Ventral Hernia Repair: Revisonal Surgery

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DISCLOSURE

- Ethicon Endosurgery
- Olympus
- Covidien
- APOLO
- GI Dynamics

Incidence

- 2 Million laparotomies per year in U.S.
- 2%-11% result in incisional hernias
- 90,000 hernia repairs per year
- Most common first 5 years

Incidence

- Recurrence after initial repair – 15-40 %
- Recurrence after second repair – can exceed 50% with traditional technique

*Mudge M et al, Br. J. Surg, 1985, 72:70-71

Risk Factors

- Wound Infection
- Abdominal distension
- Age - Gender
- Obesity
- Emergency laparotomies
- Early re-exploration
- Immunosuppression
- Technique

Surgical Options

- Primary Closure defect >4cm (failure 31-54%)*
- Primary closure with relaxing incisions
- Primary closure with onlay Mesh
- Onlay mesh only
- Retrorectus mesh (Stoppa)
- Inlay mesh (Open - Laparoscopic)
- Sandwich technique

* Hesselink VJ. Surg Gynecol Obstet 1993;176(3):228-34

Progress – Repair with mesh

- Decreased recurrence rate – 10%
- Increased complication rate:
  - **Wound Infection**
  - **Adhesion formation**
  - **Entercutaneous Fistula**

Mudge M et al, Br. J. Surg, 1985, 72:70-71

The Next Step : Laparoscopic Repair

- Described by LeBlanc and Booth in 1993
- Allows for decreased recurrence rate of mesh repair
- Decreased Wound complication rate

LeBlanc KA et al, Surg Laparosc Endosc 1993,3:39-41

Laparoscopic Repair

- ↓ Hospital stay
- ↓ Postoperative pain
- ↓ Recurrence (4% vs 16.5%)*
- ↓ Infection: Wound (1.1%); Mesh(0.6%)

Table 1 Comparison studies of laparoscopic and open ventral hernia repairs

		# Patients		Morbidity		Mesh infection		Wound infection		Recurrence	
Study	Year	Lap	Open	Lap	Open	Lap	Open	Lap	Open	Lap	Open
McGreevy	2003	65	71	5	15	2	0	0	7	—	—
Raftopoulos	2003	50	22	14	10	1	0	1	1	1	4
Wright	2002	90	90	15	31	1	1	1	8	1	5
Robbins	2001	18	31	—	—	1	4	1	0	—	—
DeMaria	2000	21	18	13	13	1	2	1	4	1	0
Chari	2000	14	14	2	2	0	1	—	—	—	—
Carbajo	1999	30	30	20	6	0	3	0	5	1	2
Ramshaw	1999	79	174	15	46	1	5	6	2	2	36
Park	1998	56	49	10	18	2	1	0	2	6	17
Holzman	1997	21	16	5	5	0	1	1	0	2	2
Percent				23.2	30.2	2.0	3.5	2.6	5.8	4.0	16.5

•Novitsky Y, Heniford T. Laparoscopic ventral hernia repair. OTGS 2006;8(1):4-9

Patient Selection

- **Poor candidates for open or laparoscopic repair:**
  - **End Stage Cardiac Disease**
  - **End Stage Pulmonary Disease**
  - **End Stage Liver Disease**
- **Questionable for laparoscopic approach:**
  - **End stage renal disease treated with peritoneal dialysis**
  - **May have a fibrinous peel that obliterates the abdominal free space**

Heniford et al, Ann Surg 2003, 238:391-400

Patient Selection

- Hernia Size:
  - Lower limit : 2 cm transverse diameter
  - Upper limit : <15 cm
    - **Recommend an overlap of 3-4 cm of mesh around hernias**
    - **Larger hernias difficult technically:**
      - **Loss of abdominal domain**
      - **Trocar placement**
      - **Accurate mesh placement**

Heniford et al, Ann Surg 2003, 238:391-400

Ventral Hernias

Recurrence after Laparoscopic Repair

Author	*n*	Recurrence (%)	Mean Follow up
Koehler (1999)	34	9	20m
Rosen (2003)	100	17	30m
Constanza (1998)	16	6	18m*
Heniford (2000)	819	4.7	20m
Carbajo (2000)	100	2	30m

*** Series of recurrent ventral hernia repairs**

Rosen M et al, Surg Endosc, 2003, 17:123-128

Ventral Hernias

Diagnosis

Additional tools

In Painful or Obese Abdominal wall

- Ultrasound
- CT Scan
- MRI

Truong SN et al, Chapter 8, in Hernia R Fitzgibbons and A Greenburg

Ventral Hernias

Diagnosis

Differential Diagnosis of Hernia with:

- Lymphnode
- Hemathoma
- Metastasis
- Seroma
- Recurrence

Truong SN et al, Chapter 8, in Hernia R Fitzgibbons and A Greenburg

Type of Meshes

- **Monofilament polypropylene (Marlex)**
- **Double-filament polypropylene (Prolene)**
- **Expanded polytetrafluoroethylene (PTFE)**
- **Tissue separating:**
  - **Polyester**
  - **Polypropylene**

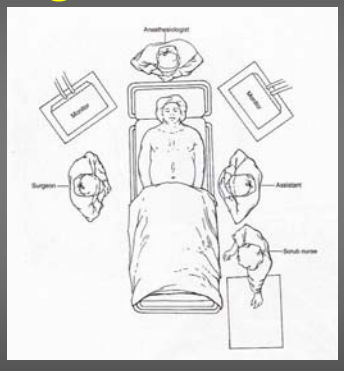
Non adhesive interface

- **Vicryl**
- **Dexon**
- **Xenografts (Surgisis, Permacol**
- **Homografts (Alloderm)**

Absorbable

Laparoscopic Repair
Positioning

- **No Bowel prep**
- **Preoperative antibiotics**
- **Arms tucked**
- **Foley cath/OGT-NGT**
- **Longitudinal Log Roll**
- **Wide prep**



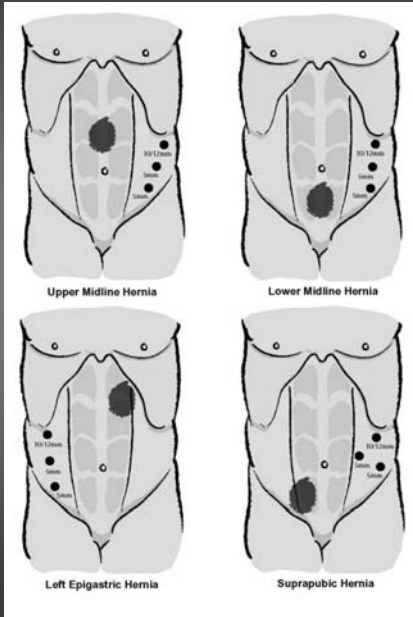
Gersin KS Laparoscopic incisional hernia repair. OTGS 2004; 6(3): 189-99

Laparoscopic Repair
Trocar placement

- Hasson technique
- Tip of 11th rib
- Transverse umbilical line
- Away from hernia defect
- Opposite to previous surgery site

Operative Technique

- Access abdomen using Hassan technique or direct visual access trocar
- Enter in area away from previous incisions
- Adhesiolysis performed and the hernia is reduced
- Hernia defect is measured and a piece of mesh chosen with 3 cm overlap

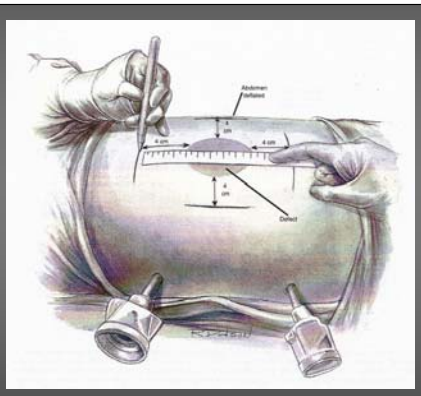


Laparoscopic Repair
Lysis of adhesions

- **Avoid energy sources**
- **Traction counter-traction**
- **Wide LOA (Falciform, bladder)**
- **ENTEROTOMY!!!!**

Laparoscopic Repair
Measuring Defect

- Intraperitoneally
- Extra-abdominally
- 4-5 cm overlap
- Multiple defects counted as one



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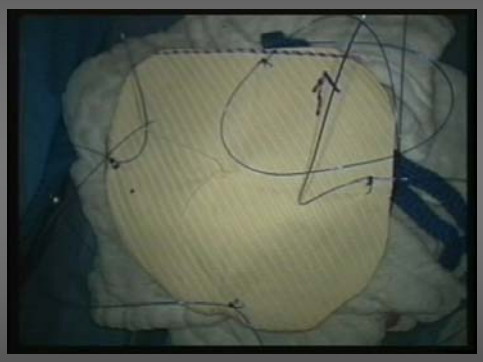
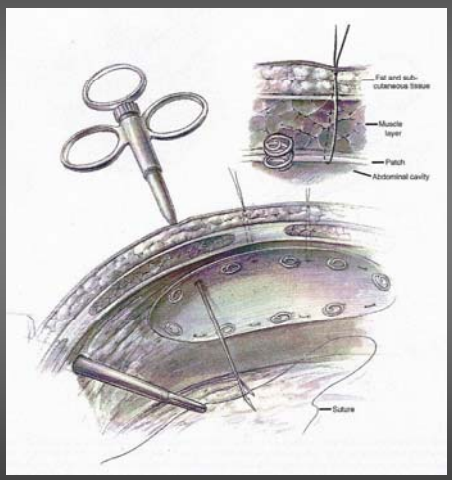
Laparoscopic Repair
Mesh Preparation

- Correct orientation and marking
- Cardinal non-absorbable sutures
- Rolling and insertion



Laparoscopic Repair
Parachuting of Mesh

- **Start from longer axis at "limited space borders"**
- **Complete side away from camera**
- **Tack circonferentially (1-2 cm interval)***
- **Additional transfascial sutures (4-6 cm interval)***



* Heniford BT. Ann Surg 2003;238(3):391-9

CAUSES of RECURRENCE

Evolution of technique
Inexperience (learning curve)
Incomplete dissection
Missed hernia
Missed lipoma (herniated preperitoneal fat) of cord or of direct hernia
Inadequate reduction of direct hernia sac
Inadequate dissection of proximal indirect sac from cord
Rolling of mesh
Mesh size and configuration
Too small
Inadequate overlap of defect
Migration
Configuration (slit or keyhole)
Mesh fixation
Mesh poorly fixed laterally
Mesh poorly fixed medially
Clips pulled through
Mesh never stapled
Issue of mesh fixation versus nonfixation
Mesh displacement
Hematoma
Seroma
Migration
Rolling of mesh
Shrinkage

Davis CJ, Arregui ME. Surg Clin N Am 2003; 83: 1141-61

INTRAOPERATIVE COMPLICATIONS

Related to laparoscopic technique
Trocar injury to bowel, bladder
Trocar site hemorrhage
Abdominal wall hematoma
Hypercapnia
Subcutaneous emphysema
Pneumomediastinum
Pneumothorax
Related to laparoscopic hernia repair
Vascular injury
Femoral vessels
Epigastric vessels
Gonadal vessels
Nerve entrapment (stapling, tacking)
Transection of vas deferens
Transection of nerve(s)

Davis CJ, Arregui ME. Surg Clin N Am 2003; 83: 1141-61

POSTOPERATIVE COMPLICATIONS

Related to the patient
Urinary retention
Others (MI, PE, DVT, etc.)

Related to the hernia repair
Seroma
Hematoma
Hydrocele
Neuralgias
  Nerve entrapment (staple)
  Nerve injury
    Ilioinguinal
    Lateral cutaneous nerve
Groin pain
  Early (transient)
  Late (chronic)
Testicular problems
  Pain
  Swelling
  Orchitis
Trocar site hernia with secondary:
  Small bowel obstruction
  Incarcerated omentum
Small-bowel obstruction from peritoneal hole
Wound infection
Mesh complications
  Infection
  Late rejection

Davis CJ, Arregui ME. Surg Clin N Am 2003; 83: 1141-61

Synthetic	Biologic
Advantages	**Advantages**
■ Strength ■ Clinical experience ■ Cost	■ Support angiogenesis ■ Native tissue repair ■ Resistance to infection
Disadvantages	**Disadvantages**
■ Chronic inflammation ■ Chronic pain ■ Chronic infection ■ No vascular ingrowth	■ Lack of remodeling ■ Initial ↓ burst strength ■ Cost ■ Failure in infected fields? ■ Disease transmission?

Costs

Synthetic	Biologic
Prolene ¢ 15/cm²	**Bovine Pericardium** $ 19/cm²
Light Weight Polypropelene ¢ 30/cm²	**Human Dermis** $ 29-31/cm²
Tissue Separating $ 2.5/cm²	

Biologic mesh
Current Applications in Hernias

- Contraindication to synthetic mesh use (Infected or contaminated field)
- Damage control abdomen
- Hiatal hernias
- Incarcerated - strangulated hernias
- Prophylaxis for high risk patients (ostomy, obese)
- Uncomplicated inguinal hernias
- Uncomplicated ventral hernias

Biologic mesh vs. synthetic
Data

- No randomized trials for ventral hernias
- One randomized trial for inguinal hernias
  - **Ridgway DM. Br J Surg 2005; 92: 21**

    Similar results, but Less pain
- One randomized trial for hiatal hernias
  - **Oelschager BK. Ann of Surg 2006**

How to choose a mesh

- Technique:
  - Intraperitoneal ?
- Contamination
  - Yes = Biologic vs Light weight (?)
- Type of Hernia
  - Large defect vs “Swiss cheese”

Does technique affect outcomes?

Ponsky J. J Am Coll Surg. 2007 Nov;205(5):654-60

- Alloderm:
  - Bridged group (n=11): 80% recurrence
  - Reinforced group (n=26): 20% recurrences
- Conclusions:
  - AlloDerm should be used only as a reinforcement after primary fascial re-appoximation

Conclusions

Biologic Meshes

- Definite role in:
  - Complex ventral hernias
  - Hiatal hernias
  - Contaminated field
- Probable role in:
  - Infected field
  - Uncomplicated inguinal hernias
- Unknown role in:
  - Uncomplicated ventral hernias

Mechanisms of recurrence

- **Missed hernia defect**
- Mesh **contraction / migration**
- Fixation failure/ **inadequate fixation**
- **Mesh too small**/ inadequate coverage (inadequate overlap)
- Mesh failure
- Tissue failure

Avoiding recurrence

- Clear visualization
- Wide coverage
- Secure fixation
- Mesh
- Future
  - Biomaterials
  - Biological mesh
  - Grown factor
  - Biodegradable Polymer Network + Grown factor

THANKS