

# ABDOMINAL WALL RECONSTRUCTION

## Incidence

- Approximately 2 million laparotomies performed per year in the US
- Incisional hernias develop in 2-11% of patients, usually within 2 years of the initial operation
- Approximately 100,000 incisional hernia repairs performed per year
- After repair, these hernias recur in 30-60% of patients in whom a prosthetic mesh or patch is NOT used
- In repairs with a prosthesis, recurrence rates are decreased to 6-10%

## Clinical Presentation

- 1<sup>st</sup> sign – an asymptomatic bulge at former incision site
- Enlargement of bulge
- Pain with movement/coughing/straining
- Vomiting, obstipation, severe pain – signs of strangulation of incarceration

## Risk factors

- Wound infection, abdominal distention, pulmonary disease (COPD), obesity, male gender, age>65, emergency surgery, malnutrition, type of closure (mass vs. layered)
- Surgical site infection is the most significant independent risk factor for development of hernias (20-30%)

## Primary Repairs

- Usually for fascial defects <5cm
- Recurrence rates are usually around 50%
- Tension is almost always present in the repair
  - Relaxation incisions
  - Internal retention sutures

## Components Separation Technique

- Technique is based on enlargement of the abdominal wall surface by translation of the muscular layers
- After mobilization of the skin, the external oblique is transected just laterally from its insertion into the rectus sheath and separated from the internal oblique
- Then, the rectus abdominus sheath is advanced medially (gain 14-20cm)
- If still under tension, the posterior sheath can be separated from the rectus for a further gain of 2-4cm.
- Advantages – usually tension free primary repair, good alternative if biomaterials are contraindicated
- Disadvantages
  - reherniation rate relatively high (5-30%),
  - skin/subcutaneous tissues must be mobilized over a large distance to reach the aponeurosis of the external oblique
    - hematoma/seroma/infection

- blood supply endangerment → skin necrosis

### Prosthetics

- Mesh types: absorbable, permanent with incorporation into tissue, permanent without incorporation, composite
- Polypropylene – (Marlex, Prolene) permanent, nonabsorbable, tissue ingrowth
- Polyester – (Mersilene) permanent, nonabsorbable
  - High rate of entero-cutaneous fistulazition, infection, recurrence of hernia
- Polytetrafluorethylene/PTFE – (Teflon, Gore-Tex, Dualmesh) permanent, nonabsorbable
  - Fewest bowel complications given non-adhesive properties
- Polyglactin 910 – (Vicryl) absorbable
  - Used only when there is a greater risk of infection
  - Can skin graft over mesh once granulation occurs
- Alloderm – cadaveric acellular dermal matrix
  - dermal cells removed with sodium deoxycholate and then freeze dried
  - chemical preparation yields dermal collagen, elastin, and laminin within a residual dermal matrix
  - undergoes neovascularization with cellular ingrowth
- Complications: infection, fistula formation, bowel adhesions, recurrence

### Mesh Repairs

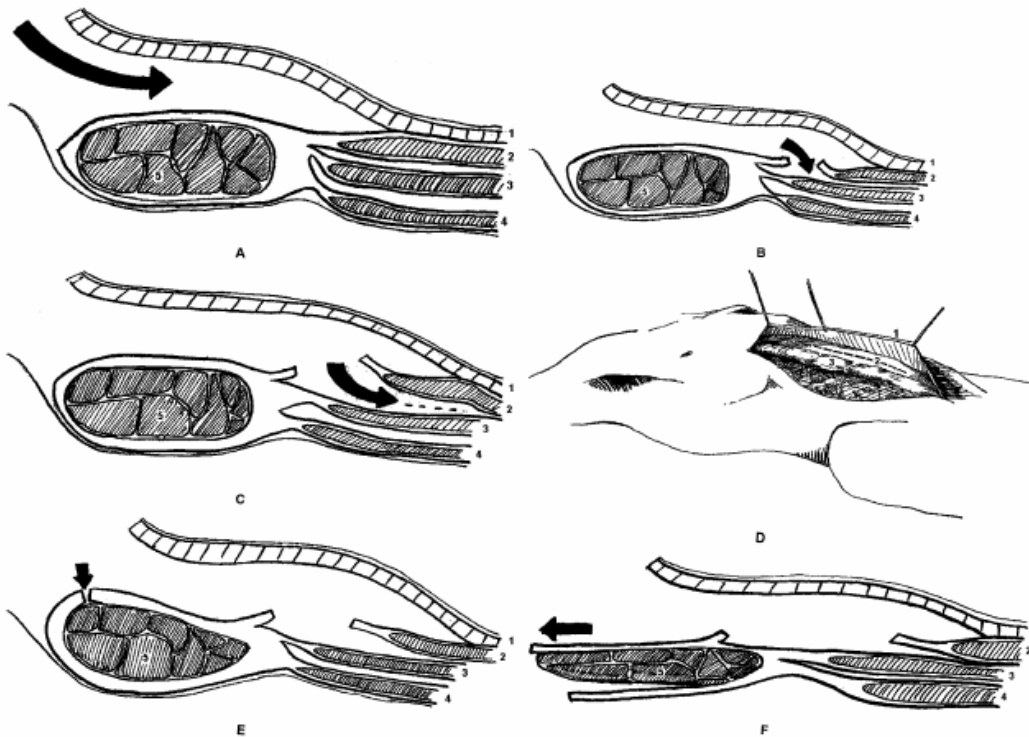
- Onlay mesh
  - Reinforce a primary repair
  - Sutured to anterior rectus sheath
  - Requires ~5cm margins from defect suture line
  - Advantages – mesh separated from abdominal contents
  - Disadvantages – large subcutaneous dissections required → seromas → infection, primary repair often under tension
- Inlay mesh
  - Hernia sac excised and healthy fascial/muscular edge identified
  - Mesh is circumferentially sewn to fascial edges
  - Advantages – lower recurrence rate than onlay repairs, no tension
  - Disadvantages – significant tension and fascial/mesh suture interface
- Sublay mesh (Rives-Stoppa repair)
  - the peritoneum/hernia sac is incised in the midline
  - Dissection is performed between the posterior sheath/preperitoneal space and the rectus abdominis muscle until the perforators are visualized laterally
  - The posterior sheath is closed primarily
  - Mesh prosthesis is sewn in the retromuscular space provide
    - should extend at least 5cm beyond the defect
    - fixated to overlying rectus muscle
    - in no place is the suture in contact with both the prosthesis and the skin, removing a potential avenue for bacterial seeding of the foreign body

- Anterior rectus sheath reapproximated
  - Complications: seroma formation (12%), infection and mesh removal (4%)
  - Polypropylene or PTFE can be used
    - PTFE may be advantageous if there is breakdown of the posterior sheath with resultant direct exposure to bowel
  - Advantages – recurrence <10%
  - Disadvantages – technically more difficult
- Underlay mesh
    - Mesh placed intraperitoneally
    - Bilayer prosthesis with nonadhesive side facing down
    - Advantages – large piece of mesh can be used reducing recurrence rate to approx. 5%, can be done laparoscopically
    - Disadvantages – intra-op bowel injury more likely

## References

- Vries Reilingh et al. “Components Separation Technique” for the repair of large abdominal wall hernias. *J Am Coll Surgery* 2003 Jan;196(1):32-7.
- Bauer JJ et al. Rives-Stoppa procedure for repair of large incisional hernias: experience with 57 patients. *Hernia*. 2002 Sep;6(3):120-3.
- Heartsill L. Open Rives-Stoppa ventral hernia repair made simple and successful but not for everyone. *Hernia*. 2005 9:162-166.

# Components Separation Technique



**Figure 1.** Technique of the "component separation technique" following Ramirez and colleagues.<sup>3</sup> After entering the abdominal cavity, the bowels are dissected free from the ventral abdominal wall. (1A) The skin and subcutaneous fat (1) are dissected free from the anterior sheath of the rectus abdominal muscle (5) and the aponeurosis of the external oblique muscle (2). (1B and 1C) The aponeurosis of the external oblique muscle (2) is transected longitudinally about 2 cm lateral from the rectus sheath, including the muscular part on the thoracic wall, which extends at least 5 to 7 cm cranially of the costal margin. (1D) The external oblique muscle (2) is separated from the internal oblique muscle (3), as far laterally as possible. (1E and 1F) If primary closure is impossible with undue tension, a further gain of 2 to 4 cm can be reached by separation of the posterior rectal sheath from the rectus abdominal muscle (5). Care must be taken not to damage the blood supply and the nerves that run between the internal oblique and transverse (4) muscle and enter the rectus abdominal muscle at the posterior side.

# Rives-Stoppa Repair

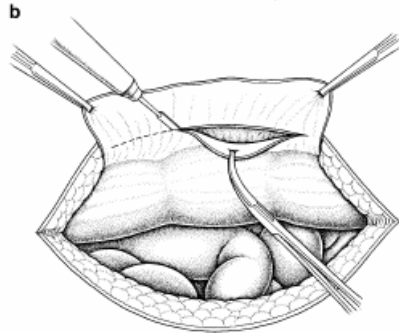
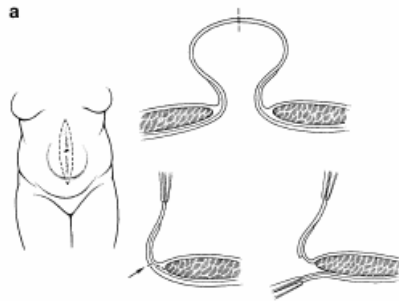


Fig. 1a, b. The peritoneum is incised in the midline. Dissection begins between the posterior sheath and the rectus abdominis muscle

postoperative doses were routinely administered. Antibiotics were continued in several patients who developed wound erythema in the early postoperative period. Twenty patients had one or two closed suction drains placed in the subcutaneous space for 2-4 days following the procedure. In addition, all patients received deep venous thrombosis prophylaxis with intermittent compression boots, which were applied immediately prior to induction of anesthesia. The boots were discontinued when patients were independently ambulating postoperatively.

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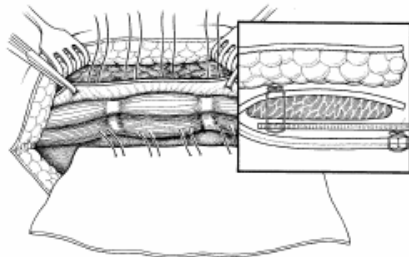


Fig. 4. The prosthesis is secured in the retromuscular space as shown. *Inset*: Final position of the mesh and sutures

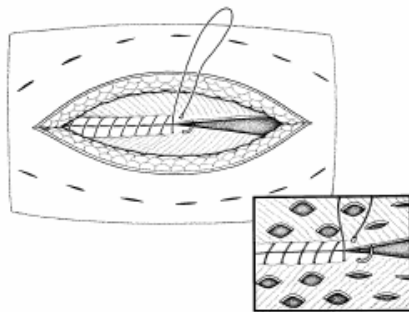


Fig. 5. The anterior sheath is closed. If tension is present, relaxing incisions may be used (*inset*)

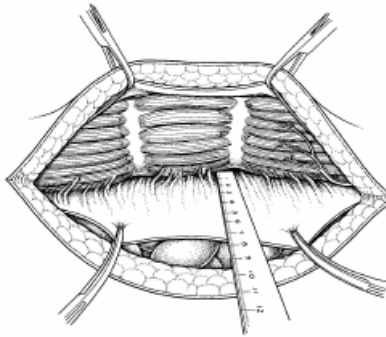


Fig. 2. Dissection continues laterally until the perforating vessels are clearly seen. Care is taken to preserve this blood supply to the rectus muscle

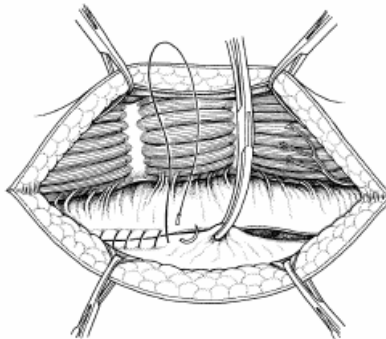


Fig. 3. The posterior sheath is closed primarily (this can almost always be accomplished). Any gaps in coverage can be sutured or covered with vicryl mesh to prevent contact between the prosthesis and the intra-abdominal contents