

TEP, TAPP, IPOM, AND Open: an algorithmic approach to inguinal hernias

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Disclosures

- Consultant / Teaching/Research Grant: Covidien
- Consultant: Bard / Davol
- MAB: VIA Surgical
- Founder: IncLinx.com



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**Controversies, Problems
& Techniques in Surgery**

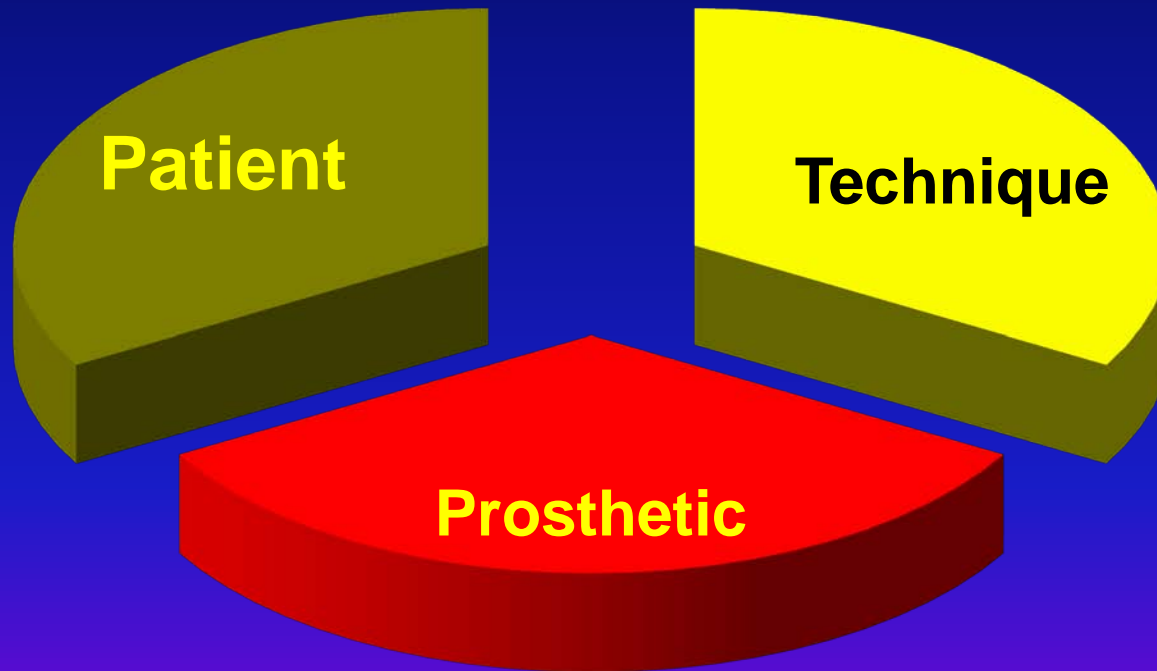
**LOOKING BACK
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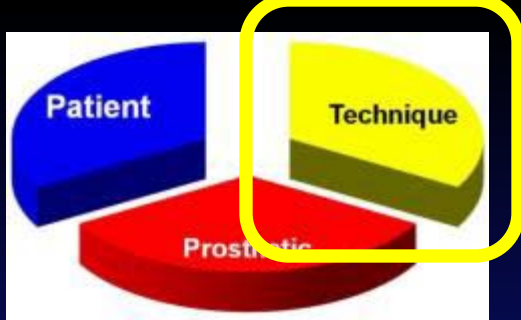
Groin Hernias

- Annual repairs: 20M worldwide,
800,000 in US
- Recurrence in 2 %
- Significant pain in 6 - 8%
 - (50,000 new cases of pain per year)

Introduction: Recipe for Success

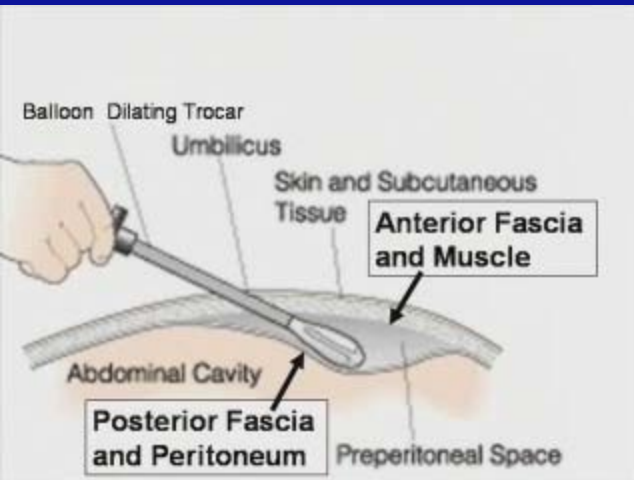
Inguinal Hernia Repair



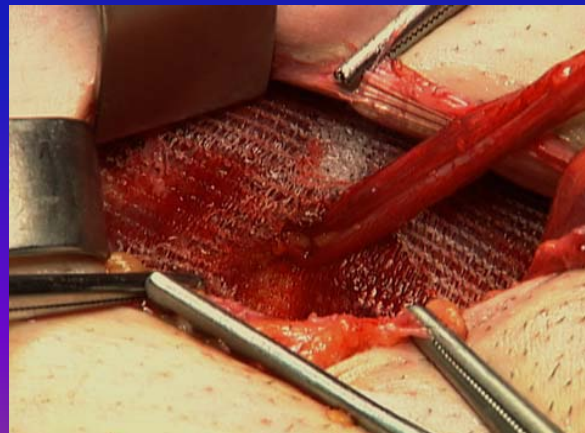


Technique will depend on experience and outcomes

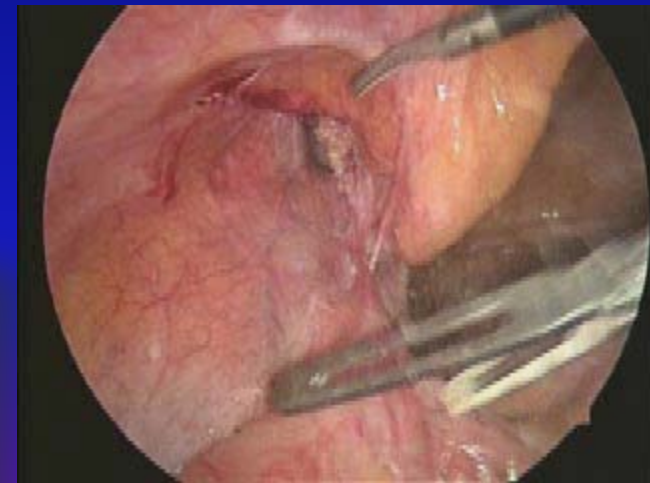
TEP



OPEN

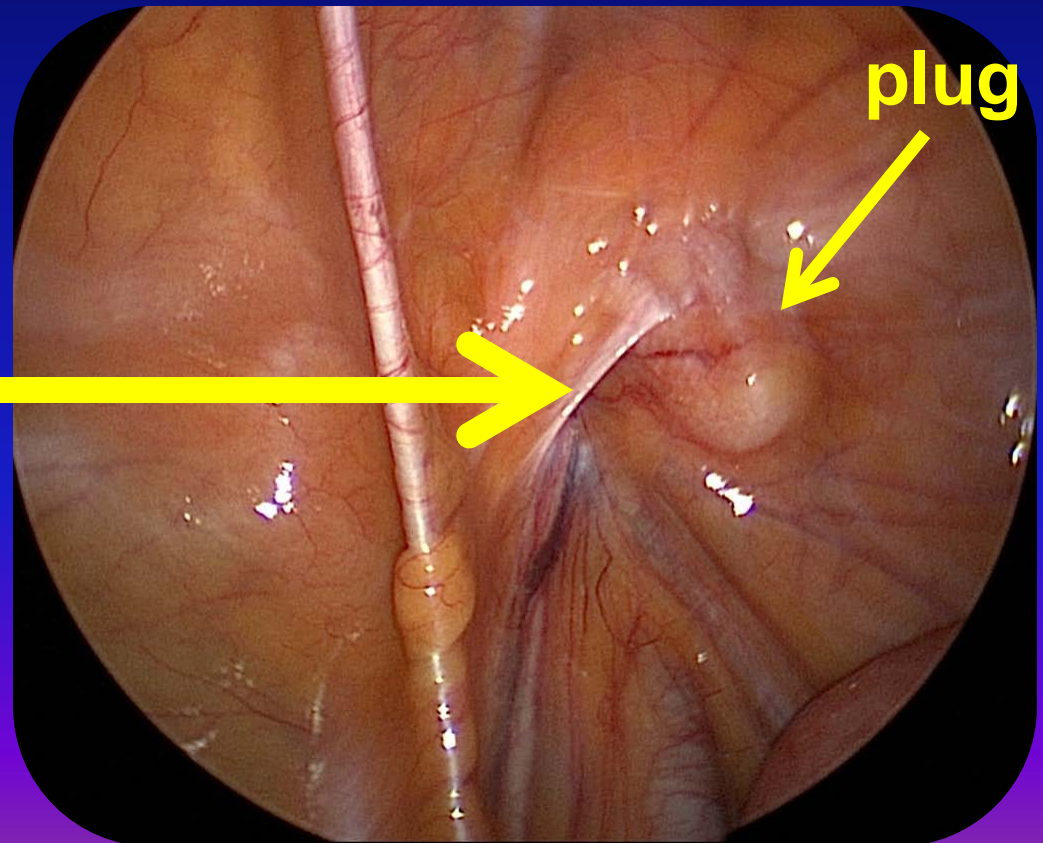


TAPP

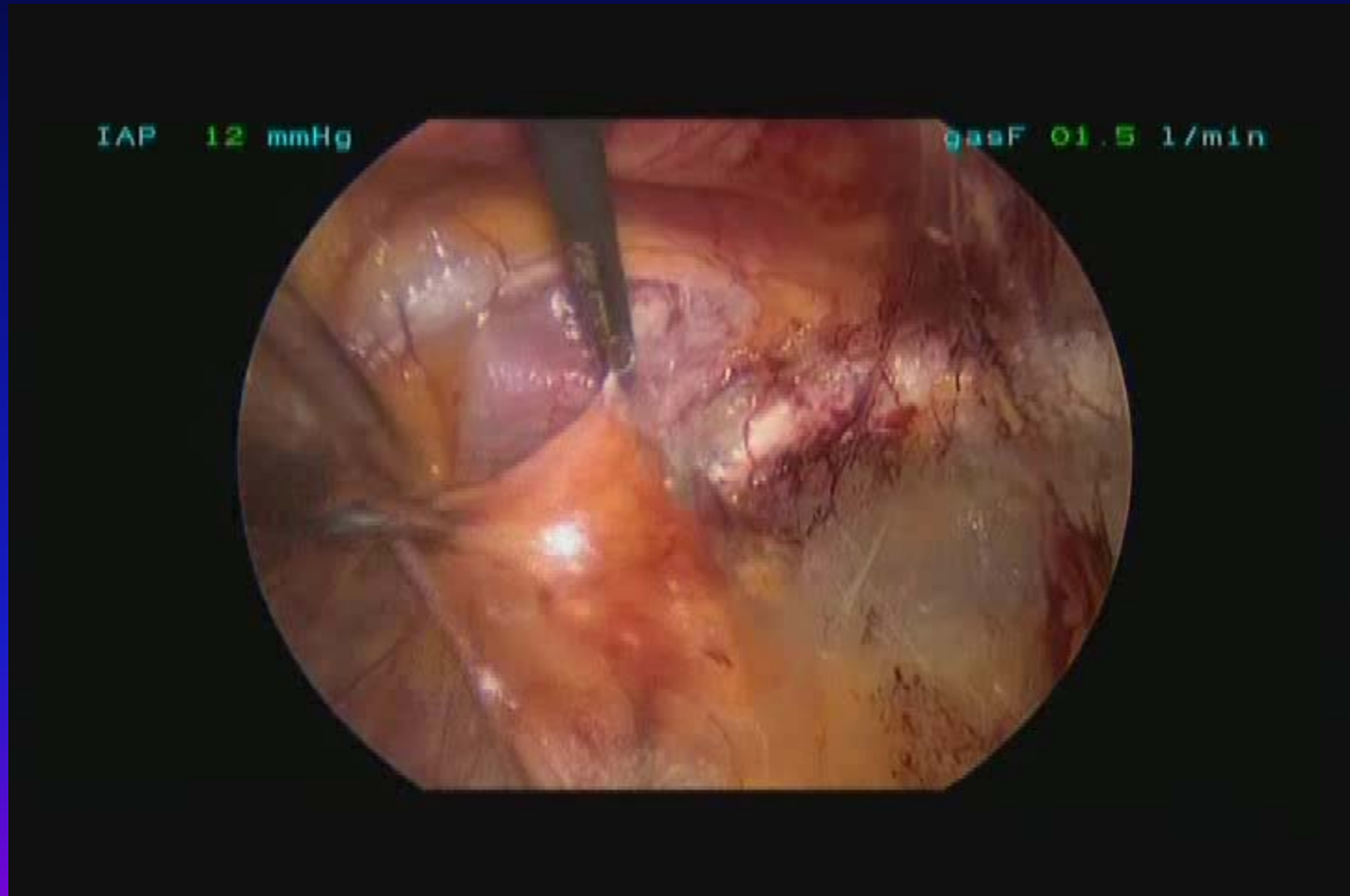


Why laparoscopy for inguinal?

- In USA, many still choose open repair
 - Cost (\$)
 - Anesthesia



Why laparoscopy for inguinal?



Laparoscopy (TEP): Outcomes

- Rapid recovery
- Quick return to work and daily activities
- Better Quality of Life outcomes
- Less acute pain complaints
- Very few intraabdominal morbidities
- Overall very low recurrence rates*

*when performed by experienced groups

TEP vs OPEN (level 1 evidence)

Pain in first 6 weeks: Favors TEP

- Dahlstrand U et al. **2013**.
 - TEP under general anesthesia is superior to Lichtenstein under local in terms of pain 6 weeks after surgery: a randomized clinical trial. Surg Endosc

TEP vs Lichtenstein (2013): systematic review with meta-analyses and trial sequential analyses of RCT

- 13 trials had randomized 5404 patients
- No conclusive evidence of a difference b/t TEP and Lichtenstein for
 - chronic pain,
 - recurrences,
 - severe complications.

? Technique

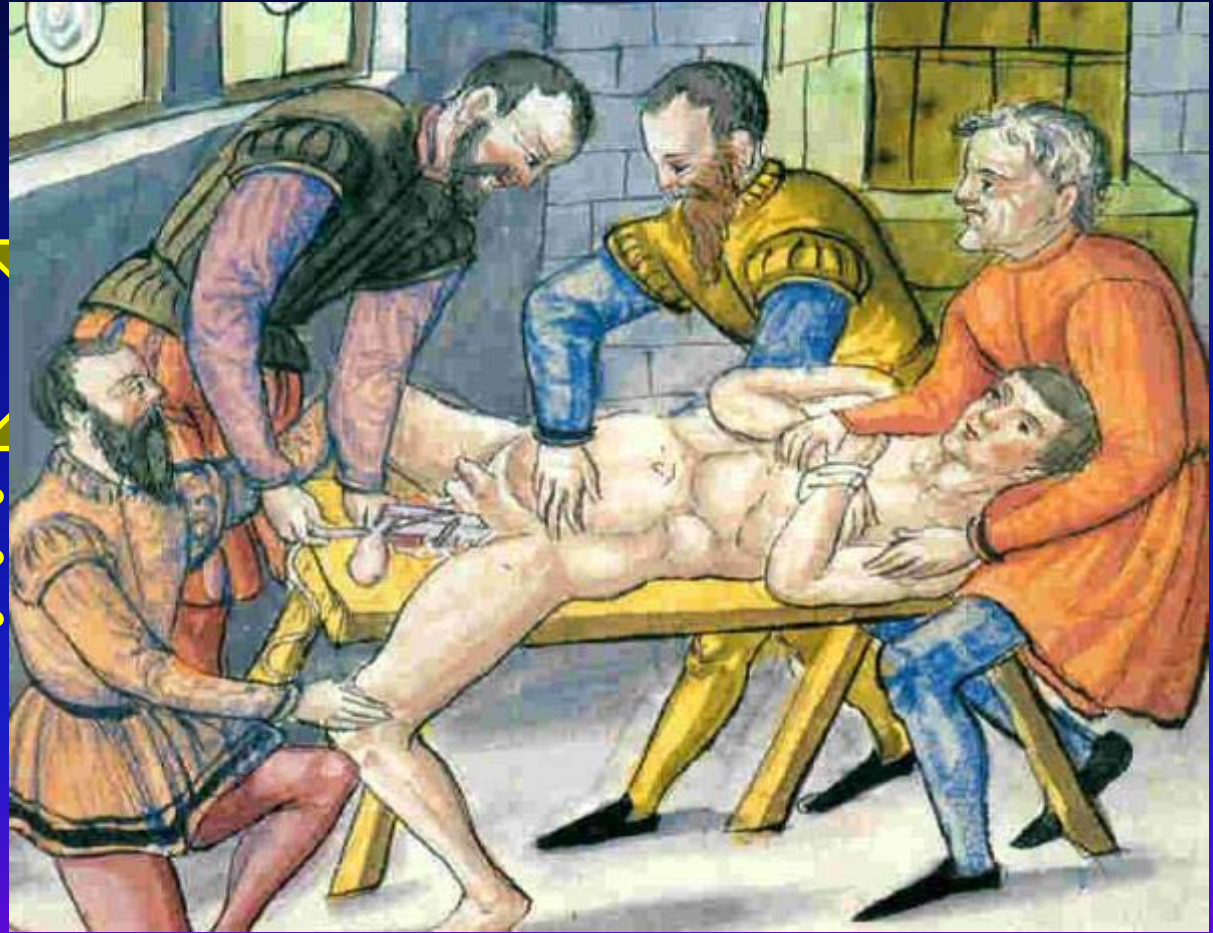
- **Surgeons who specialized in one method of hernia repair appeared to have excellent outcomes whenever they operated**

Evolution of Inguinal Hernia

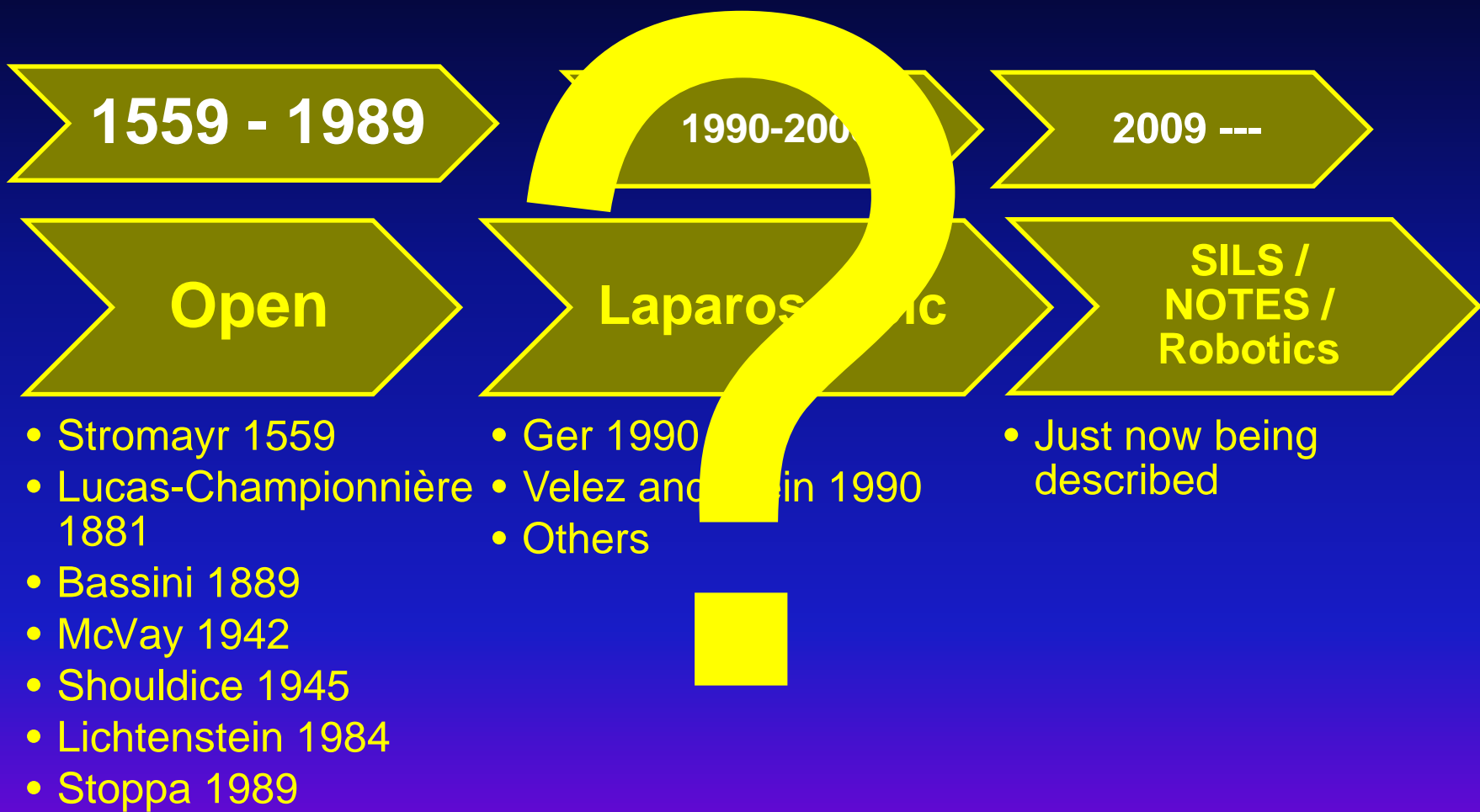
1559 - 1989

Open

- Stromayr 1559
- Lucas-Championnière 1881
- Bassini 1889
- McVay 1942
- Shouldice 1945
- Lichtenstein 1984
- Stoppa 1989



Evolution of Inguinal Hernia



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best hernia technique

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[Hernia Repair: Is Laparoscopic Always Best?](#)

[www.bidmc.org/.../Surgery/LatestTechniques/IsLaparoscopicAlwaysBest...](#)

Laparoscopic or minimally invasive **surgery** means smaller incisions, less pain and a quicker recovery for patients undergoing abdominal operations. But while ...

[Patient Information for Laparoscopic Inguinal Hernia Repair - SAGES](#)

[www.sages.org/.../patient-information-for-laparoscopic-inguinal-hernia-r...](#)

Approximately 600,000 **hernia repair** operations are performed annually in the ... The **procedure** may not be **best** for some patients who have had previous ...
Jason Levine and Jason Levine +1'd this

[Current options in inguinal hernia repair in adult patients](#)

[www.ncbi.nlm.nih.gov/.../Hippokratia/v.15\(3\); Jul-Sep 2011](#)

by M Kulecoglu - 2011 - Cited by 9 - Related articles

Inguinal **hernia** is a very common problem. Surgical **repair** is the current approach, whereas asymptomatic or minimally symptomatic **hernias** may be **good** ...

[Incisional Hernia Repair – Laparoscopic or Open Surgery?](#)

[www.ncbi.nlm.nih.gov/.../Ann R Coll Surg Engl/v.91\(8\); Nov 2009](#)

by T Dehn - 2009 - Cited by 5 - Related articles

There will be no imminent shortage of patients requesting incisional **hernia repair**. But how should they be **best** served? As with other forms of **hernia repair**, the ...

[A Secret for Patients Undergoing Hernia Repair - WSJ.com](#)

[online.wsj.com/.../SB1000142405297020383300457724934402283400...](#)

Feb 28, 2012 - **Hernia repair**, one of the most common surgical procedures, carries risk ... **good**, causing formation of scar tissue that makes eventual **repair** ...

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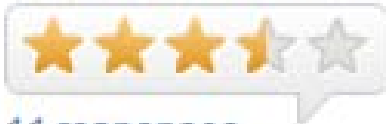
Dr. Diego R. Camacho, MD

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Specializes in General Surgery - Male - Age 42

Patient Satisfaction



11 responses

How was your experience?

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Dr. Camacho's Background

Research training, expertise and qualifications

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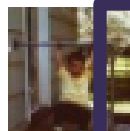
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**Matt Maunu**

16 y/o male with inguinal hernia. Mesh or no mesh?

Like Comment Unfollow Post 7 hours ago near Saint Cloud, MN

Seen by 48

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Amiki Szold If mesh is good for a 20 year old, why is it different 4 years earlier?

3 hours ago · Like



Brian Jacob Lap tep with mesh is great for the recurrence after Marcy.

3 hours ago · Like



Guy Voeller coz you don't know how to do proper Marcy

2 hours ago via email · Like



Andreas Koch ... but is there real evidence to use mesh in every case??? For a 20 years old male with an L I Hernia Shouldice or marcy would also be a good choice, the problem of all studies is that we are looking for THE INGUINAL HERNIA without classification of size and location, we don't know which is the best procedure in case of young males with small indirect hernias

2 hours ago · Like



Michael Rosen If he isn't symptomatic just wait

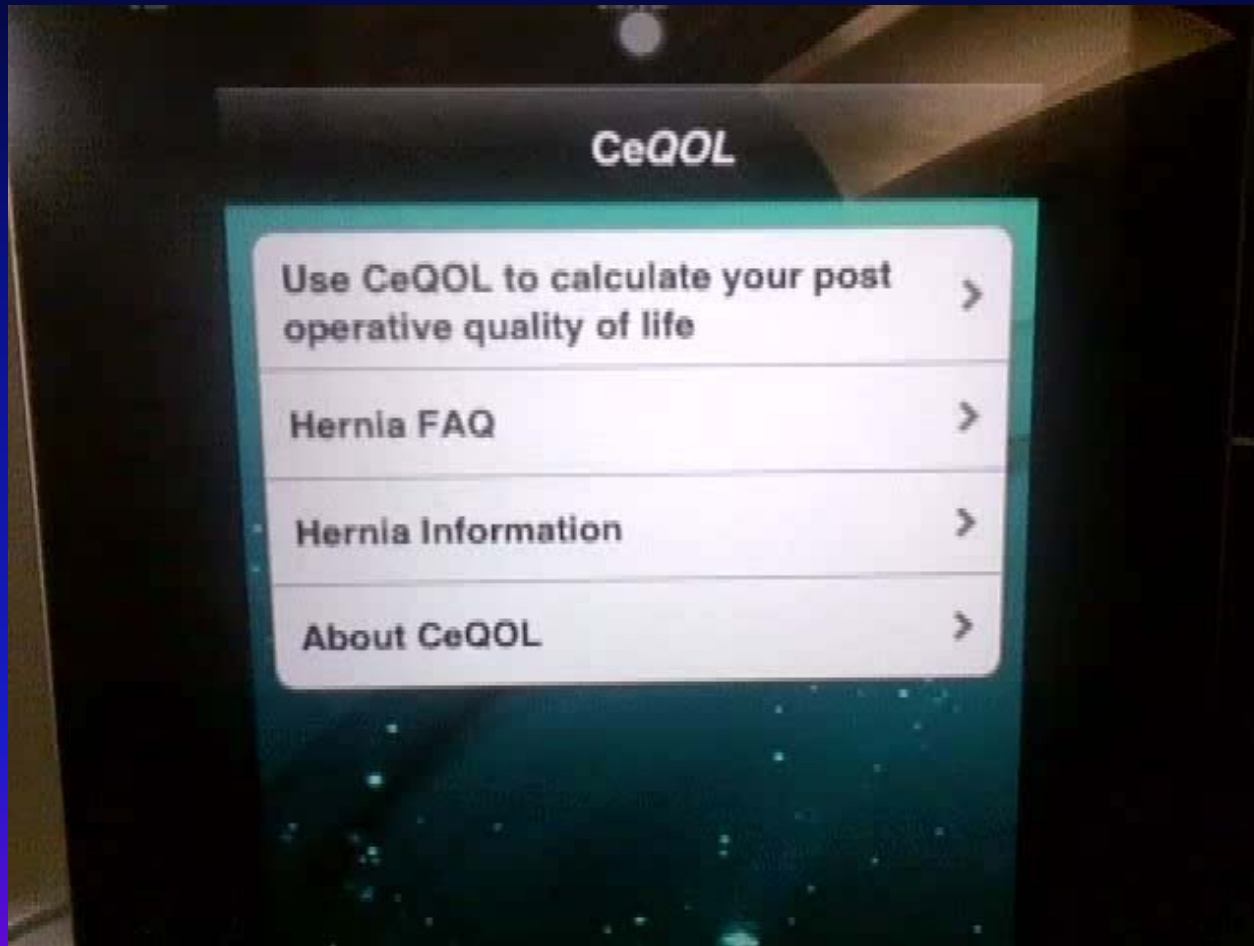
2 hours ago via mobile · Like



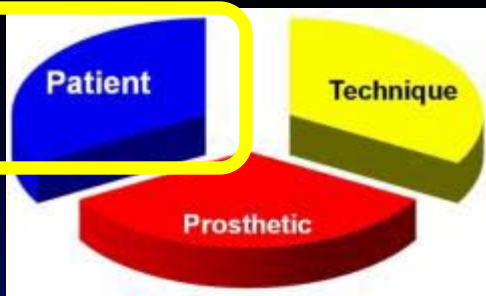
Matt Maunu That's what I recommended, and they agreed. Now mom is a little nervous about waiting. I'll try and reassure them again, but, if pushed am leaning towards a TEP with light weight mesh. But, will use this discussion when I speak with mom about the options/risks/etc.

2 hours ago via mobile · Like

Patient Education– CeQOL



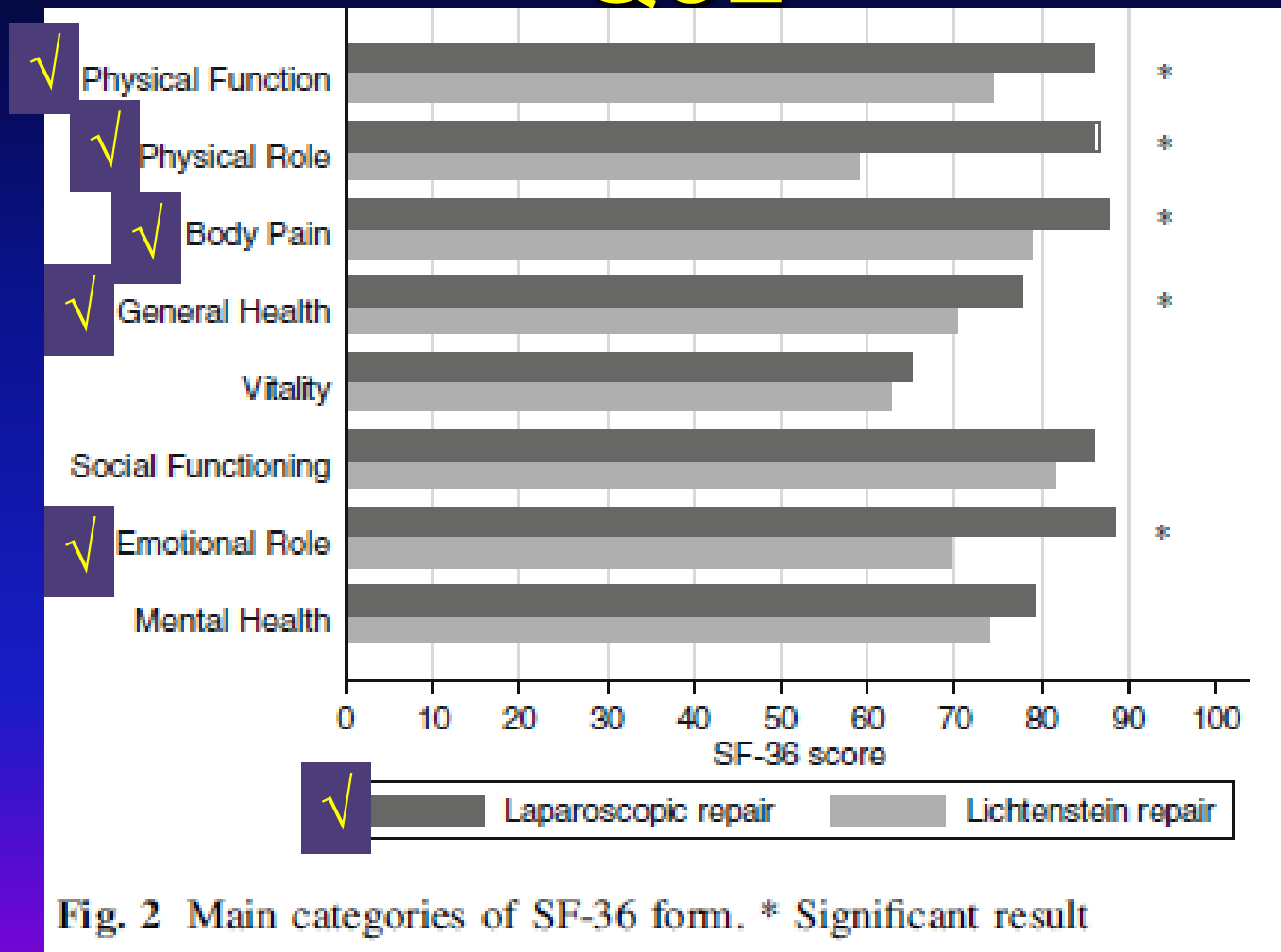
<https://play.google.com/store/apps/details?id=com.carolinas.CeQOL>



All decisions start with the patient

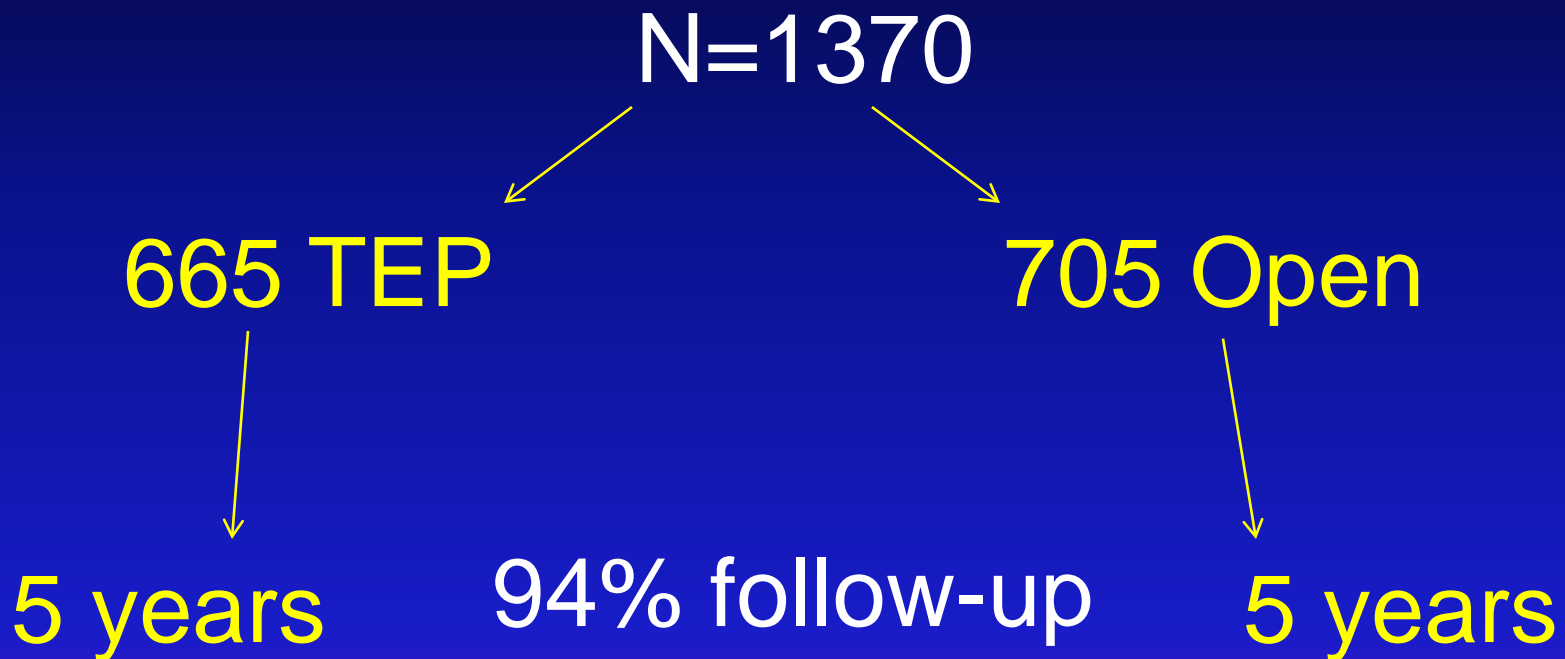
- Individualize our approaches
 - Option you choose will depend on
 - Patient goals / expectations
 - Patient history (pain or bulge)
 - Patient's hernia
 - Intraoperative findings
 - Surgeon's experience
- Hernia surgeons need to know how to perform **ALL**

Laparoscopy vs. Lichtenstein: QoL

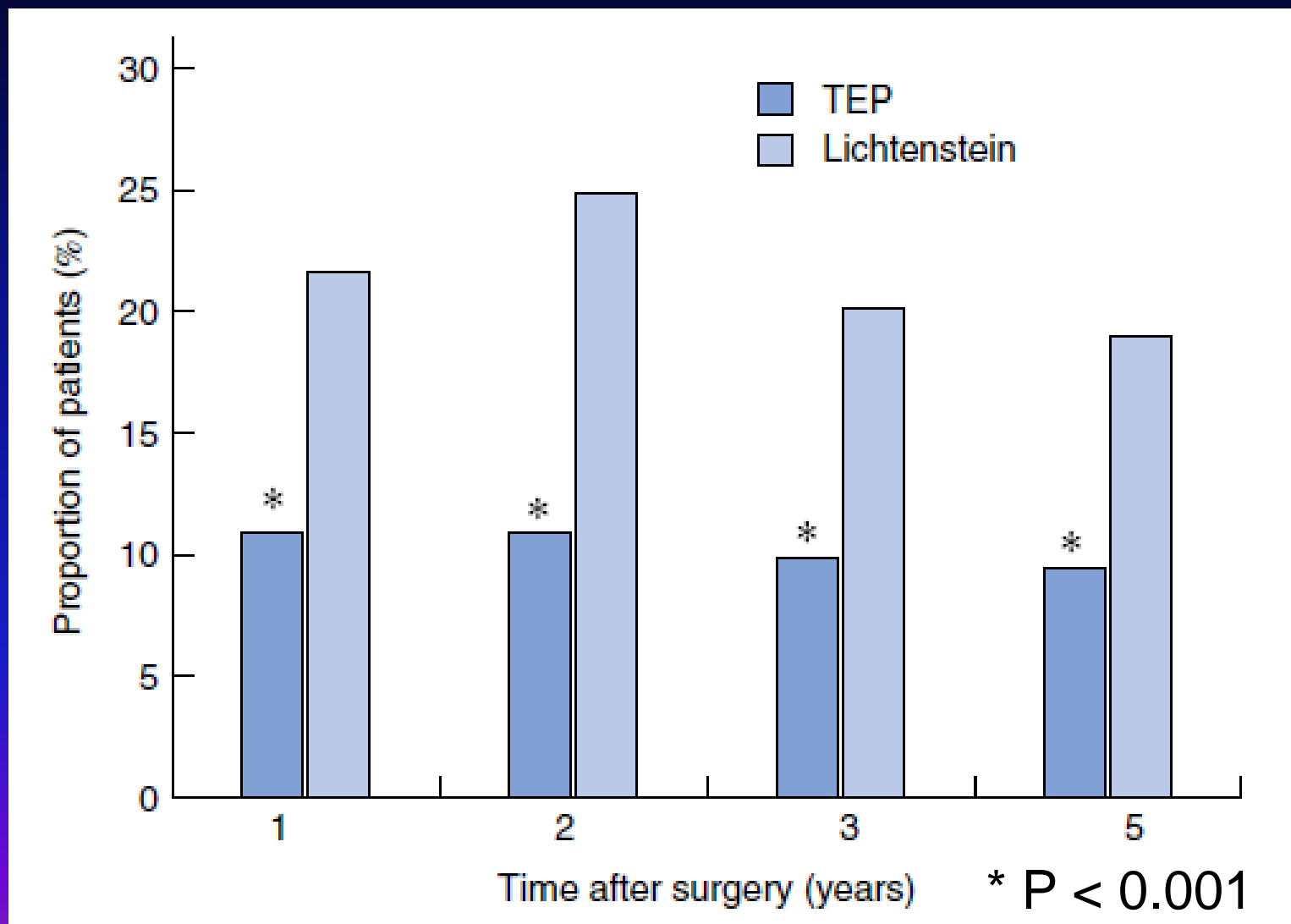


Laparoscopy vs. Open: Chronic Pain

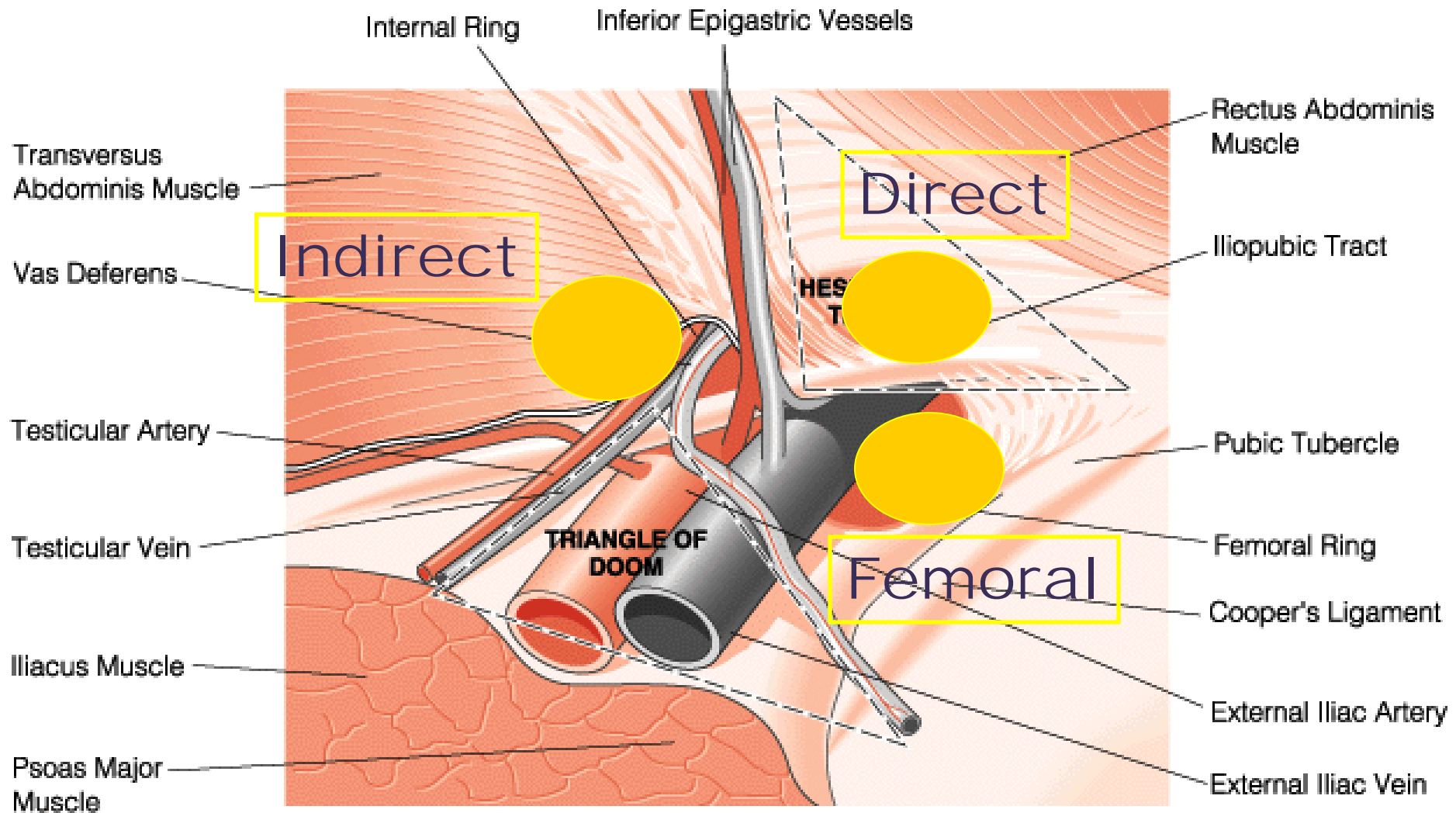
- RCT



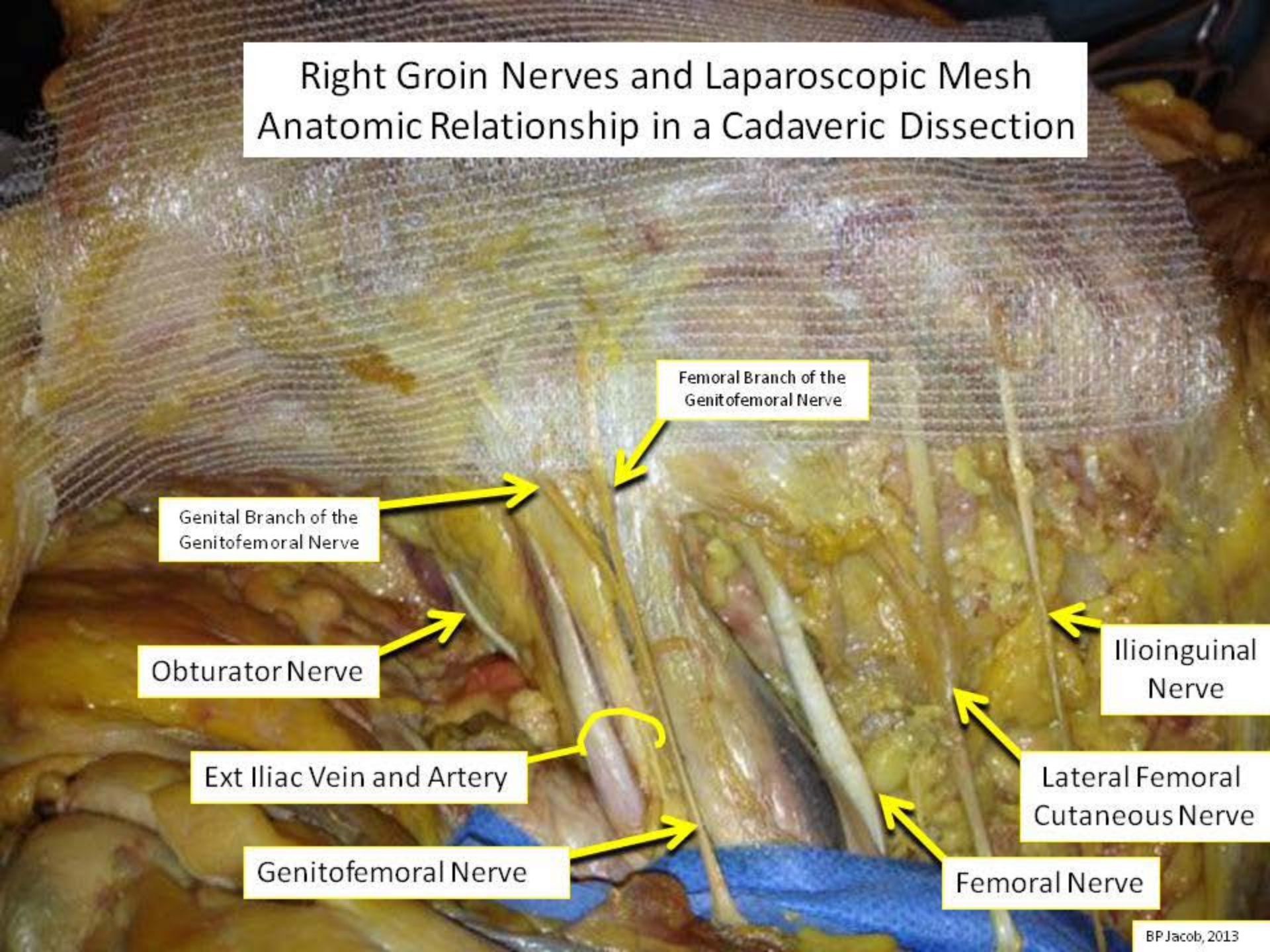
TEP vs. Lichtenstein: Chronic Pain



Left Inguinal Anatomy: Laparoscopic View



Right Groin Nerves and Laparoscopic Mesh Anatomic Relationship in a Cadaveric Dissection



Genital Branch of the Genitofemoral Nerve

Femoral Branch of the Genitofemoral Nerve

Obturator Nerve

Ilioinguinal Nerve

Ext Iliac Vein and Artery

Lateral Femoral Cutaneous Nerve

Genitofemoral Nerve

Femoral Nerve

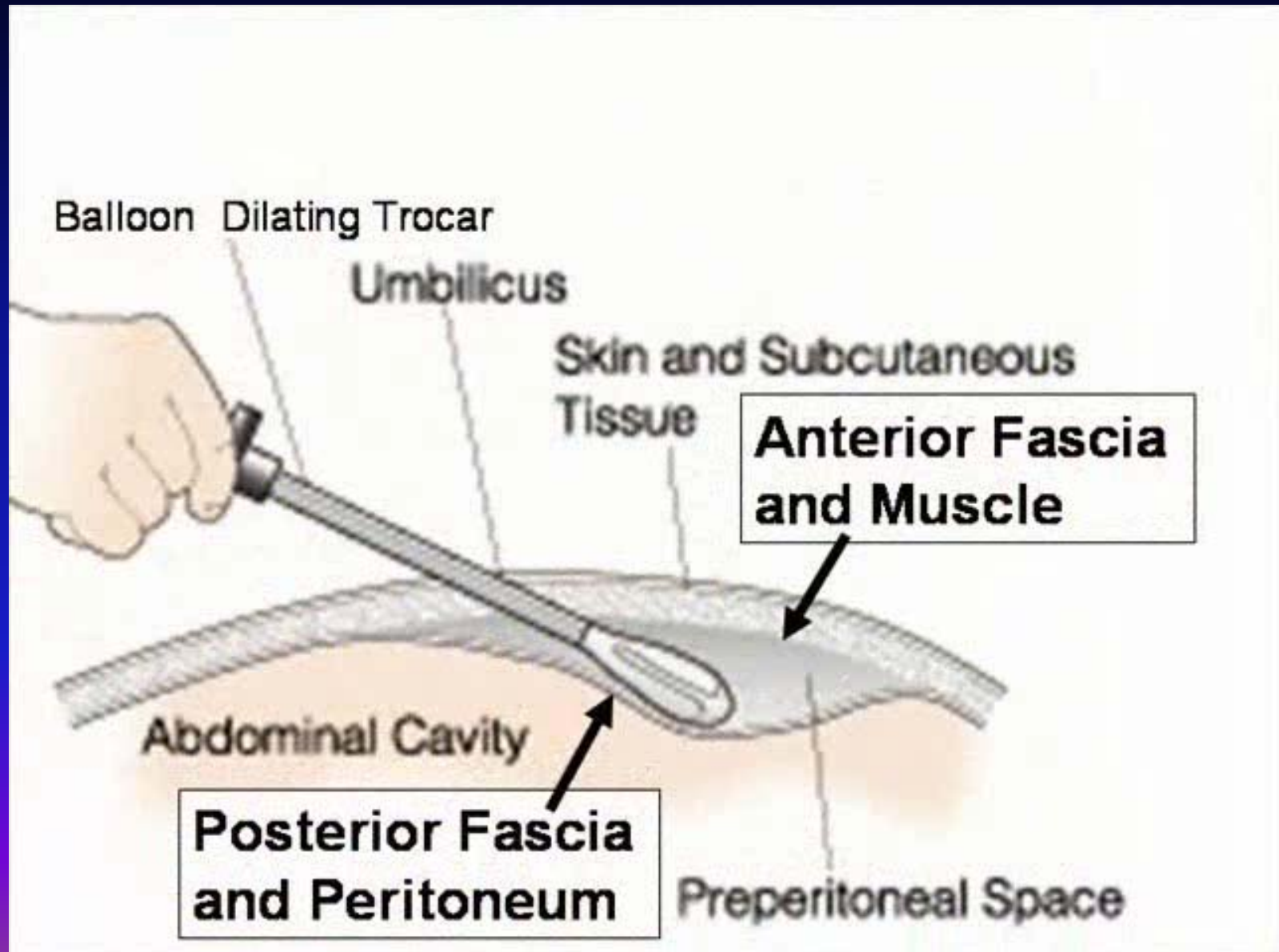
TEP equipment



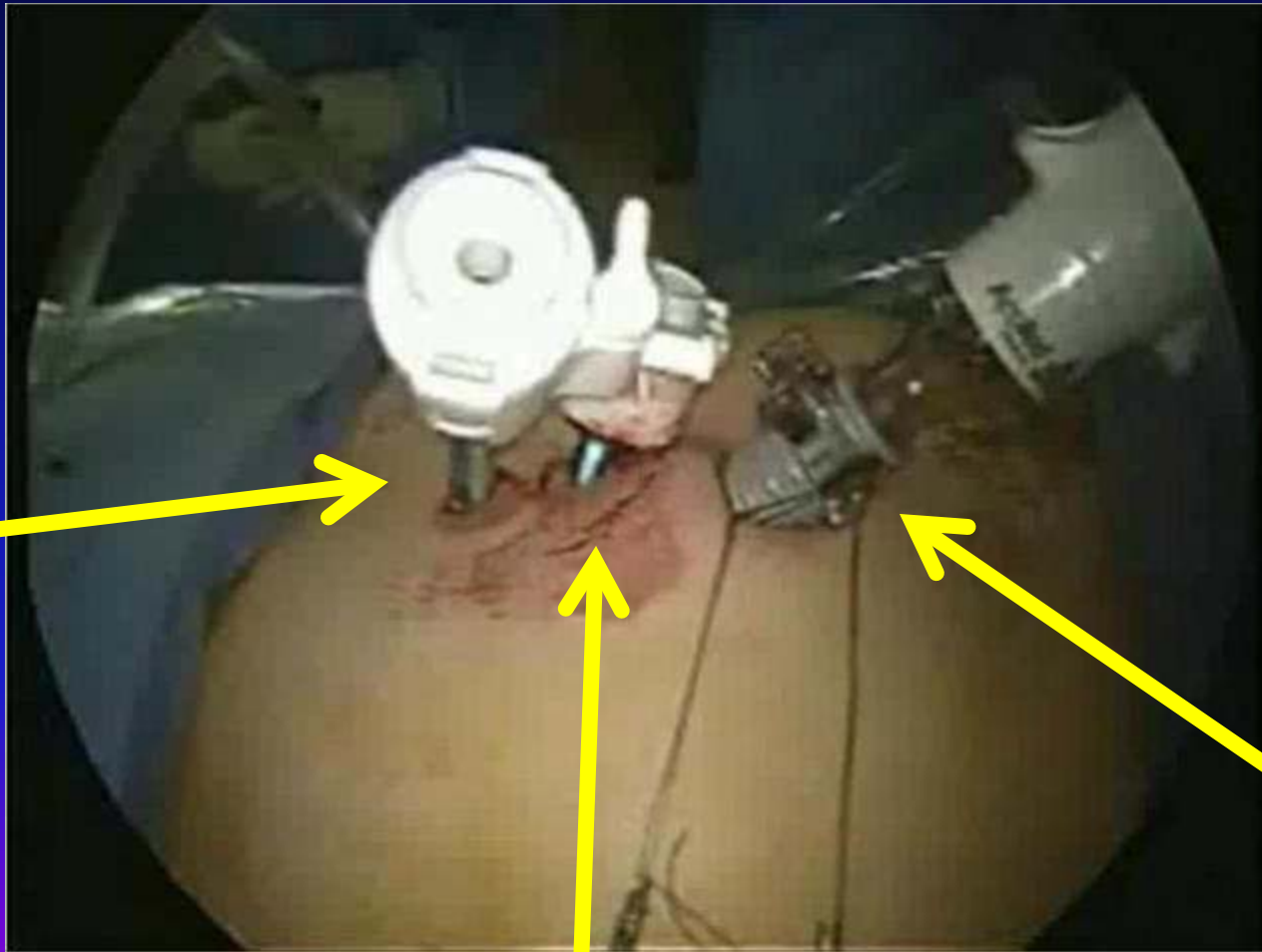
Incision and Entry into preperitoneal space: TEP



TEP: Creating the preperitoneal space



Trocars: standard TEP



“e-TEP” (modification of TEP)

The enhanced view–totally extraperitoneal technique for repair of inguinal hernia

Jorge Daes

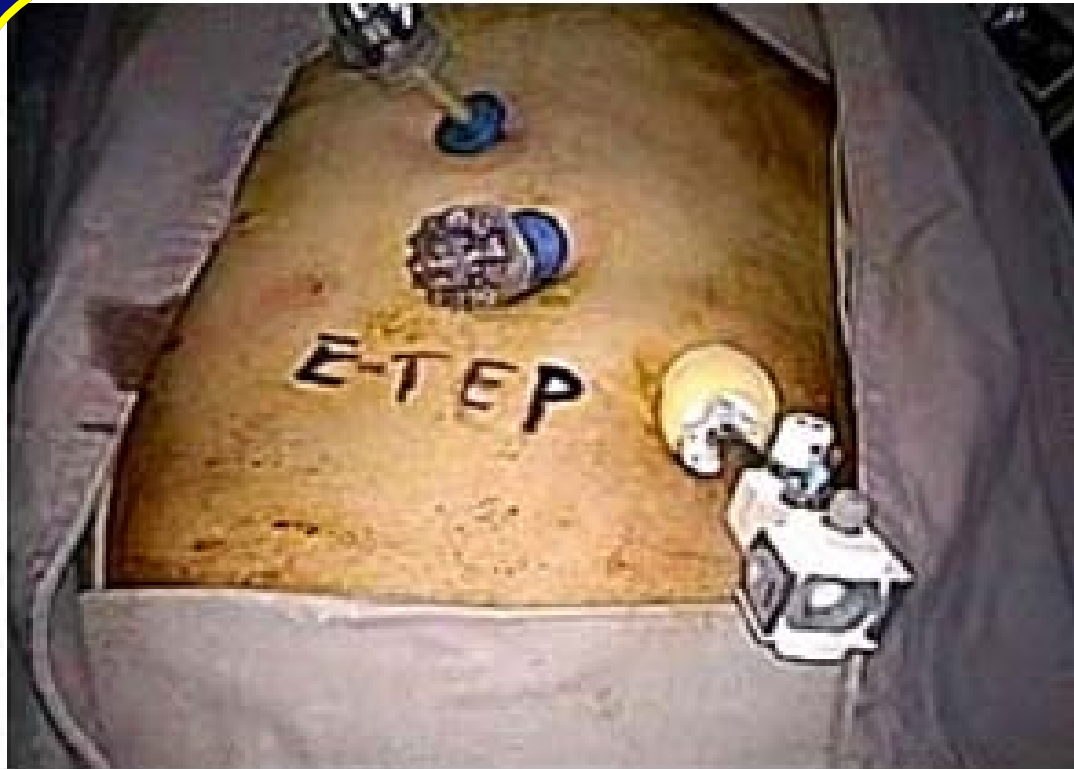
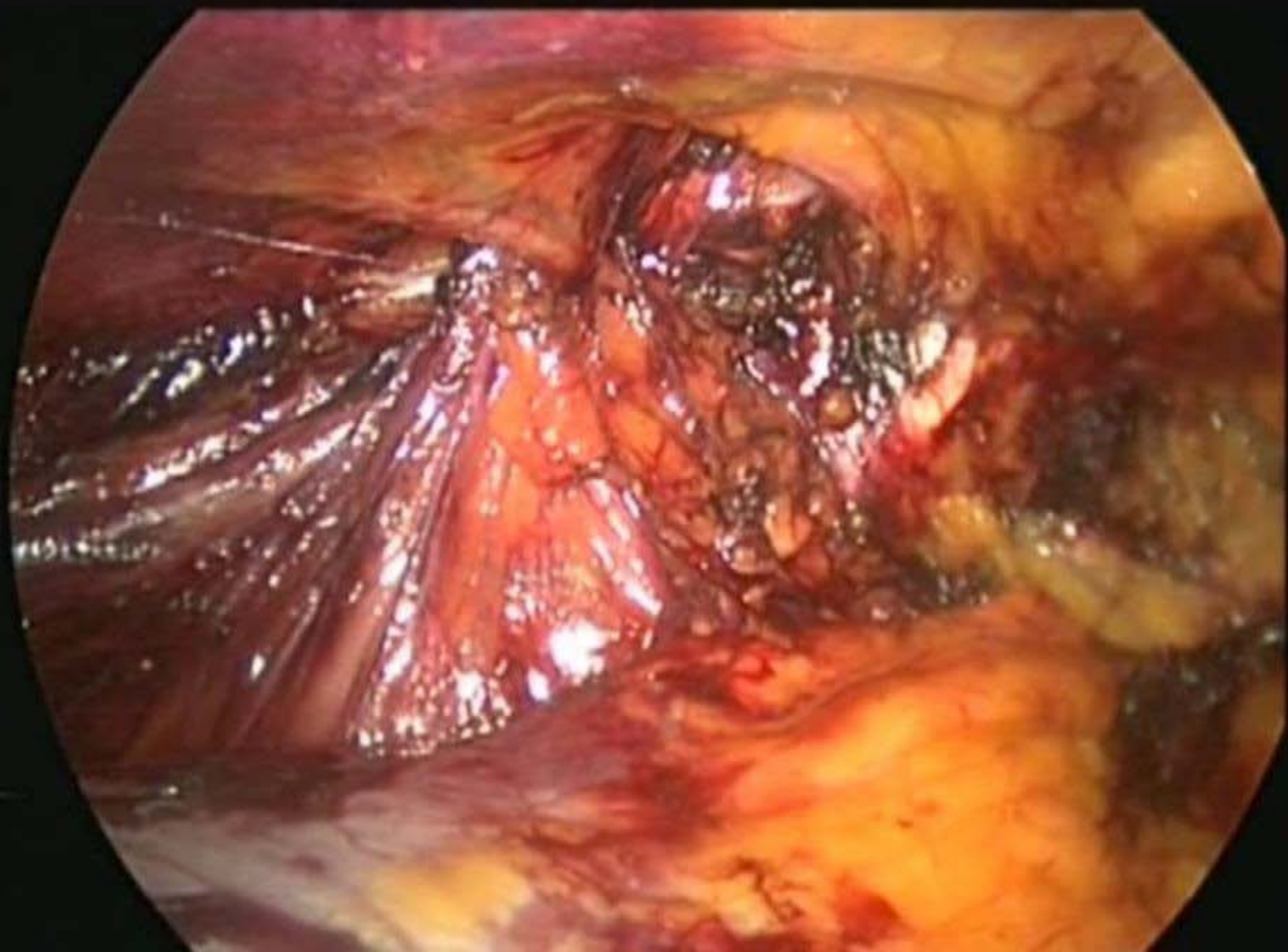
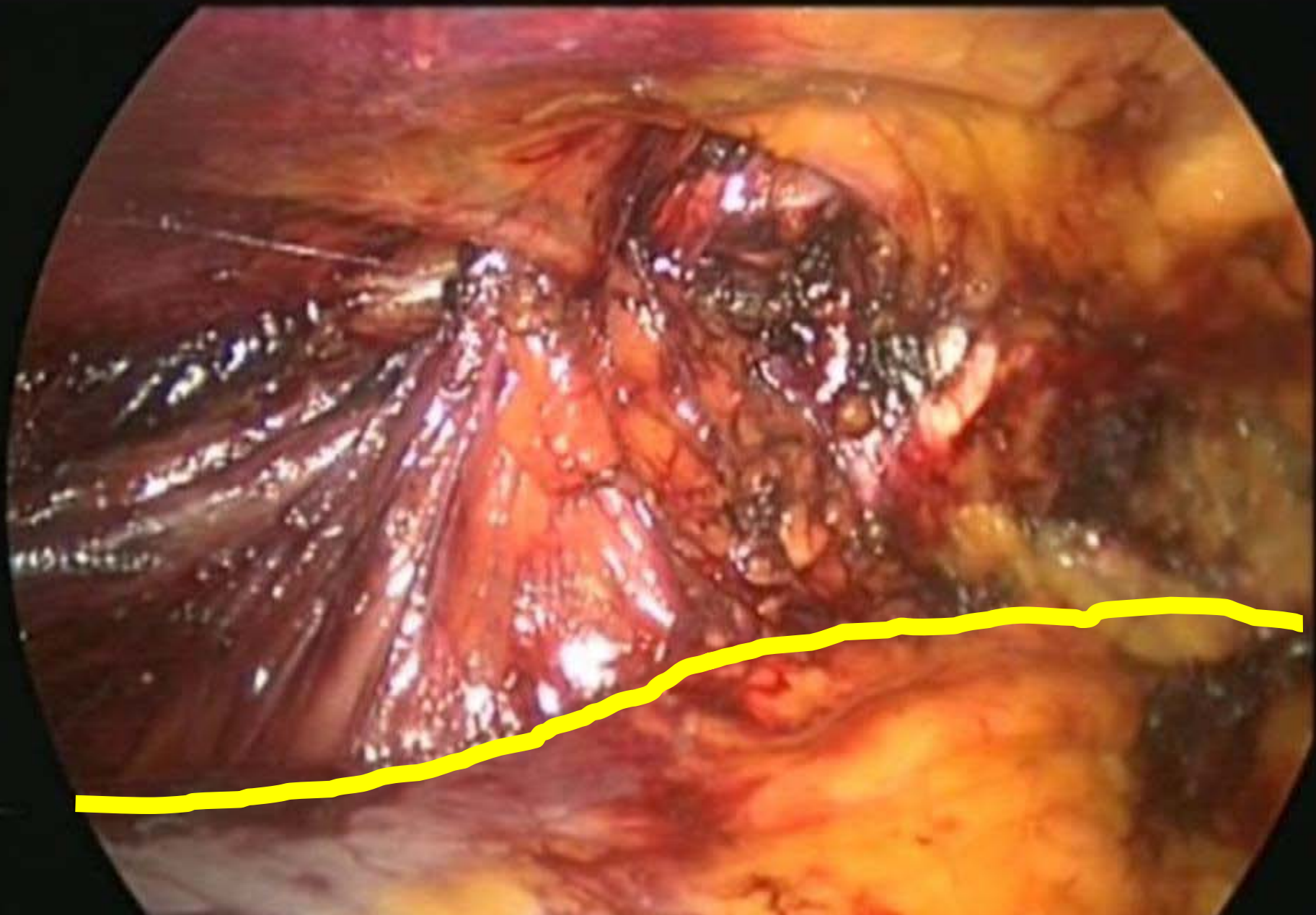
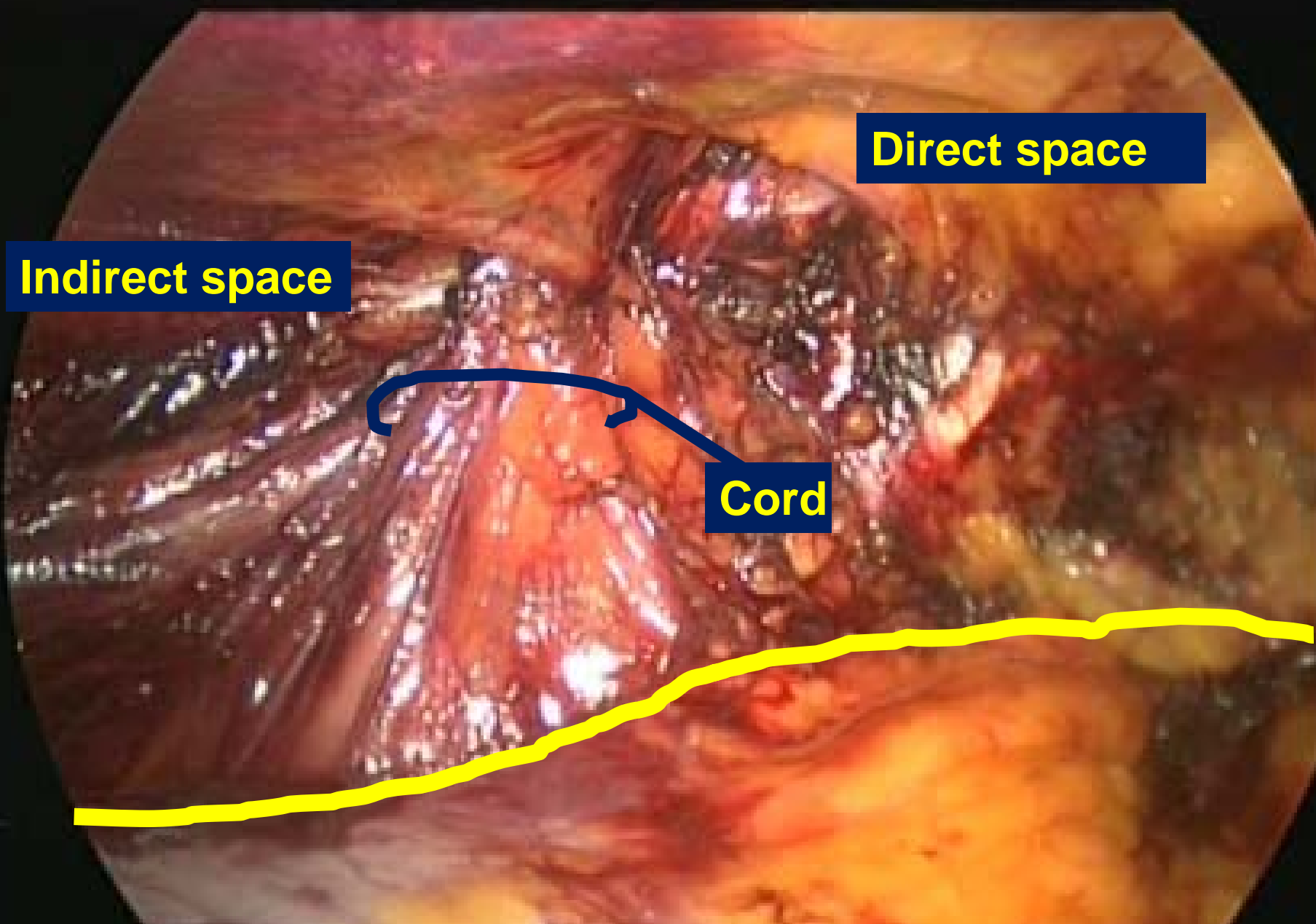


Fig. 4 Setup for a unilateral right inguinal hernia





LEFT GROIN: Peritoneum reduced

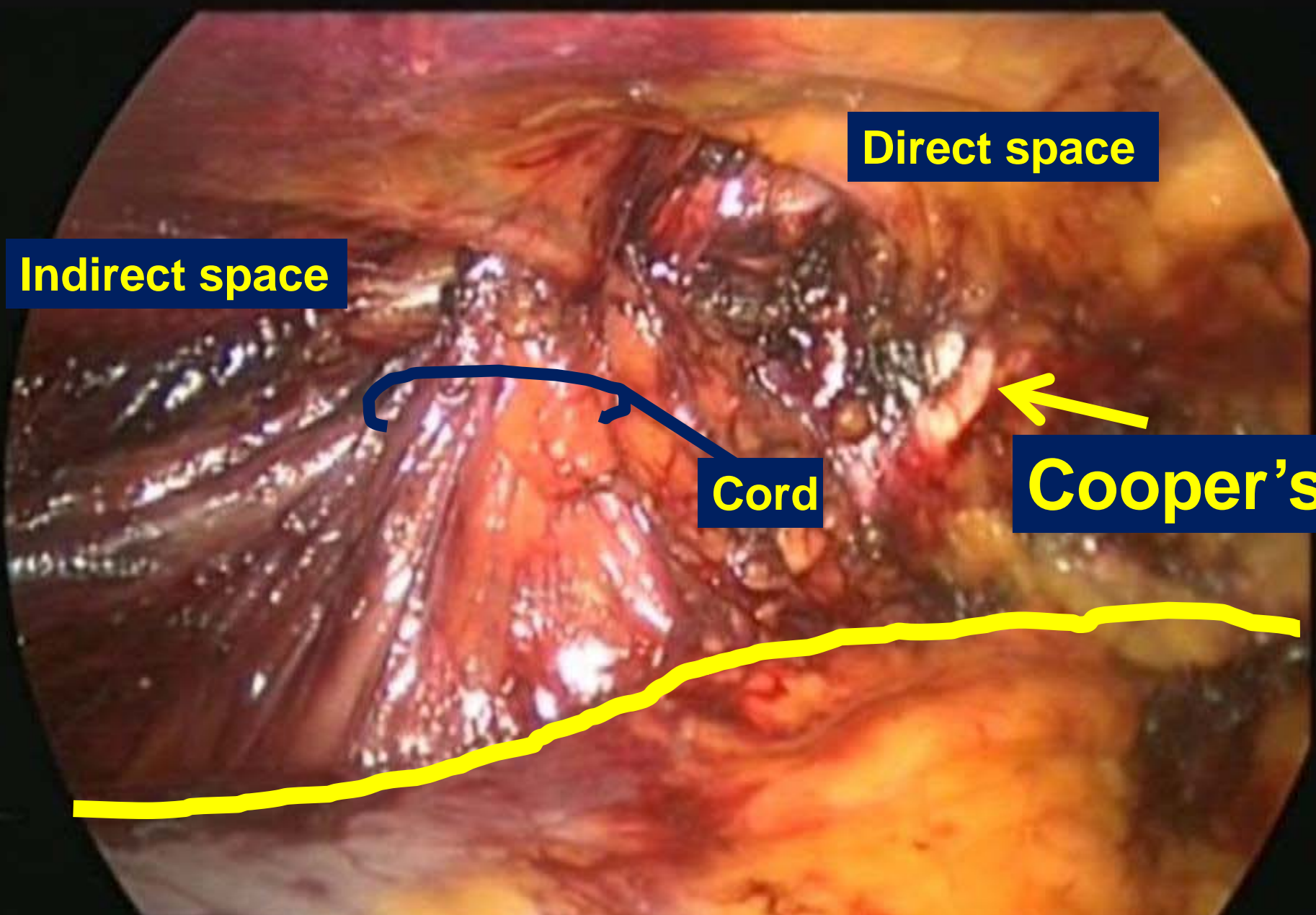


Indirect space

Direct space

Cord

LEFT GROIN: Peritoneum reduced



Indirect space

Direct space

Cord

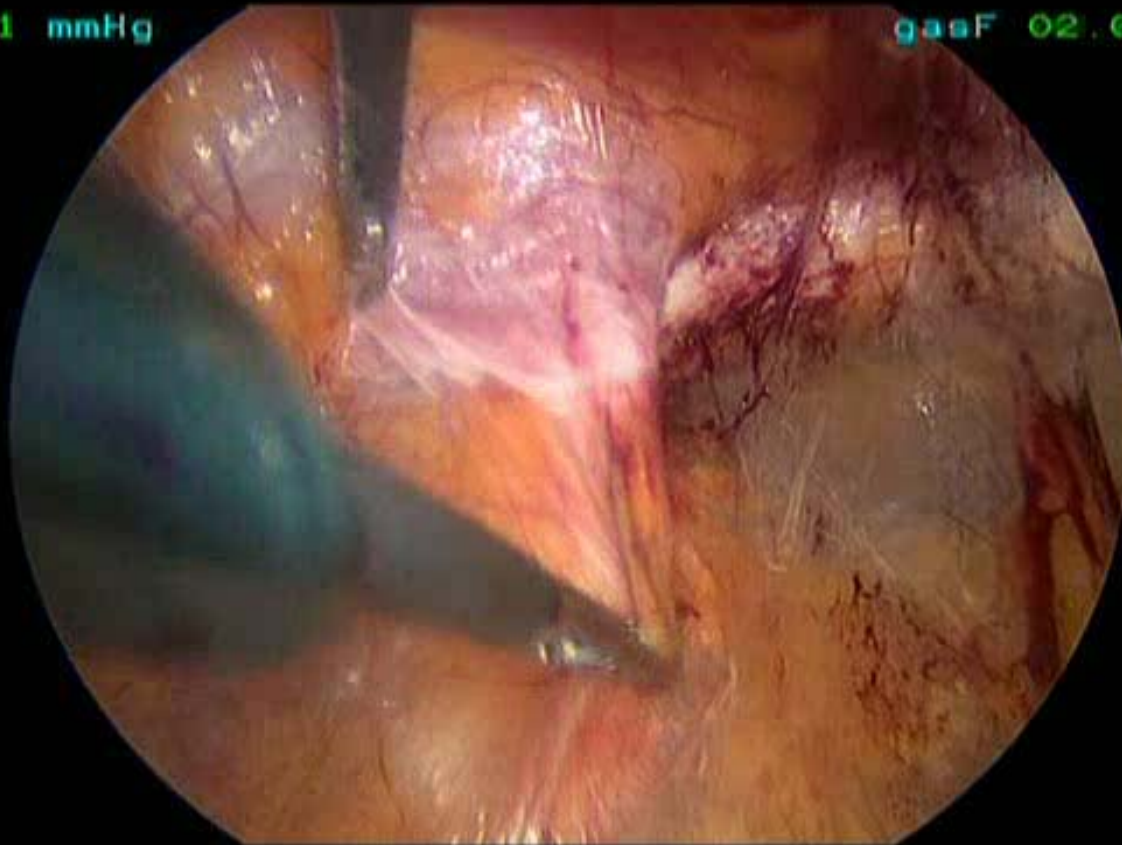
Cooper's

LEFT GROIN: Peritoneum reduced

Laparoscopy : great for direct hernia

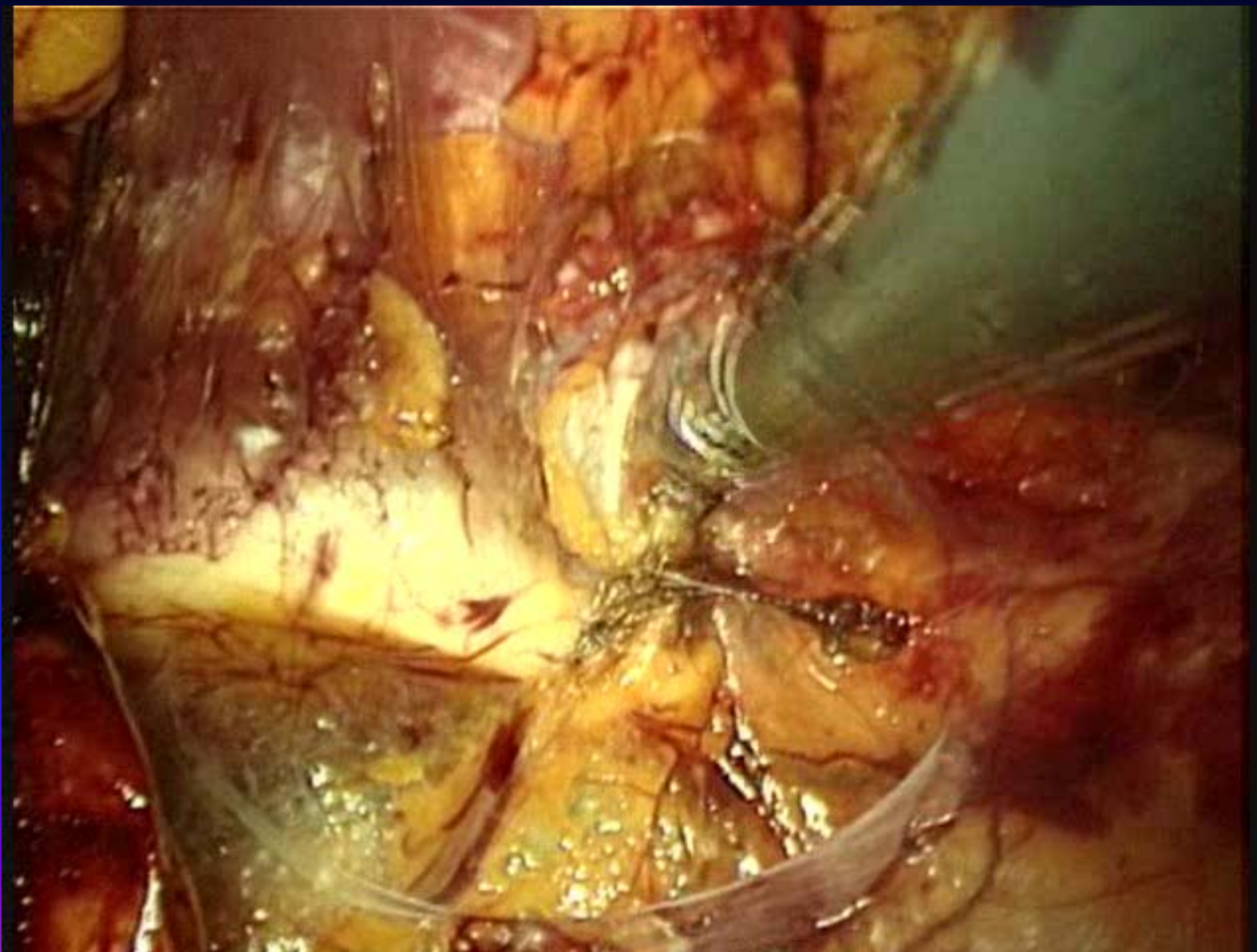
IAP 11 mmHg

gasF 02.0 1/min



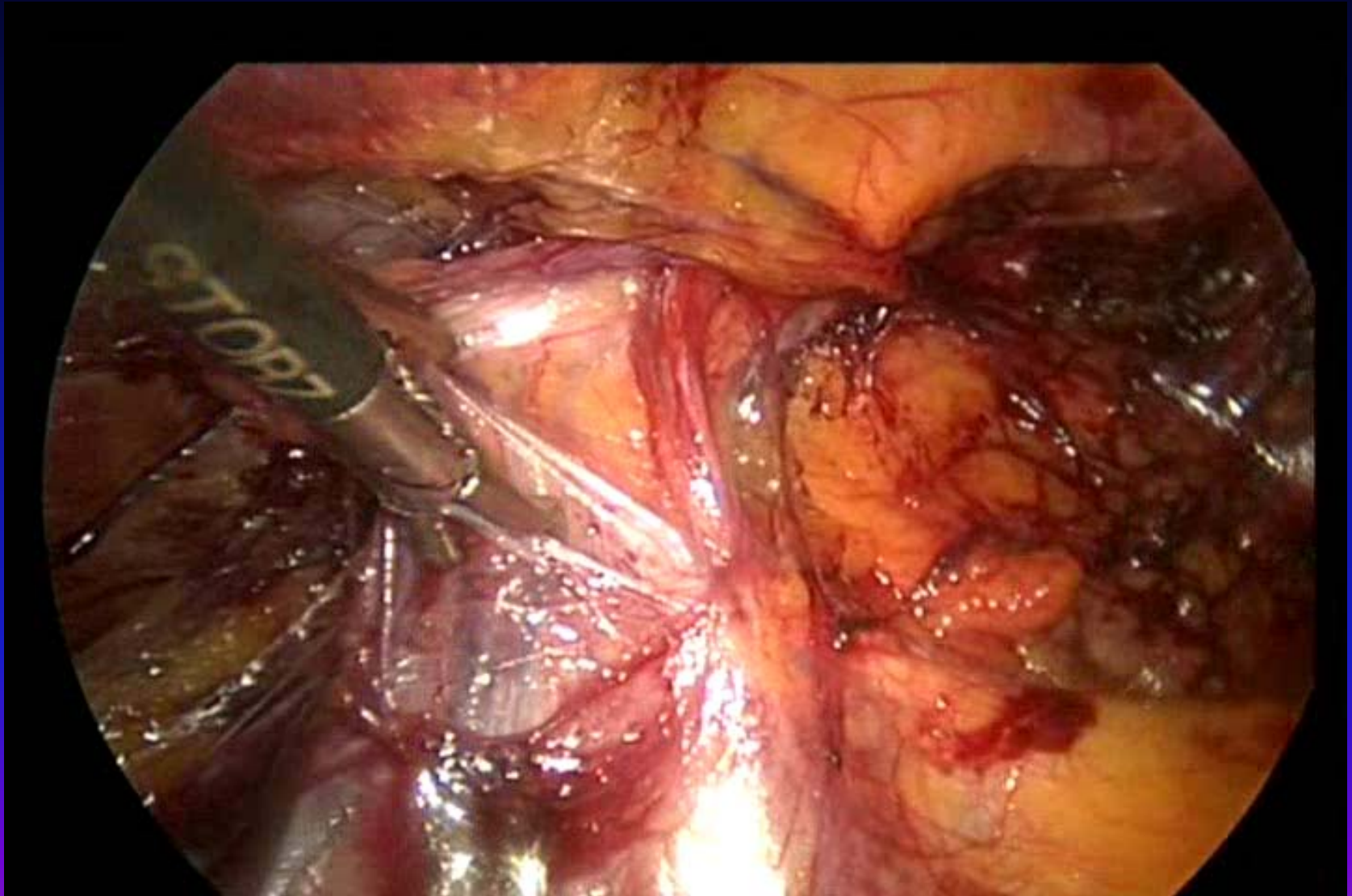
Left groin

laparoscopy: great for femoral hernia



Right groin

laparoscopy: great for indirect hernia



Mesh covers all defects with overlap

IAP 04 mmHg

94°F 12.0 l/min



TEP vs. TAPP

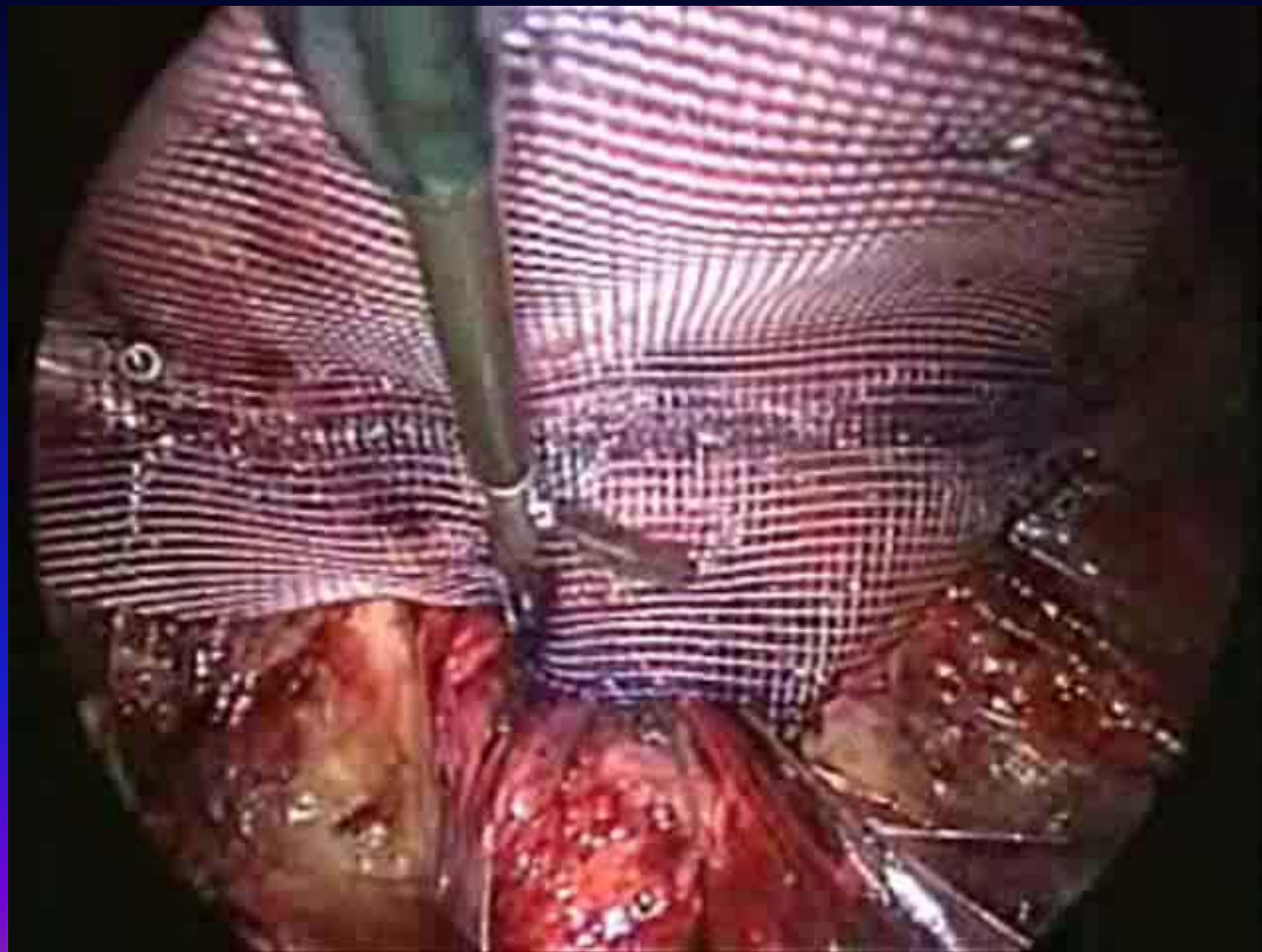
- More than 12,000 patients
 - NO differences for recurrence rates, vascular injuries, and OR time
 - **TEP**
 - More conversions to another type of procedure
 - May be harder to learn
 - **TAPP**
 - Slightly higher
 - Intraabdominal adhesions
 - Trocar site hernias
 - Visceral injuries



TEP vs. TAPP: Only one RCT

- 1 RCT (n=52)
 - Length of stay was shorter in the TEP group
 - (mean difference: -0.70 days, 95% CI -1.33 to -0.07; p=0.03)
 - No differences in OR time, LOS, recurrence, return to activity

TEP: no peritoneum to close!

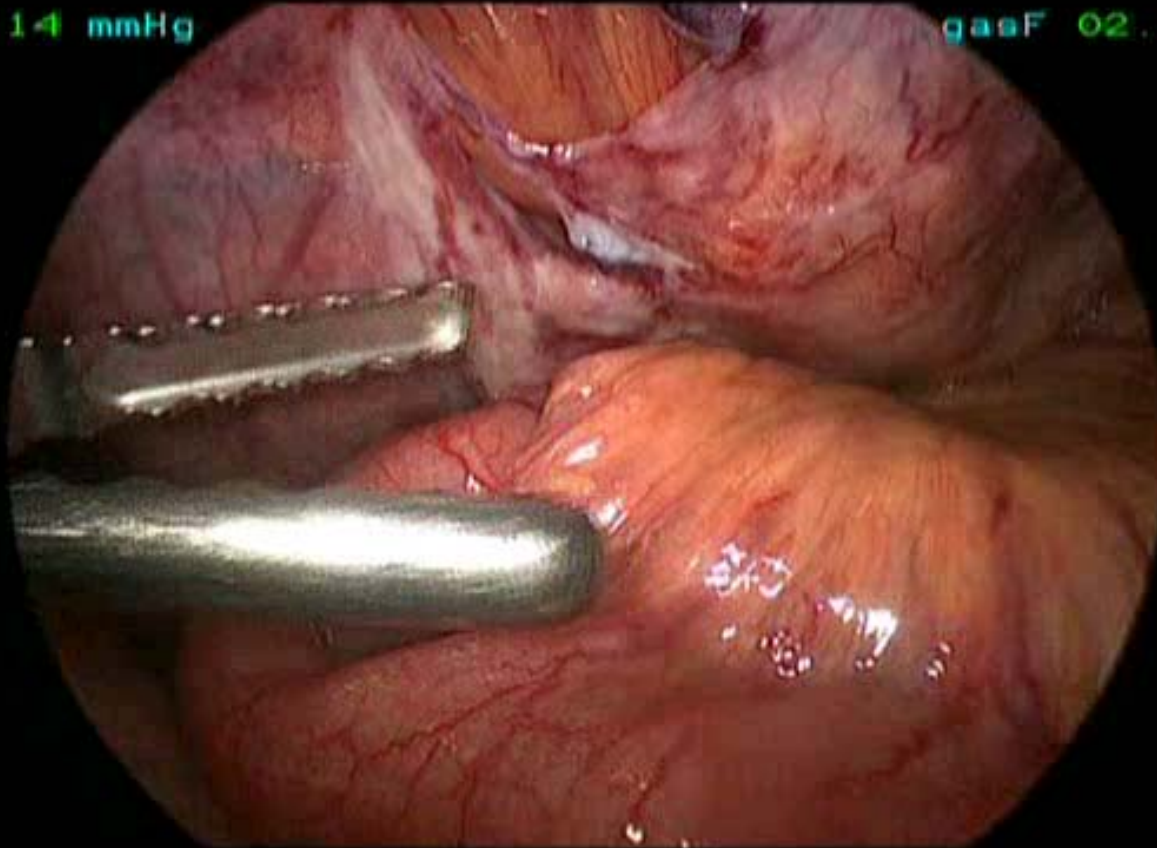


Right groin

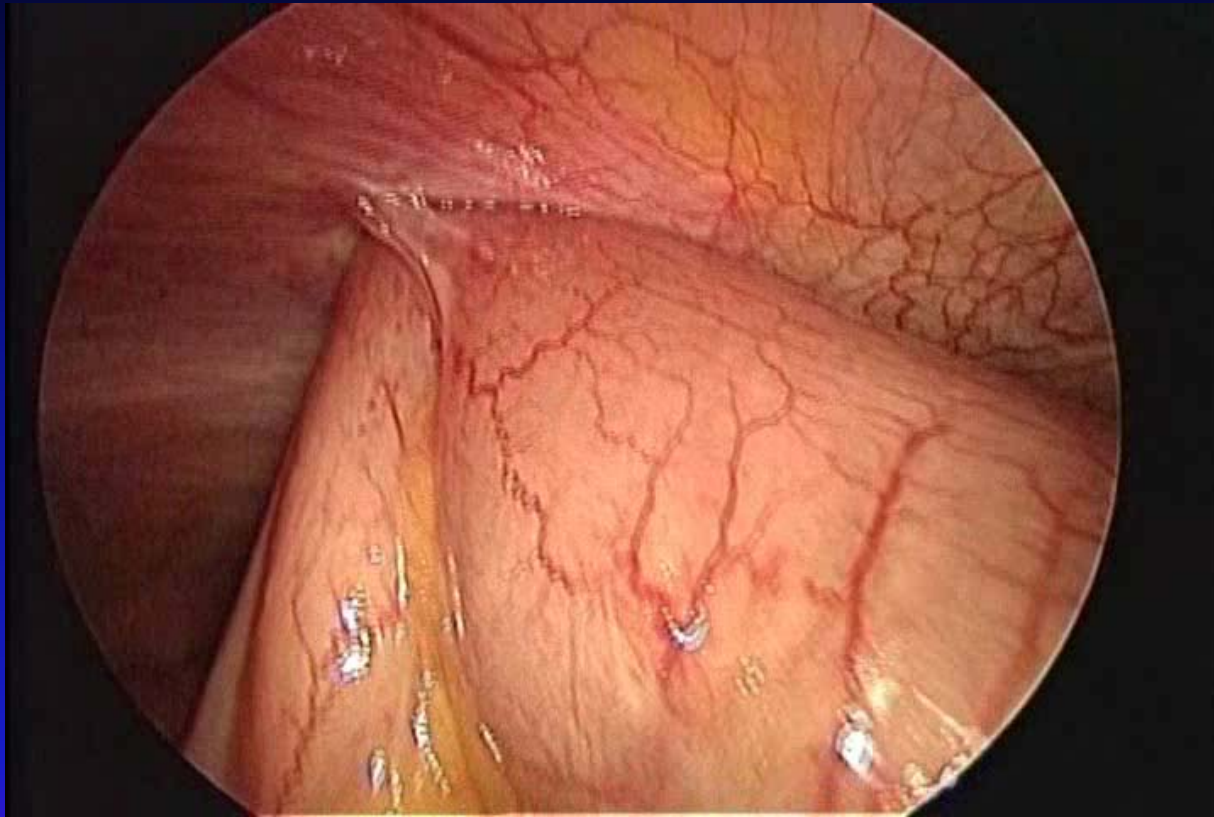
TAPP: early internal hernia through peritoneal defect

IAP 14 mmHg

gasF 02.5 l/min



TAPP: early trocar site hernia

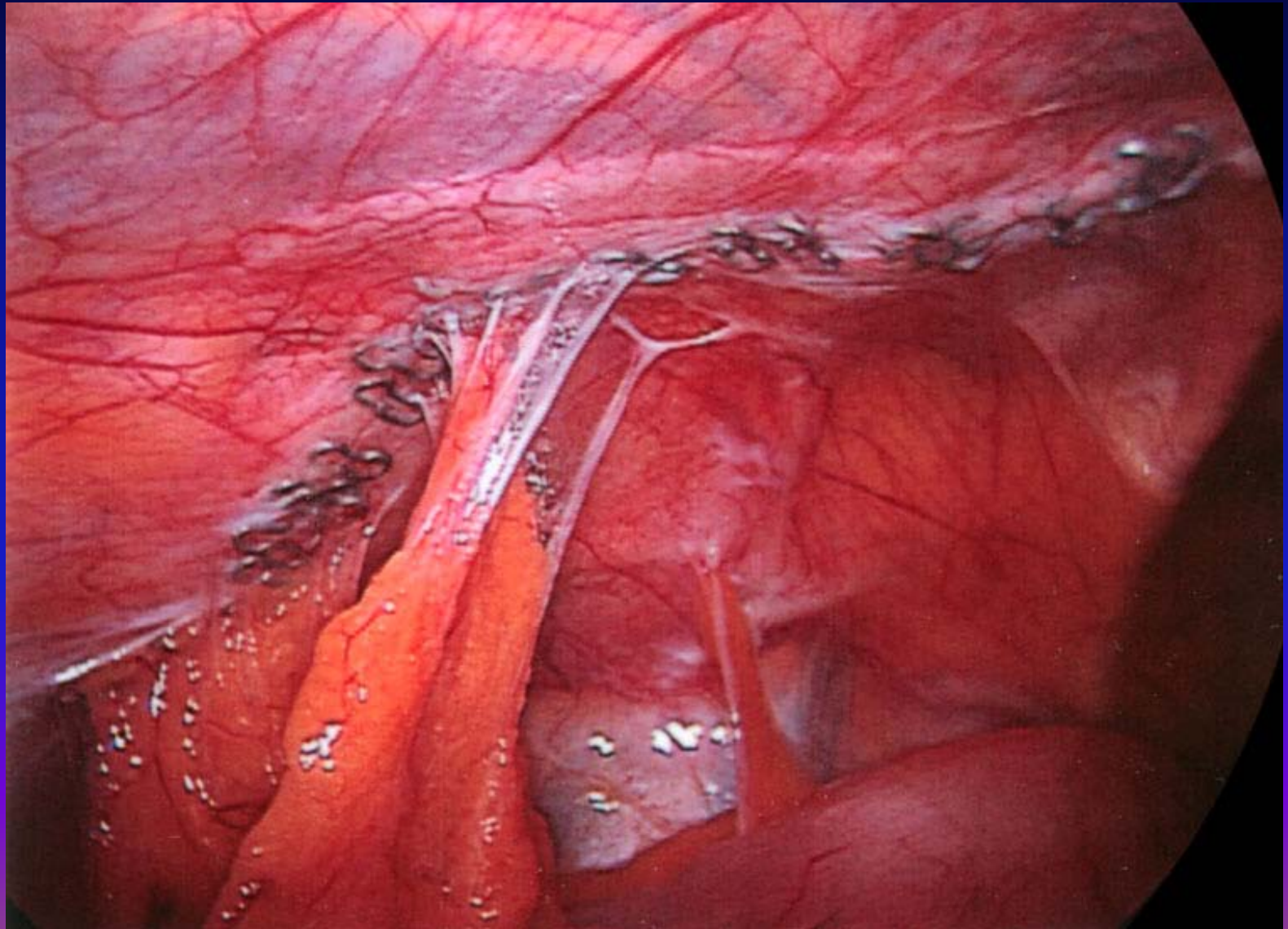


Higher occurrence of bowel obstruction

TAPP: 0.5% (6 / 1,157) versus 0.07% (1/1,357) for TEP

Bringman S, Blomqvist P (2005) Intestinal obstruction after inguinal and femoral hernia repair: a study of 33,275 operations during 1992–2000 in Sweden. *Hernia* 9:178–183

TAPP: late adhesions



So, TEP or TAPP or open
How do I choose??

All are appropriate at different times

Indications / recommendations

TEP or TAPP?

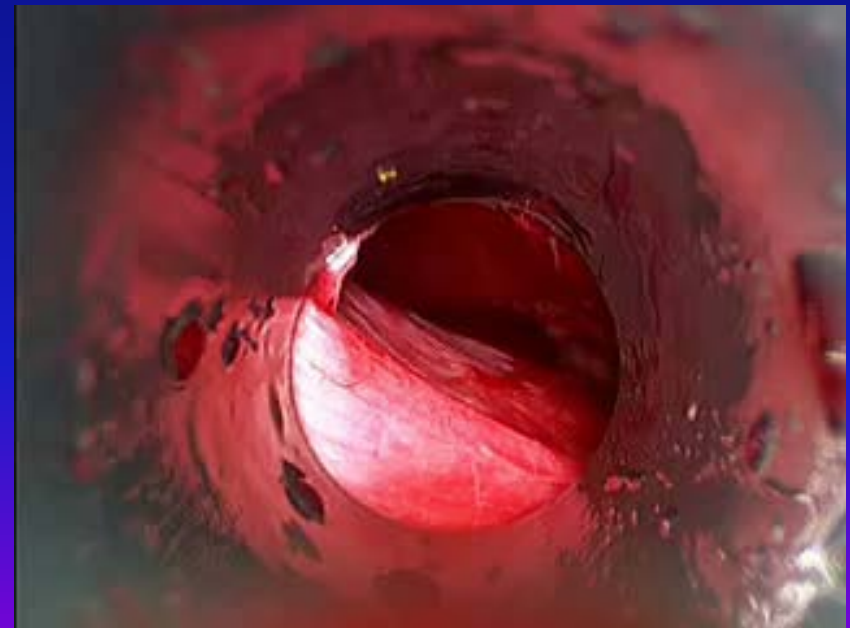
TEP

- All Primary Hernia
 - (unilateral or bilateral)
- All Recurrences
 - Following open hernia repair
- Prior lower midline incisions and prostatectomy*

TAPP

Primary Hernia with history of lower abdominal surgery

- Outcomes- TEP
 - 1388 patients/10 years
 - 171 previous lower midline incision
- Enterotomy: 3
 - All in early experience
- Cystotomy: 4



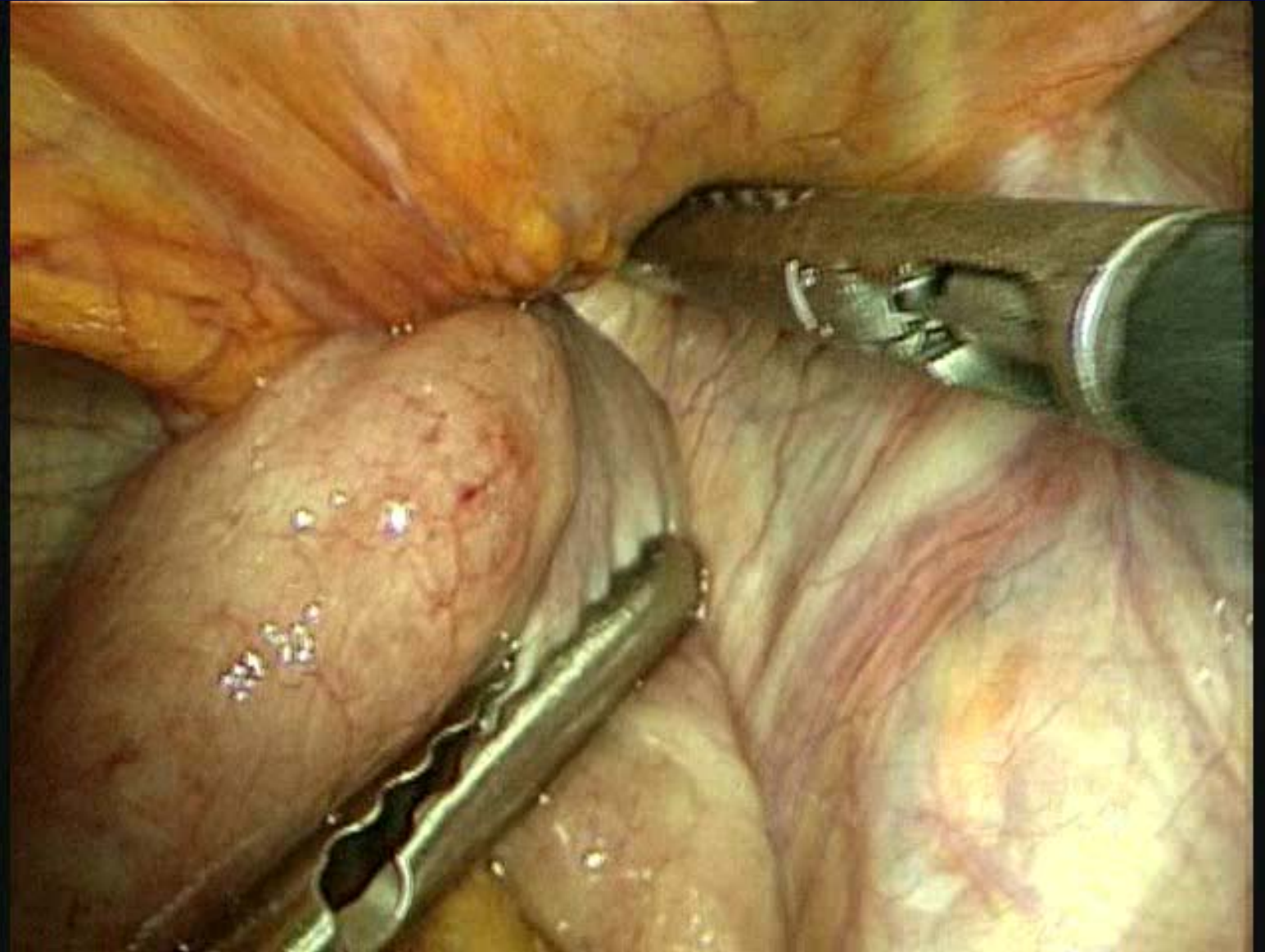
Indications / recommendations

TEP

- Primary Hernia
 - (unilateral or bilateral)
- Recurrences
 - Following open hernia repair
- Prior abdominal surgical history, including lower midline and prostatectomy*

TAPP

Incarcerations / strangulations



Indications / recommendations

TEP

- Primary Hernia
 - (unilateral or bilateral)
- Recurrent hernia
 - Following open hernia repair
- Prior abdominal surgical history, even involving lower midline

TAPP

- **Incarcerations or strangulations**

Scrotal Hernias



Indications / recommendations

TEP

- Primary Hernia
 - (unilateral or bilateral)
- Recurrent hernia
 - Following open hernia repair
- Prior abdominal surgical history, even involving lower midline

TAPP

- Incarcerations or strangulations
- **Scrotal hernias**

Inguinodynia: tack



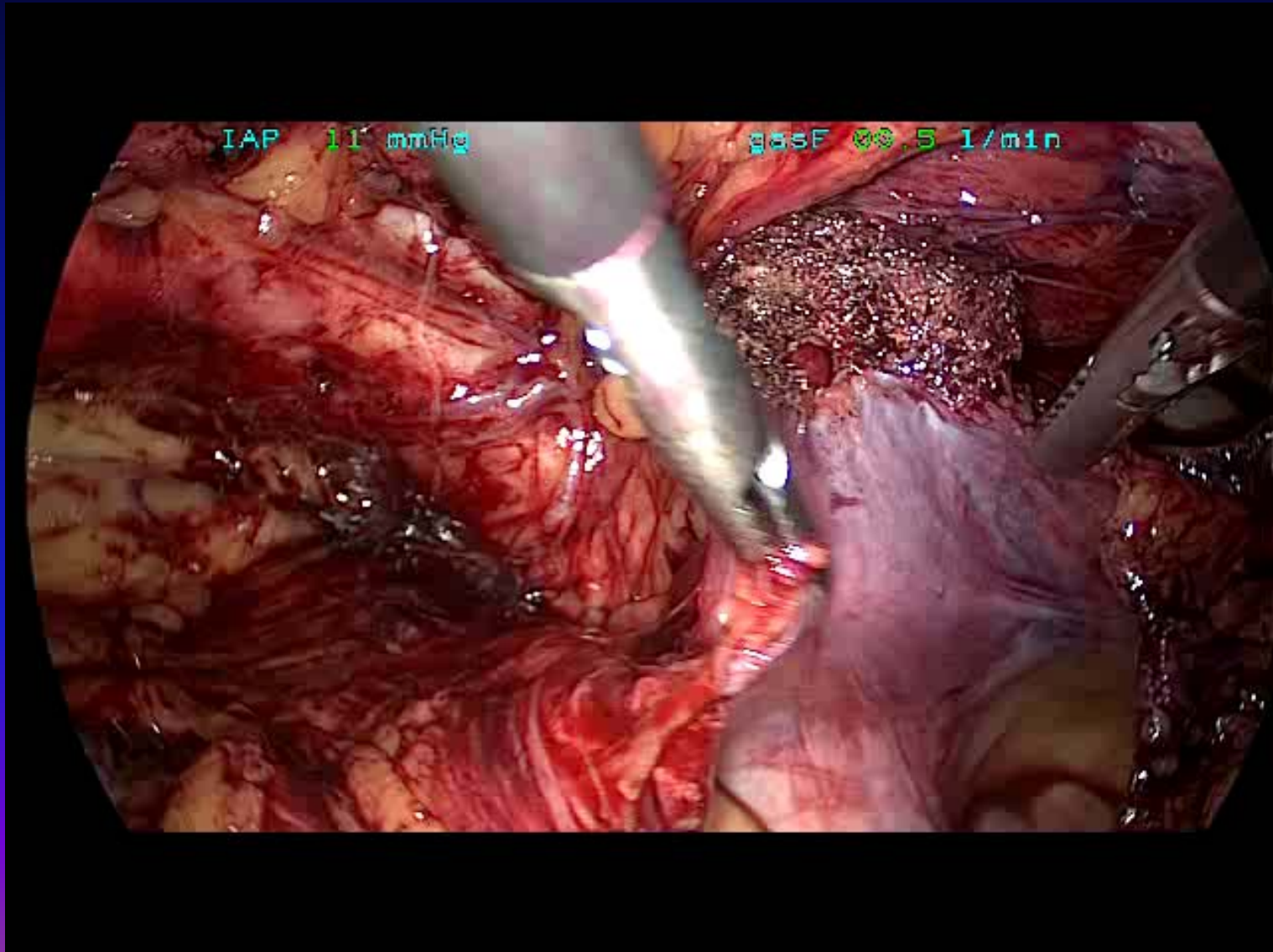
Inguinodynia: recurrence

IAP 12 mmHg

gasF 01.5 l/min



Inguinodynia: old mesh



Inguinodynia: missed hernia after plug and patch



Indications / recommendations

TEP

- Primary Hernia
 - (unilateral or bilateral)
- Recurrent hernia
 - Following open hernia repair
- Prior abdominal surgical history, even involving lower midline

TAPP

- Incarcerations or strangulations
- Scrotal hernias
- **Inguinodynia**

Recurrences

Investigator	Recurrence rate	
	Laparoscopic	Open
TAPP versus open mesh		
Payne, et al [18]	0	0
Filipi, et al [19]	0	2 (7%)
Heikkinen, et al [20]	0	0

Laparoscopic: 0 – 13%

Open: 0 – 11%

Khoury, et al [31]	3%	3%
Andersson, et al [32]	2 (3%)	0
Bringman, et al [33]	2 (2%)	0
Colak, et al [34]	2 (3%)	4 (6%)
Lal, et al [35]	0	0
Eklund, et al [36]	5 (1%)	0
Multicenter prospective randomized trials		
MRC [37]	7 (1.9%)	0
SCUR [39]	4	11
VA [40]	10.1%	4.9%

Laparoscopy for recurrences: not widely used in Europe

- R1 recurrence: most authors prefer a **Gilbert** repair through an anterior approach, under local anesthesia.
- R2 recurrence: preperitoneal mesh repair under local anesthesia. If R2 recurrence is due to a previous preperitoneal mesh repair, an anterior approach with a **Lichtenstein, Gilbert** or **Stoppa** repair is preferable. In both cases, only local anesthesia is used and the patient is discharged immediately.
- In case of R3 recurrence prefer a **Stoppa operation** by an anterior approach, the **Wantz technique** or the **laparoscopic technique**.

MANY open repair techniques

Recurrent Inguinal Hernia: Any data to support laparoscopy?

- 82 patients (recurrences following open repairs)
 - Giant scrotal hernias excluded
- Randomly assigned to
 - TAPP (24) [Group A]
 - TEP (26) [Group B]
 - Open Lichtenstein (32) [Group C]
- Followed post-operatively for 3 years
- Primary outcomes
 - Pain
 - Return to normal activities (professional or otherwise)

Table 3. Visual analog scale of pain^a

	TAPP	TEP	OPEN
	GROUP A <i>n</i> = 24	GROUP B <i>n</i> = 26	GROUP C <i>n</i> = 32
Time point postoperatively	Visual analogue scale of pain		
6 hours	4	4	5
12 hours	3	3	4
24 hours	1	1	4
48 hours	1	1	3
7 days	1	1	2
20 days	0	0	2
Return to full ordinary and professional activities	Days		
Mean ± SD	14 ± 9	13 ± 8	20 ± 11

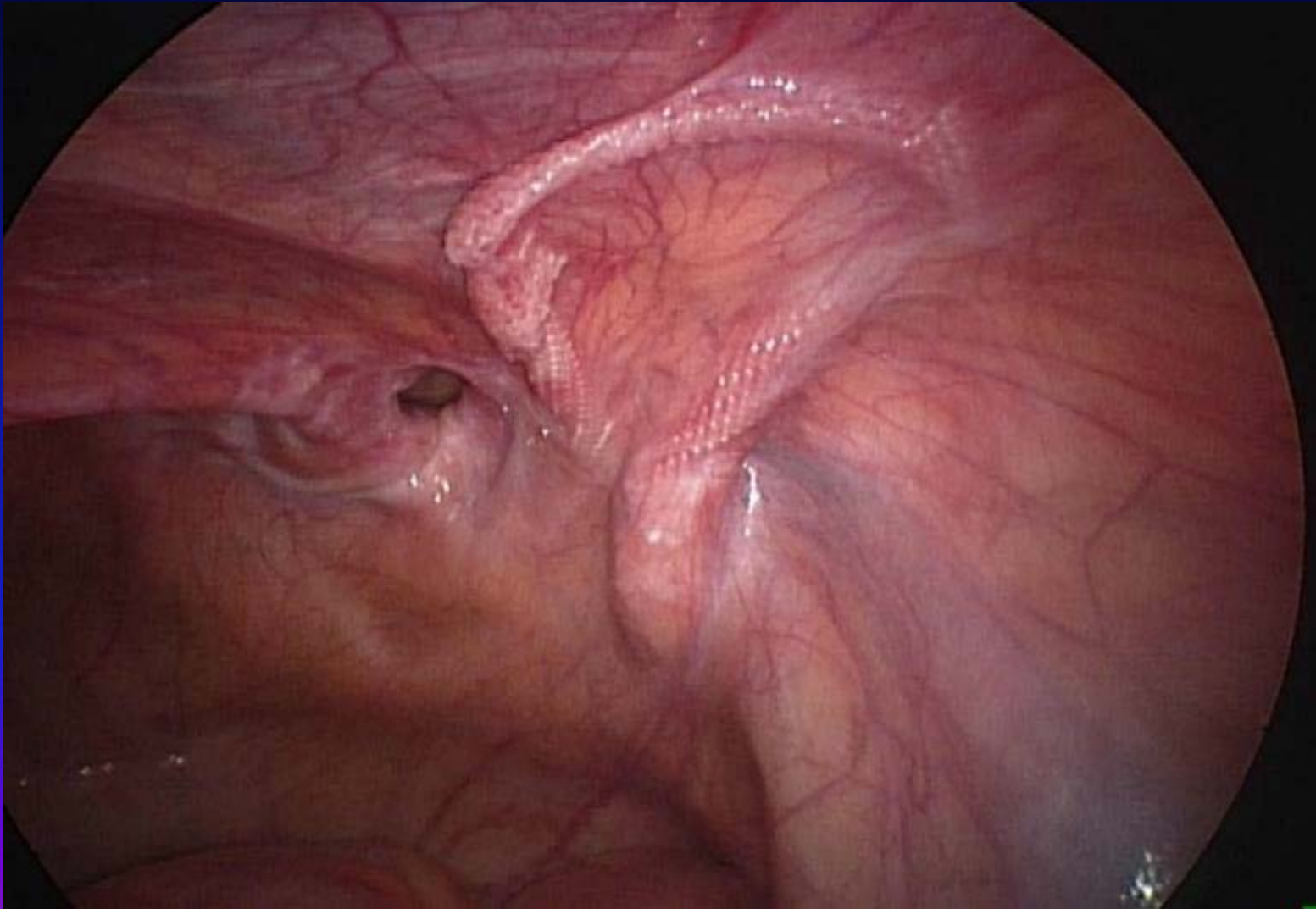
^a Median values recorded postoperatively with patients at rest (*p* = 0.001). Days (mean values) until return to full ordinary and professional activities (*p* = 0.001) also are presented

1) Significantly less pain laparoscopically.

Sevonius D et al. 2011. Br J Surg

- Retrospective review of 19,582 reoperations entered into the Swedish Hernia Register (1992-2008).
- Lap repair was the reference standard.
 - Suture repair (2.55 hazard ratio for recurrence)
 - Plug repair (2.31)
 - Lichtenstein repair (1.53)
 - Open preperitoneal mesh (1.36)
- **Laparoscopic and open preperitoneal repair were associated with a lower risk of reoperation following repairs of an open recurrence (p<0.001)**

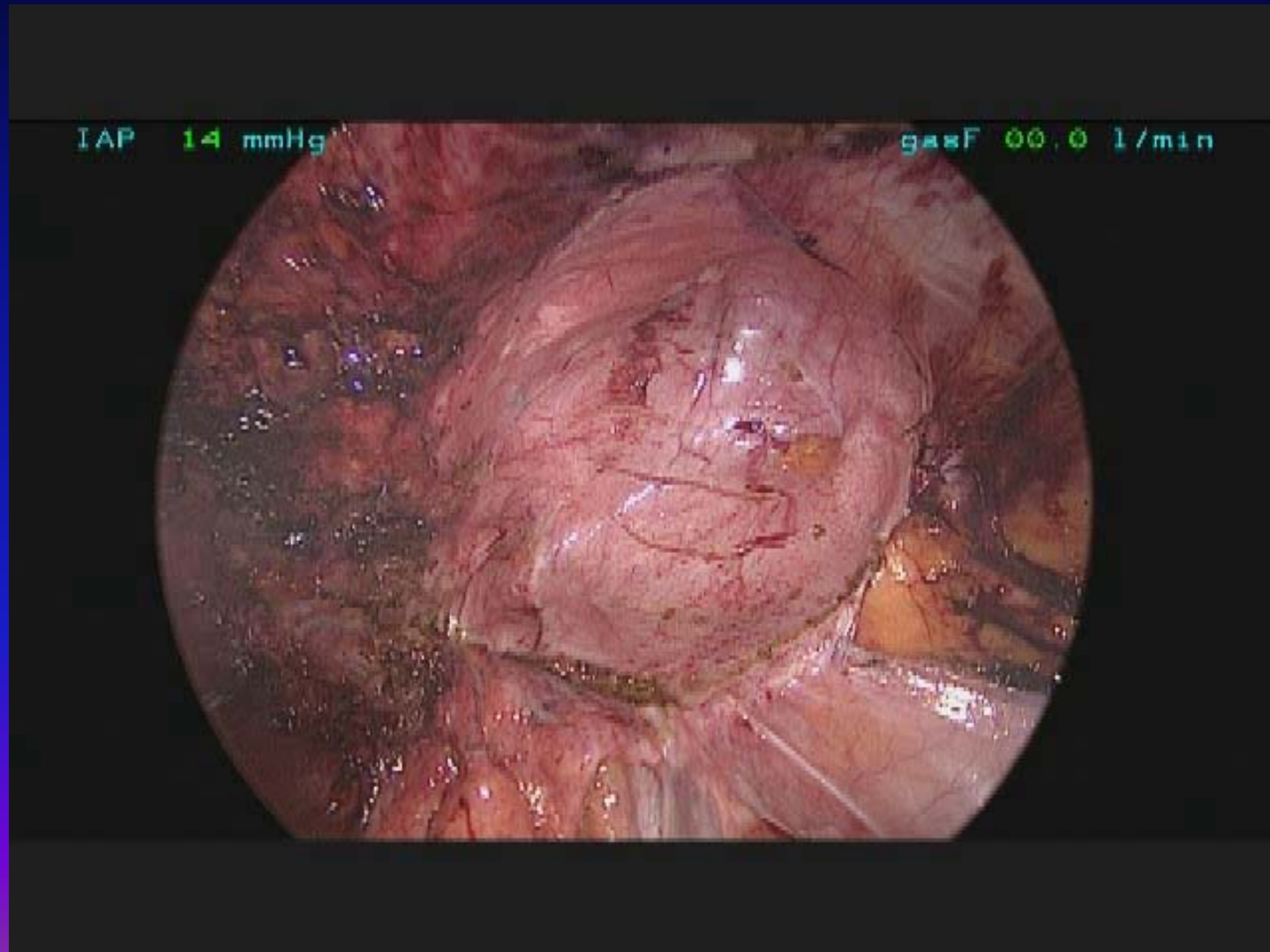
Etiology: Mesh shrinks



Recurrence after TEP or TAPP



Recurrence after TEP or TAPP: - large defects : role for IPOM





Indications / recommendations

TEP

- Primary Hernia
 - (unilateral or bilateral)
- Recurrent hernia
 - Following open hernia repair
- Prior abdominal surgical history, even involving lower midline

TAPP

- Incarcerations or strangulations
- Scrotal hernias
- Inguinodynia
- **Recurrence**
 - **After TEP or TAPP**

Female, palpable inguinal hernia, but also a history of Pfannenstiel



Recommendations

TEP

- Primary Hernia
 - (unilateral or bilateral)
- Recurrent hernia
 - Following open hernia repair

TAPP

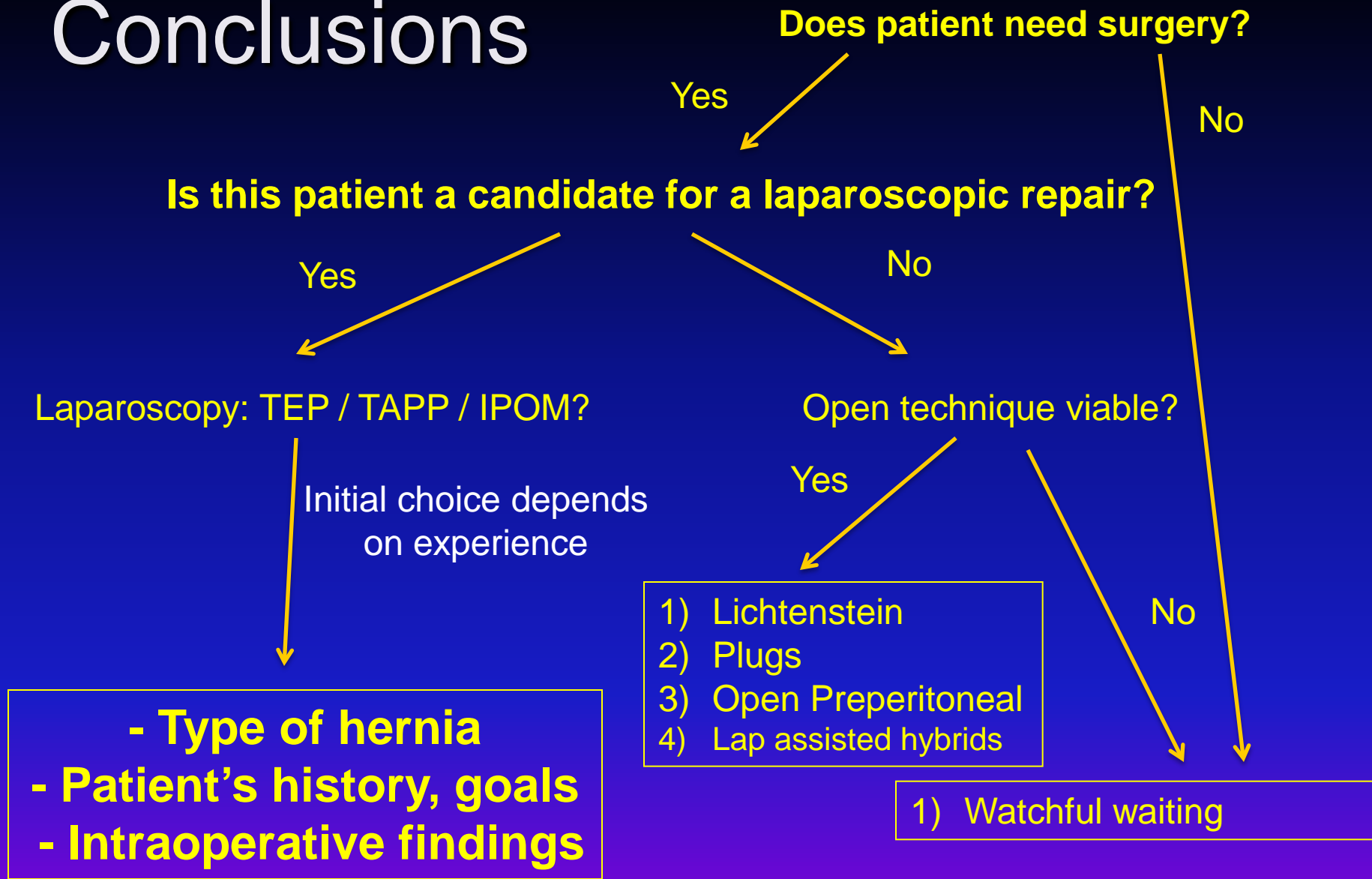
- Incarcerations or strangulations
- Scrotal hernias
- Inguinodynia
- Recurrence
 - After TEP or TAPP
- Women with previous Pfannenstiel
- Prior abdominal surgical history involving lower midline*

*Can also be done via an open technique

Not all hernias need to be fixed

- Evidence to support watchful waiting until symptoms worsen without adverse events
 - Watchful Waiting vs Repair of Inguinal Hernia in Minimally Symptomatic Men: A randomized clinical trial. Fitzgibbons RJ et al. JAMA 2006.
 - Observation or Operation for Patients with an Asymptomatic Inguinal Hernia: A randomized clinical trial. O'dwyer PJ et al. Annals Surg. 2006
 - Does delaying repair of an asymptomatic hernia have a penalty? Thompson JS et al. Am J Surg. 2008

Conclusions



Conclusions

- Establish and individualize goals
- There is no “one BEST” approach
 - A hernia specialist should be familiar with all available options
 - Each method has its merits and its disadvantages
- Utilize the technique you are most familiar with , but have back up plans for specific scenarios

Hernia Surgeon Global Communities

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–bpjacob@gmail.com



- **Ask to join:**

- **International Hernia Collaboration**

- www.herniagroup.com



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Thank you



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