Patient care and counseling
- Patient selection
- Patient expectations/goals
- Informed consent and conversation about mesh/Documentation
- Post operative instructions and recovery/Follow up care
- Long term outcomes
- Risk factors

Surgical Outline
- Patient positioning
- Achieving surgical exposure and adhering to surgical principles
- Anatomic landmarks
- Careful dissection
- Understanding of pelvic and periurethral anatomy
- 3D spatial relations when passing trocars and placing sling
- Optimizing recognition of injuries during cystoscopy
- Tensioning
- Closure

Avoidance of complications
- Bleeding -- meticulous hemostasis, knowledge of anatomy and potential pitfalls
- Infection -- sterile technique, antibiotics
- Urethral injury -- not violating the layers of the urethra, recognition
- Bladder injury -- passage of trocars just behind the pubic bone, careful observation
- Obstruction -- avoidance of over-tensioning
- Mesh exposure -- technical factors of closure, tissue handling, patient factors
- Pain -- counseling patients re: preop risk factors. Evaluate symptoms

Surgical Pearls
1. Place patient in trendelenberg (moving bowels out of the way).
2. Make vaginal incision large enough for mesh to easily lay flat in the wound (some of us have small fingers and can easily guide the trocar into the vaginal wound thru such a small incision that the mesh edges can erode thru)
3. Hug (don’t scrape) the backside of the pubic bone with the trocar
4. Keep the trocar in a straight path behind the bone until you feel the tip with your finger in the vagina, then guide the trocar on your finger into the more central vaginal wound.

5. Scope after trocar placement. Inspect anterior bladder, just inside bladder neck, and lateral dome with the bladder full/mucosa flat (no wrinkles hiding the trocar). If placed through the bladder, simply remove and reposition trocar. Abort if urethra is damaged.

6. Carefully inspect the vaginal tissues (and the periuethral sulcus area) for “buttonholing”.

7. Cut mesh limbs as short as you can without pulling up/putting tension on the mesh limbs and lift the skin edges so the mesh drops into the subcutaneous tissues.

8. Be meticulous with the wound closure to prevent mesh exposures in the vagina.
1. Positioning of patient is important. Visualization is key during the tensioning portion of the sling and requires proper positioning for adequate visualization.

2. Knowledge of the anatomy of the obturator foramen is important. Avoiding the neurovascular bundle is paramount during the placement of these slings.

3. Adequate hydrodissection is important to help prevent mesh extrusion, particularly in the vaginal sulcus.

4. Create the periurethral tunnels with sharp dissection to keep the tunnels at the same depth. This will help prevent mesh extrusion in the sulcus. If the hydrodissection is done well, the tunnel should open up with small widening movements of the scissors.

5. The size of the midurethral incision is important. It needs to be large enough to visualize the sling and allow it to lay flat. Do not over dissect the area to help avoid having the sling migrate from the midurethra.

6. Place a finger in the vaginal sulcus to confirm that the trocar is behind the pubic ramus when placing the sling incision slings.

7. With single incision slings, it is crucial to anchor the sling into the obturator internus muscle/obturator membrane (depending on the manufacturer). Single incision slings tend to fail if they are anchored incorrectly into just the advential tissue.

8. Tensioning is different with TOTs vs SISs. Single incision slings are designed to work by abutting the urethra whereas TOT slings require some spacing between the sling and urethra (typically a metzenbaum scissors or Kelly is placed behind the TOT).

9. If bleeding is encountered with dissection/sling placement, hold pressure in the sulcus.

10. We recommend cystoscopy with a 70 degree lens since bladder perforation is typically at 5 and 7 o’clock (unlike RP slings where bladder perforation is typically at 2 and 10 o’clock). It is important to thoroughly examine the urethra as well with the cystoscope.

11. Typically performed under a MAC/local anesthesia. The procedure takes about 10 minutes. Benefits of MAC anesthesia include an option for intraoperative cough test and quick PACU recovery. Typically the patients void within 30 minutes of surgery and are discharged to home without a foley.

12. Typical postoperative restrictions: No heavy lifting 4-6 wks; nothing per vagina 4-6wks.
Boston Scientific (AMS 800 AUS) Artificial Urinary Sphincter
Optimize preoperative implant regimen with chlorhexidine wash, antibiotics, and chlorhexidine prep.

Perineal incision preferred over penoscrotal incision to optimize bulbar urethra exposure

A Babcock clamp can be useful if placed around the urethra to help facilitate its dissection from the corpora cavernosa.

Dissection should be performed sharply to avoid urethral injury.

Place the cuff as far proximal as possible on the bulbar urethra.

Careful cuff measurement is critical to avoid persistent incontinence or urethral atrophy.

2-0 Vicryls may be preplaced (with all needles removed) along the suprapubic fascial incision for preparation of closure of the fascia after placement of the reservoir (so as to not inadvertently puncture the reservoir).

Boston Scientific (AMS) AdVance Male Sling
During mobilization of the urethra from the perineal body for ~1-2 cm, a marker can be used to identify the insertion of the perineal body for later identification during sling placement. A Vicryl suture may also be placed at this juncture to define the proximal location of the mesh and used later to tack the mesh to the bulb.

Do not perform the bulbar urethral dissection too proximally. Only partially release the central tendon sharply. Excessive mobilization leads to the mesh being too close to the bladder neck and may cause more urge symptoms and urge incontinence.

Critical aspects of helical needle passage include starting at a 45 degree angle until through the obturator membrane, then dropping to a 90 angle for passage into the apex of the triangle. Pop, pop, stop and drop.

Prior to tensioning the sling, make sure that the blue sutures on the sling are facing up and are not twisted or off the midline.
Coloplast Virtue Quadratic Sling

Spare bulbar musculature during perineal dissection, use of Alexis retractor facilitates exposure

The J hook introducers are passed from the perineal incision to the obturator foramen and should exit
~ 4 cm from the adductor longus tendon and ~ 2 cm lateral to the groin crease.

Tension the sling starting with the transobturator arms and followed with the prepubic arms. While holding the desired level of tension on the prepubic arms, place a figure of eight Prolene suture in the periosteum of the ischiopubic ramus to fix the prepubic arm.
1) **Retractor**: Use a Lonestar retractor and avoid multiple Allis clamps and weighted speculum. As with any surgery, exposure is key, and the Lonestar retractor allows easy access to the vaginal tissues, and flexible traction-counter traction options using the yellow and blue skin hooks. The jointed retractor allows a flush mount onto the pelvis and is secured in place using perforating towel clips. The wide dimensions of the retractor allows easy access to the transobturator space for anatomic landmark palpation and trocar passage. A weighted speculum is not necessary for adequate exposure, thus minimizing tissue trauma and distortion from heavy retraction. Use the hooks and a gentle single Allis or rat-tooth pickups to avoid traumatically clamping along incision line which compromises perfusion and wound-healing. This retraction strategy permits the surgeon to operate solo, no assistant needed.

2) **Maximize local injection with perineal/pudendal blocks**: Optimal control for intraop bleeding and postop pain is achieved using the maximum safe dose for local injection of 0.25% bupivicaine with epinephrine. Anesthesiologist should be involved in decision-making for the patient's optimal dose. Local injection is done diffusely throughout the transobturator space, vaginal subepithelial plane, and region of the pudendal nerve bilaterally at the vaginal apex. Care is taken to withdraw before injection to prevent intravascular injection of bupivicaine. Lipid rescue protocol should be available when using large doses of local bupivicaine.

3) **Get adequate flap thickness by local injection to raise bullae to lift epithelial flaps**: Hydrodissection of the vaginal subepithelial space lifts the epithelium off the underlying fibromuscular attachements and reveals a clear plane for easy sharp and blunt dissection with minimal bleeding.

4) **Use small tunneled incisions (kangaroo pouch)**: The vaginal incision should be minimized to allow two finger breadths (3-4 cm) and tunneled, using the skin hooks to lift the flaps during dissection. The dissection is carried distally to the bladder
neck, laterally to the arcus tendineous, and proximally to the prior hysterectomy scar or uterine cervix.

5) **Reduce POP before mesh placement**: Reduction of the cystocele, enterocoele, and/or rectocele is done to position the support tissue in the native plane of support. Imbricating or pursestring absorbable (2.0 Vicryl on CT-2) sutures may be placed to reduce the prolapse to native angles supporting normal functional recovery. Patients usually have little good native support tissue, so the planes between epithelium and viscera are thin. Care must be taken to take shallow imbricating sutures and not perforate the bladder or ureters, or place the sutures under excessive tension and deviate the lower urinary tract drainage abnormally.

6) **Use endopelvic fascial puncture with Metzenbaum scissors to get targeted, isolated access to ischial spine/sacrospinous ligament**: Using the sacrospinous ligament for mesh suspension can entail dissection through tissues with large veins and varicosities and subsequent excessive bleeding. The key to limiting bleeding is focal perforation of the endopelvic fascia thus allowing enough space for palpation and instrument passage for sacrospinous ligament fixation. Gelfoam and thrombin are routinely used in mesh placement to assure complete hemostasis in the region of the sacrospinous ligament. This is where you may get significant venous bleeding, so be prepared with gelfoam and thrombin, consider packing for 5 minutes while working on contralateral side. Your goal is to minimize EBL to <50cc for the entire case.

7) **Trim and tailor the mesh to cover the entire prolapsed tissue defect.** The mesh is trimmed to approximate the size to be an onlay graft over the support tissue defect.

8) **Tensioning mesh with retractor off tension – laying it loosely like a pantaloons.** Think of mesh onlay like a grafting procedure, keep it loose.

9) **Always do cystoscopy look for patent ureters, normal urethra and bladder.** Dictate the check was done and no urothelial injury noted.

10) **Use interrupted absorbable suture closure with minimal to no trimming epithelium and no tension on incision closure.**

11) **Pack with vaginal pack and foley overnight.** Consider sending home and return to clinic next day, or <24 hour stay overnight.

12) **Rectal exam to assure no rectal injury.** Consider using B&O suppository on every patient so you don’t forget to do the rectal exam at the end.
Surgical Technique

- Dissection sacral promontory
  - Careful identification
  - Identify ureter and iliac vessels (avoid lateral dissection)
  - Meticulous dissection down to longitudinal lig – may need to cauterize middle sacral vessel
  - Adequate space to visualize needle entry and exit

- Dissection anterior vaginal wall
  - May be difficult if prior hysterectomy or C-section
  - Try to get at least 4cm space
  - Can retrograde fill bladder if planes unclear (or if ANY question of bladder entry)

- Dissection posterior vaginal wall
  - Identification rectovaginal space entry point
  - Important to have assistant helping with vaginal manipulator to deviate vagina anteriorly

- Attachment mesh to vagina
  - I use permanent suture (Goretex) cut to 9 inches
  - Avoid full thickness bites

- Attachment mesh to sacral promontory
  - I use 2 sutures
  - Appropriate tensioning – do vaginal exam to assess support and ensure not over-tensioned

- Cystoscopy to ensure no foreign body in bladder, look for bilateral efflux

Robotic approach considerations

- Side docking helpful for vaginal access for assistant and for cystoscopy

- Port placement very important – in general robotic ports should be 10cm apart

- Need steep Trendelenburg - can use laparoscopic instruments before docking robot to make sure small bowel stays out of pelvis with bed angle

- Use 3rd arm to help with retraction of bladder during anterior vaginal wall dissection, aid with exposure during posterior flap attachment, and to retract sigmoid during sacral dissection and suturing

- Slip knot for sacral sutures