Laparoscopic Repair of Incisional Hernia

Maria B. ALBUJA-CRUZ, MD
University of Colorado
Department of Surgery-Grand Rounds

Overview

- Definition
- Advantages of Laparoscopic Repair
- Disadvantages of Open Repair
- Supporting Data
- Summary
- Conclusions

INCISIONAL HERNIA

- Protrusion of viscera from the abdominal cavity trough a route formed after trauma induced by cutting[1]
- Occurs in up to 11% of surgical abdominal wounds
- In up to 20% of patients that develop a postop wound infection[8]
- Occurs in up to 23% of patients 13 years after surgery[2]
- Patient risk factors that results in a predictably high incidence of VH:
  - Malnutrition
  - Obesity
  - Steroid use
  - DM2
  - COPD
  - Radiation therapy
- One of the most common procedures performed by general surgeons
- Approx 200,000 ventral hernia repairs performed annually

Laparoscopic Repair

- First reported by LeBlanc and Booth in 1993
- Minimally invasive access to the abdominal cavity. Minimizes the surgical insult
- Provides a unique internal view of the entire abdominal wall, enabling the surgeon to identify remote small Swiss cheese-type defects
- Requires minimal dissection
- Mesh placement in the inner layer of the abdominal wall→ lowest relapse rate
- Provides wide mesh overlap in an underlay position

Open Repair

- Dr. Judkins will base most of her argument on the fact that open repair will reconstruct a functional abdominal wall
- True for component separation, not for retrorectus repair
- Substantial lipocutaneous flap dissection is necessary to gain access to the lateral abdominal wall musculature.
  - Devascularization of the abdominal wall and skin flap necrosis
- Many series have reported major wound morbidity (seromas, subcutaneous abscess, flap necrosis) in 30% to 40%
- RCT[10]: Open component separation group had a 52% wound complication rate with 10% requiring surgical debridement

Laparoscopic Repair of Ventral Hernias

Nine Years' Experience With 850 Consecutive Hernias

B. Todd Heniford, MD, FACS, Adrian Park, MD, FACS,† Bruce J. Ramshaw, MD, FACS,‡ and Guy Voeller, MD, FACS§*

- 850 pt LVHR with mesh implantation by 4 surgeons in 4 different academic medical centers
- Expanded polytetrafluoroethylene (ePTFE) mesh (Gore-Tex DualMesh)
- Full-thickness stitches were placed circumferentially using a suture passer and the perimeter of the mesh was then stapled
- No drains were inserted
- Mean follow-up time of 20.2 m

Results

- Conversion to open was necessary in 3.6%
- Mean operating time was 120 min
- Hospital stay averaged 2.3 days
- There were 128 complications in 112 patients (13.2%)
- Overall infection rate was 1.8%

Results

TABLE 3. Operative and Postoperative Complications

Complication	No. (%) of Patients
Prolonged ileus	25 (3.0)
Prolonged seroma (>8 wk)	21 (2.6)
Intestinal/bladder injury	14 (1.7)
Prolonged pain (>6 mo)	13 (1.6)
Urinary retention or urinary tract infection	10 (1.2)
Cellulitis at trocar site	9 (1.1)
Respiratory distress	8 (1.0)
Trocar site herniation	7 (0.9)
Mesh infection	6 (0.7)
Cardiac event	6 (0.7)
Hematoma or postoperative bleeding	3 (0.4)
Fever of unknown origin	3 (0.4)
Clostridium difficile infection	3 (0.4)

Results/Conclusion

- Hernia recurrence rate was 4.7%
- Recurrence was associated with:
  - large defects
  - obesity
  - previous open repairs
  - perioperative complications
- Conclusions:
  - low rate of conversion to open surgery
  - a short hospital stay
  - moderate complication rate
  - low risk of recurrence.

Laparoscopic treatment vs open surgery in the solution of major incisional and abdominal wall hernias with mesh

M. A. Carbajo,[1] J. C. Martín del Olmo,[1] J. I. Blanco,[1] C. de la Cuesta,[1] M. Toledano,[1] F. Martin,[1] C. Vaquero,[2] L. Inglada[3]

[1] Department of General Surgery, Medina del Campo Hospital, Carretera de Peñaranda km 1, 47400 Medina del Campo, Valladolid, Spain
[2] Experimental Surgery Laboratory, University of Valladolid, Valladolid, Spain
[3] Department of Medicine, Medina del Campo Hospital, Carretera de Peñaranda km 1, 47400 Medina del Campo, Valladolid, Spain

- 60 pt with VH defects > 80 cm2
- Randomly assigned to two groups: 30 cases LR and 30 OpR
- The mean follow-up period was 27 months (range: 18–55)
- Laparoscopic procedure: Dual-Mesh PTFE
  - External fixation with circular stapling
  - Fixation was exclusively internal with stapler
- Open procedure: tension-free closure. PTFE and polypropylene mesh

Results

Table 2. Immediate complications

	Open surgery	Laparoscopic surgery
Incarceration	0	1 (Reop.)
Mild seroma	15	4
Massive seroma	5	0
Abscess	3 (1Reop.)	0
Mild hematoma	3	0
Moderate hematoma	3	1
Phlebitis	3	0
Cellulitis	2	0
Skin necrosis	1	0

Results

- 2 accidental intestinal perforations in OpR group
- No hernia relapses or late complication occurred in the LR group
- The mean postoperative stay for the laparoscopic group was 2.23 days vs 9.06 days in OpR, $p = < 0.05$.

Comparison of laparoscopic and open repair of incisional and primary ventral hernia: results of a prospective randomized study

M. C. Misra, V. K. Bansal, M. P. Kulkarni, D. K. Pawar

- All uncomplicated primary ventral, incisional, and recurrent hernias, including irreducible hernia in the adult population
- 66pt recruited: 33 OpR and 33 LR
- Laparoscopic procedure: polypropylene mesh.
  - Mesh fixation 2 rows of tacks
- Open procedure: Polypropylene mesh.
  - Mesh placed between the posterior rectus sheath/peritoneum and the rectus muscle.
- Mean f/u period was 12.97 m for OpR and 13.73 m for LR

Results

Table 2. Postoperative complications and hospital stay

Complication	OPEN Group 1	LAP Group 2	*p* Value
Superficial wound infection	9	2 (10-mm port)	
Deep wound infection	1	0	
Mesh infection	1	0	
Flap necrosis	1	0	
Postoperative ileus	0	0	
Urinary retention	1	1	
Seroma	1	4	
Total	14	7	0.058
Hospital stay in days			
Mean	3.43	1.47	0.007
Range	1–34	1–3	
Recurrence	1/30	2/32	0.954
%	3.33	6.25	

Results

- Wound-related complications were seen largely in OpR patients
- 36% wound-related complications in OpR group as compared with 6.6% in the LR group $p = 0.058$
- The mean hospital stay was 3.43 days OpR group and 1.47 days LR group. $p < 0.007$
- No statistically significant difference in the pain scores or analgesic requirements during the immediate postoperative phase between the two groups

The comparison of laparoscopic and open ventral hernia repairs: a prospective randomized study

U. Barbaros · O. Asoglu · R. Seven · Y. Erbil · A. Dinccag · U. Deveci · S. Ozarmagan · S. Mercan

- 46 pt with ventral hernias (primary and incisional)
- LR (group 1= 23); OpR (group 2= 23)
  - Pt with hernia < 3cm and emergency cases were not included in this study
- Laparoscopic procedure: different types of meshes.
  - Mesh fixation: Non-absorbable transfascial sutures and titanium tackers
- Open repair: Onlay polypropylene mesh
  - suction drains were placed in all patients
- No significant differences between the demographic data

Results

Parameter	LAP	Group 1	Group 2	*P*
Ileus		1	–	<0.05
Enterotomy		1[a]	–	<0.05
Mean mesh size (cm^2)		210 ± 203	226 ± 195	>0.05
Seroma/haematoma		4/1	–	<0.05
Mesh removal due to infection		1[a]	4	<0.05
Mesh removal due to rejection		1	–	<0.05
Mean operating time (min)		99 ± 32	72 ± 18	<0.05
Postoperative pain		1.53	1.61	>0.05
Mean length of hospital stay (days)		2.5 ± 1.5	6.3 ± 4.2	<0.05
Recurrence		–	1	<0.05
Mean follow-up time (months)		18(2–43)	20(6–28)	>0.05

Laparoscopic versus open incisional hernia repair

An open randomized controlled study

S. Olmi, A. Scaini, G. C. Cesana, L. Erba, E. Croce

Department of Surgery, Center of Laparoscopic and Minimally Invasive Surgery, S. Gerardo Hospital, via Donizetti 106, 20052 Monza, Milan, Italy

- 170 pt with incisional hernia were enrolled
  - 85 OpR
  - 85 LR
- Median F/u 24m
- Laparoscopic procedure: Parietex Composite mesh, Sofradim
  - Fixed with 4 transparietal stitches and by two concentric rings with tacks
- Open Procedure: polypropylene mesh positioned as an inlay (under the rectal muscles, preperitoneally). Drains were usually placed
- No difference between the two groups in age, ASA score, BMI, and hernia diameter

Results

Table 3. Operative findings

	Laparoscopic group	Open group	*p* Value
Mean operative time min (95% CI)	61.0 (54.1–68.9)	150.9 (132.1–169.7)	<0.005
Mean hernia diameter cm (95% CI)	9.7 (8.3–11.1)	10.5 (8.8–12.5)	0.75
Adhesiolysis (pts)	80/85	2/85	
Use of drainage (%)	0	97.6	
Mean length of hospitalization (95% CI)	2.7 (2.2–3.2)	9.9 (5.2–14.6)	<0.005
Complications (%)	16.4	29.4	<0.005
Median follow-up months (range)	24.0 (16–55)	24.0 (16–55)	
Return to work in days (range)	13 (6–15)	25 (16–30)	<0.005
Relapse (%)	2.3	1.1	

Results

- Major complications occurred in 4 out of 84 patients (4.7%) OpR: hemorrhage, pulmonary embolism, and deep venous thrombosis
- Wound infection was lower in LG patients (1.1%) than in OG patients (8.2%).
- Relapse rate of 2.3% in LG and 1.1% in OG patients

Conclusions

- Short-term results indicate that laparoscopic incisional hernia repair is associated with a shorter operative time and hospitalization, a faster return to work, and a lower incidence of wound infections
- Further studies and longer follow-up are required to confirm these findings

Comparison of Laparoscopic and Open Repair With Mesh for the Treatment of Ventral Incisional Hernia

A Randomized Trial

Kamal M. F. Itani, MD; Kwan Hur, PhD; Lawrence T. Kim, MD; Thomas Anthony, MD; David H. Berger, MD, MHCM; Domenic Reda, PhD; Leigh Neumayer, MD; for the Veterans Affairs Ventral Incisional Hernia Investigators

- Multicenter Randomized Trial: 4 VA medical centers
- VIH measuring 25 to 225 cm2
- 162 pt with VIH met the enrollment criteria
- Randomized: LR (n=80) or OR (n=82) hernia repair.
- Open procedure: components separation with on-lay polypropylene mesh
- Laparoscopic procedure: PTFE dual mesh
  - transabdominal fixation sutures and tacks between sutures, Mean f/u 8 weeks
- Demographic characteristics, features of the hernia, coexisting conditions, and ASA score were similar in the 2 groups

Results

- Ten patients (13.7%) assigned to the LR group received an OpR intraoperatively
  - 7 patients: adhesions were extensive and conversion from laparoscopic to open repair was performed
  - 3 patient had bowel injury
- 3 patients, laparoscopic access could not be obtained

Table 2. Postoperative Complications (Primary and Secondary Outcomes)

	Patients, No. (%)				
	Laparoscopic Repair (n=73)	Open Repair (n=73)	*P* Value[a]	Odds Ratio (95% Confidence Interval)	Attributable Risk per 100 Persons[b]
Primary outcome					
Overall complications through 8 wk	**23 (31.5)**	**35 (47.9)**	**.03**		
Other	3 (4.1)	1 (1.4)			
Overall	7 (9.6)	1 (1.4)	.046	8.9 (1.0-76.9)	8.2
Short-term postoperative complications	(n=72)	(n=73)			
Hernia site infection	**2 (2.8)**	**16 (21.9)**			
Bleeding	1 (1.4)	1 (1.4)			
Intra-abdominal abscess	2 (2.8)	2 (2.7)			
Seroma	**6 (8.3)**	**18 (24.7)**			
Other	10 (13.9)	5 (6.8)			
Overall	15 (20.8)	33 (45.2)	.001	0.3 (0.1-0.6)	−24.4
Serious complications within 30 d	(n=68)	(n=72)			
Sepsis	2 (2.9)	0			
Urinary tract infection	1 (1.5)	0			
Other	1 (1.5)	1 (1.4)			
Overall	3 (4.4)	1 (1.4)	.25	4.1 (0.4-45.5)	3.0
Long-term (8 wk) postoperative complications	(n=69)	(n=70)			
Hernia site infection	1 (1.5)	1 (1.4)			
Wound hematoma	0	0			
Intra-abdominal abscess	1 (1.5)	0			
Ileus/bowel obstruction	1 (1.5)	0			
Seroma	0	0			
Skin necrosis	0	0			
Other	1 (1.5)	1 (1.4)			
Overall	3 (4.4)	2 (2.9)	.69	1.5 (0.2-9.4)	1.5

Meta-analysis

Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh

S. S. Forbes[1,2,3], C. Eskicioglu[1,2,3], R. S. McLeod[1,2,3,4] and A. Okrainec[1,5]

Departments of [1]Surgery and [2]Health Policy, Management, and Evaluation, University of Toronto, [3]Dr Zane Cohen Digestive Diseases Clinical Research Centre and [4]Samuel Lunenfeld Research Institute, Mount Sinai Hospital, and [5]Toronto Western Hospital, University Health Network, Toronto, Ontario, Canada

- 8 RCT studies→ 526 patients
- Mean size of the hernias: 23.2 to 141.2 cm2
- Follow-up 6 to 40.8 months

Meta-analysis

Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh

S. S. Forbes[1,2,3], C. Eskicioglu[1,2,3], R. S. McLeod[1,2,3,4] and A. Okrainec[1,5]

Departments of [1]Surgery and [2]Health Policy, Management, and Evaluation, University of Toronto, [3]Dr Zane Cohen Digestive Diseases Clinical Research Centre and [4]Samuel Lunenfeld Research Institute, Mount Sinai Hospital, and [5]Toronto Western Hospital, University Health Network, Toronto, Ontario, Canada

- No significant difference in the risk of hernia recurrence between laparoscopic and open repair in eight studies
- There was no significant difference in seroma formation in six studies
- There was no significant difference in hemorrhagic complications or bowel injuries
- Risk of a wound infection not requiring mesh removal was significantly lower in patients undergoing laparoscopic repair laparoscopic (1.5% vs 10.1%)

Conclusion Meta-analysis

- Laparoscopic repair is at least as safe as conventional open repair
- LR offers a risk of perioperative complications that is $\leq$ than of OpR
- LR decreased wound infection rates, and a trend toward decreased haemorrhagic complications and mesh infections.

Abdominal Wall Reconstruction
Georgetown University Hospital

Pictured documentation that Dr. Judkins believes in VHR!

laparoscopic ventral hernia repair

Sarah Judkins MD and Christopher Raeburn MD

hernia repair (LVHR) but usually resolve spontaneously.

❖Seromas posterior to the mesh occur infrequently and are less likely to spontaneously resolve. They often cause symptoms warranting intervention.

METHODS

❖We present a case of persistent posterior seroma complicated by infection following LVHR.

❖Review of patient records and the literature was performed to examine the incidence and optimal management of posterior seromas.

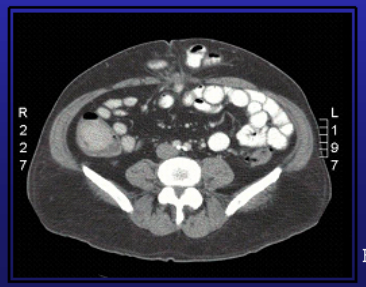
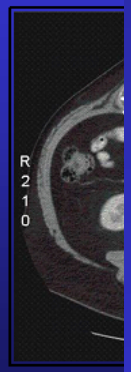


Fig 1

laparotomy for trauma 30 years ago. Fig 1

❖LVHR was
without compl
measured 120
with additiona

❖Three years
to us for a lar
to the mesh fo
that time, he
intermittent c



of purulent fluid from his left upper

RESULTS

❖In Operating Room:

- Laparoscopic removal of mesh
- Laparoscopic component separation
- Tension-free 1° repair midline defects
- Reinforced with Surgisis mesh onlay

Laparoscopic component separation

staged repair

Summary

- Less risk of wound complication
- Shorter hospital stay
- Faster return to work

THE END

Conclusions

- A large, multicenter RCT with rigorous methodology and longer follow-up is needed to measure long-term outcomes
- Alternatives techniques as minimally invasive component separation

References

- 1. Crovella F et al. Incisional Hernia. Springer 2008
- 2. Itani K et al. Comparison of Laparoscopic and Open Repair With Mesh for the Treatment of Ventral Incisional Hernia. A Randomized Trial. Arch Surg. 2010;145(4):322-328
- 3. Forbes S et al. Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh. British Journal of Surgery 2009; 96: 851–858
- 4. Barbaros U et al. The comparison of laparoscopic and open ventral hernia repairs: a prospective randomized study. Hernia 2007; 11:51–56
- 5. Carbajo M et al. Laparoscopic treatment vs open surgery in the solution of major incisional and abdominal wall hernias with mesh. Surg Endosc 1999; 13: 250–252
- 6. Misra MC et al. Comparison of laparoscopic and open repair of incisional and primary ventral hernia: results of a prospective randomized study. Surg Endosc (2006) 20: 1839–1845
- 7. Breuing K et al. Incisional ventral hernias: Review of the literature and recommendations regarding the grading and technique of repair. Surgery 2010;148:544-58
- 8. Olmi S et al. Laparoscopic versus open incisional hernia repair An open randomized controlled study. Surg Endosc (2007) 21: 555–559
- 9. Jin J, Rosen M. Laparoscopic Versus Open Ventral Hernia Repair. Surg Clin N Am 88 (2008) 1083–1100
- 10. de Vries Reilingh TS, van Goor H, Charbon JA, et al. Repair of giant nmidline abdominal wall hernias: “components separation technique” versus prosthetic repair: interim analysis of a randomized controlled trial. World J Surg 2007;31:756–63.
- 11. Todd Heniford et al. Laparoscopic Repair of Ventral Hernias. Nine Years’ Experience With 850 Consecutive Hernias. Ann Surg 2003;238: 391–400