IPOM Repair: Still My Go-To Repair!

Abdominal Core Health Quality Collaborative Quality Improvement Summit

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March 23, 2024

MEDICAL COLLEGE OF WISCONSIN
DEPARTMENT OF SURGERY
Division of General Surgery

Disclosures

- Speaker/teacher for WL Gore
- Speaker/teacher for Intuitive Surgical

IPOM Repair

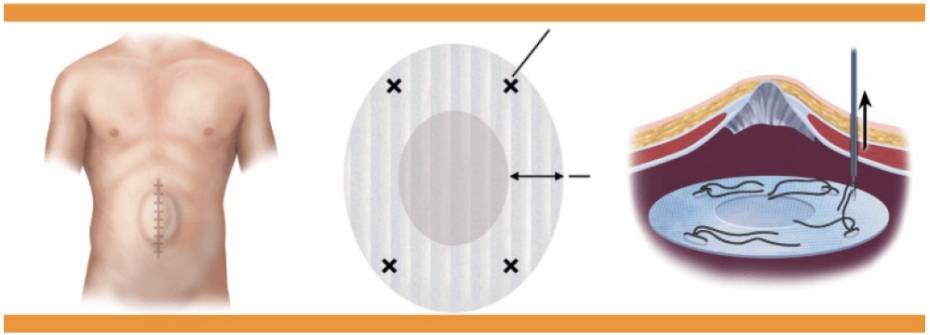
- Open IPOM
- Laparoscopic IPOM
- Robotic IPOM
- Techniques, tips and tricks

IPOM Repair

- Open IPOM

Open IPOM

- Midline incision
- Numerous sutures to fixate mesh circumferentially
  - Not just four sutures, space 1cm apart so no gaps
- Creation of subcutaneous skin flaps



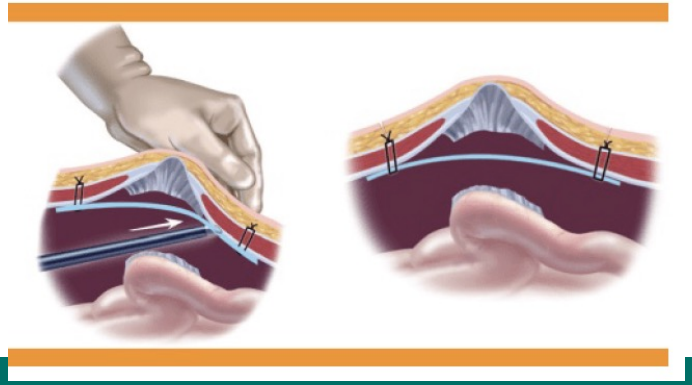
https://www.sages.org/publications/patient-information/patient-information-for-laparoscopic-ventral-hernia-repair-from-sages/

IPOM Repair

- Open IPOM
- Laparoscopic IPOM

Laparoscopic IPOM

- 1993 – Dr Karl LeBlanc
- Bridging under defect (underlay)
- Wider mesh overlap, no skin flaps
- Secure with transfascial sutures and/or tacks



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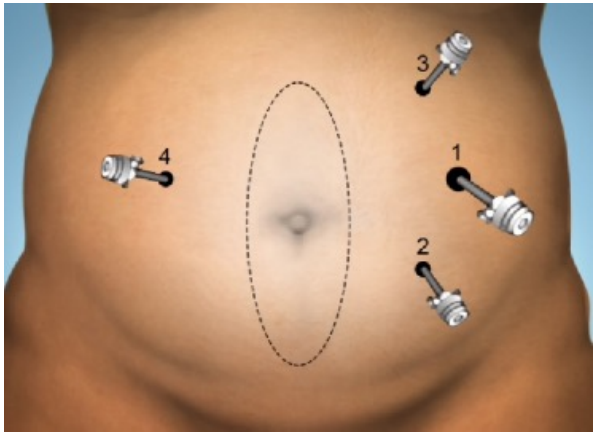


https://emedicine.medscape.com/article/1892407-technique

Laparoscopic IPOM

- Improved outcomes compared to open IPOM
  - Decreased SSIs
  - Decreased hospital length of stay
- Had been the preferred MIS approach for ventral hernia repair for decades
- Has evolved into the IPOM-plus (fascial defect closure)

Laparoscopic IPOM

Surgical Endoscopy (2019) 33:3069–3139
https://doi.org/10.1007/s00464-019-06907-7

GUIDELINES

Update of Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS))—Part A

R. Bittner[1,2] · K. Bain[3] · V. K. Bansal[4] · F. Berrevoet[5] · J. Bingener-Casey[6] · D. Chen[7] · J. Chen[8] · P. Chowbey[9] · U. A. Dietz[10] · A. de Beaux[11] · G. Ferzli[3] · R. Fortelny[12] · H. Hoffmann[13] · M. Iskander[14] · Z. Ji[15] · L. N. Jorgensen[16] · R. Khullar[9] · P. Kirchhoff[13] · F. Köckerling[17] · J. Kukleta[18] · K. LeBlanc[19] · J. Li[20] · D. Lomanto[21] · F. Mayer[22] · V. Meytes[3] · M. Misra[23] · S. Morales-Conde[24] · H. Niebuhr[25] · D. Radvinsky[26] · B. Ramshaw[27] · D. Ranev[28] · W. Reinpold[29] · A. Sharma[9] · R. Schrittwieser[30] · B. Stechemesser[31] · B. Sutedja[32] · J. Tang[33] · J. Warren[34] · D. Weyhe[35] · A. Wiegering[36] · G. Woeste[37] · Q. Yao[38]

Laparoscopic IPOM

New statements

Level 2A	The primary goal of the reconstruction of linea alba is the restitution of functionality of the abdominal wall. The improved cosmesis is a positive side effect
Level 2C	Closure of the defect prior to intraperitoneal onlay mesh (IPOM-Plus) results in less recurrence, seroma formation, and bulging in some studies.
	There are significantly fewer adverse events noted following the closure of fascial defect when compared to non-closure repair
	Closure of the fascial defect during laparoscopic ventral/incisional hernia repair reduces significantly seroma rate in the most studies
Level 3	The bridged repair (cIPOM, c = classic) is associated with a significantly higher risk of hernia recurrence and a higher overall complication rate
	IPOM-Plus repair patients show better satisfaction with the result in some studies and have better functional status

Robotic IPOM

- Along came the robotic IPOM…

IPOM Repair

- Open IPOM
- Laparoscopic IPOM
- Robotic IPOM

Robotic IPOM

- Theoretical advantages over laparoscopic repair
  - Ability to primarily close the fascial defect
    - Easier and more ergonomic than laparoscopically
  - Intracorporeal suture fixation of the mesh, avoiding tacks and transfascial sutures
    - Possible advantage of decreased post-op pain

Robotic vs Lap IPOM

JAMA Surgery | Original Investigation

Patient-Reported Outcomes of Robotic vs Laparoscopic Ventral Hernia Repair With Intraperitoneal Mesh
The PROVE-IT Randomized Clinical Trial

Clayton C. Petro, MD; Sam Zolin, MD; David Krpata, MD; Hemasat Alkhatib, MD; Chao Tu, MS; Michael J. Rosen, MD; Ajita S. Prabhu, MD

- Single-blinded, prospective, randomized clinical trial
- Single institution, 2 surgeons
- Primary or incisional midline ventral hernias, defect < 7cm
- 75 patients, randomized to laparoscopic or robotic IPOM repair
- Primary outcomes: Pain scores
- Secondary outcomes: QOL, OR time, wound morbidity, recurrence, length of stay and cost

Robotic vs Lap IPOM

Table 2. Operative Details

Variable	No. (%) Laparoscopic (n = 36)	Robotic (n = 39)	*P* value
Antibiotics given according to SCIP protocol	36 (100)	39 (100)	>.99
Type of robot used			
Si	NA	14 (36)	NA
Xi	NA	25 (64)	NA
Fascial closure	36 (100)	39 (100)	>.99
Sublay intraperitoneal permanent mesh fixation			
Transfascial suture and permanent tack fixation	36 (100)	2 (6)	<.001
Peritoneal suture fixation	0	37 (94)	
Conversion to laparoscopy	NA	2 (6)	NA
Conversion to robotic repair	0	NA	NA
Intraoperative complications	2 (6)	2 (6)	
Bowel serosal injury	2 (6)	1 (3)	>.99
Liver injury	0	1 (3)	
Operative time, median (IQR), min	94 (69-116)	146 (123-192)	
Surgeon A	94 (57-128)	142 (124.5-194)	<.001
Surgeon B	89 (61.5-123)	147 (121.5-185.5)	

- All patients had primary fascial closure
- OR time significantly greater robotic vs laparoscopic IPOM

Robotic vs Lap IPOM

Table 3. Outcomes

Outcome	Data captured, No.	Median (IQR) Laparoscopic (n = 36)	Robotic (n = 39)	*P* value
Length of hospital stay, h	75	10 (8 to 31)	25 (10 to 30)	.17
Discharged home, No. (%)	75	20 (56)	17 (44)	.42
PACU, morphine equivalents	75	45 (29 to 71)	46 (28 to 68)	.88
Postoperative complications, No. (%)	75	3 (8)	2 (6)	>.99
Pulmonary embolism	NA	0	1 (3)	>.99
SSO	NA	1 (3)	0	>.99
Readmission	NA	1 (3)	1 (3)	>.99
Reoperation	NA	1 (3)	0	>.99
NRS-11				
Preoperative	75	1.5 (0 to 4)	1 (0 to 3)	.86
PACU	75	6 (4 to 8)	6 (5 to 8)	.97
Postoperative day				
1st	73	5 (3 to 7)	5 (3 to 6)	.61
7th	68	3 (2 to 5)	4 (2 to 5)	.58
30th	65	2 (0 to 2)	1 (0 to 2)	.71
PROMIS 3a				
Preoperative	75	49 (40 to 49)	44 (31 to 51)	.29
Postoperative day 30	65	44 (38 to 48)	46 (42 to 51)	.28
Delta	66	−3 (−9.4 to .41)	0 (−2.9 to 9.5)	.01
HerQLes				
Preoperative	75	51 (37 to 73)	55 (35 to 73)	.91
Postoperative day 30	66	75 (41 to 81)	67 (45 to 79)	.66
Cost				
Disposable/reusable median cost ratio	NA	1.00 (0.87 to 1.19)	0.97 (0.85 to 1.51)	.60
Operating room time-cost ratio	NA	0.85 (0.67 to 1.00)	1.25 (0.98.1.49)	<.001
Total cost ratio	NA	0.97 (0.85 to 1.16)	1.13 (0.90 to 1.52)	.03

- No significant differences in post-operative complications, length of stay, pain scores and quality of life
- Robotic approach had greater cost, driven by operating room time

Robotic vs Lap IPOM

- Conclusions:
  - Laparoscopic and robotic IPOM ventral hernia repair have comparable outcomes
  - No differences between approaches in post-operative pain control
  - Robotic approach had increased operative time and cost

IPOM

- Concerns regarding IPOM repair
  - Post-operative pain
    - Mesh fixation
  - Visceral adhesions from intraperitoneal mesh
  - Mesh complications: infection, SBO, erosion, EC fistula
    - 5-year study of mesh complications:
      - 5.6% in open repairs
      - 3.7% in laparoscopic repairs

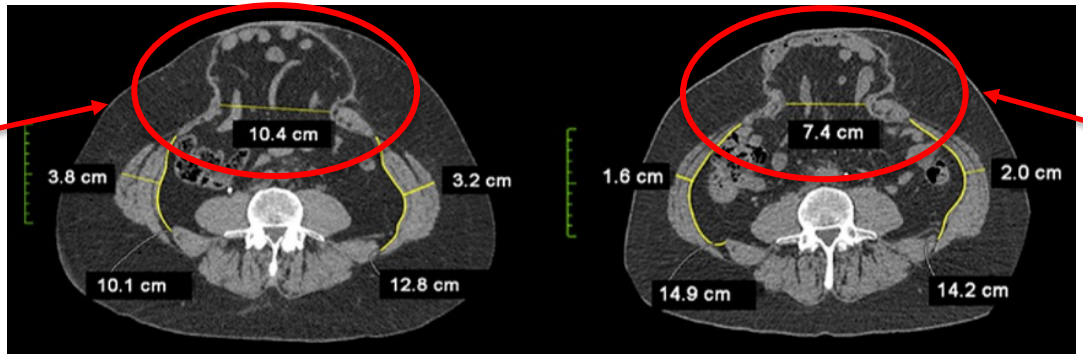
IPOM Repair

- Open IPOM
- Laparoscopic IPOM
- Robotic IPOM
- Techniques, tips and tricks

Patient Selection

- Choose your patients well!
- For MIS IPOM, hernia defects <6-8cm wide
  - Larger than this, harder to re-approximate fascia primarily
  - More abdominal wall pliability in obese versus thin patients

No



Yes

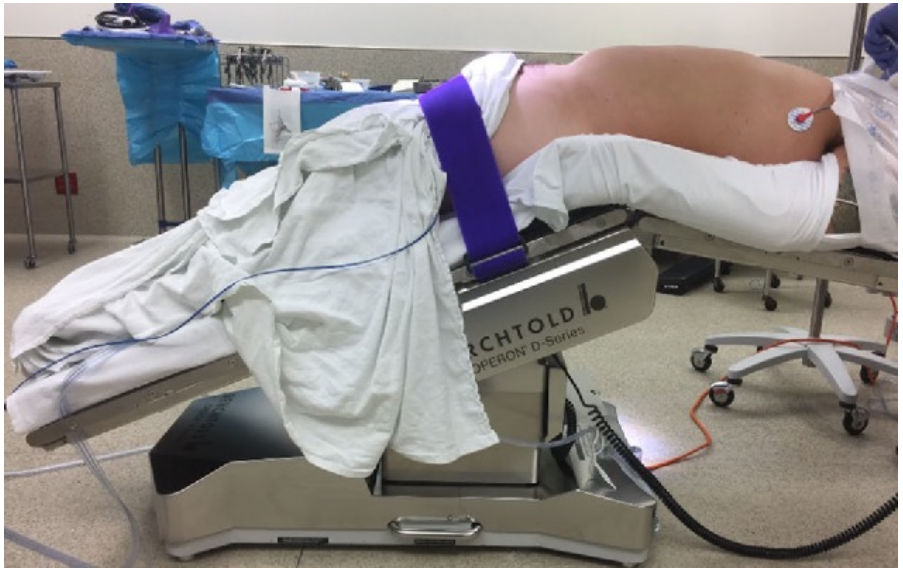
https://www.semanticscholar.org/paper/Preoperative-chemical-component-relaxation-using-A%3A-Elstner-Read/9ef28931b5cbbaff311f44b7d2dd2b92bd9635d9/figure/2

Patient Selection

- Recurrent hernia and excision of prior mesh
  - Easier to remove mesh from the abdominal wall using the wristed robotic instruments versus laparoscopic
- Patients who are not candidates:
  - Larger fascial defects (>8-10cm) → consider robotic retrorectus/TAR approach or open
  - Superficial skin breakdown/ulceration
  - Incarcerated/large hernia sac
  - Other indications for open versus MIS repair

Patient Positioning

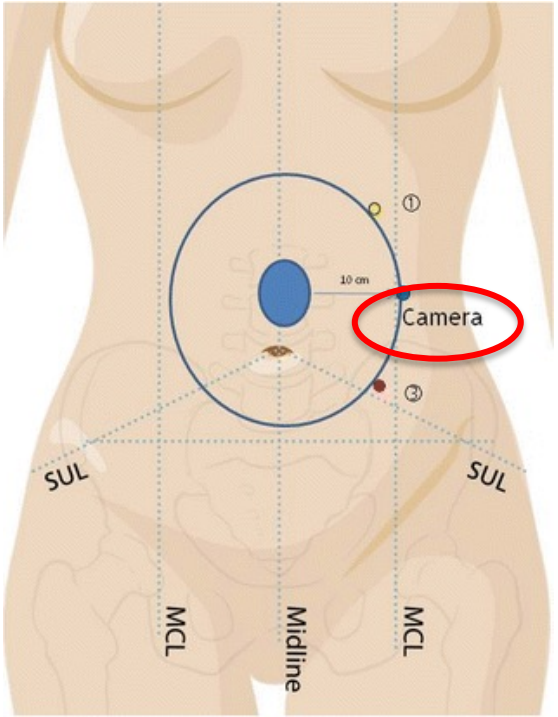
- Slide patient to edge of bed where trocars are going to be placed
- Tuck arm on same side as trocars
  - Avoid too much padding that will elevate the arm
  - Can use a ski to keep arm flush with the bed
- Flex bed



https://www.semanticscholar.org/paper/Early-operative-outcomes-of-endoscopic-(eTEP-wall-Belyansky-Zahiri/6f5a51e32aed5a94edc8643b107b7665c77bd5db/figure/0

Port Placement

- Be flexible with port placement!
- Three 8mm ports (Xi system)
- Ensure 10-15cm distance from edge of hernia defect
- Place camera port first
  - Halfway from ASIS to costal margin (measure insufflated), as lateral as possible



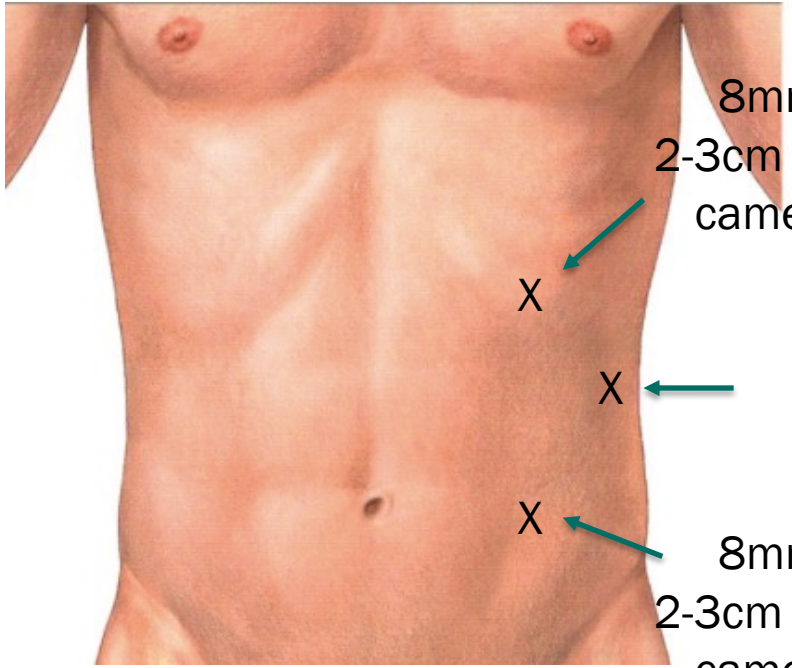
https://link.springer.com/chapter/10.1007/978-1-4614-8739-5_28

Port Placement

- Other two trocars 8-10cm from camera port, 2-3cm medial
  - At least 2cm from ASIS or costal margin to avoid hitting hip/chest wall

https://link.springer.com/chapter/10.1007/978-3-319-27470-6_26

Port Placement



- Left arm tucked because of Veress entry in the left upper quadrant

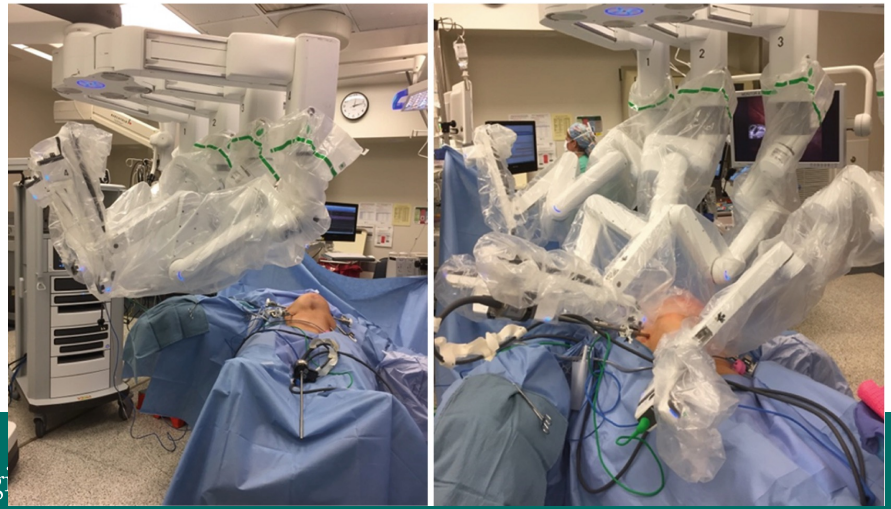
Port Placement

- Use bariatric length trocars, regardless of the patient's body habitus
  - Helps with robotic arm range of motion

https://www.researchgate.net/figure/Standard-8mm-robotic-trocar-and-Long-12mm-robotic-trocar-Regardless-of-width-or-length_fig3_372161948

Docking

- Xi system → side docking
- Can dock from either side, depending on where the system is in the room
  - If same side, manually spin the arms 180 degrees



https://www.google.com/url?sa=i&url=https%3A%2F%2Flink.springer.com%2Fchapter%2F10.1007%2F978-3-319-90737-6_8&psig=AOvVaw1mgoIrrmBLtOY1xuq6-5L5&ust=1645643044191000&source=images&cd=vfe&ved=0CAsQjRxqFwoTCMC41JyAIPYCFQAAAAAdAAAABAQ

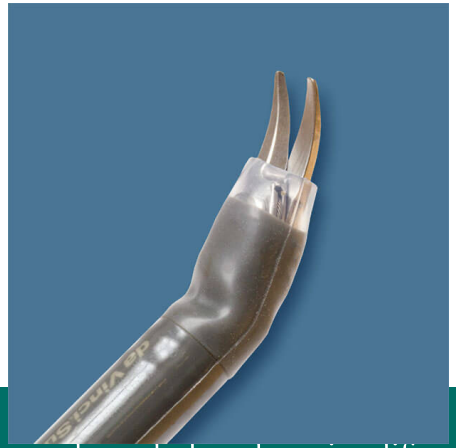
Instruments

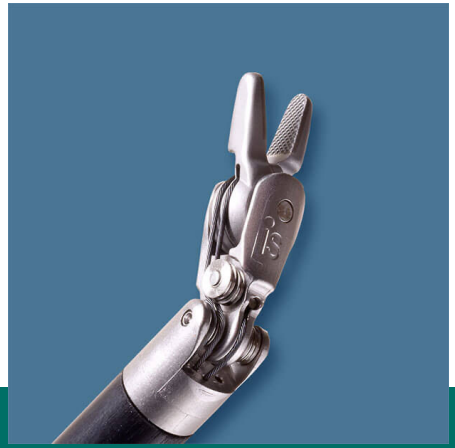
- Camera: 8mm, 30 degree (looking up)
- Left hand: Force bipolar
  - Better grip than fenestrated bipolar, especially when suturing
  - Useful for gripping if you need to remove prior mesh

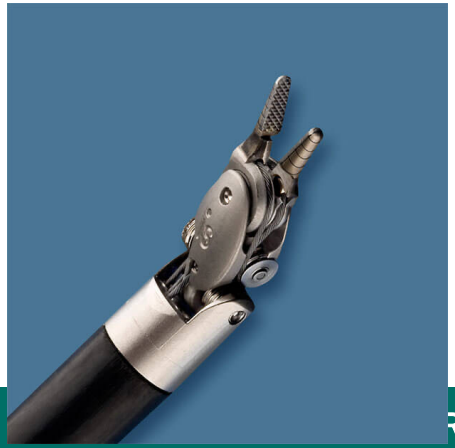
https://www.intuitive.com/en-gb/products-and-services/da-vinci/instruments/force-bipolar

Instruments

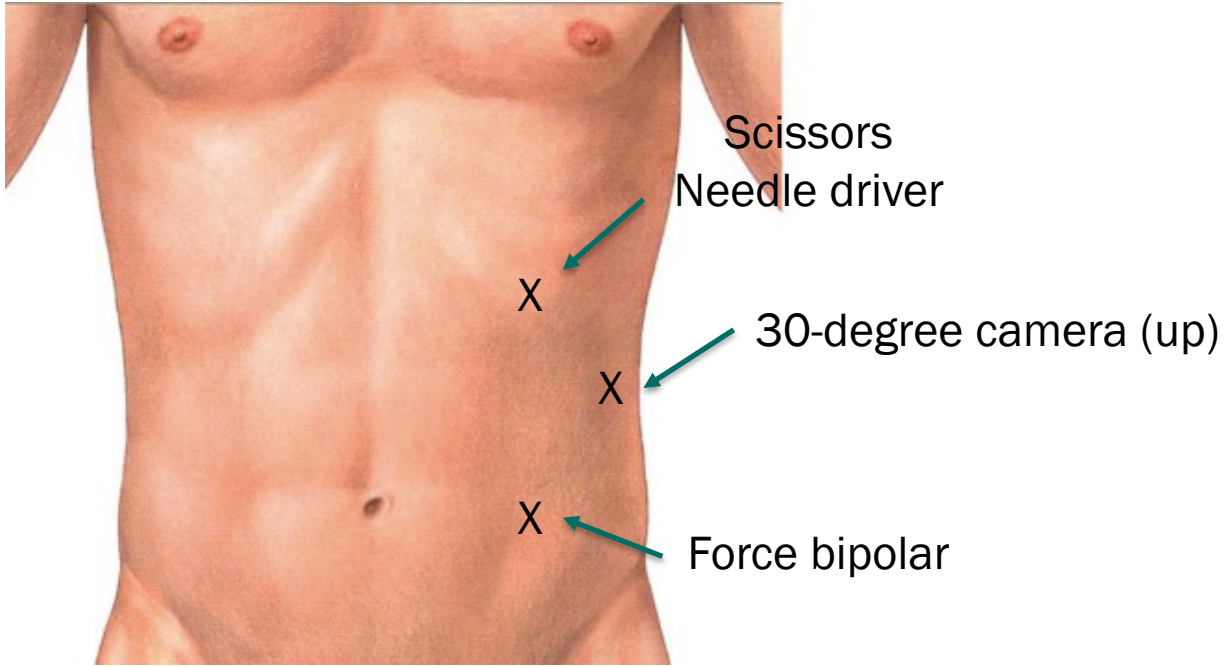
- Right hand:
  - Scissors (dissection and adhesiolysis)
  - Mega needle driver (suturing)
  - Can use suture cut needle driver instead if minimal adhesiolysis







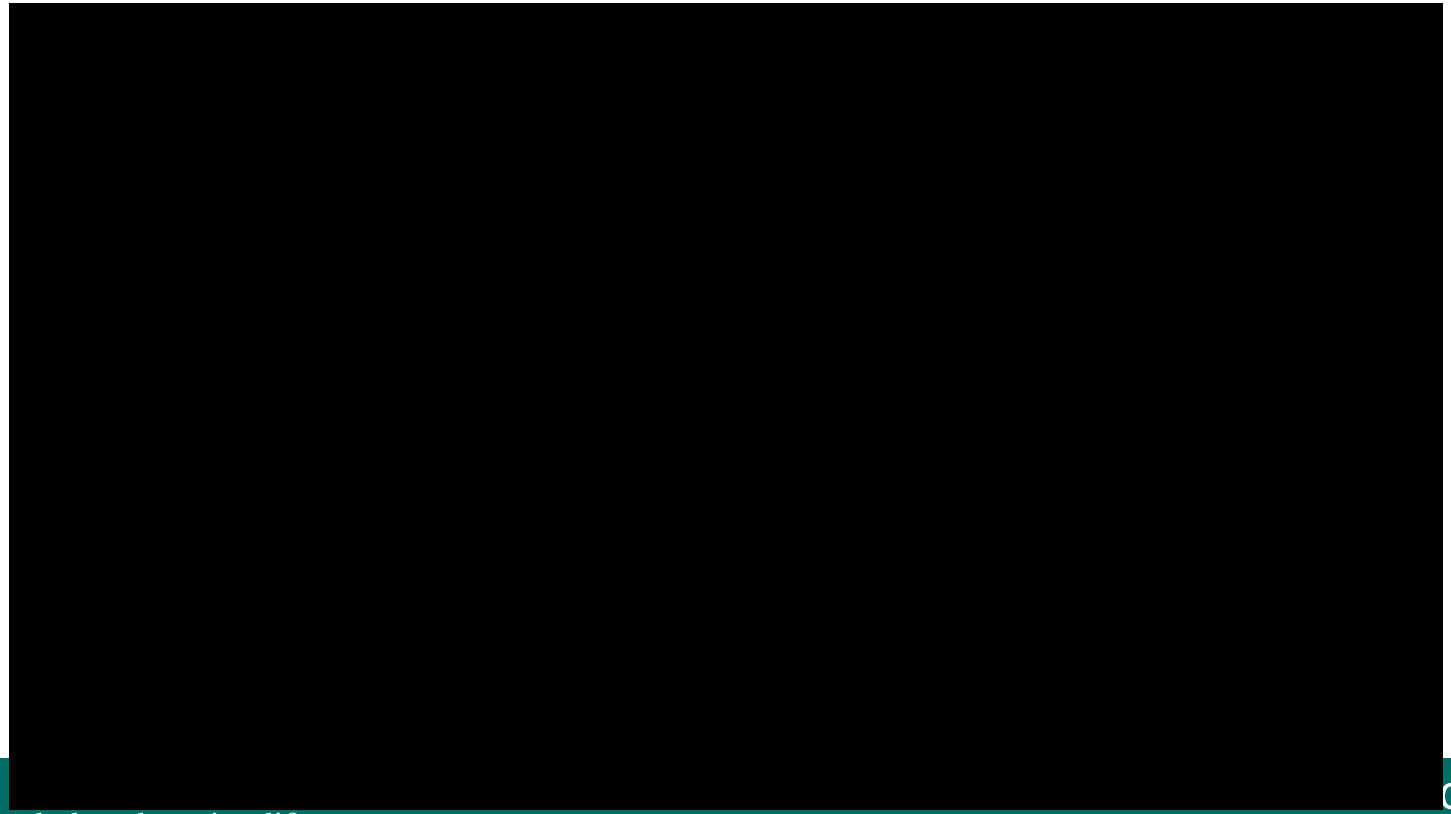
Instruments



Fascial Defect Closure

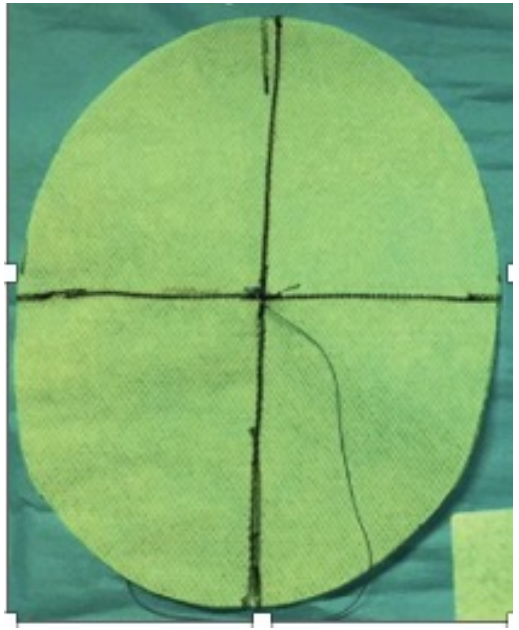
- Desufflate the abdomen to 8-10mmHg
- Use running barbed suture (0-VLOC 180 or 0-Stratafix PDS)
  - Pull tight every 1-2 stitches to help offset tension
  - GS-21 (VLOC) or CT-2 (Stratafix) needle
    - CT-1 needle too large to go through 8mm port
- Incorporate hernia sac as long as not puckering skin
- Run along entire defect and then back to halfway point
  - Leave hanging down

Fascial Defect Closure



Mesh Placement

- Mark mesh if unmarked to clearly identify middle
- Take fascial closure suture and place through middle mark on the mesh
- Parachute mesh toward the abdominal wall
- 12cm and 15 x 10cm mesh sizes fit down 8mm port
  - Larger mesh, place 12mm port on other side for mesh placement



https://link.springer.com/chapter/10.1007/978-3-319-90737-6_12

Mesh Placement

Mesh Fixation

- Barbed suture (2-0 VLOC 90 or 2-0 Stratafix PDS)
  - GS-22 (VLOC) or SH (Stratafix) needle
- Insert two sutures at same time as mesh placed
- Place one suture at 3 o'clock and one at 9 o'clock
- Run stitch toward you/camera first
  - More frustrating!
- "Flesh-to-mesh" or "mesh-to-flesh"
  - Change direction of needle as needed to avoid torque

Mesh Fixation

Conclusions

- Choose patients well when first starting robotic IPOM
- Be systematic, position the patient, dock and place ports the same way every time
  - Helps improve efficiency and decrease operative time
- Make sure to place the ports as lateral as possible to facilitate suturing
- Find the instruments that work best for you

Conclusions

- Robotic IPOM is challenged with new approaches (TAPP and eTEP)
  - No definitive clinical data
  - IPOM is technically the easiest to perform, short learning curve
- Important to have multiple approaches in your toolbox
  - Many differences among patients and hernias
  - Goal is to provide the best, most durable repair for patients
- We still have so much more to learn!

Questions?