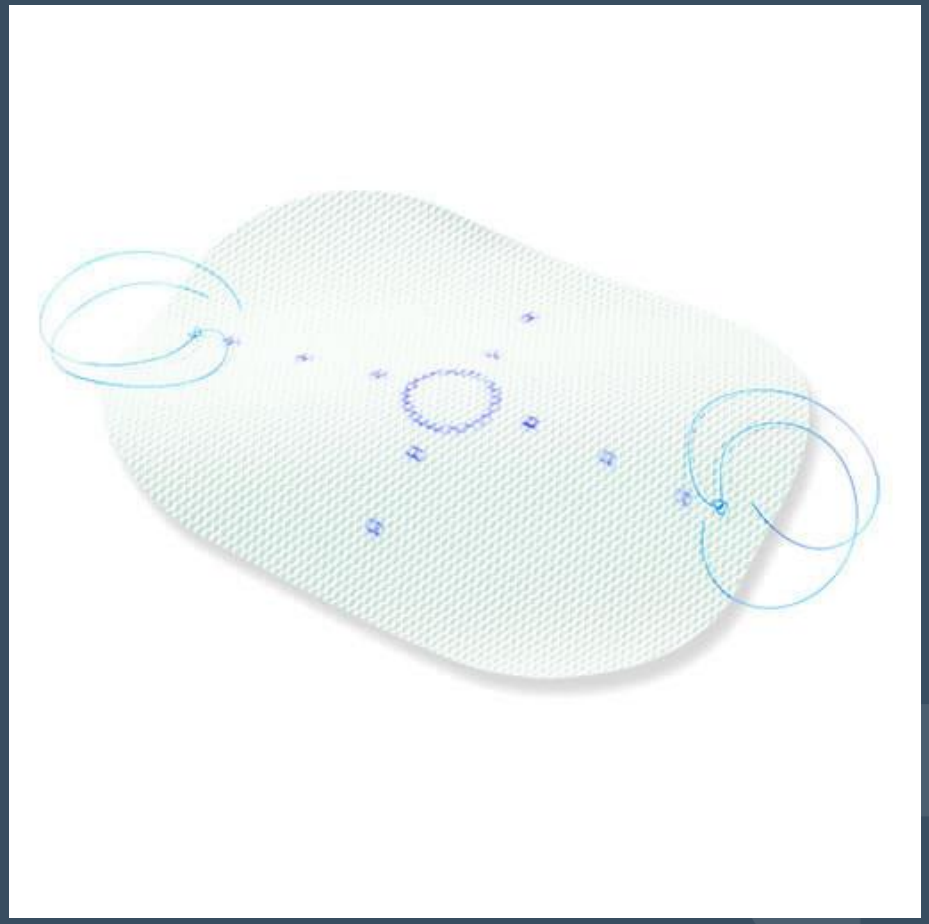
Long Term Effects of Intra-Peritoneal Mesh Placement for Ventral Hernia Repairs

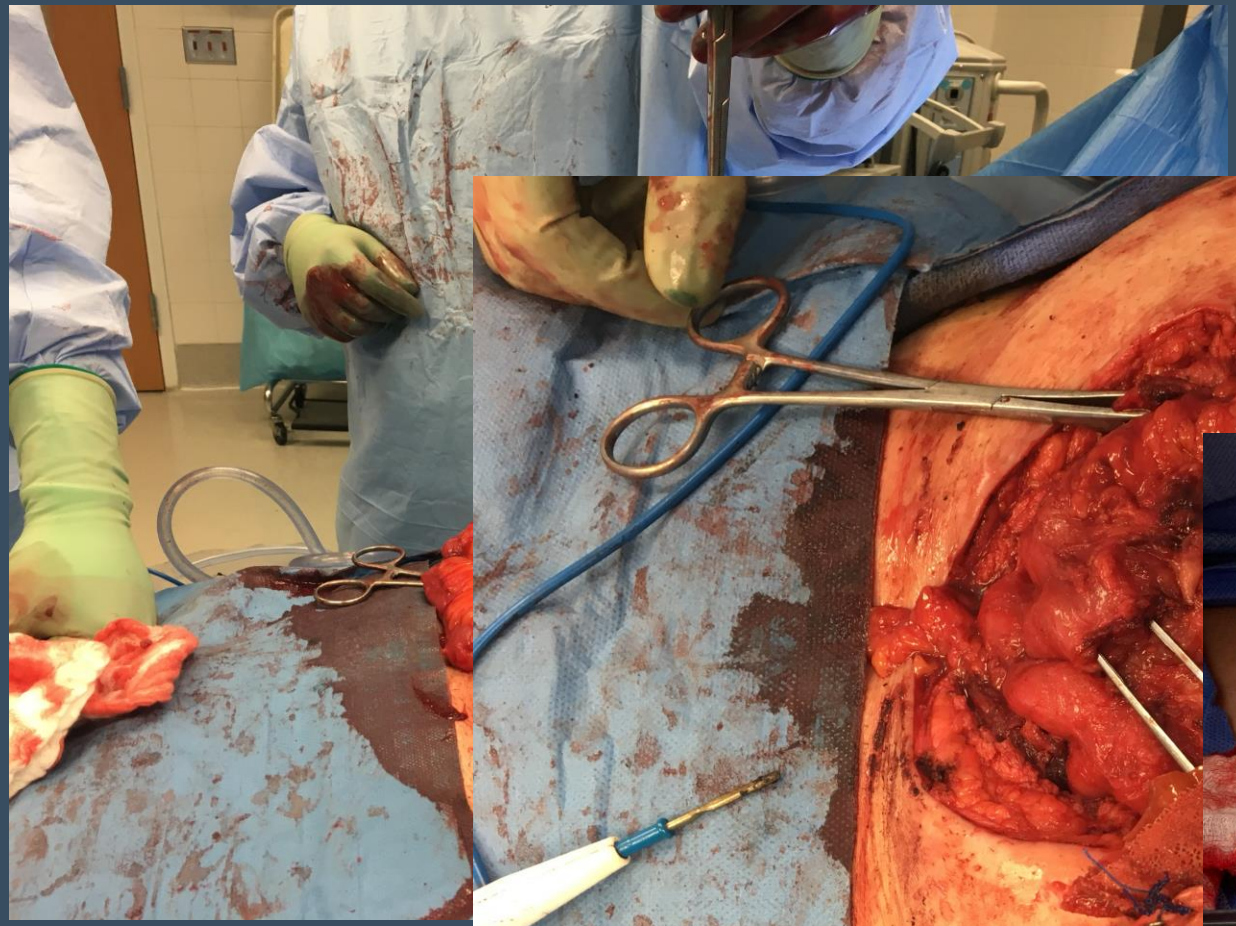
Lucas Beffa, MD, FACS
Assistant Professor of Surgery
Lerner College of Medicine
Cleveland Clinic

Overview

1. IP mesh related complications
2. Evidence vs. Bias surrounding IPOM mesh
3. Long term studies
4. Key Takeaways

What's the big deal???





Intraperitoneal Polypropylene Mesh Hernia Repair Complicates Subsequent Abdominal Surgery

J. A. Halm, MD,[1]* L. L. de Wall, MD,[1]* E. W. Steyerberg, MD,[2] J. Jeekel, MD,[1] J. F. Lange, MD[1,3]

[1]*Department of Surgery, 10M, Erasmus MC, University Medical Center Rotterdam, Dr. Molewaterplein 40, 3015 GD Rotterdam, The Netherlands*
[2]*Department of Public Health, Erasmus MC, University Medical Center Rotterdam, Dr. Molewaterplein 40, 3015 GD Rotterdam, The Netherlands*
[3]*Department of Surgery, Medical Centre Rijnmond-Zuid, Groene Hilledijk 315, 3075 EA Rotterdam, The Netherlands*

- 2007
- Compared patients who underwent subsequent abdominal surgery following uncoated PP in intra-peritoneal position to uncoated PP in preperitoneal position
- 39 IP vs 27 PP

Table 5.
Complications at subsequent laparotomy related to intra- and preperitoneal mesh

Complications		Complications in subsequent interventions in patients with intraperitoneal grafts (n = 39)		Complications in subsequent interventions in patients with preperitoneal grafts (n = 27)		*P* Value
Perioperative	No complications	9	(23%)	19	(70%)	< 0.001
	Complications	30		8		
	Adhesions	24	(62%)	7	(26%)	
	Dense visceral adhesions					
	Which required bowel resection	8	(21%)	0	(0%)	
Postoperative	No complications	20	(51%)	21	(78%)	0.04
	Complications	19		6		
(< 30 days)	Surgical site infection	10	(26%)	1	(4%)	
	Superficial,	3	1			
	Deep	6	0			
	Mesh removal required	1	0			
	Hematoma/seroma	1	(3%)	1	(4%)	
	Small bowel perforation	3	(8%)	0	(0%)	
	Ileus	3	(8%)	1	(4%)	
	Urinary retention, UTI	3	(8%)	1	(4%)	
	Peritonitis/sepsis	1	(3%)	0	(0%)	
	Pneumonia	3	(8%)	0	(0%)	
	Other	9	(23%)	3	(11%)	
	Deceased	2	(5%)	0	(0%)	
Late (OPD[a])	No complications	30	(77%)	26	(96%)	0.04
	Complications[b]	9		1		
(> 30 days)	Enterocutaneous fistula	2	(5%)	0	(0%)	
	Deep mesh infection	1	(3%)	0	(0%)	
	Other	2	(5%)	1	(4%)	

Evidence vs Bias - IPOM

OXFORD

BJS, 2023, **110**, 1732–1768
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Guideline

Midline incisional hernia guidelines: the European Hernia Society

David L. Sanders[1,2], Maciej M. Pawlak[1,2], Maarten P. Simons[3], Theo Aufenacker[4], Andrea Balla[5], Cigdem Berger[6], Frederik Berrevoet[7], Andrew C. de Beaux[8], Barbora East[9], Nadia A. Henriksen[10], Miloslav Klugar[11], Alena Langaufová[12], Marc Miserez[13], Salvador Morales-Conde[14], Agneta Montgomery[15,16], Patrik K. Pettersson[15,16], Wolfgang Reinpold[6], Yohann Renard[17], Simona Slezáková[11], Thomas Whitehead-Clarke[18] and Cesare Stabilini[19,20]

Key Question 7: What is the difference in outcome considering different positions of mesh in incisional hernia repair?

Recommendation A: For patients with a midline incisional hernia, the guidelines panel recommends that mesh should be placed in the retromuscular plane (strong recommendation, very low certainty evidence).

Good Practice Statement A: Surgeons performing incisional hernia repair should be familiar with the technique for positioning the mesh in different planes (including onlay, retromuscular, and intraperitoneal).

Good Practice Statement B: For patients with a midline incisional hernia, the guidelines panel suggests that any mesh in the abdominal cavity exposed to the abdominal viscera should be used with caution due to the risk of long-term complications at any subsequent abdominal surgery.

Due to the risk of intraperitoneal adhesions, and with the growing popularity of alternative minimally invasive methods for retromuscular repair such as MILOS and extended Totally ExtraPeritoneal (eTEP), which are showing promising results, it is suggested to keep the mesh out of the peritoneal cavity where possible to limit contact with the viscera.

Evidence vs Bias - IPOM

Society	Recommendation	Grade
European Hernia Society	Retromuscular (2023)	Very Low
International Endohernia Society	Retromuscular (2022)	Low
Americas Hernia Society	Retromuscular (2020)	Weak
SAGES	Lap IPOM (2016)	Moderate

Why so many recommendations against IPOM?

- Adhesions?
- Fistulas?
- Intra-operative complications?
- Long term mesh complications?
- Making future operations difficult?

Subsequent Operations

Effect of Mesh Type and Position on Subsequent Abdominal Operations after Incisional Hernia Repair

Christopher W Snyder, MD, MSPH, Laura A Graham, MPH, Stephen H Gray, MD, MSPH, Catherine C Vick, MS, Mary T Hawn, MD, MPH, FACS

Table 4. Logistic Regression for Risk of Enterotomy or Unplanned Bowel Resection*

Previous incisional hernia repair type	Odds ratio	(95% CI)	p Value
Suture	Ref		
Polypropylene			
Underlay	1.4	(0.5–4.3)	0.56
Inlay	1.0	(0.3–3.6)	0.98
Onlay	0.3	(0.04–2.8)	0.31
ePTFE			
Open	2.1	(0.6–7.6)	0.27
Laparoscopic†			
Absorbable/biologic	1.4	(0.3–6.0)	0.67
Age (continuous)	1.04	(1.00–1.08)	0.03
Previous VIHR case category			
Primary	Ref		
Recurrent	4.3	(1.8–10.3)	0.001

- No difference in complications based on mesh type or mesh position

JAMA | Original Investigation

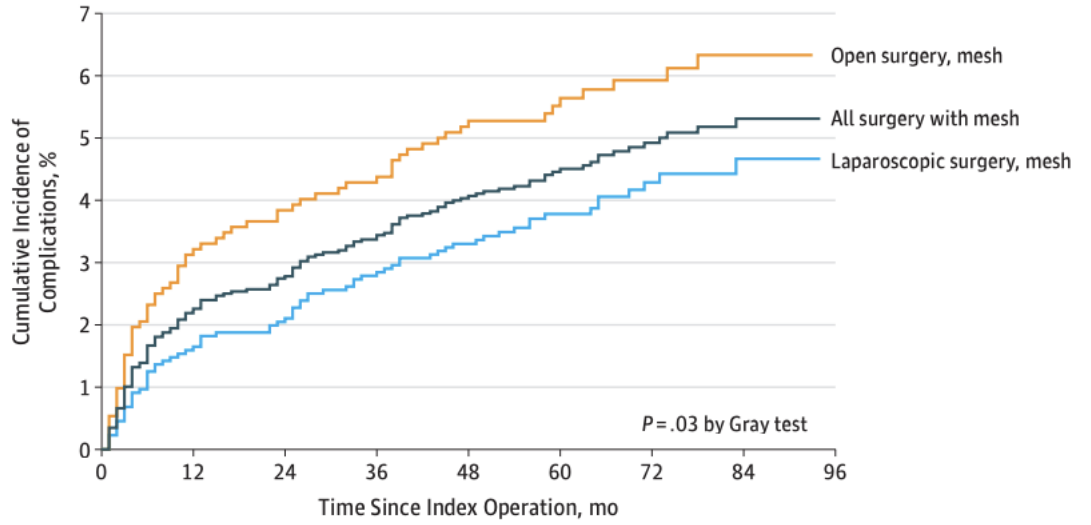
Long-term Recurrence and Complications Associated With Elective Incisional Hernia Repair

Dunja Kokotovic, MB; Thue Bisgaard, MD, DMSc; Frederik Helgstrand, MD, DMSc

Table 1. Patient Demographics and Mesh Characteristics for Patients Undergoing Incisional Hernia Repair[a]

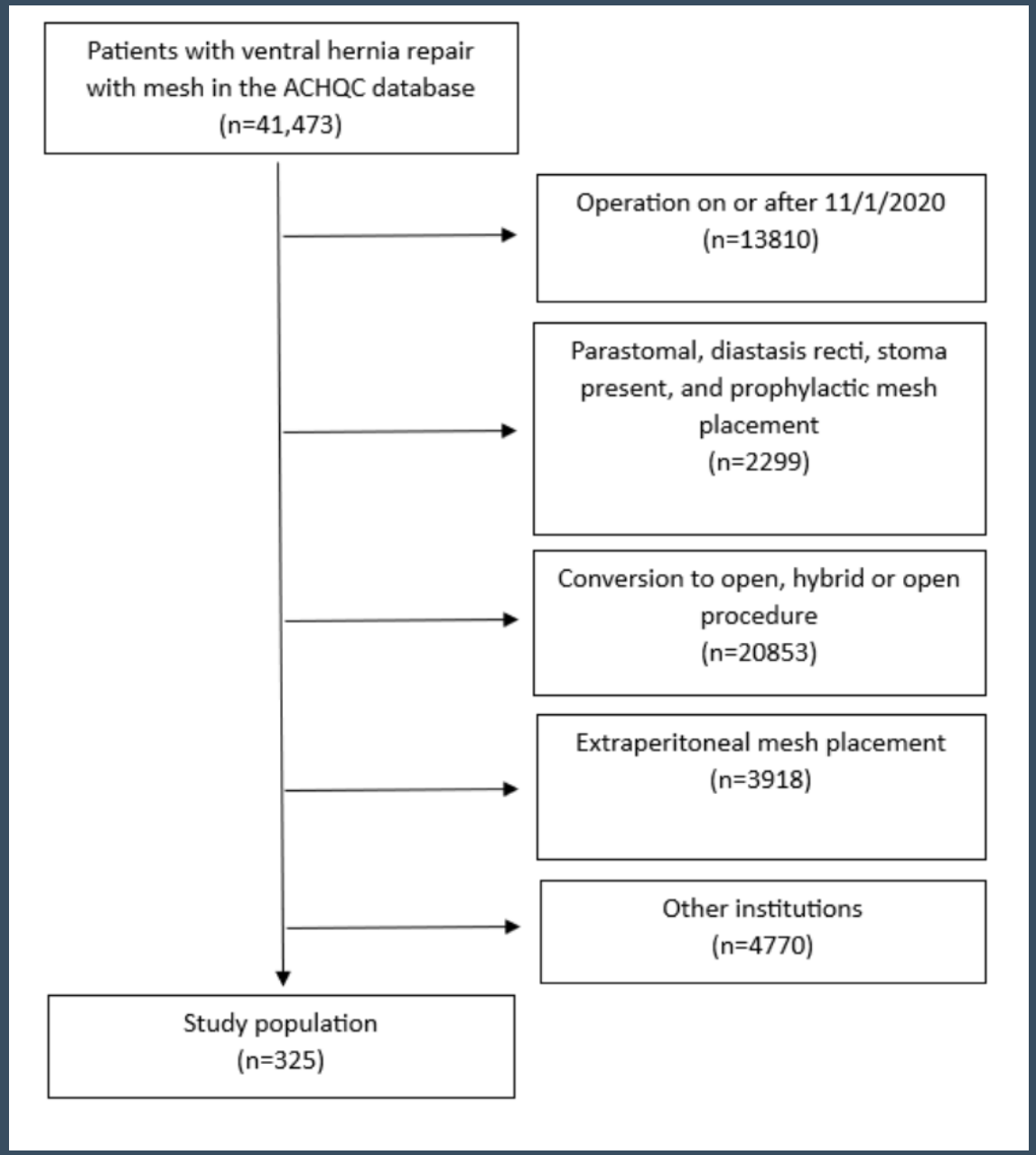
Characteristics	Open Repair		Laparoscopic Mesh Repair (n = 1757)
	Mesh (n = 1119)	Nonmesh (n = 366)	
Sex			
Male	547 (48.9)	170 (46.4)	805 (45.8)
Female	572 (51.1)	196 (53.6)	952 (54.2)
Age, y			
18-50	267 (23.9)	128 (35.0)	462 (26.3)
51-60	324 (29.0)	93 (25.4)	498 (28.3)
61-70	301 (26.9)	63 (17.2)	456 (26.0)
>70	227 (20.3)	82 (22.4)	341 (19.4)
Hernia defect, cm			
0-2	166 (14.8)	210 (57.4)	101 (5.7)
3-7	463 (41.4)	108 (29.5)	676 (38.5)
8-15	311 (27.8)	33 (9.0)	692 (39.4)
16-20	133 (11.9)	11 (3.0)	209 (11.9)
>20	46 (4.1)	4 (1.1)	79 (4.5)
Primary vs recurrent repair			
Primary	921 (82.3)	320 (87.4)	1560 (88.8)
Recurrent	198 (17.7)	46 (12.6)	197 (11.2)
Mesh size, median (interquartile range), cm^2	180 (66-400)	NR	324 (225-500)
Mesh type			
PLL	597 (53.4)	NR	23 (1.3)
Coated PPL	123 (11.0)	NR	843 (48.0)
PPL plus ePTFE	230 (20.6)	NR	617 (35.1)
ePTFE	48 (4.3)	NR	79 (4.5)
Coated polyester	26 (2.3)	NR	176 (10.0)
Other[b]	95 (8.4)	NR	19 (1.1)
Mesh position			
Sublay	322 (28.8)	NR	NR
Onlay	451 (40.3)	NR	NR
Intraperitoneal	255 (22.8)	NR	1757
Other[c]	91 (8.1)	NR	NR
Mesh fixation technique			
Tack	226 (20.2)	NR	1719 (97.9)
Suture	823 (73.5)	NR	4 (0.2)
Other[d]	70 (6.3)	NR	34 (1.9)
Tack type			
Absorbable	17 (14.5)	NR	241 (24.9)
Nonabsorbable	100 (85.5)	NR	727 (75.1)

Figure 2. Cumulative Incidence of Mesh-Related Complications Treated by Surgical Intervention After Index Incisional Hernia Repair



No. at risk								
Laparoscopic mesh	1757	1620	1532	1455	1332	942	578	260
Open mesh	1119	1000	942	880	790	556	370	211
All mesh	2876	2620	2474	2335	2122	1498	948	471

What is the long-term mesh complications of MIS IPOM in our hands?


Patients with ventral hernia repair with mesh in the ACHQC database (n=41,473)
Operation on or after 11/1/2020 (n=13810)
Parastomal, diastasis recti, stoma present, and prophylactic mesh placement (n=2299)
Conversion to open, hybrid or open procedure (n=20853)
Extraperitoneal mesh placement (n=3918)
Other institutions (n=4770)
Study population (n=325)

Results

	Overall (N=325)
Age (years)	57.0 (13.2)
Female, n(%)	163 (50.2%)
White race, n(%)	267 (83.4%)
BMI (kg/m^2), mean (SD)	33.1 (6.81)
Recurrent hernia, n(%)	83 (25.5)
Hypertension, n(%)	168 (51.7%)
Diabetes mellitus, n(%)	63 (19.4%)
Hepatic insufficiency or liver failure, n(%)	2 (0.6%)
COPD, n(%)	29 (8.9%)
Inflammatory bowel disease, n(%)	6 (1.8%)
Anti-platelet medications, n(%)	20 (6.2%)
Anti-coagulation medications, n(%)	13 (4.0%)
Immunosuppressants, n(%)	32 (9.8%)
History of abdominal wall SSI, n(%)	13 (4.0%)

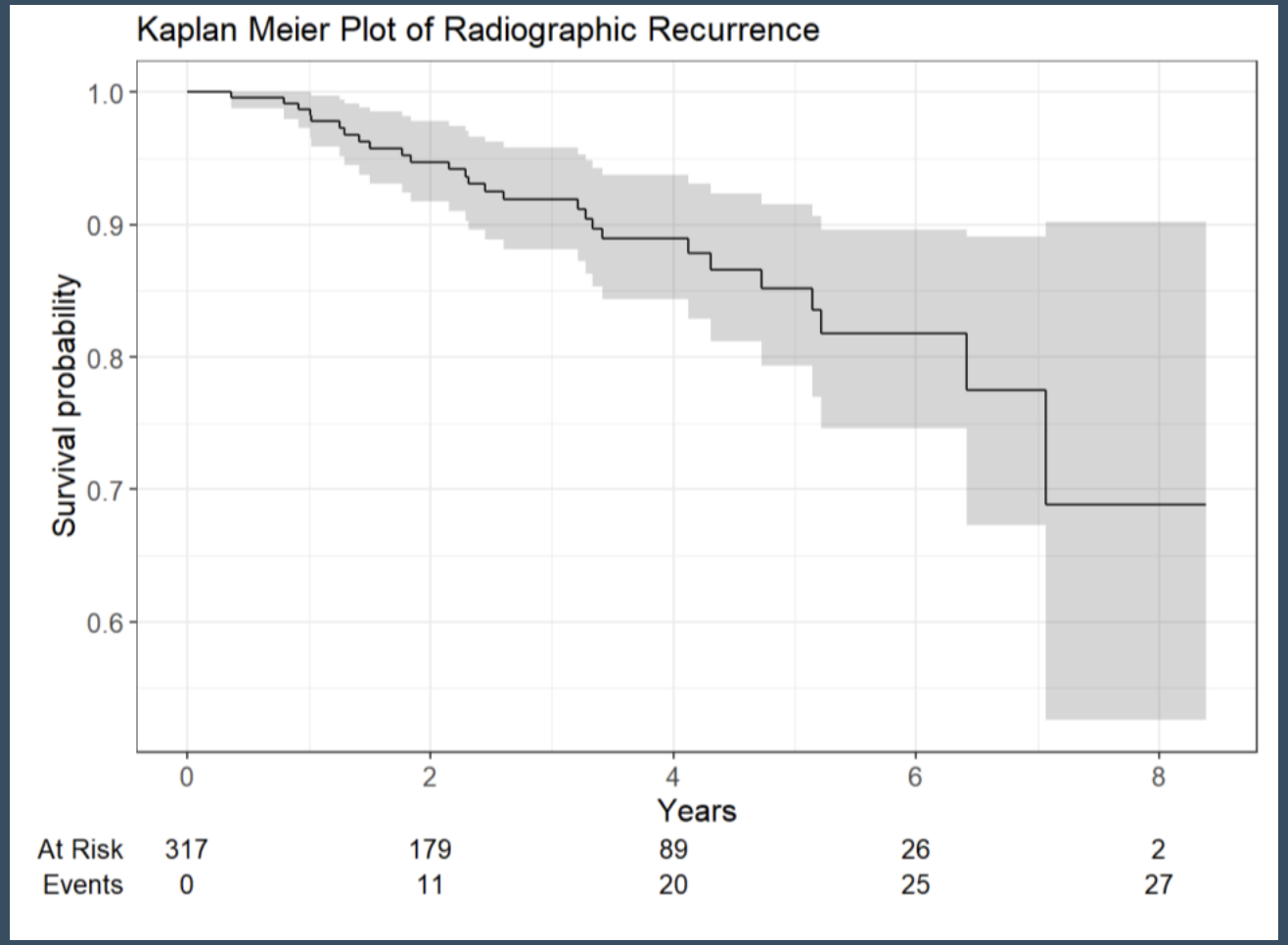
Table 2: Operative Details

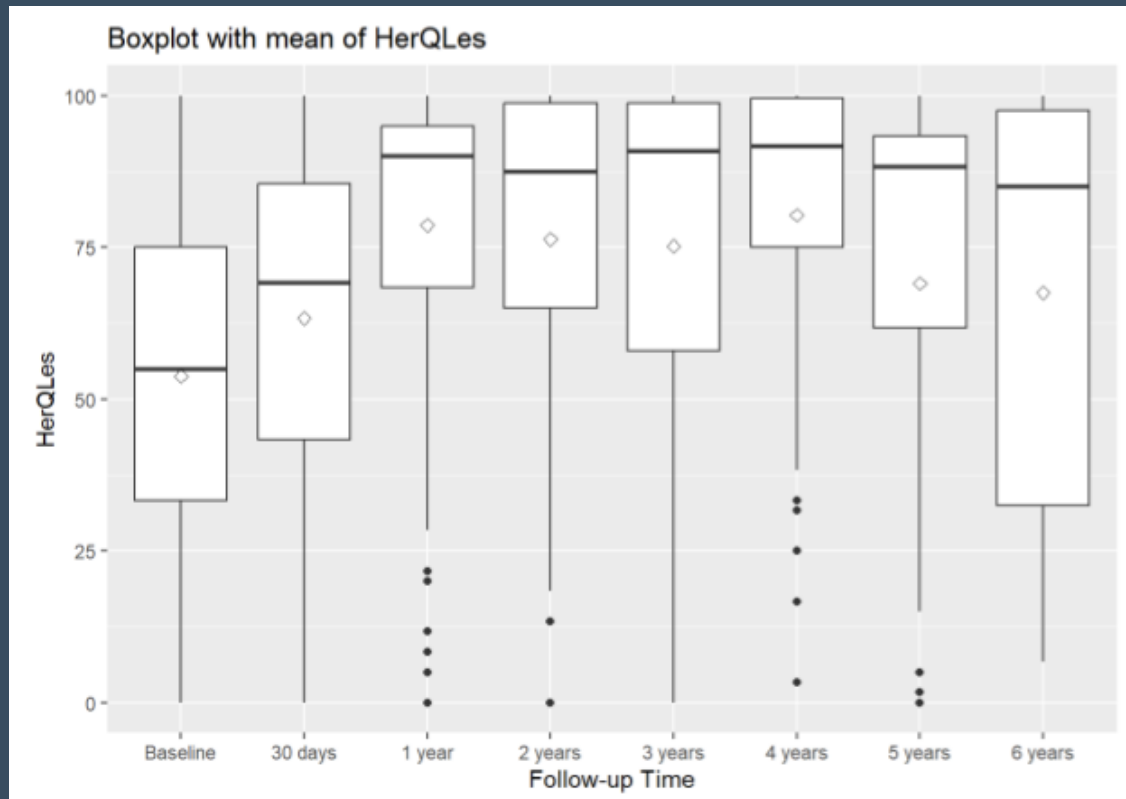
	Overall (N=325)
Elective Case, n(%)	316 (97.2%)
ASA Class, n(%)	
I	3 (0.9%)
II	99 (30.5%)
III	210 (64.6%)
IV	13 (4.0%)
Operative approach, n(%)	
Laparoscopic	236 (72.6%)
Robotic	89 (27.4%)
Wound status, n(%)	
Clean	323 (99.4%)
Clean-contaminated	1 (0.3%)
Contaminated	1 (0.3%)
Operative time (minutes), n(%)	
0 – 59	99 (30.5%)
60 - 119	137 (42.2%)
120 – 179	72 (22.2%)
180 – 239	9 (2.8%)
240 +	8 (2.5%)
EHS hernia classification, n(%)	
M1	20 (6.2%)
M2	164 (50.5%)
M3	206 (63.4%)
M4	52 (16.0%)
M5	7 (2.2%)
Non- midline	14 (4.3%)
Concomitant procedure performed, n(%)	21 (6.5%)
Other hernia	8
Foregut/Endocrine	3
Hepatobiliary/Pancreatic	2
Obstetric/Gynecologic	2
Urologic	1
Soft Tissue/Plastics	6
Intra-operative complications, n(%)	8 (2.5%)
Bowel injury	6
Liver injury	1
Unspecified	1
Hernia length (cm), mean (SD)	5.35 (4.07)
Hernia width(cm), mean (SD)	4.16 (3.86)
Mesh length (cm), mean (SD)	15.7 (4.73)

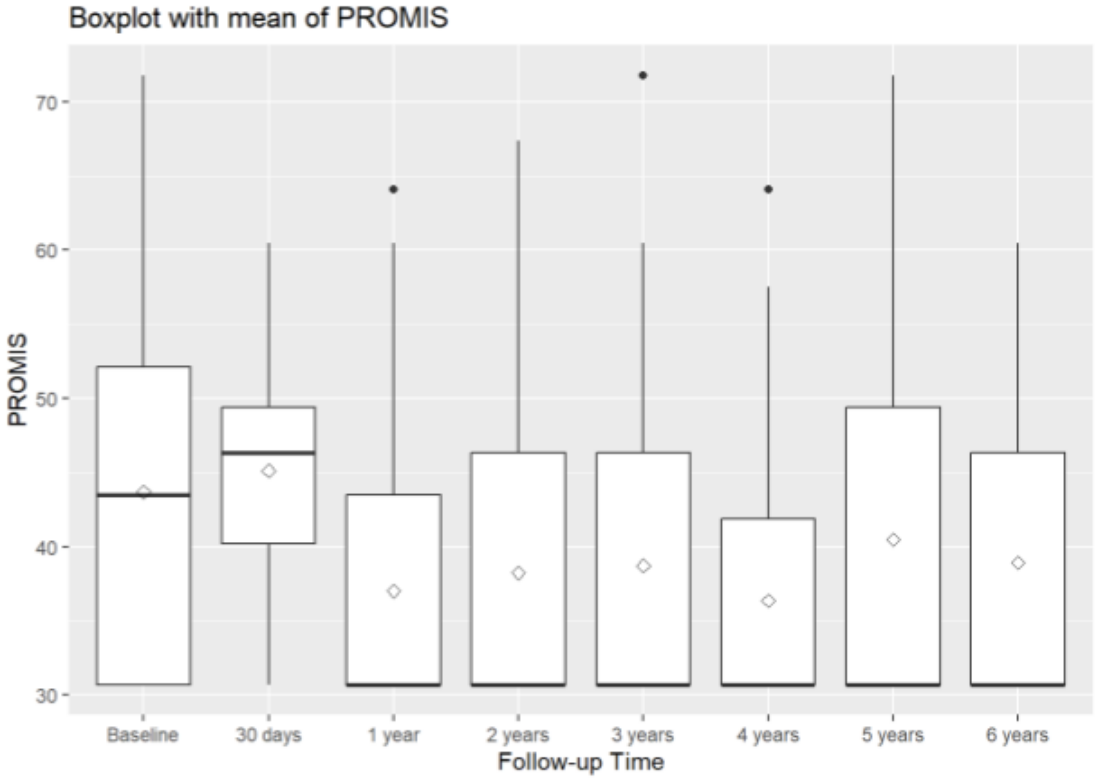
Results

- Follow up (3 years or greater)
  - 256 (77.8%)
- Mesh complications
  - 2 (0.01%)
    - 1 mesh explant for chronic pain
    - 1 mesh explant at time of colon cancer operation
- 16 patients had subsequent abdominal operations
  - 5 -- Hernia recurrence
  - 9 -- Unrelated intra-abdominal
  - 1 -- Obstructed port site hernia
  - 1 -- Adhesive SBO unrelated to mesh

	N	N(%)
1-year		
SSI	97	0
SSO	97	3 (3.1%)
SSOPI	97	1 (1.0%)
Reoperation	97	4 (4.1%)
Radiographic recurrence	82	7 (7.2%)
Pragmatic recurrence	155	16 (10.3%)
2-year		
SSI	37	0
SSO	37	0
SSOPI	37	0
Reoperation	37	2 (5.4%)
Radiographic recurrence	36	7 (18.9%)
Pragmatic recurrence	110	25 (22.7%)
3-year		
SSI	57	0
SSO	57	0
SSOPI	57	0
Reoperation	57	5 (8.8%)
Radiographic recurrence	47	6 (10.5%)
Pragmatic recurrence	129	29 (22.5%)
4-year		
SSI	45	0
SSO	45	0
SSOPI	45	0
Reoperation	45	4 (8.9%)
Radiographic recurrence	38	2 (4.4%)
Pragmatic recurrence	89	11 (12.4%)
5-year		
SSI	32	0
SSO	32	1 (3.1%)
SSOPI	32	0
Reoperation	32	2 (6.3%)
Radiographic recurrence	27	3 (9.4%)
Pragmatic recurrence	55	7 (12.7%)
6-year		
SSI	21	0
SSO	21	0
SSOPI	21	0
Reoperation	21	2 (9.5%)
Radiographic recurrence	15	0
Pragmatic recurrence	34	8 (23.5%)

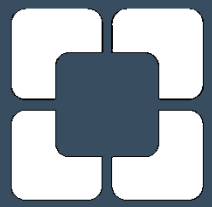

Kaplan Meier Plot of Radiographic Recurrence
Survival probability
1.0
0.9
0.8
0.7
0.6
0
2
4
6
8
Years
At Risk 317 179 89 26 2
Events 0 11 20 25 27


Boxplot with mean of HerQLes
HerQLes
100
75
50
25
0
Baseline
30 days
1 year
2 years
3 years
4 years
5 years
6 years
Follow-up Time


Boxplot with mean of PROMIS
PROMIS
70
60
50
40
30
Baseline
30 days
1 year
2 years
3 years
4 years
5 years
6 years
Follow-up Time

Key Takeaways

- There is a bias for RM repairs with weak evidence
- Association of MIS IPOM with adverse outcomes is often over stated with low rate of long term complications
- IPOM is a good operation
  - eTEP is a good operation
  - TAR is a good operation
    - *Each with its own complication profile*
- Don’t over complicate a simple hernia



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