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ORIGINAL ARTICLE

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Mesh herniorrhaphy during elective colorectal surgery

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Abstract The management of large ventral hernias in patients undergoing elective colorectal surgery is controversial considering the reluctance to use a mesh during a clean-contaminated case. We retrospectively reviewed the charts of all patients having undergone at our institution any colorectal surgery along with ventral hernia repair with mesh as identified by the ICD-9 codes between 1997 and 2003. Three patients underwent incisional mesh herniorrhaphy along with elective colorectal surgery, including a right hemicolectomy, a colostomy closure, and a diverting colostomy. Hernia size varied between 330 and 1,243 cm^2. All hernias were repaired using polypropylene mesh in an onlay fashion. Average operative time was 199 min. Two patients developed postoperative wound infection, one of them requiring incision and drainage of a part of the wound. One patient developed skin necrosis of the lower aspect of his incision requiring skin excision and open wound. All open wounds granulated well and healed by secondary intention despite presence of exposed mesh. Therefore prosthetic ventral hernia repair using polypropylene mesh can be performed concomitant to elective colorectal operations, thus avoiding another laparotomy. The incidence of wound complications is, however, high but does not usually require mesh excision.

Keywords Ventral hernia · Surgical mesh · Colorectal surgery · Complications

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Introduction

The management of large ventral hernias in patients undergoing elective colorectal surgery is controversial considering the reluctance of most surgeons to use nonabsorbable mesh during a clean-contaminated case in fear of acute or chronic wound and mesh infections. The presence of a ventral hernia requiring repair in a patient presenting for a colon or rectal operation is not infrequent considering the 2–11% incidence of incisional hernias following abdominal surgery [1]. These hernias are typically treated with primary repair with a rate of recurrence of 10–50% [2] or managed at a later stage. Although mesh hernioplasty is now the gold standard treatment for most ventral hernias, with a 3–17% reported recurrence rate [3], there have been few studies evaluating the safety of using nonabsorbable mesh to repair a hernia in the setting of elective colorectal operations. The aim of this study was to analyze the outcome of patients with mesh ventral hernia repair during colorectal surgery, especially in regards to mesh-related complications.

Methods

We retrospectively reviewed the charts of all patients who underwent simultaneous colorectal operation and ventral hernia repair at the Jackson Veteran's Affairs Medical Center and the University of Mississippi Medical Center between January 1997 and December 2003. The patients were identified by the codes of the *International Classification of Diseases*, 9th edition, for all colon and rectal operations and all ventral hernia repairs. Only patients who had a nonabsorbable mesh used were included. The study was approved by the local institutional review boards. Demographic data, comorbidities, operative records, hospital course, and postoperative clinic notes were reviewed. Particular attention was given to the amount of spillage encountered during the operation and the postoperative short and long-term

complications. Infection was defined as erythema around the incision and/or wound discharge requiring bedside or operative drainage.

Results

Between 1997 and 2003 a total of 31 patients underwent a ventral hernia repair during an elective colon or rectal operation. Only three patients, however, had a nonabsorbable mesh used for the herniorrhaphy. All patients were men with an average age of 59.3 years. All patients were mechanically bowel prepared prior to surgery and received perioperative oral and intravenous antibiotics. The various operations included a right hemicolectomy for adenocarcinoma, a closure of a colostomy from a prior Hartmann operation for obstructing sigmoid colon cancer, and a diverting end colostomy for radiation proctitis and chronic diarrhea. One ventral hernia was recurrent after two previous repair with one of them using mesh. The fascial defects ranged in size from 330 to 1,243 cm^2. All hernias were repaired using polypropylene mesh in an onlay fashion over omentum or anterior rectus sheet flaps. The mesh was fixed with nonabsorbable sutures without adding glue. There was minimal spillage of intestinal contents during the operations. Prior to placing the mesh, the peritoneal cavity was thoroughly irrigated with saline. The average operative time was 199 min. The average estimated blood loss was 166 cc.

Postoperatively, two patients developed wound infections (66.6%). One patient developed a group D *Streptococcus* wound infection on postoperative day two and was treated successfully with antibiotics; another patient developed methicillin-resistant *Streptococcus* aureus and group G *Streptococcus* wound infection 5 weeks postoperatively, necessitating incision and drainage of a part of the wound with subsequent vacuum-assisted closure. One patient (33.3%) developed skin necrosis of the lower aspect of his incision requiring excision of the necrotic area and leaving the wound open to heal by secondary intention. This patient was sent home with exposed mesh and wet-to-dry dressing changes. None of the wound complications required excision of the mesh. All wounds granulated well despite the presence of exposed mesh, and there is no evidence of hernia recurrence with an average follow-up of 25 months.

Discussion

Many patients presenting for elective colorectal surgery have primary ventral or incisional hernias that would normally require a mesh for adequate repair. However, in view of the 12–35% incidence of wound infection following colon resection [2] most surgeons elect to repair these hernias either primarily or with an absorbable mesh in fear of mesh infection, chronic sinuses, fistulae, or other mesh-related complications. Most of these patients subsequently require another operation to repair their recurrent hernia.

There have not been any prospective randomized studies to address the safety of mesh herniorrhaphy in a setting of elective colon and rectal surgery. There have been, however, a few case series reported that seem to show an acceptable incidence of wound complications with a very infrequent need for mesh excision when polypropylene mesh is used [2, 4, 5]. Vix et al. [5] reported in 1997 that nonabsorable mesh can safely be used in the repair of a hernia in a contaminated field if placed in the retromuscular prefascial plane. Birolini et al. [2] in 2000 retrospectively analyzed the short-term results of 20 patients who underwent colonic resection or bowel continuity reestablishment and simultaneous incisional hernia repair with an onlay polypropylene mesh technique. Their results showed a risk of mesh-related morbidity of 15.8% (3 of 19) within the first year and 23.1% (3 of 13) at 2-year follow-up. The occurrence of postoperative wound infection in their patients did not prevent mesh incorporation. Geisler et al. [4] in 2003 reported their experience with 29 patients undergoing elective surgical implantation of mesh with concomitant open bowel. They noted a 13% incidence of wound seromas, all treated successfully by aspiration, and a 7% incidence of wound infections occurring exclusively in sites of parastomal repair, with one case of wound infection with fistula requiring mesh removal. In addition, many studies have reported the use of polypropylene mesh for parastomal hernia repair with acceptable wound and mesh-related complications [6, 7, 8], although these data may not necessarily be extrapolated to the setting of mesh ventral hernia repair during colorectal operations with open bowel. In our current study we noted a high incidence of wound complications (100%) with two-thirds of them being wound infections. Although the number of patients is limited, the study suggests a higher incidence of wound infection than reported by other authors.

In view of the risk of infection polypropylene mesh seems to be an appropriate mesh to use in this setting of colorectal surgery. Polyester mesh has been shown to have an increased risk of complications [1]. Expanded polytetrafluoroethylene mesh has a microporous surface that allows bacterial contaminants but not leukocytes to invade the 10 μm pores [9]; the removal of contaminated expanded polytetrafluoroethylene patches is thus inevitable [1, 10, 11, 12, 13]. In contrast, our data, as those of other publications [2, 4, 13, 14], show that infected polypropylene meshes can be left in place. Most of these infections declare themselves within 2 weeks of implanting the mesh, but longer periods of up to 3 years have been reported [13, 15]. Aggressive local wound care along with frequent dressing changes and wound irrigation are hallmarks of healthy granulation tissue formation and successful mesh salvage. New bioactive prosthetic mesh, such as material derived from porcine small intestinal submucosa, may be a promising

alternative for hernia repair in contaminated or potentially contaminated fields, but experience and available data are still limited [16].

Enterocutaneous fistulae, on the other hand, are a debilitating complication of intra-abdominal operations. They are specifically feared during colorectal operation for cancer, adhesions, or inflammatory bowel disease and mesh placement, especially if this is complicated with wound infection. Enterocutaneous fistulae occur mainly following intraperitoneal polypropylene mesh placement in direct contact with bowel [1, 17, 18], although this is contested by other authors [19, 20]. We advocate interposing omentum or bilateral anterior rectus sheet flaps between the mesh and the bowel. The risk of enterocutaneous fistula, however, remains difficult to assess in our small study with limited follow-up, especially that the average time for a fistulae to develop is 3.3 years in one study [1], but can even be as late as 10 years after the initial repair [18].

Conclusion

Prosthetic ventral hernia repair using polypropylene mesh can be performed concomitant to elective colorectal operations, thus avoiding another laparotomy. However, this is, achieved at the expense of a high incidence of wound complications, mainly infection.

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References

1. Leber G, Garb JL, Alexander AI, Reed WP (1998) Long-term complications associated with prosthetic repair of incisional hernias. Arch Surg 133:378–382
2. Birolini C, Utiyama EM, Rodrigues AJ Jr, Birolini D (2000) Elective colonic operation and prosthetic repair of incisional hernia: does contamination contraindicate abdominal wall prosthesis use? J Am Coll Surg 191:366–372
3. McLanahan D, King LT, Weems C, Novotney M, Gibson K (1997) Retrorectus prosthetic mesh repair of midline abdominal hernia. Am J Surg 173:445–449
4. Geisler D, Reilly JC, Vaughan SG, Glennon EJ, Kondylis PD (2003) Safety and outcome of use of nonabsorbable mesh for repair of fascial defects in the presence of open bowel. Dis Colon Rectum 46:1118–1123
5. Vix J, Meyer C, Rohr S, Bourtoul C (1997) The treatment of incisional and abdominal hernia with a prosthesis in potentially infected tissues: a series of 47 cases. Hernia 1:157–161
6. Byers JM, Steinberg JB, Postier RG (1992) Repair of parastomal hernias using polypropylene mesh. Arch Surg 127:1246–1247
7. Janes A, Cengiz Y, Israelsson LA (2004) Randomized clinical trial of the use of a prosthetic mesh to prevent parastomal hernia. Br J Surg 91:280–282
8. Steele SR, Lee P, Martin MJ, Mullenix PS, Sullivan ES (2003) Is parastomal hernia repair with polypropylene mesh safe? Am J Surg 185:436–440
9. Amid PK (1997) Classification of biomaterials and their related complications in abdominal wall hernia surgery. Hernia 1:15–21
10. Balen EM, Diez-Caballero A, Hernandez-Lizoain JL, Pardo F, Torramade JR, Regueira FM, Cienfuegos JA (1998) Repair of ventral hernias with expanded polytetrafluoroethylene patch. Br J Surg 85:1415–1418
11. Bleichrodt RP, Simmermacher RK, van der Lei B, Schakenraad JM (1993) Expanded polytetrafluoroethylene patch versus polypropylene mesh for the repair of contaminated defects of the abdominal wall. Surg Gynecol Obstet 176:18–24
12. Pennington DG, Lam T (1996) Gore-Tex patch repair of the anterior rectus sheath in free rectus abdominis muscle and myocutaneous flaps. Plast Reconstr Surg 97:1436–1440
13. Petersen S, Henke G, Freitag M, Faulhaber A, Ludwig K (2001) Deep prosthesis infection in incisional hernia repair: predictive factors and clinical outcome. Eur J Surg 167:453–457
14. Marchal F, Brunaud L, Sebbag H, Bresler L, Tortuyaux JM, Boissel P (1999) Treatment of incisional hernias by placement of the intraperitoneal prosthesis: a series of 128 patients. Hernia 3:141–147
15. Deysine M (1998) Pathophysiology, Prevention, and Management of Prosthetic Infections in Hernia Surgery. Surg Clin North Am 78:1105–1115
16. Franklin ME Jr, Gonzalez JJ Jr, Michaelson RP, Glass JL, Chock DA (2002) Preliminary experience with new bioactive prosthetic material for repair of hernias in infected fields. Hernia 6:171–174
17. Fernandez Lobato R, Martinez Santos C, Ortega Deballon P, Fradejas Lopez JM, Marin Lucas FJ, Moreno Azcoita M (2001) Colocutaneous fistula due to polypropylene mesh. Hernia 5:107–109
18. Losanoff JE, Richman BW, Jones JW (2002) Entero-colocutaneous fistula: a late consequence of polypropylene mesh abdominal wall repair: case report and review of the literature. Hernia 6:144–147
19. Usher FC, Ochsner J, Tuttle LL Jr (1958) Use of marlex mesh in the repair of incisional hernias. Am Surg 24:969–974
20. Vrijland WW, Jeekel J, Steyerberg EW, Den Hoed PT, Bonjer HJ (2000) Intraperitoneal polypropylene mesh repair of incisional hernia is not associated with entero-cutaneous fistula. Br J Surg 87:348–352