

Infected grafts of incisional hernioplasties

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Summary: Prosthetic grafts are used often enough for incisional hernioplasty to familiarize surgeons with the management of some complications that are bound to occasionally occur despite correct medical decisions and excellent surgical technique. This paper discusses five cases of infection in grafted incisional hernioplasties. Two are examples of the possibility that exposed and infected grafts can be saved in spite of the loss of a large amount of covering skin, and another when complicated by an intestinal fistula. In a series of 66 incisional hernioplasties performed in the past three years, five wounds developed infections that involved the mesh grafts. Two cases have a higher degree of interest in that one involved an intestinal fistula, and another a large area of skin loss. All five were successfully treated to complete healing without evidence of residual infection or recurrence of the hernias. The overall success rate for patients followed a year or longer is 95%. Eventual recovery did not guarantee that in the postoperative period additional care was not required, rather it was a time reached when the patient was free of wound problems and an intact repair remained. Treatment of infected mesh repairs require aggressive management including diligent local wound care in all cases, and also, though arguably, systemic antibiotics as well. Equally important is a high degree of patience by the surgeon, the patient and the family for the long time and tedious care needed even to attempt to salvage the grafted repair. These complications are treatment-intensive; they require an unlimited amount of attention and concern by the entire surgical staff to achieve a successful outcome.

Key words: Incisional hernioplasty — Infection — Prosthetic mesh grafts — Monofilament suture — Intestinal fistula — Skin slough

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Within the general classification of hernias, about 10% of those repaired are of the incisional variety. These vary related to: the size of the previous incision, if it was complicated by infection, excessive obesity of the patient and the degree of retraction of the lateral muscles over time [Ponce 1971, Wantz 1991].

Complications associated with incisional herniorrhaphy are troublesome, the most problematic and controversial being management of an infected prosthetic graft. Herniorrhaphy through a previously infected wound is at risk for reinfection despite complete healing of the skin and absent any current signs of infection.

When infection occurs in a herniorrhaphy wound, the organisms cultured frequently are identical to those from the prior wound's flora. Houck et al reported a 16% infection rate in incisional hernia repairs in clean non-infected wounds compared to 1.5% for other clean abdominal operations [Houck 1989].



Fig. 1
Split-thickness coverage following skin sloughs after incisional hernioplasties (two patients not part of this three-year series)

It is erroneous to assume that an infected mesh graft must be removed early to achieve wound healing. If the infected mesh is removed, it is almost certain the hernia will soon recur. When grafts are sutured with cotton, silk or other braided materials, it is customary for infected wounds to drain endlessly. Many form sinuses that persist until they are opened widely and all infected sutures together with the mesh removed. It is clear that in most cases persistent infection is related to the presence of multifilamented sutures, not monofilament mesh. Use of monofilament sutures, when needed in hernia repairs with or without mesh, is the highest standard we know today. Its use has allowed many infected mesh grafts to be saved, and subsequently recurrences avoided. Larson et al reported that in infected cases granulation tissue grows through porous mesh, and eventually becomes a satisfactory bed for the application and growth of split thickness skin grafts [Larson 1978]. We have observed this as well (Fig. 1).

This report concerns five cases of incisional herniorrhaphy with grafts that became infected and were managed successfully without removal of the graft or evidence of hernia recurrence. Unique to this report is one case complicated by an intestinal fistula, and another by a large skin slough.

Methods

We reviewed our experience with 66 patients who underwent repairs of incisional hernias. Only those who had prior surgery through an abdominal incision that subsequently herniated were included in this series; some had up to four prior unsuccessful repairs. There were 34 females whose ages ranged from 32 to 85 years; the average being 59 years. There were 32 males whose ages ranged from 31 to 81 years, the average being 57 years. Females weighed from 111-256 lbs (50-106 kg), the average being 178 lbs (81 kg). Males weighed from 135-278 lbs (61-126 kg), the average being 209 lbs (95 kg). Hernias were related to various intraabdominal operations, or to prior herniorrhaphies. Operations that preceded development of the incisional hernia included diverticulosis, cholecystectomy, gynecologic operations, appendectomy, umbilical herniorrhaphy and post-sternotomy abdominal defects. Ten patients developed hernias in laparoscopic trocar sites.

Pure tissue repairs were done in three patients. Mersilene mesh was used in 27 patients and Prolene mesh in 36 patients. Typically, the smaller hernias were repaired with sutured tissues or prolene grafts. The larger hernias were repaired using Stoppa's technique with mersilene mesh fixed by transcutaneous monofilament coated sutures of PDS (Maxon) [Stoppa 1989].

Patients had either regional or general anesthesia. Operating times varied; they averaged 53 min for those repaired with prolene grafts, and 105 min for those repaired with mersilene grafts. Larger patients took proportionally more operating time, and in most cases mersilene grafts were used for the larger hernias. Perioperatively, all patients received a first-generation cephalosporin, or clindamycin if allergic to penicillin.

For patients judged to be at greater risk for bowel injury, or those who had evidence of bowel obstruction, mechanical bowel preparation and oral antibiotics were used. Suction drains were

used in all larger repairs. All patients with drains spent at least one night in the hospital. The longest hospital confinement was 10 days, that being in a patient who had respiratory insufficiency. On an individual basis, selected patients received subcutaneous heparin postoperatively to discourage development of deep venous thrombosis. Respiratory incentive spirometry was used routinely to minimize pulmonary complications. Patients were followed until total wound healing was certain, and then again at least a year after their surgery to check on the status of their repairs. After at least one year follow-up in 40 of our 66 patients repaired, two recurrences (5%) have been identified.

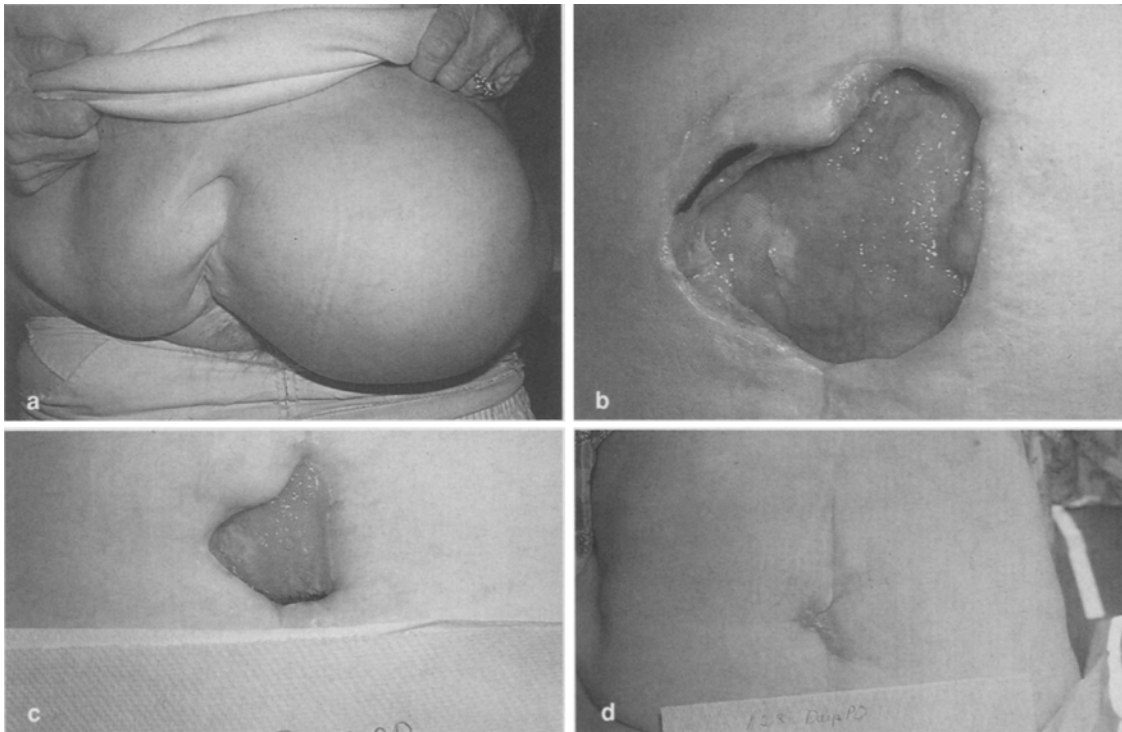
Results

Systemic complications included postoperative ileus (3 patients), atelectasis or pneumonia (6 patients), and urinary retention (1 patient). One 80 year old male expired. He had been discharged two weeks earlier with an uncomplicated repair. Autopsy revealed he succumbed to a massive myocardial infarction.

Seroma that required aspiration occurred in 8 patients, a rate of 12%. Three of these had mersilene grafts (11%), the other five had prolene grafts (14%).

Infection occurred in 3 out of 27 patients (11%) with mersilene grafts, and in 2 of 36 patients (6%) with prolene grafts, for an infection rate of 8% for the entire group.

All five patients that developed serious wound infections required aggressive treatment with adequate drainage, antibiotics and diligent local wound care. Four of these patients had cultures of their infected wounds; the fifth was treated without antibiotics because she presented with an open wound of one week and evidence of progressive healing. One patient developed a small bowel fistula which required hospital confinement and parenteral feeding. Once the fistula closed, the infected graft was treated

**Fig. 2a-d**

Case #4. **a** Preoperative appearance with incisional hernia. **b** Postop 21 days, 100 Square centimeters of exposed mesh. **c** Postop 60 days. **d** Postop 128 days

until it became incorporated into granulation tissue. Another patient had a large skin slough with gross exposure of the mersilene graft. The large subcutaneous and dermal defect progressively closed by contraction of surrounding tissues. Skin flaps or grafts were not needed to obtain satisfactory coverage of the defect.

Case #1. JB, a 49 year old male who weighed 233 lbs (106 kg), presented 6 years following upper abdominal incisional herniorrhaphy that resulted from a median sternotomy for cardiac surgery. The initial hernia repair became infected and was treated for 6 months until it closed. The patient presented with a large recurrent epigastric hernia. At surgery the old subcutaneous and dermal scar was excised, and the fascial defect was repaired with a retromuscular prolene mesh graft using interrupted 2-0 PDS transfascial and continuous 3-0 prolene sutures. Ancef was given perioperatively. The wound was drained. The patient did well for 10 months; then he presented with a draining sinus through the mid-portion of the surgical incision.

Culture revealed beta non-hemolytic streptococcus and staphylococcus aureus. Initial treatment included oral antibiotics, wound packing and normal saline irrigation. After three weeks, the sinus tract was excised along with some pale-green suture material, different than we used; apparently it remained from the earlier operations. The wound was packed open. It healed completely after four months. Through 16 months, there is no evidence of infection or recurrence of his hernia.

Caveat: Previously infected wounds may harbor chronically contaminated multifilamented suture material. When reoperation is performed, removal of all old suture material will reduce the chance of forming a stitch-abscess or a draining sinus. If a stitch-abscess occurs in a mesh-graft repair, it is recommended to initially excise the infected stitch and sinus tract without removing the mesh.

Case #2. LF, a 65 year old female who weighed 181 lbs (82 kg), presented 25 years after tubal ligation. At the operation incarcerated omentum was

excised. A 10 x 10 inch (24 x 24 cm) mersilene graft was inserted into the retromuscular plane and held in place with transcutaneous PDS sutures. Nine days following surgery the central portion of the wound became reddened. Vibramycin was started, and the redness disappeared. On the 21st day the wound opened. Proteus was cultured. The wound was treated with normal saline irrigation and packing until it closed completely in the 14th postoperative week. Ten months after surgery there is no further evidence of infection or recurrence of the hernia.

Caveat: The presence of acute inflammation or suspected infection in a recent mesh-graft hernioplasty does not imply that the mesh is infected or must be removed. Prompt treatment with antibiotics may prove curative, but can be misleading regarding the wound's response. Once infection has become clearly evident, the wound should be opened enough to allow aggressive local care of the entire grafted area.

Case #3. MF, a 62 year old female who weighed 205 lbs (93 kg), presented with an upper and lower midline abdominal

**Fig. 3a, b**

Case #5. **a** Postop 60 days, 34 days after the fistula sealed.

b Postop 122 days

hernia. Following a laparoscopic appendectomy she developed small bowel obstruction which required lysis of adhesions, also a cholecystectomy was done. She developed intraabdominal abscesses which were drained percutaneously via radiological guidance. The hernia contained transverse colon and she suffered intermittent partial colonic obstruction. Preoperatively she was given mechanical bowel preparation and oral erythromycin base and neomycin sulfate. Mefoxin was given at surgery. The hernia was repaired with an 11 x 8 inch (27 x 19 cm) mersilene graft in the retromuscular plane, held in place by 2-O PDS transcutaneous sutures. For two months there was no evidence of wound infection. In the ninth postoperative week the wound opened, exposing the mesh. Treatment consisted of normal saline irrigation, packing and oral cephalosporins. Complete wound closure occurred in the 14th week. Two years following the herniorrhaphy she has remained free of infection with an intact repair.

Caveat: Late appearance of infection following incisional hernioplasty is not unusual, especially when the previous

incision was infected. Prompt opening of the infected wound with the aggressive wound care will usually be successful for cure without removal of the mesh.

Case #4. HB, a 75 year old female who weighed 168 lbs (73 kg), 20 years earlier had a herniorrhaphy in a cholecystectomy incision. That repair failed and she presented with a large hernia that now protruded primarily to the left side of her abdomen (Fig. 2a-d). She had been repeatedly refused surgery for this increasingly symptomatic incapacitating hernia because of her history of asthma and several myocardial infarctions. Following cardio-pulmonary preparation, her hernia was repaired with a retromuscular 12 x 12 inch (30 x 30 cm) mersilene graft and transcutaneous PDS sutures. The skin covering the entire hernia had become thinned as the hernia had enlarged. This resulted in a significant slough which required debridement and exposure of the graft. Cultures showed methicillin-resistant staph. She was treated as an out-patient with intravenous vancomycin. Readmission was necessary for additional debridement.

Repeat cultures showed *Pseudomonas aeruginosa*. A central line was established for prolonged intravenous antibiotics; the wound was irrigated and packed, and she was seen twice weekly in the office to check her progress. After the skin slough and debridement, the open circular-shaped wound exposed about 100 cm² of unprotected mersilene mesh. It was anticipated that skin grafting would eventually be necessary to cover this wide defect. After 18 weeks of accumulated granulation tissue growth into and through the mersilene, and with simultaneous contracture of the surrounding skin, the wound healed completely, obviating the need for a coverage procedure. Since then, two small areas of the wound have drained spontaneously. These have been incised in the office and have healed. No suture material or mesh has been exposed or removed. At present she is clinically infection-free and without evidence of hernia recurrence.

Caveat: Complete wound closure will occur over exposed mesh-graft repair given adequate debridement, aggressive local care and time. Skin grafting should be reserved for only those wounds that don't get progressively smaller after many months of conscientious care. It is not unusual for a large open wound to take four to six months to close completely.

Case #5. RG, a 49 year old male who weighed 201 lbs (91 kg), presented with a large upper abdominal incisional hernia, the result of a two-stage procedure for perforated diverticulitis one year earlier. His repair was done with a retro-muscular 6 x 10 inch (15 x 24 cm) prolene mesh and 2-0 prolene transfascial sutures. A rapidly expanding wound hematoma developed and the patient was returned to the operating room on the second post-op day. The hematoma was drained. Cultures proved negative. He was discharged on the 9th post-op day, afebrile and doing well. Five days later he developed a wound abscess and was returned to the operating room for drainage. Cultures revealed staph aureus. He was treated with IV Methicillin, and

normal saline wound irrigation and packing. On the 17th PO day the exposed prolene mesh buckled and became stained yellow. A charcoal meal and CAT scan confirmed the diagnosis of an intestinal fistula. A 3 x 3 cm window was cut out of the prolene mesh that covered the external opening of the fistula. Cultures showed multiple enteric organisms with heavy growths of enterococcus alpha hemolytic strep and prevotella melaninogenica. The patient was made NPO, given IV hyperalimentation, Tagamet and Somatostatin. Drainage was 200 cc initially and it gradually decreased until the fistula closed completely on the 9th day of treatment. On the 29th PO day he restarted oral intake, and was discharged on the 31st PO day. He was treated as an outpatient with wet to dry dressings, regular diet and oral antibiotics. The wound healed completely 14 weeks after his initial surgery (Fig. 3a, b). He returned to full duty two weeks later as an air-conditioner installer. He has been fol-

lowed for 18 months and is free of infection and with an intact repair. His only expressed concern is the thickness of his scar. This was excised 18 months postoperatively without difficulty.

Caveat: An intestinal fistula, especially one of low-output, complicating a mesh-graft repair, deserves a trial of conservative treatment before the decision is made to remove the mesh. Management of this problem may require that a small area of the mesh be removed to allow proper egress of fistula drainage. Doing so may be just enough, together with conservative management of the fistula, to allow complete healing of the wound without hernia recurrence.

Discussion

Mersilene and prolene meshes proved to be excellent material for incisional hernioplasty. These should be used with monofilament suture, not silk,

cotton or other braided materials. Doing so gives the best chance of mesh graft salvage if infection complicates the healing process. The decision of which mesh to use is mostly related to the size of the defective area of the abdominal wall that requires repair. A case is reported of the successful management of an intestinal fistula complicating a prolene mesh graft repair. Once the fistula was closed, treatment of this herniorrhaphy proceeded with the same success as other cases of infected grafts. If the patient's general condition permits, it is worthwhile to attempt to seal the fistula by conservative measures before deciding to remove the mesh.

All five infected wounds that had hernia repairs done with prosthetic mesh were treated successfully to complete healing without removing the grafts. This in itself is not unusual as the ability for total healing of an infected mesh repair has been recognized and reported for many years.

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