

Glue for mesh fixation in laparoscopic ventral hernia repair. An experimental comparison with conventional fixation.

A. Vanlander, F. Berrevoet MD PhD

**Department of General and Hepatobiliary
Surgery and Liver Transplantation Service**

University Hospital Ghent

Disclosures



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Introduction

➔ Laparoscopic ventral hernia repair : pro & con



- Low recurrence rates
- Less wound & mesh infection
- Occult hernias are treated



- Postoperative pain
 - ➔ Sharma 2011 : Chronic pain in 14.7% (N=1242, FU 5.4 yrs)
 - ➔ Beldi 2011 :

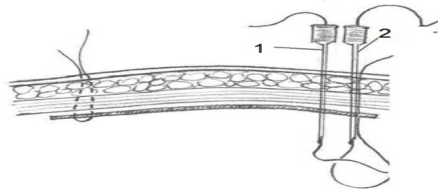
Table 3 Postoperative pain scores (VAS) after 6 weeks and after 6 months

	Spiral tacks	Sutures	<i>p</i> -Value
Total VAS score (mean \pm SD)			
6 weeks postoperatively	2.5 \pm 0.8	3.2 \pm 0.7	0.345
6 months postoperatively	1.0 \pm 0.5	0.7 \pm 0.3	0.955
VAS \geq 2 (<i>n</i>)			
6 weeks postoperatively	28% (5/18)	61% (11/18)	0.020
6 months postoperatively	38% (7/18)	50% (9/18)	0.310

SD standard deviation

Introduction

➔ Laparoscopic ventral hernia repair : mesh fixation



➔ Strong fixation – prevent mesh migration and hernia recurrences



➔ Traumatic to abdominal wall tissue → Postoperative pain
→ No difference in pain between sutures and tacks

Beldi 2011

Wassenaar 2010

➔ ***Atraumatic fixation : glue***

Pain, quality of life and recovery after laparoscopic ventral hernia repair.

Eriksen et al. Hernia 2009 Feb;13(1):13-21. doi: 10.1007/s10029-008-0414-9. Epub 2008 Aug 1.

LVHR was associated with considerable postoperative pain and fatigue in the first postoperative month, prolonging the time of convalescence and significantly affecting patients' quality of life up to 6 months postoperatively.



Langenbecks Arch Surg
DOI 10.1007/s00423-013-1126-x

SYSTEMATIC REVIEWS AND META-ANALYSES

Laparoscopic ventral hernia repair: is there an optimal mesh fixation technique? A systematic review

Emmelie Reynvoet • Ellen Deschepper • Xavier Rogiers •
Roberto Troisi • Frederik Berrevoet

Results A total of 25 series were included for statistical evaluation. Thirteen trials used both tacks and sutures, ten used only tacks, and two used only sutures. Overall recurrence rate was 2.7 % (95 % CI [1.9–3.4 %]).

Conclusion None of the currently available mesh fixation techniques used for LVHR was found to be superior in preventing hernia recurrence as well as in reducing abdominal wall pain. The pain reported was remarkably high with all different fixation devices. Further research to develop solid and atraumatic fixation devices is warranted.

Adhesions to sutures, tackers, and glue for intraperitoneal mesh fixation: an experimental study

M. H. F. Schreinemacher · K. W. Y. van Barneveld ·
E. Peeters · M. Miserez · M. J. J. Gijbels ·
J.-W. M. Greve · N. D. Bouvy

Methods Six commercially available fixation methods were placed intraperitoneally in rats with a small pore polypropylene mesh coated on one side with ePTFE (Intramesh T1[®]). Two non-absorbable fixation methods: Prolene[®] (polypropylene) sutures and Protack[®] (titanium) tackers. Four absorbable methods: Vicryl[®] sutures (polyglactin), Absorbatack[®] and Permasorb[®] tackers (both mixes of lactic and glycolic acids) and Tisseel Duo[®] (fibrin

Conclusions Absorbable fixation methods such as polyglactin sutures and fibrin glue show a favorable adhesion profile compared to longer-term absorbable or non-absorbable fixation methods. However, before using fibrin glue as a single fixation method more research is required.

Hernia (2014) 18:865–872
DOI 10.1007/s10029-013-1192-6

Introduction

➔ Fibrin glue - Schug-Pass, Surg Endosc 2009

Surg Endosc (2009) 23:2809–2815
DOI 10.1007/s00464-009-0509-0

**Fixation of mesh to the peritoneum using a fibrin glue:
investigations with a biomechanical model and an experimental
laparoscopic porcine model**

C. Schug-Pass · H. Lippert · F. Köckerling

Conclusion Mesh fixation alone to the undamaged peritoneum in the intraperitoneal region cannot be recommended because of the risk for dislocation. Additional fixation using sutures, tacks, or both is needed until the mesh material is completely integrated.

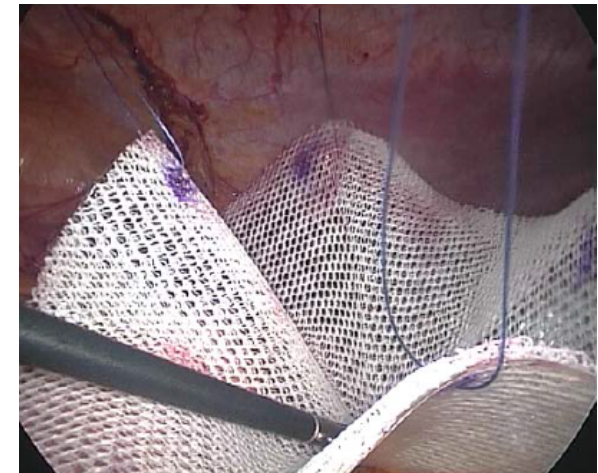


Conclusion : fibrin glue on peritoneum : unreliable technique

Use of fibrin glue (Tissucol[®]) in laparoscopic repair of abdominal wall defects: preliminary experience

S. Olmi, A. Scaini, L. Erba, E. Croce

After a mean follow-up of 16 months (range, 3–24 months), no postoperative complications, recurrences, or deaths had been reported. Similarly, no adverse gastrointestinal events were reported (e.g., nausea, vomiting, diarrhea, abdominal distension, abdominal colic).



Conclusions: The use of fibrin glue in the present study provided stable and uniform fixation of the prosthesis and minimized intraoperative and postoperative complications. Consequently, laparoscopic treatment of small to medium-sized abdominal defects using this approach is our therapeutic option of choice.

Fibrin sealant for mesh fixation in laparoscopic umbilical hernia repair: 1-year results of a randomized controlled double-blinded study

J. R. Eriksen · T. Bisgaard · S. Assaadzadeh ·
L. N. Jorgensen · J. Rosenberg

A total of six patients (17 %) developed a hernia recurrence within the first postoperative year (including the two reoperations for recurrence), five patients in the fibrin sealant group (26 %) and one in the tack group (6 %), $p = 0.182$. One patient presented with an obvious recurrent hernia and five had verification of the diagnosis by ultrasonography or a CT scan.



Synthetic glue

➔ Cyanoacrylate glue :

- ➔ Ladurner 2011 rabbit model : 12 weeks : no mesh migration
tensile strength tacks(14.15N) and sutures(14.84N) > glue(9.64N)
($p < 0.001$)
- ➔ Losi 2010 rat model – no mesh migration, good tissue integration....
- ➔ Fortelny 2007 rat model : tissue integration is impaired at points where glue is pointed...
- ➔ Toxicity...???

➔ *Controversial results in small animal experiments*

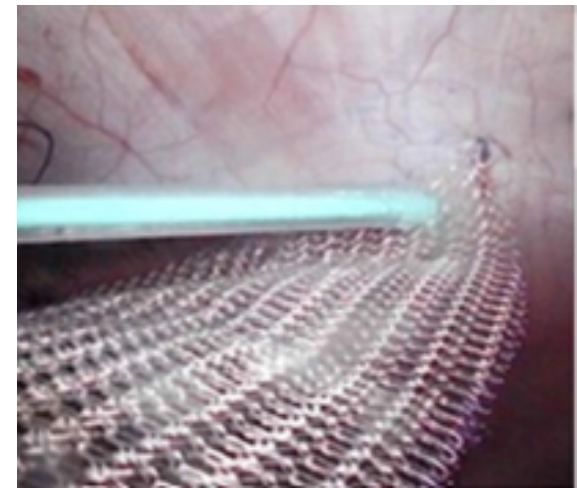
Hernia

DOI 10.1007/s10029-015-1347-8

ORIGINAL ARTICLE

The use of cyanoacrylate sealant as simple mesh fixation in laparoscopic ventral hernia repair: a large animal evaluation

**E. Reynvoet · S. Van Cleven · I. Van Overbeke ·
K. Chiers · P. De Baets · R. Troisi ·
F. Berrevoet**



Reynvoet et al. Hernia 2015

Materials

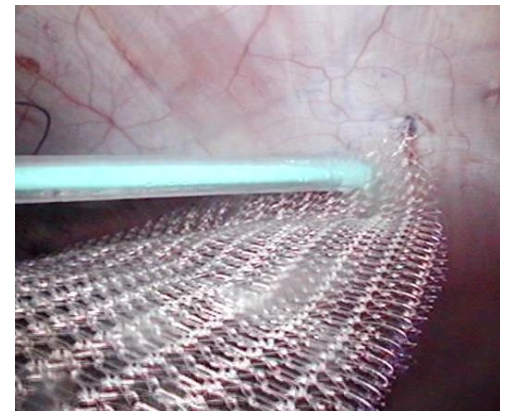
➔ Resorbable Tacks (Securestrap®)

- ➔ Strap design with two hooks
- ➔ Resorbable over 12-18 months
- ➔ 7 mm penetration in abdominal wall



➔ Cyanoacrylate glue (Ifabond®)

- ➔ Synthetic glue
- ➔ Resorbable over 6 months



Methods

➔ 2. Laparoscopy

Two meshes were implanted : glue versus tacks

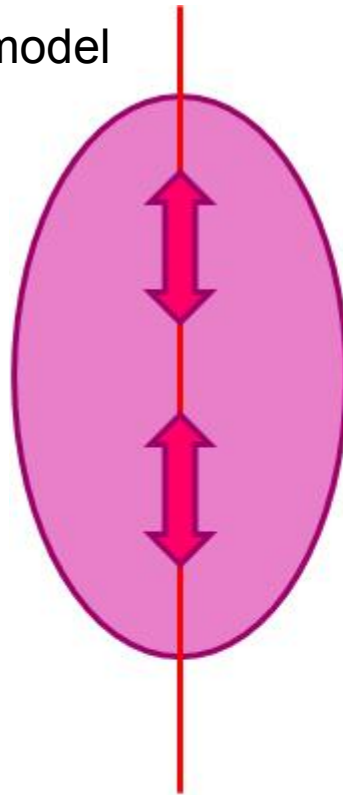
Methods

- ➔ **20 sheep were operated**
 - ➔ 1. Hernia model
 - + 1 week
 - ➔ 2. Laparoscopy : two polypropylene meshes implanted
 - ½ : closure of the fascial defect
 - ½ : no closure of the fascial defect
 - + 1 day (n=6)
 - + 2 weeks (n=8)
 - + 6 months (n=6)
 - ➔ 3. Relaparoscopy and euthanasia

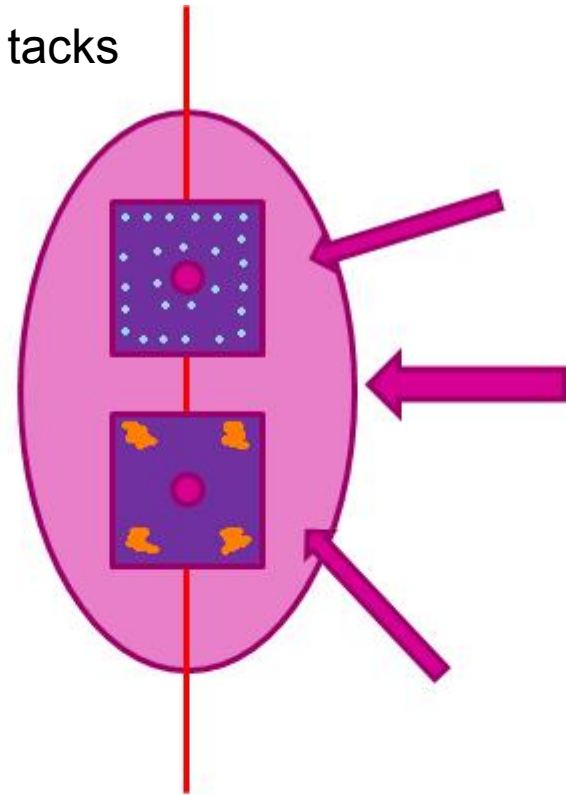


Methods

1. Hernia model



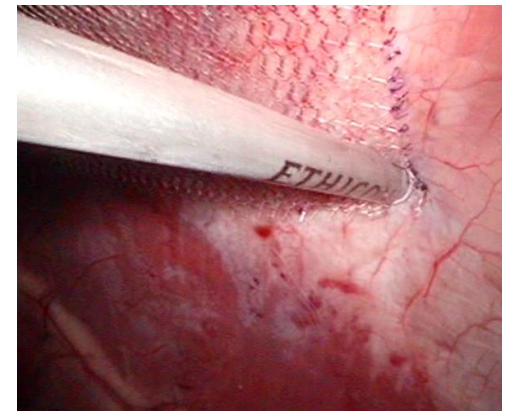
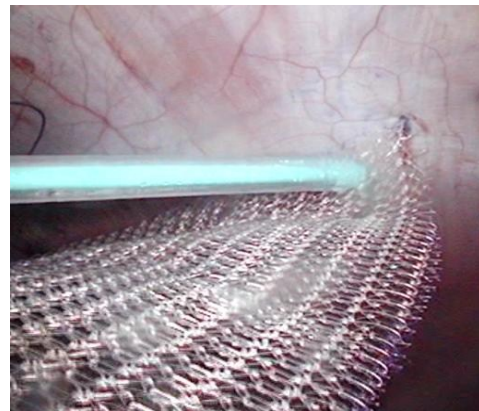
2. Glue vs tacks



Methods

➔ 2. Laparoscopy

Two meshes were implanted : glue versus tacks



Methods

➔ 3. After 1 day – 2 weeks – 6 months :

1. Relaparoscopy :

- Mesh placement
- Mesh migration
- Buckling
- Adhesion formation

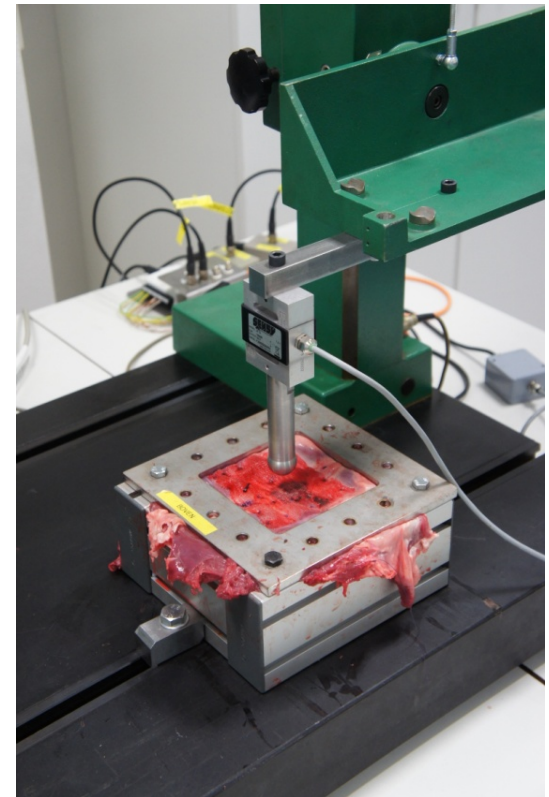
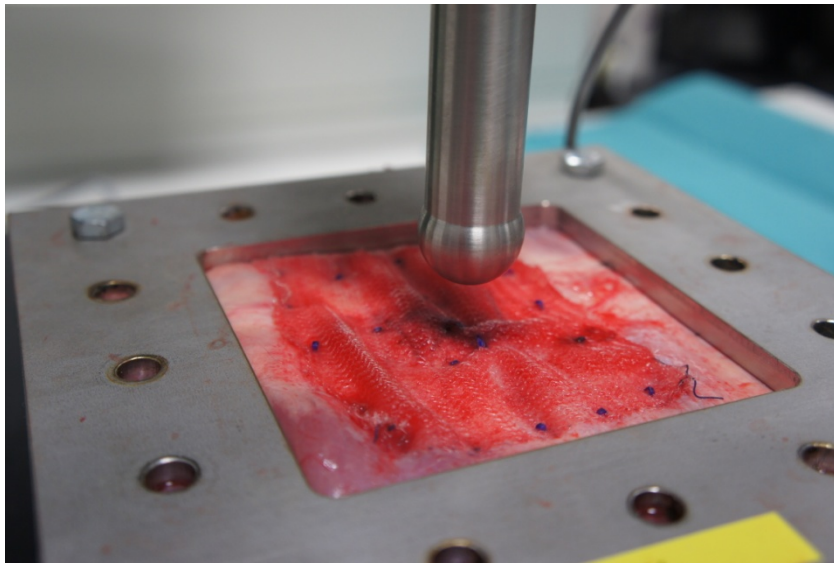


➔ 2. Euthanasia with excision of mesh plus abdominal wall :

- Burst strength testing
- Histopathological evaluation

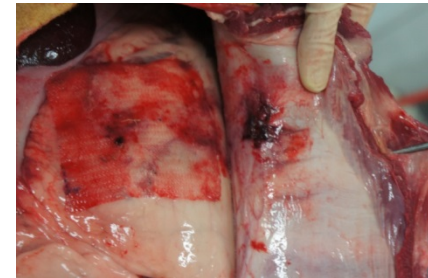
Methods

- ➔ Burst Strength testing (100N)



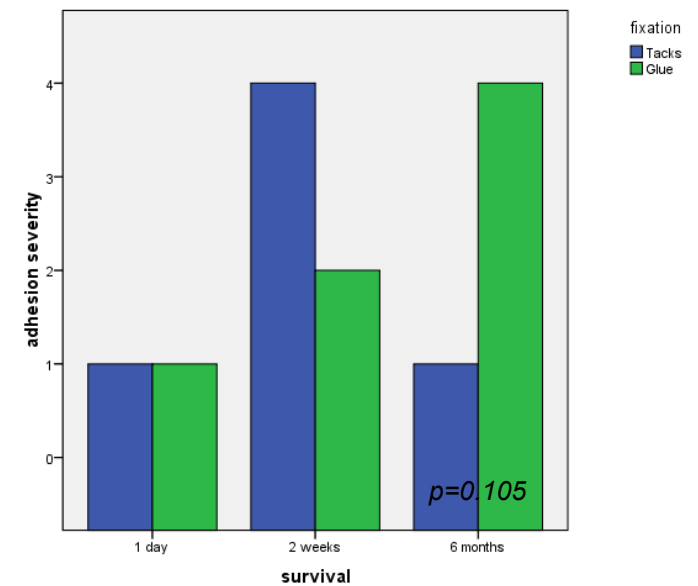
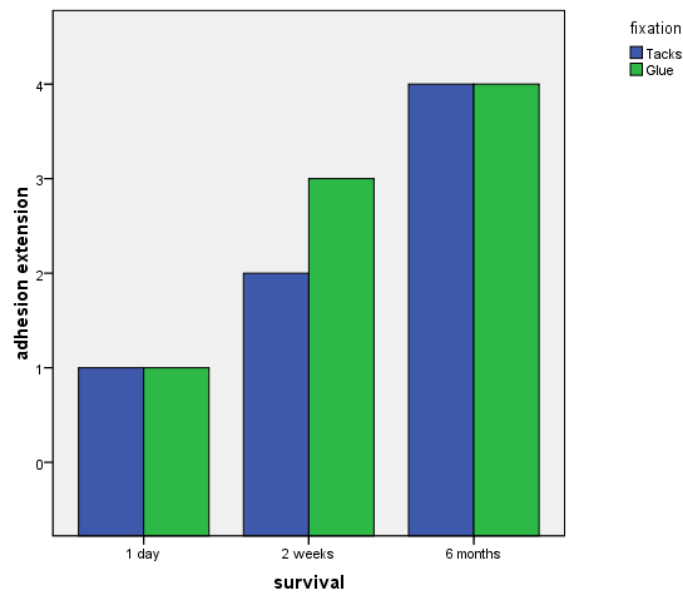
Results

- ➔ One animal died due to intestinal incarceration and was not included in this analysis
- ➔ No hernia recurrences after 6 months
- ➔ Mesh placement:
 - ➔ 1 day : one mesh detached (glue)
 two meshes severe buckling (tacks)
 - ➔ Other groups : good mesh incorporation of all samples



Results

➔ Adhesions

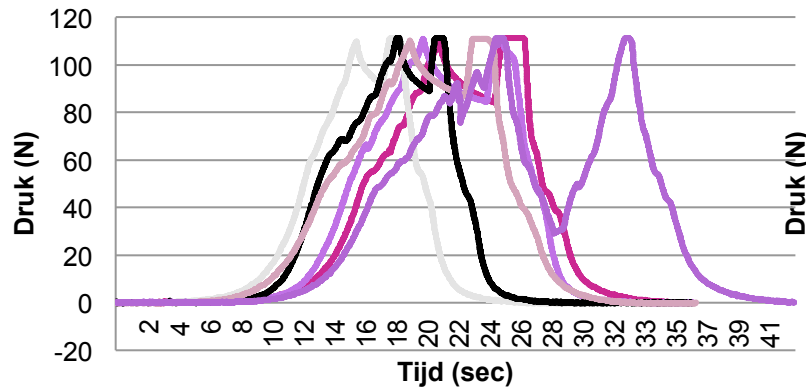


all $p>0.05$

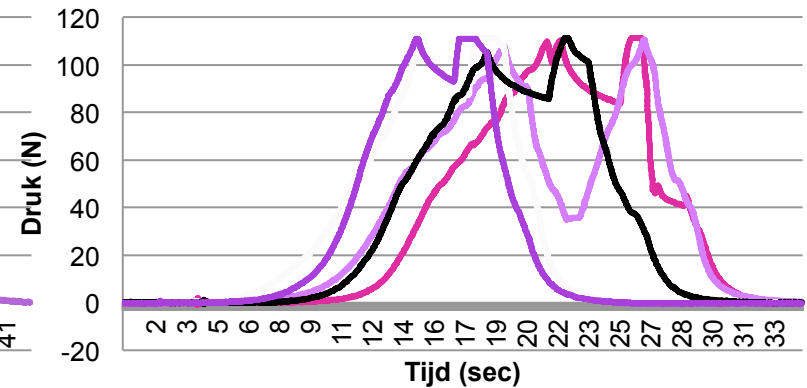
Results

➔ Burst Strength

Burst StrengthTack (1 day)

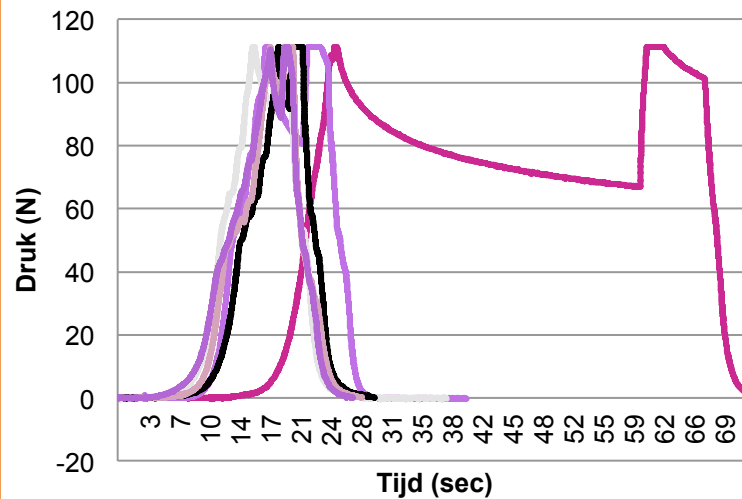


Burst Strength Glue (1 day)

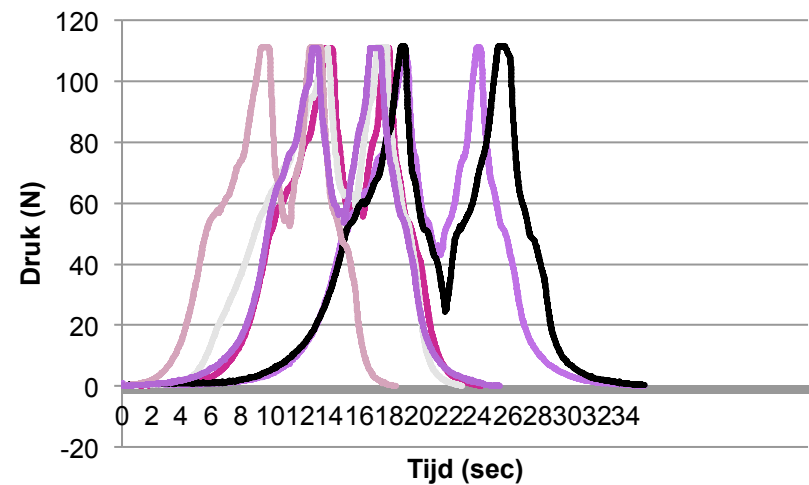


Results

**Burst strength Glue
(2 weeks)**



**Burst strength Glue
(6 months)**



Conclusion in this study

- ➔ **Synthetic glue is feasible as a mesh fixation alternative with strong attachment to the abdominal wall and equal adhesion formation as resorbable strap fixation.**
- ➔ **Glue application intraperitoneally is still challenging and a barrier on the visceral side of the mesh is necessary to prevent leakage onto intra-abdominal content.**
- ➔ **No observed toxicity macroscopically, but histopathology has to be awaited...**
- ➔ **No difference in recurrence or tissue integration in closed versus non-closed defects, probably because only small defects were treated.**

But.....

Original article

Recurrence rate after absorbable tack fixation of mesh in laparoscopic incisional hernia repair

M. W. Christoffersen¹, E. Brandt², F. Helgstrand^{2,5}, M. Westen¹, J. Rosenberg^{3,5}, H. Kehlet^{4,5}, P. Strandfelt¹ and T. Bisgaard^{1,5}

¹Gastro Unit, Surgical Division, Hvidovre Hospital, ²Department of Gastrointestinal Surgery, Køge Hospital, ³Gastro Unit, Surgical Division, Herlev Hospital, and ⁴Section of Surgical Pathophysiology, Rigshospitalet, University of Copenhagen and ⁵Danish Hernia Database, Copenhagen, Denmark
Correspondence to: Miss M. W. Christoffersen, Gastro Unit, Surgical Section, Hvidovre Hospital, University of Copenhagen, Kettegård Alle 30, DK-2650 Hvidovre, Denmark (e-mail: mette.willaume@gmail.com)

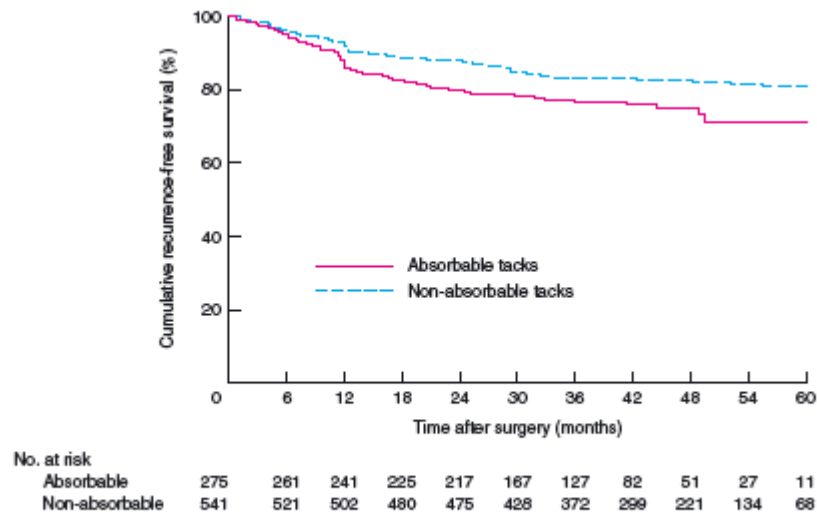


Fig. 2 Kaplan–Meier survival plot illustrating the cumulative recurrence-free survival rate (reoperation and clinical recurrence) after laparoscopic incisional hernia repair with mesh fixation using absorbable or non-absorbable tacks. $P = 0.007$ (log rank test)

Conclusion

- ➔ **No benefit proven for transabdominal sutures regarding recurrence rate (non-absorbable nor absorbable)**
- ➔ **No level 1 evidence that sutures contribute significantly more to postoperative pain**
- ➔ **Valid clinical data on absorbable fixation devices warns us for using only absorbable fixation**
- ➔ **So: lacking level 1 evidence a combination of fixation methods seems the best option; the role of closing the defect in this issue remains unclear....**