



hernia
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“Tacking, Gluing, or No Fixation”

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Samsun/ TÜRKİYE



Inguinal Hernia Surgery

- Recurrences 0%
 - Pain 0%
- Infection 0%
 - Seroma 0%
 - Hematoma 0%
- Vascular injury 0%
- Testicular atrophy 0%
 - Work loss 0%

Laparoscopic Inguinal Hernia Repair

- Less postoperative pain
 - Lesser morbidity
 - Faster recovery
- Earlier return to normal activities

Barkun JS et al; Surgery 1995

Tanhiphat C et al; Surg Endosc 1998

- Recurrences
 - Pain
 - Infection
 - Vascular injury
- Tecticular atrophy
 - Work loss

Recurrence-----small mesh

inadequate fixation

migration of mesh

missed hernia

inexperience

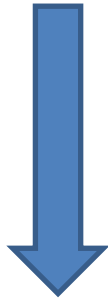
Pain----- nerve interruption by stapler

pubalgia because of stapler

local effects of mesh on nerve

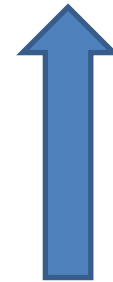
Hernia Surgery

Recurrence



OUT

Pain



IN

USA

- 800.000 herniorraphy
- 34.800 patients/year chronic pain
- Chronic pain %0-43 (%11)
“inguinodynia”

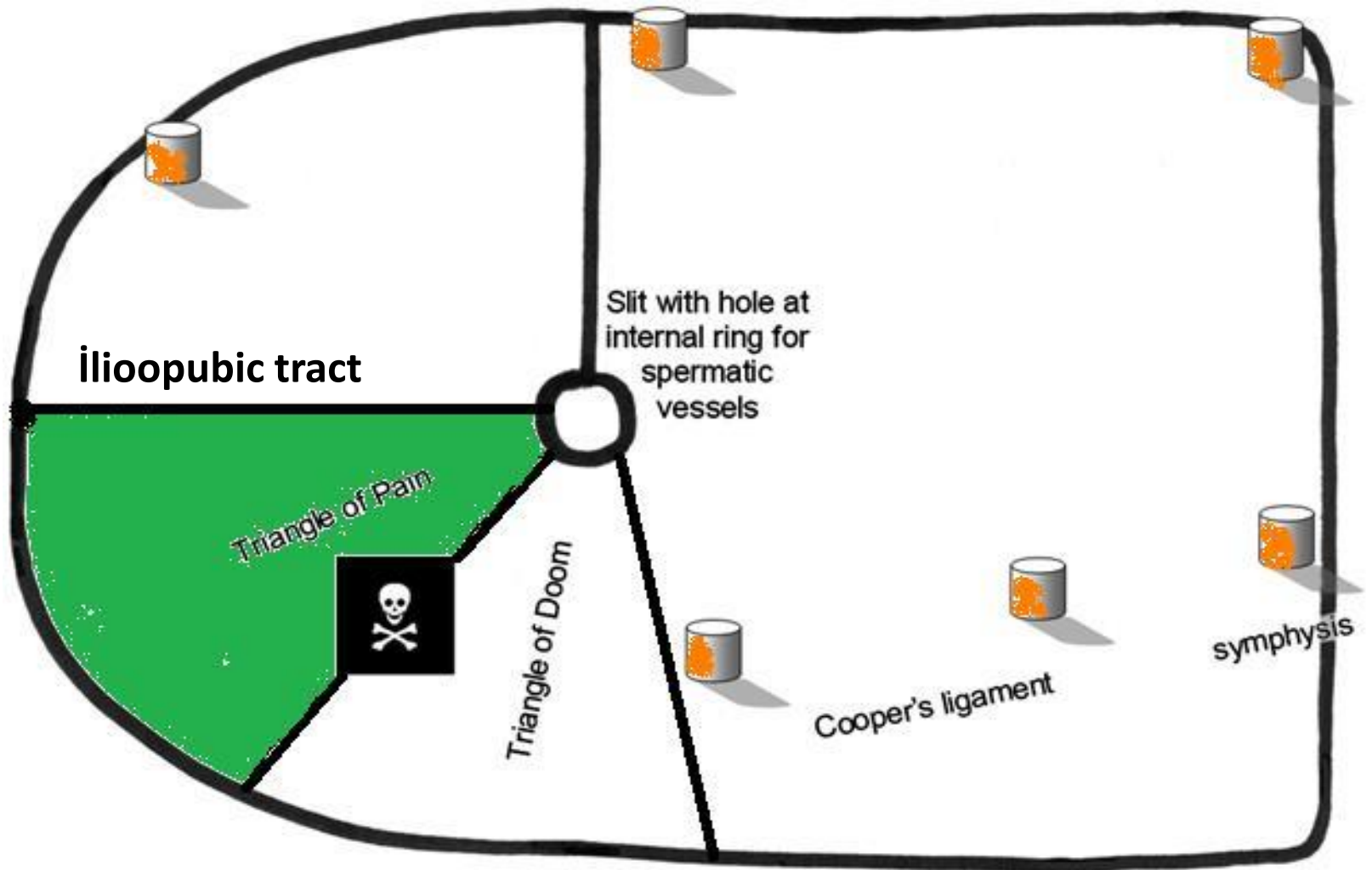
Nienhuijs SW, International J Surg, 2008

Nienhuijs SW, Am J Surg, 2007

Bozuk M, Am J Surg, 2003

Madura JA, Am J Surg, 2005

Left Groin



- How can we avoid these complications?
- And should not lead to relapse and pain

- We should use **stapler** but small number and according to the rules. Otherwise at increased **risk of recurrence**
- **Fixation is unnecessary** , the rate of recurrence is not increase if you can use adequate size mesh and perform good technique. Also it is **cheap** method.
- Use of the **FS is feasible**. It is not increase the rate of recurrence and protect pain. (what about the cost of ?)

Fixation X No Fixation



Laparoscopic inguinal hernia repair without mesh fixation, early results of a large randomised clinical trial

Craig Taylor · Laurent Layani · Victor Liew · Michael Ghusn · Nic Crampton · Stephen White

Table 3 Incidence of new and persistent groin pain

	Fixation	No fixation	<i>p</i> value
Any new pain	38%	23%	0.0003
Pain score ≥ 2	22%	15%	0.049
≥ 3	16%	8%	0.009
≥ 4	2%	Nil	0.06

Pain and number of fixation tacks

An association was also found between the number of fixation tacks used and the incidence of pain. This association reached statistical significance when more than six tacks were used ($p = 0.008$, Table 4).

***500 hernias, 2004-2006, prospective multicenter double-blinded randomised trial, TEP, follow-up 6-13 months**

***Only one recurrence (0.2%) in fixation group**

***The cost of disposable materials and equipment was 375 AUD less per patients in the nonfixation group.**

Conclusion

Mesh fixation appears to be unnecessary in TEP repair of small hernial defects. It is associated with higher operative costs and an increased likelihood of developing chronic groin pain. The omission of mesh fixation did not increase the risk of early hernia recurrence.

Total Extraperitoneal Laparoscopic Inguinal Hernia Repair Without Mesh Fixation

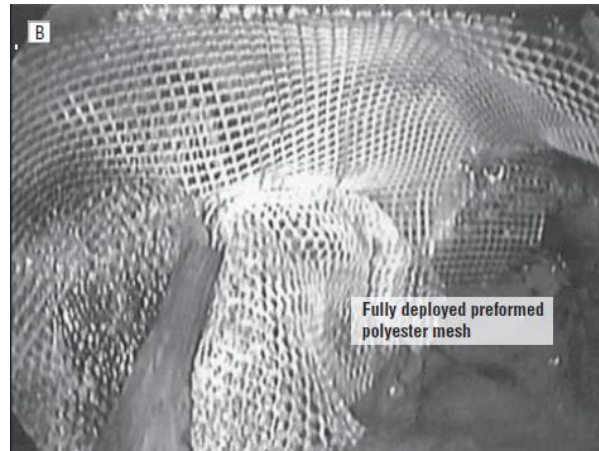
Prospective Study With 1-Year Follow-up Results

Evangelos Messaris, MD, PhD; Guy Nicasri, MD; Stanley J. Dudrick, MD

(REPRINTED) ARCH SURG/VOL 145 (NO. 4), APR 2010

WWW.ARCHSURG.COM

- *They were operated 311 hernias between 2004-2006
- *96 % patients have been followed up one year
- *They were used polyester and slit meshes



- **No hernia recurrence**
 - %6.1 seroma
- Chronic pain was nil (analgesic requirement was nearly 2 weeks mostly in patients with seroma)
- **No fixation reduced the operating room costs by 350-450 USD**
 - **Fixation is not necessary in hands of experienced laparoscopic surgeons**

Randomized Prospective Study of Totally Extraperitoneal Inguinal Hernia Repair: Fixation Versus No Fixation of Mesh

Cody A. Koch, Susan M. Greenlee, RN, Dirk R. Larson, MS,
Jeffrey R. Harrington, MA, David R. Farley, MD

JSLs (2006)10:457-460

2002-2004, prospective randomized, two groups-- with or without tacking

Postoperative pain levels in their study were also decreased in patients who did not receive mesh fixation compared with patients in whom the mesh was fixed; however, the differences were not statistically significant

No recurrence and no nerve injury

- **Conclusion:** They recommend a tackless endoscopic TEP inguinal hernia repair in select patients.
- They do not believe that eliminating the fixation of the mesh in patients with smaller defects (3 cm) will lead to an increased incidence of hernia recurrence.

Randomized Clinical Trial of Fixation vs Nonfixation of Mesh in Total Extraperitoneal Inguinal Hernioplasty

Alfredo Moreno-Egea, MD; José Antonio Torralba Martínez, MD;
Germán Morales Cuenca, MD; José Luis Aguayo Albasini, MD

ARCH SURG/VOL 139, DEC 2004

COMMENT

efficient, as with anterior hernioplasties. Along this line, our study shows that hospital cost can be reduced by eliminating the routine use of mesh fixation. A suture gun in our center costs around €400; thus if in 2003 we operated on 116 inguinal hernias via laparoscopy, the cost of this item amounts to €46600. By selecting patients in whom to fix the mesh, together with large-sized direct and bilateral cases (200 cases in 2003), we could create a considerable saving (€38400/y). These data may be of great interest for departments planning to set up as clinical management units.

In conclusion, mesh fixation in the TEP technique offers no clinical advantages and increases the cost of the process. Our results recommend limiting the use of mesh fixation in the laparoscopic approach to cases of direct bilateral hernias.

Table 2. Morbidity of the 2 Groups of Patients Undergoing Surgery for Inguinal Hernia, According to Mesh Fixation*

Mesh Fixation	Total Extraperitoneal Laparoscopic Inguinal Hernioplasty		
	No (n = 85)	Yes (n = 85)	P Value
Anesthesia, general/spinal	57/28 (32.9)	72/13 (15.3)	.01
Operating time, min, mean ± SD			
Unilateral	39.1 ± 15.3	45.7 ± 17.9	.01
Bilateral	44.2 ± 22.6	50.5 ± 19.2	.05
Intraoperative morbidity	3 (3.5)	5 (5.9)	.36
Bleeding	0	3	
Wound infection	1	0	
Transitory neuralgia	2	2	
Postoperative morbidity	11 (12.9)	13 (15.3)	.32
Bleeding	10	11	
Wound infection	0	1	
Transitory neuralgia	1	1	
Hospital admission	3	8	
Ambulatory surgery	82 (96.4)	77 (90.6)	.31
Failures	2 (2.4)	4 (5.2)	
Pain, visual analog scale score, mean ± SD			
24 h	1.65 ± 1.3	1.78 ± 1.4	.26
1 mo	0.14 ± 1.7	0.16 ± 0.6	.46
No. of analgesics consumed, mean ± SD	4.73 ± 6.32	5.69 ± 7.69	.18
Time of analgesic consumption, d, mean ± SD	2.7 ± 5.48	3.03 ± 4.81	.34
Chronic pain	1 (1.2)	1 (1.2)	.75
Orchitis	0	0	
Recurrence	3 (2.7)	0	.11

*Values are expressed as number (percentage) of patients unless otherwise indicated.

Laparoscopic total extraperitoneal inguinal hernia repair with nonfixation of the mesh for 1,692 hernias

Pankaj Garg · Mahesh Rajagopal · Vino Varghese ·
Mohamed Ismail

Surg Endosc (2009) 23:1241–1245

	Mesh fixed (61 hernias/33 patients), <i>n</i> (%)	Mesh not fixed (1,692 hernias/896 patients), <i>n</i> (%)	<i>p</i> -Value
Operating time (min)	32.1 ± 8.5	30.2 ± 6.0	0.22, NS (<i>t</i> -test)
Conversion to open procedure	1 (3.03)	0	NS
Seroma formation	6/61 (9.8)	28/1652 (1.7)	0.0008 (Fisher's exact test)
Urinary retention	9 (27.3)	41 (4.6)	<0.0001 (Fisher's exact test)
Hospital stay (days)	1.35 ± 0.49	1.06 ± 0.25	<0.0001 (<i>t</i> -test)
Return to normal activities (days)	9.88 ± 3.3	7.59 ± 1.3	<0.0001 (<i>t</i> -test)
Pain at 1 month	8 (24.2)	30 (3.3)	<0.0001 (Fisher's exact test)
Recurrence	0	2 (0.2)	NS

difficult dissection or large defects. This could have led to a bias. However the prime purpose of the study was to show that TEP repair without mesh fixation is safe and associated with low recurrence rates. The technical points that must be given special care are adequate dissection, proper size of the mesh used, and accurate placement of the mesh in the preperitoneal space.

From the findings of this study, we can conclude with reasonable confidence that TEP inguinal hernia repair performed without mesh fixation is safe and feasible with minimal recurrence rates.

Gluing?

Fibrin Sealants

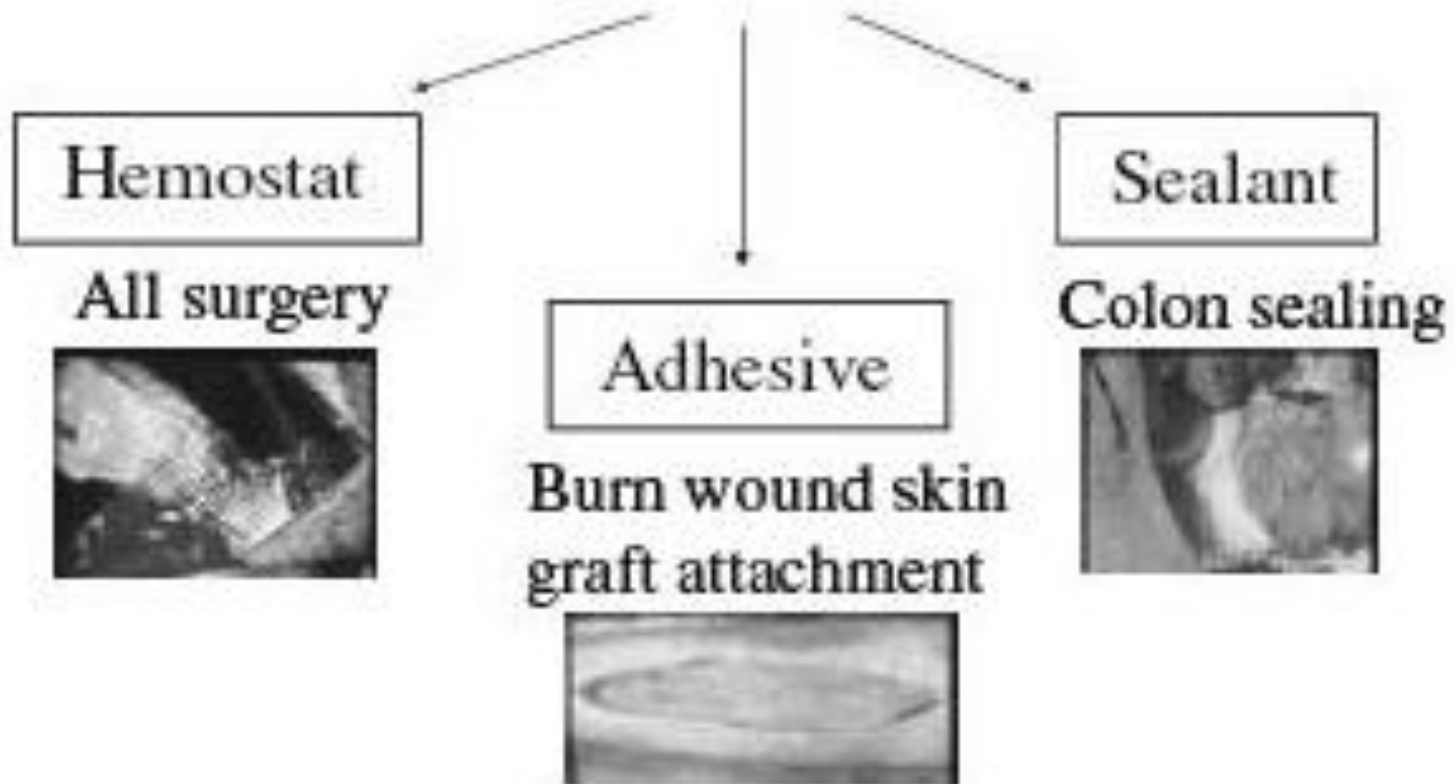
Fibrinogen & Thrombin

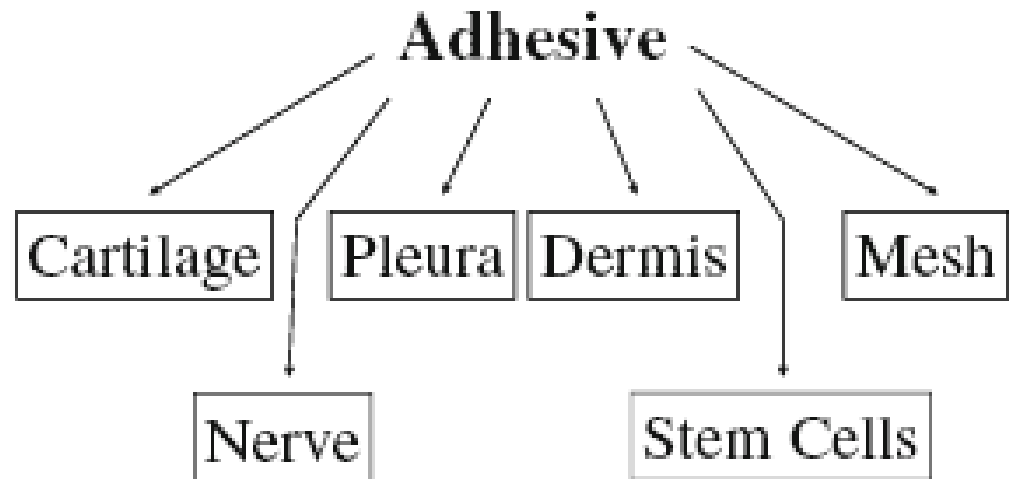
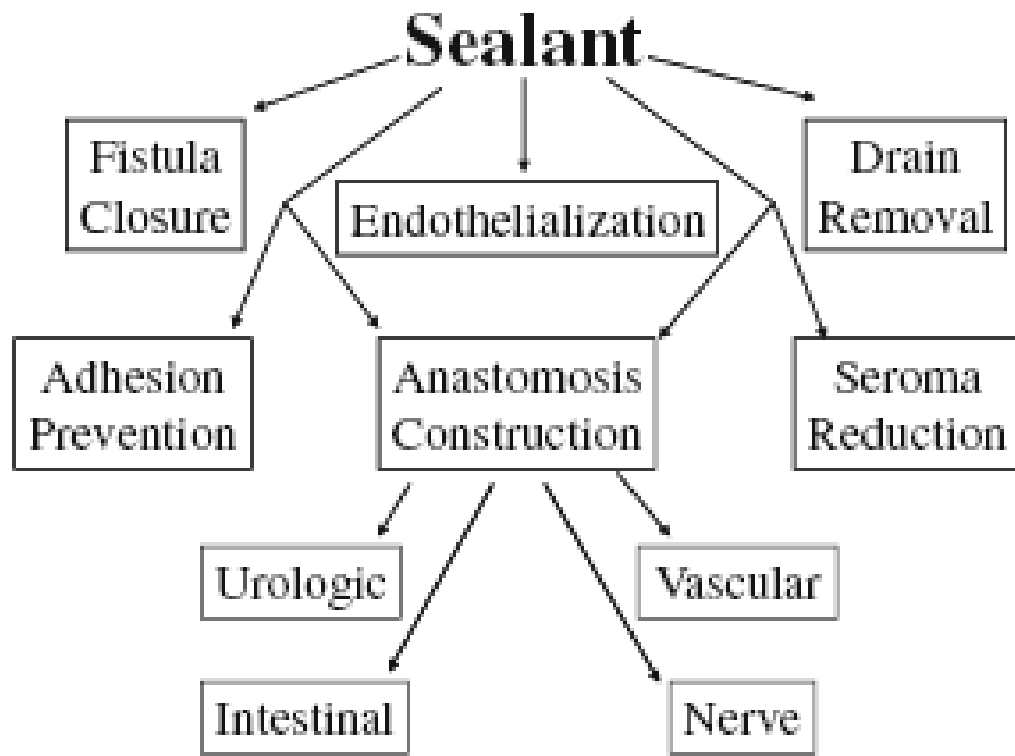
- Hemostasis
 - Sealants
 - Adhesives

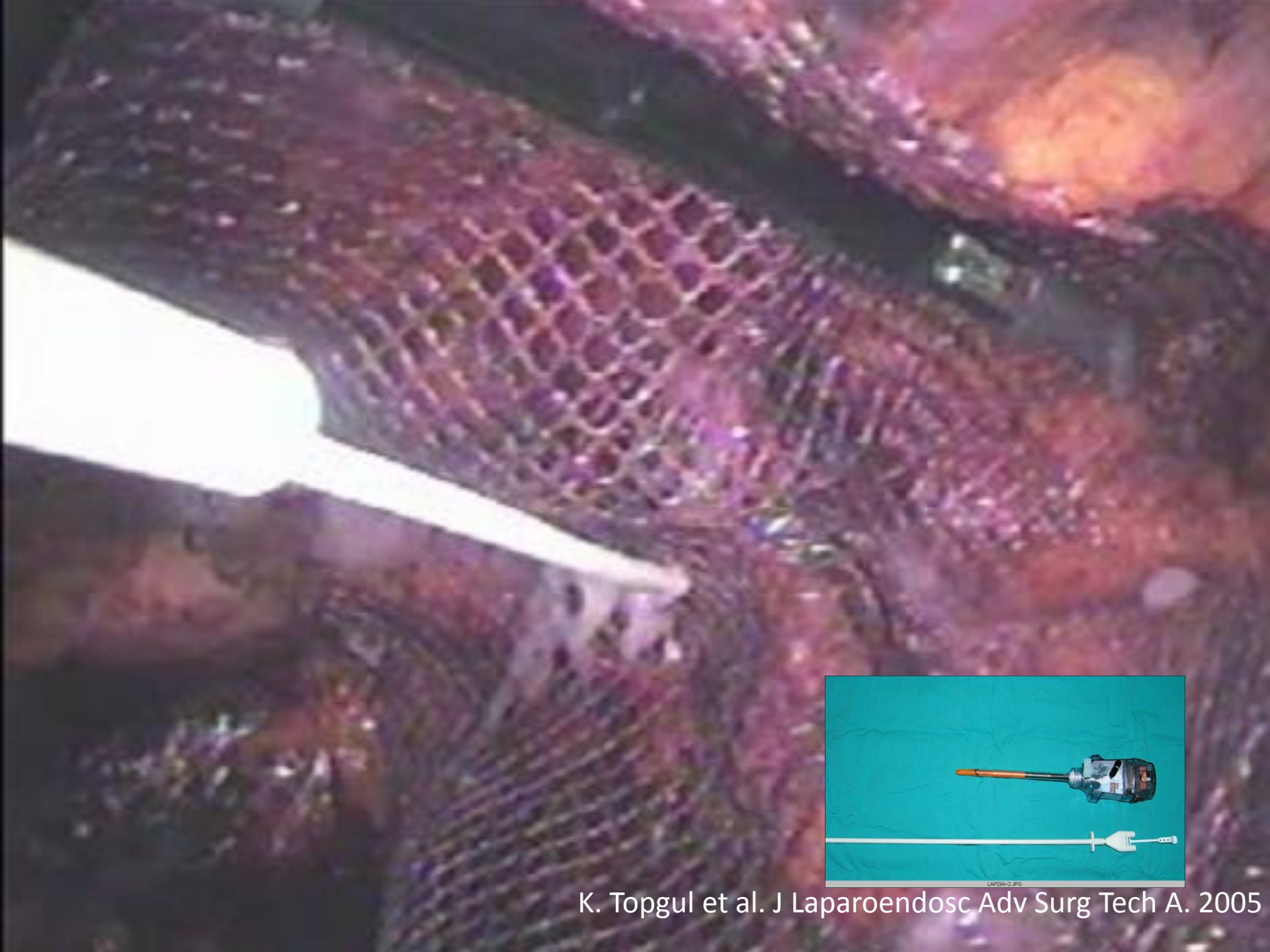
Byrne DJ, et al; Br J Surg, 1991

Spotnitz WD, et al; Transfusion therapy: clinical principles and practice, 2004

Fibrin sealant indications







K. Topgul et al. J Laparoendosc Adv Surg Tech A. 2005

Autologous Platelet-Rich Fibrin Sealant **VIVOSTAT** System

- The Vivostat system is a medical device for preparing and applying autologous fibrin sealant from the **patient's own blood**.
- The system is fully automated and controlled by a microprocessor.
- Due to the nature of autologous, it eliminates the incidence of pathogen transmission.

To produce the fibrin, **120 ml of the patient's own blood** is drawn into the preparation unit and mixed with a sodium citrate solution for anticoagulation.

The process results in the production of **4±6 ml fibrin sealant**. The production time for the fibrin is **20 min.**

Preparation **time** and the **cost** is questioned



The laparoscopic applicator

S. C. Schmidt J. M. Langrehr; Endoscopy; 2006
de Hingh et al, Eur Surg Res; 2009

Fixation materials in the laparoscopic repair ---which one?

- EMS– Protak– EndoAnchor– Tisseal (FS)

in Tisseal group

- Less pain
- More rapid return to work
- Less seroma/hematoma
- No increase the rate of recurrence

Olmi S, Surgery, 2007

Novik B, Surg Endosc , 2006

Use of Fibrin Sealant for Prosthetic Mesh Fixation in Laparoscopic Extraperitoneal Inguinal Hernia Repair

ANNALS OF SURGERY
Vol. 233, No. 1, 18–25 2001

Namir Katkhouda, MD, FACS,* Eli Mavor, MD,* Melanie H. Friedlander, MD,* Rodney J. Mason, MD, PhD,* Milton Kiyabu, MD,† Steven W. Grant, MD,* Kranti Achanta, MD,* Erlinda L. Kirkman, DVM,† Krishna Narayanan, MD,* and Rahila Essani, MD*

Table 1. GRAFT MOTION AND TENSILE STRENGTH MEASUREMENTS

	FS (n = 18)	Staples (n = 16)	No Fixation (n = 15)	P Value		
				FS vs. staples	FS vs. no fixation	Staples vs. no fixation
Graft motion (mm)	0 (0–2)	0	5 (0–10)	NS	<.01	<.001
Tensile strength (kg)	0.955 (0.25–3.2)	1.03 (0.09–4.5)	0.46 (0.16–2.64)	NS	<.01	<.01

FS, fibrin sealant.
Results are expressed as median (range).

- Graft motion---- FS=S>NF
- Tensile Strength---- FS=S>NF
- Histologic findings---FS >S= NF

In conclusion, based on our strong experimental evidence, we believe that FS could replace staples for mesh fixation in laparoscopic extraperitoneal inguinal hernia repair. The combination of soft fixation obtained with FS and the natural adherence achieved in the extraperitoneal position by intraabdominal pressure transmitted through the peritoneum onto the mesh should guard against graft migration and possible hernia recurrence.

Tisseel vs tack staples as mesh fixation in totally extraperitoneal laparoscopic repair of groin hernias

A retrospective analysis

P. Topart, F. Vandenbroucke, P. Lozac'h

Surg Endosc (2005) 19: 724–727

rence at a mean of 16.3 months after surgery. When reviewed, 15 patients (14.7%) complained of pain in the groin area more than 3 months after surgery. The postoperative results were compared between the two groups and there was no difference in the overall complication rate. There were slightly more seromas but less hematomas in the fibrin glue group compared to the tack staples group, but this was not statistically significant. However, the postoperative chronic pain rate was significantly reduced in the fibrin glue group ($p = 0.037$).

Table 3. Postoperative complications in the tack staples group

Complication	No. (%)
Wound healing problem	1 (0.9)
Pain	12 (11.8)
Hematoma	8 (7.8)
Orchitis	1 (0.9)
Urine retention	1 (0.9)
Seroma	10 (9.7)
Total	27 patients (26.4)

series was in the fixation devices. Two milliliters of Tisseel is available for 149 USD, whereas the single-use Tacker stapler is 287 USD.

In conclusion, there is no evidence in the literature to support nonfixation of the mesh in TEP repair of groin hernias, whereas the use of staples has been identified as one of the factors for postoperative chronic pain. Although prospective randomized trials should be performed Tisseel fibrin glue for mesh fixation is secure as the tack staples, ensuring an adequate fixation and a low recurrence rate. This new method of mesh fixation is obviously potentially less harmful than stapling the mesh and can help reduce the risk of chronic postoperative pain at a comparative or even lower cost than a stapling device.

Comparing fibrin sealant with staples for mesh fixation in laparoscopic transabdominal hernia repair: a case control-study

Graziano Ceccarelli · Luciano Casciola · Massimo Codacci Pisanelli ·
Alberto Bartoli · Lelio Di zitti · Alessandro Spaziani · Alessia Biancafarina ·
Massimo Stefanoni · Alberto Patrìti

From July 2003 to June 2006 we performed 823 laparoscopic herniorrhaphies. Fibrin glue (Tissucol®) was used in 88 cases. Two homogeneous groups of 68 patients (83 cases) treated with fibrin glue and 68 patients (87 cases) where the mesh was fixed with staples, were compared.

Table 2 Results and complications

	Fibrin glue use	Staples use	<i>p</i>
Operative time	35'(22–65)	25'(14'–50')	<0.05
Discharge (hours)	24 h	24 h	<i>n.s.</i>
Complication:			
<i>Groin chronic pain</i>	0	0	<i>n.s.</i>
<i>Hematoma of scrotum</i>	0 (0%)	1(1.14%)	<i>n.s.</i>
<i>Seroma</i>	2 (2,4%)	2 (2.29)	<i>n.s.</i>
<i>Trocar hernia</i>	0 (0%)	1 (1.14)	<i>n.s.</i>
<i>Trocar site bleeding</i>	0 (0%)	3 (4.41%)	<i>p</i> < 0,05
<i>10 mm trocar site pain</i>	0 (0%)	4 (5.88%)	<i>p</i> < 0,05
Recurrence rate	0	0	<i>n.s.</i>

Conclusions

Our study shows that it is possible to fix hernia mesh using different and non-traumatic devices such as fibrin glue (Tissucol®) with the same results in terms of recurrence rate, hospital stay, and costs; but with better results in terms of post-operative pain, seromas, and trocar-related trauma. The incidence of neuropathic problems (acute and chronic pain) were in our experience low in both techniques, with no significant difference. However the use of fibrin glue, in our opinion, needs extensive experience in laparoscopic techniques, as the anatomical dissection and inguinal region preparation have to be carefully performed, and the mesh size has to be adequate; peritoneum closure with a running suture is more time consuming. Ours is a retrospective study, comparing two groups of selected cases (recurrences, inguino-scrotal hernias and large direct hernias were excluded). Large randomized trials and longer follow-up are required to demonstrate the advantages of either technique [17].

Less chronic pain following mesh fixation using a fibrin sealant in TEP inguinal hernia repair

Hernia (2006) 10: 272–277

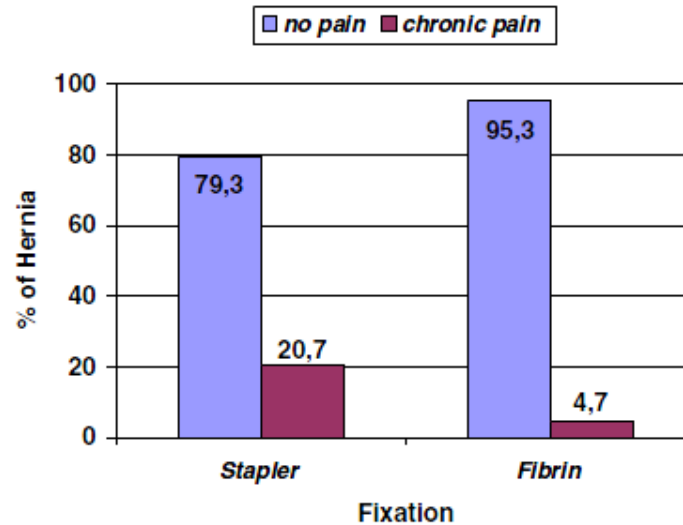


Fig. 2 Chronic inguinal pain: stapler versus fibrin sealant ($P=0.002$)*, *Fisher exact test

Schug-Pass C et al, Langenbecks Arch Surg;2010

Lovisetto F et al, Annals of Surgery; 2007

Lau H , Annals of Surgery; 2005

Olmi S et al, Surg Endosc; 2006

Novik B et al, Surg Endosc; 2006

STAPLER



FIBRIN GLUE ?

NO FIXATION



Conclusions/ Suggestions

FS is feasible.

Less pain, no increase of recurrence rate.

But it may be has some **cost drawbacks** depend on country, instution and insurance agent.

No fixation, in small (2cm) hernias may be recommended. Does not increase recurrence rate in this group hernias.

Good technique/adequate size mesh

Less pain

most cost-effective

If there is a large hernia over 4 cm,
you should use stapler fixation
(not enough evidence yet for no
fixation)

But you should use only a few number
(2-4) stapler to avoid postoperative
pain.