion vaginoplasty (PIV) or vulvoplasty is a gender-affirming surgical procedure wherein the penis and scrotum are dissected and reconstructed into a vulva and a vagina. Clitoroplasty is a component of PIV that involves dissecting and reshaping the glans penis to create a sensate neoclitoris. This document outlines the clitoroplasty technique employed by the reconstructive urology team at Women's College Hospital (Dr. Alexandra Millman, Dr. Yulia Wilk-Goldsher, and Dr. Yonah Krakowsky).

#### **Orientation**

The patient is placed in a lithotomy position with a Trendelenberg tilt. Their arms are folded over their abdomen to reduce post-operative numbness. The surgeon is seated, facing the patient's pelvis. The first assistant is on the patient's right and reaches over their right leg to access the surgical field. The scrub nurse is on the patient's left, opposite the first assistant. The second assistant stands at a table adjacent to the scrub nurse where they prepare the skin graft (not described here).

At this point in the procedure, the patient has had a bilateral orchiectomy, a partial corporotomy, and the penis has been degloved. The suprapubic space (a potential space) was created between the skin and subcutaneous tissue of the mons pubis by dividing the suspensory ligament of the penis. The glans and its neurovascular pedicle (dorsal neurovascular bundle (NVB) attached to a sheet of tunica albuginea) have been redirected back through the penile skin tube, so they now hang separately. The corpus spongiosum, containing a Foley catheter, hangs below the dorsal neurovascular bundle, on top of the partially resected bulbospongiosus muscle. The glans is held by a penetrating towel clamp, but the distal 2-3 cm of the penis is otherwise unmodified. The patient had been circumcised prior to this case.

## **Dissection of the Glans**

Using needle-tip electrocautery, create a longitudinal incision at 12 o'clock along the glans, starting about 5 mm distal to the corona and ending 5 mm distal to that. Cut through the spongy tissue, to the depth of the tunica albuginea but no further. The excess tunica will be used as an anchor point for the neoclitoris later in the procedure.. Continue the cut laterally to about 9 o'clock, and then proximally, back towards the corona. Replicate this cut on the other side of the glans, to 3 o'clock. Reflect the glans and dorsal NVB superiorly to expose the ventral aspect of the tunica albuginea, then continue the incision circumferentially along the ventral border of the corona. Create a ventral midline incision longitudinally along the skin of the distal shaft, starting at the corona and ending at the cut edge of the shaft skin.

## **Completion of the Corporotomy**

Using electrocautery, separate the flaps of distal shaft skin from the stumps of the corporal bodies up to the 3 o'clock and 9 o'clock cuts on the glans. Then, extend the lateral cuts made from the previous corporotomy up into the glans. Excise the stumps of the corpora in their entirety, along with any remaining corpus spongiosum tissue in the distal portion of the glans. Leave behind the narrow rectangle of spongy tissue (previously demarcated) with the remaining dorsal tunica albuginea attachment. This strip will be sewn into the neoclitoris.

## **Suturing of the Neoclitoris**

Beginning at the initial dorsal midline incision, appose the cut edges of spongy tissue with a running subcuticular stitch (1 mm deep) to form an ovoid neoclitoris (3-0 biosyn suture, tapered needle). Once the lateral cut edges are reached, tie off the suture, ensuring the knot is directed internally. The tissue is not attached to the distal flaps of the tunica albuginea, left behind in the dissection stage. It is re-attached to these laps with a horizontal mattress suture through the lateral cut ends of the neoclitoris. The suture passes through the layers of tissue as follows: tunica albuginea, spongiosum, spongiosum, tunica albuginea.

### **Fixation of the Neoclitoris**

Fold the sheet of tunica albuginea containing the dorsal neurovascular bundle upon itself such that it can be tucked into the suprapubic space. Palpate the pubis to locate the origin of the adductor longus tendon, which will serve as a landmark for the placement of the clitoris. With a tapered needle, take a bite of the periosteum of the pubis, then a bite of the dorsal neurovascular bundle near its attachment to the body, and a bite of the flap of tunica albuginea lateral to the neoclitoris (2-0 vicryl suture). Secure with a knot. Repeat this process on the other side of the neoclitoris with a new suture.

The folded sheet of tunica albuginea is then fixed to the subcutaneous tissue in the suprapubic space. Take a bite of the dorsal neurovascular bundle where it folds, and a bite of the underlying subcutaneous tissue (tapered needle, 2-0 vicryl suture). Secure with a surgeon's knot and repeat on the other side.

NOTE: next described steps were omitted from the final illustration

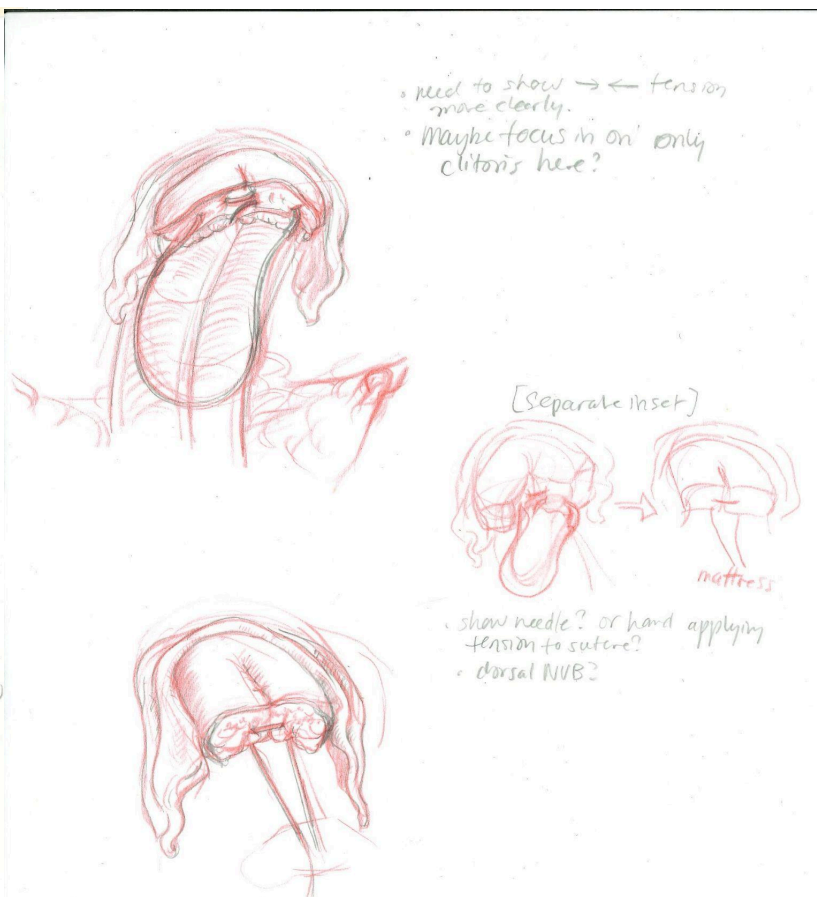
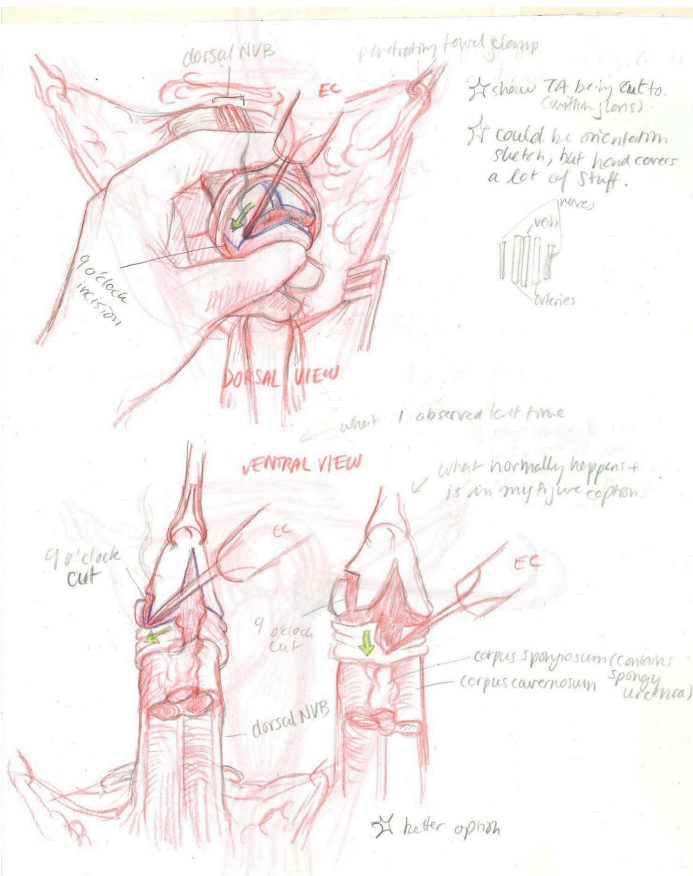
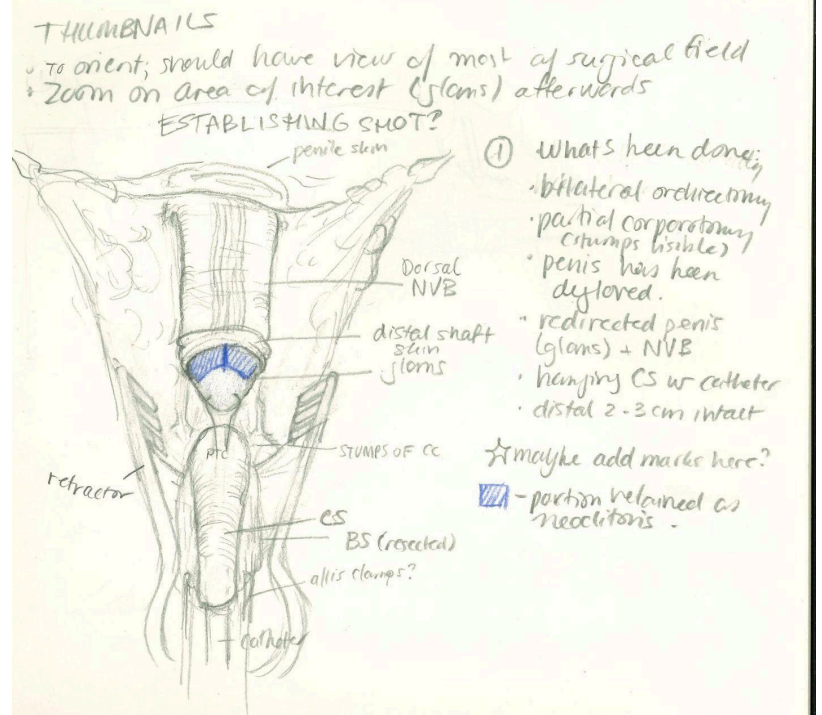
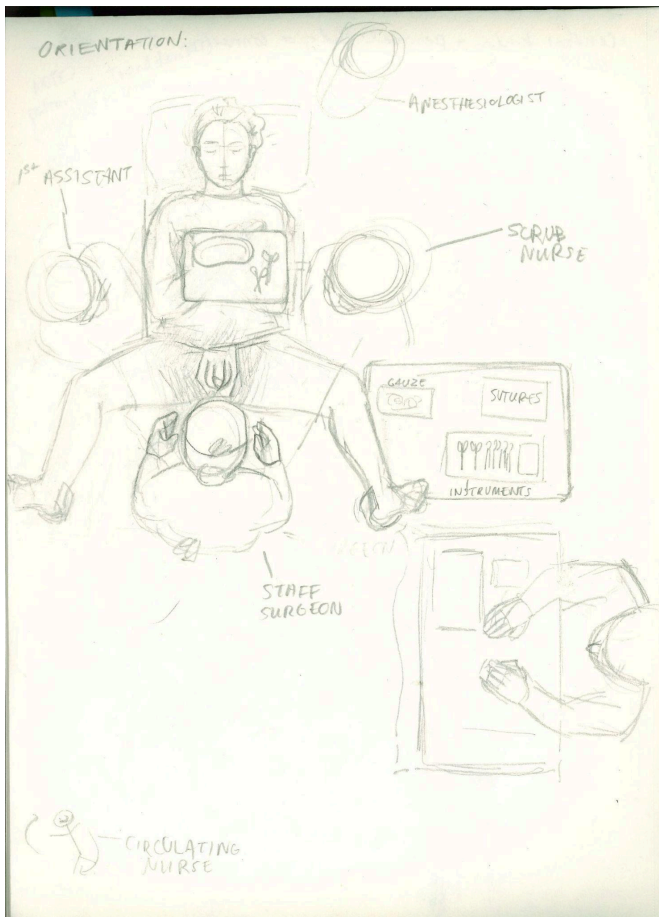
### **Resection of the Urethra**

Lift the Foley-containing urethral spongiosum to align it with the neoclitoris. Apply minimal tension to avoid inaccurate measurement of the urethra. Using electrocautery, create a circumferential incision of the urethral spongiosum, at the level of the inferior border of the neoclitoris. Extend the incision along the ventral midline of the urethra, to the point at which the catheter can no longer be palpated. This is the new urethral meatus.

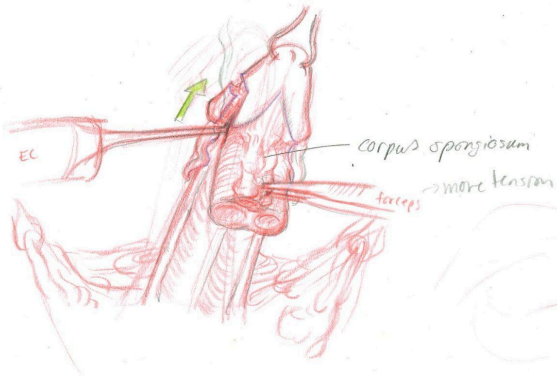
### **Attachment of the Neoclitoris to the Urethra**

The spatulated urethra will be used as the base of the vestibule. Join the distal-most end of the spatulated urethra to the neoclitoris, starting at the lateral edge of both. Bite through the serosa of the urethra, skip the spongy tissue, and then bite through the mucosa (tapered needle, 2-0 vicryl suture). Then, pass the suture through the skin and spongy tissue of the neoclitoris. Anchor the stitch with a surgeon's knot. Continue joining the inferior border of the neoclitoris to the distal-most end of the spatulated urethra, until the suture spans the width of the clitoris. Anchor the suture with a surgeon's knot. The clitorourethral complex is now complete 🎉.

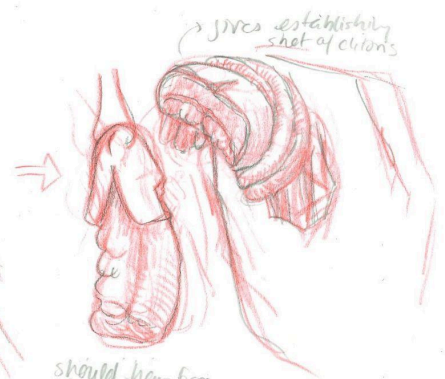
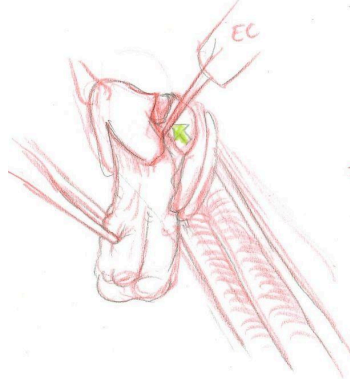
## Initial Thumbnail Sketches







another intervening step that shows full excision of inferior portion of glans?



should hang free, no tension.

☆ problematic thumbnail  
 → change in POV  
 → didn't show excision clearly?  
 → doesn't show relation of tunica albuginea glans to dorsal NVB well...

HOWEVER, good segue into neoclitoris suturing...



☆ Important to recontextualize here. Can probably condense these 2 steps in a (A) and (B) style legend. Catheter MUST be shown to recontextualize for neoclitoris step.

AL → need to shift penis ghost down a lot. THIS drawing is NOT accurate, exists solely as proof of concept.

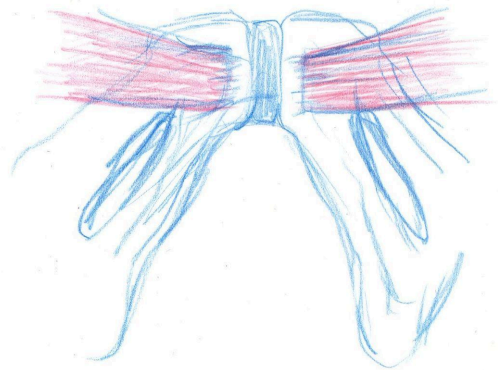
placement is alburnus

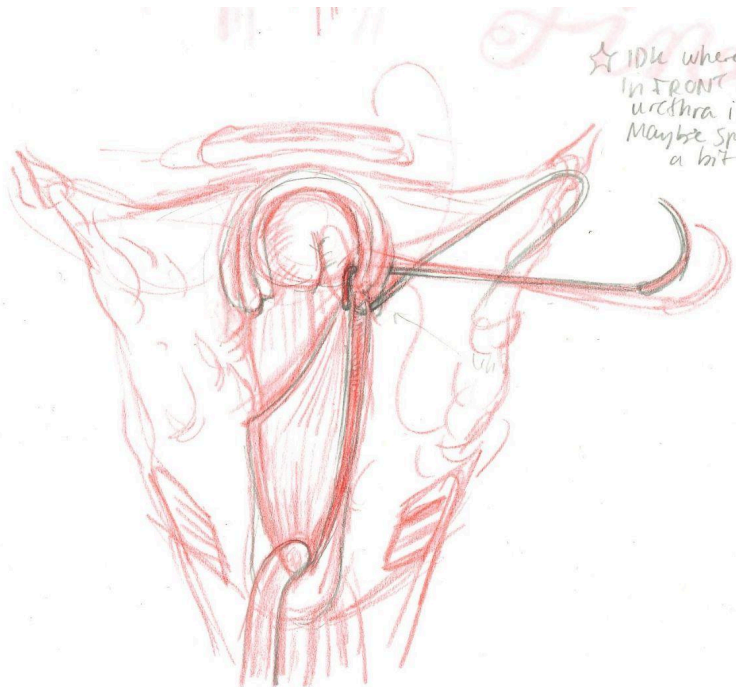
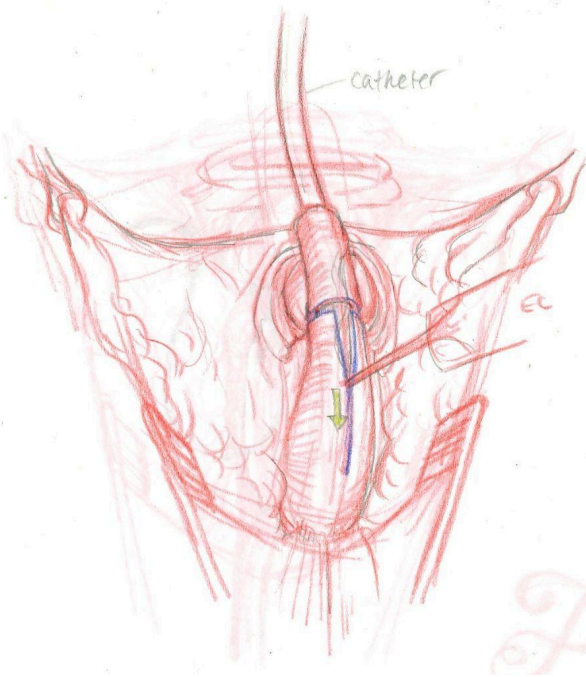
needs to be actually retracting more



1.459 of Grant's

Incision: Anterior surface of body of pubis, inf. to pubic crest, lateral to pubic symphysis.





☆ IDle where L. min is.  
In FRONT of corner of  
urethra is my guess.  
Maybe space this out  
a bit more?



Finw



## Maquettes

### 1. Neoclitoris formation

- a. Purpose: understand how “tissue” deforms under tension of stitches, specifically in the neoclitoris; understand the layers of tissue remaining in the distal shaft and glans post-dissection
- b. Version 1: just the neoclitoris



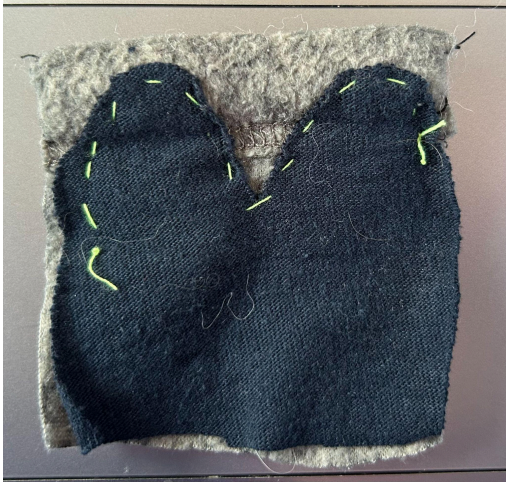
- c. Version 2: clitorourethral complex



- d. Version 3: sculpey version of spongy tissue strip with folded foreskin and distal portion of dorsal NVB

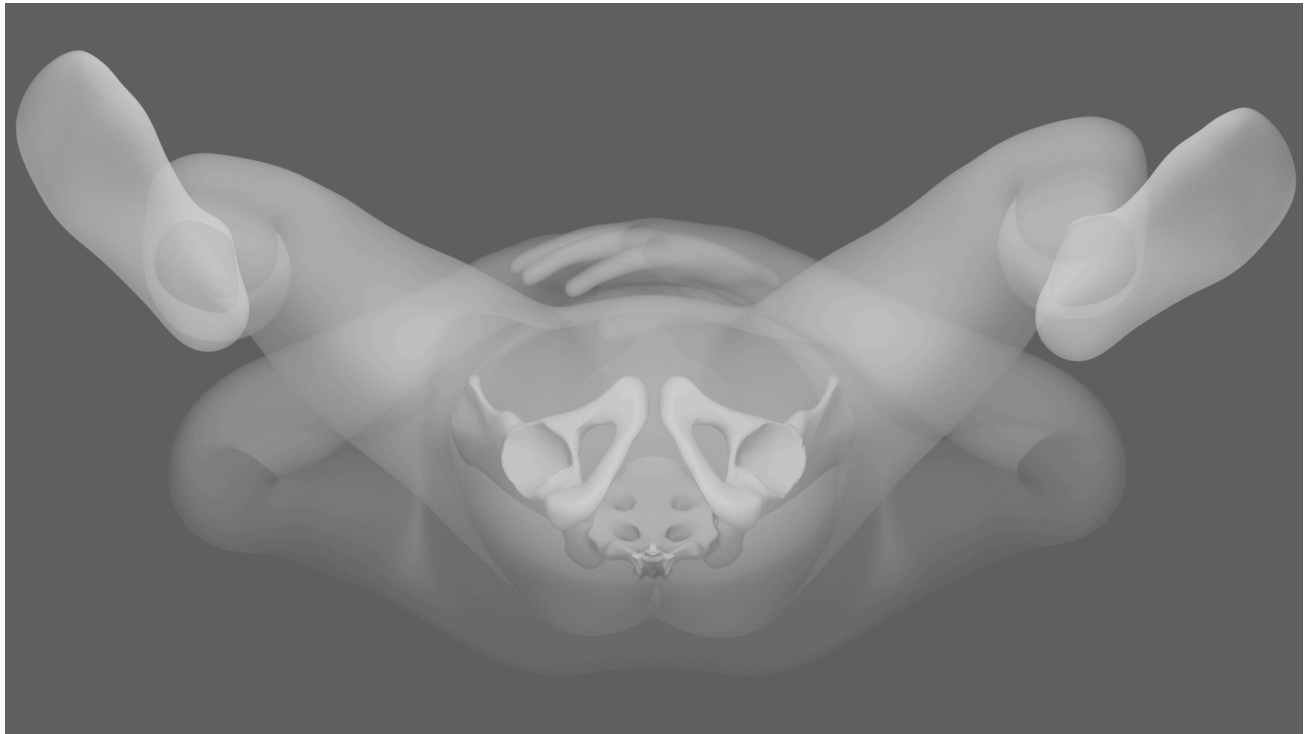


- e. Version 4: fabric again, trying to understand positioning of tunica albuginea flaps relative to the strip of neoclitoris tissue (I was wrong, the arched ends are not attached, they hand loose)



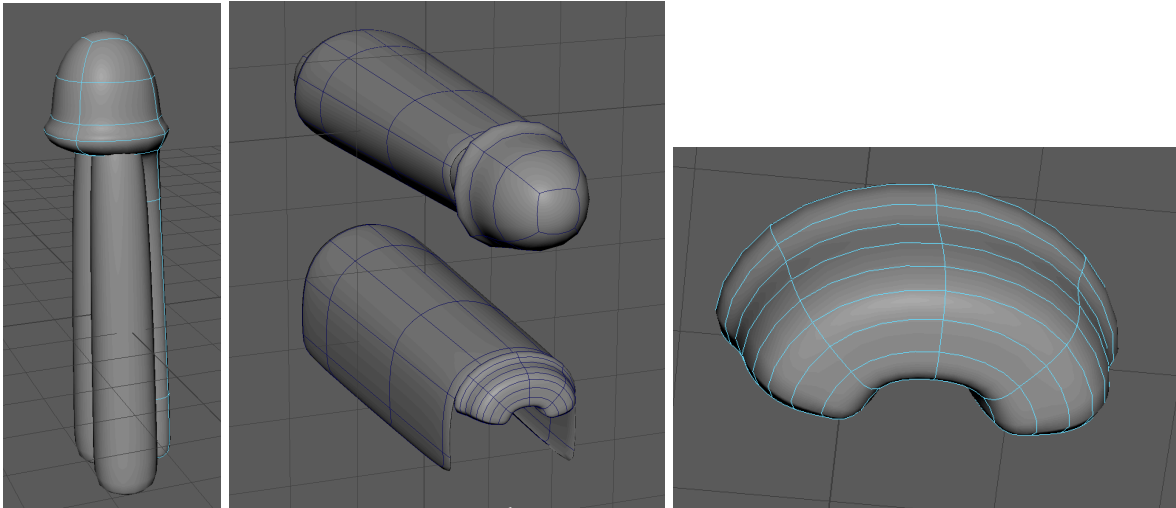
NOTE: all of the following were made in Maya

- 2. View of the pelvis from the lithotomy position
  - a. Purpose: understand orientation of pelvis (and therefore adductor longus tendon) from the lithotomy view



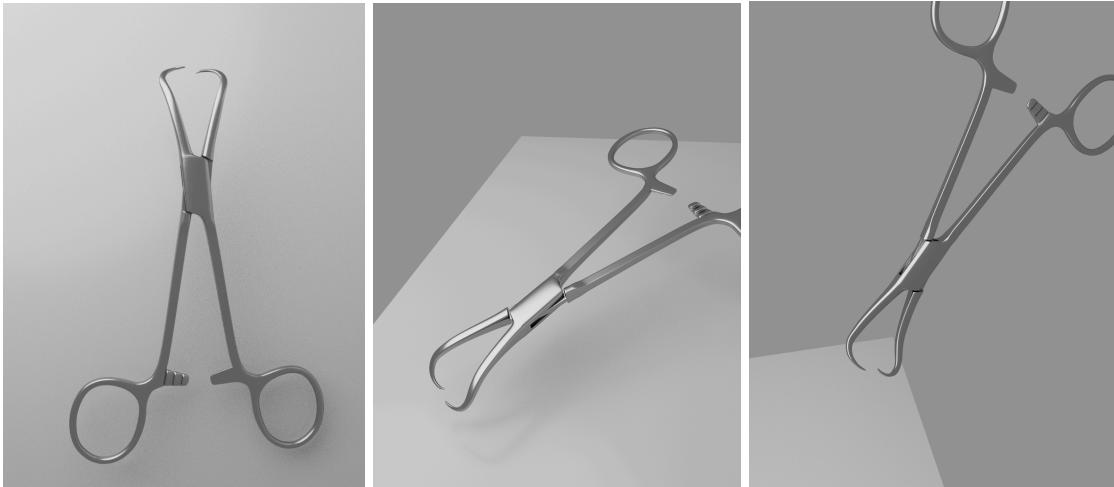
3. Erectile columns, skin, and dissected neoclitoris

- a. Purpose: understand shading, shape of corona when dissected, position of erectile columns and projection of corpora cavernosa into the glans

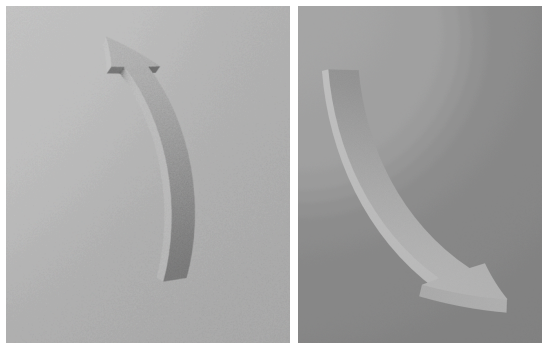


4. Penetrating towel clamps

- a. Purpose: to accurately capture the trilaminate joint of the tool



5. Arrows - just makes life a little easier





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