Overview of parastomal hernia surgical repair

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Abstract:

Parastomal hernia is a prevalent issue and treatment could pose difficulties due to significant rates of recurrence and morbidities of the repair. In this review we discuss the existing requirement of care is to perform parastomal hernia repair with mesh whenever possible. There exist several alternatives for mesh reinforcement (biologic and synthetic) in addition to surgical strategies, to include type of repair (keyhole and Sugarbaker). We conducted this review by searching published literature in the following databases: MEDLINE/PubMed, PsycINFO, and the Cochrane Central Register of Controlled Trials through "December, 2017". Reference lists of other relevant publications were screened to identify additional potentially relevant studies that were not identified by the first method of literature searches. Parastomal hernia is an enormously prevalent problem. Actually, nearly every stoma will ultimately cause some degree of parastomal hernia if followed for long enough. The complications of hernia variety from asymptomatic to possibly life-threatening. The traditional paradigm of straight repair and stoma re-siting has greatly been abandoned due to inappropriate recurrence rates at the first site as well as the new site. The current requirement of care is to perform an appropriate repair of the hernia

in situ, with augmented repair utilizing mesh. The present trend and practice, is to use biologic mesh because of the efficacy and favorable safety profile.

Introduction:

A parastomal hernia is an incisional hernia pertaining to an abdominal stoma. The reported occurrence of hernias differs depending upon the type of stoma and size of the aperture in the stomach wall. The occurrence of parastomal hernia is higher for colostomies compared to ileostomies, with rates as high as 48.1 % reported [1].The majority of patients who develop a parastomal hernia will certainly be asymptomatic. Nonetheless, patients can suffer difficulty fitting a stoma appliance, stomach discomfort, swelling and unsightly bulge at the site of the stoma. One more consequenceofaparastomal hernia isanincreasedriskofstoma prolapse, making stoma management difficult and frequently needing surgical adjustment. The threats of an untreated parastomal hernia consist of incarceration, obstruction and strangulation, which can all result in significant morbidity and mortality when emergency surgery is needed [2].Current therapy choices consist of non-operative management, stoma relocation and repair of the enlarged fascial problem, with or without mesh. There are presently three kinds of mesh fascial fixing established by the level in the abdominal wall where the mesh is placed. Onlay repair service places the mesh subcutaneously, fixed in addition to the fascia of the former rectus sheath. Sublay mesh method positions the mesh in between the rectus abdominis muscle and back rectus sheath. The rug method positions the mesh intraabdominally, fixed to the peritoneum, with the stoma emerging via the mesh or laterally to the mesh (Sugarbaker technique). In asymptomatic patients, a traditional strategy has the tendency to be the chosen. This is because surgical repair could be difficult, without any assurance of success. Where surgery is needed, there is no clear advice as to which surgical method is the most efficient.

Parastomal hernia is a prevalent issue and treatment could pose difficulties due to significant rates of recurrence and morbidities of the repair. In this review we discuss the existing requirement of care is to perform parastomal hernia repair with mesh whenever possible. There exist several alternatives for mesh reinforcement (biologic and synthetic) in addition to surgical strategies, to include type of repair (keyhole and Sugarbaker).

Methodology:

We conducted this review by searching published literature in the following databases: MEDLINE/PubMed, PsycINFO, and the Cochrane Central Register of Controlled Trials through "December, 2017". Reference lists of other relevant publications were screened to identify additional potentially relevant studies that were not identified by the first method of literature searches. One main term was used in our search; "parastomal hernia", "surgical repair". We restricted our search for only English published articles with human subject, and we included all study types RCTs, reviews, systematic reviews, meta-analysis, except for case reports studies we excluded this from our search.

Discussion:

- **Treatment Options**

The best approach to repair parastomal hernia is, of course, closure of the stoma largely. However, thinking this is not a clinically suitable scenario, the hernia needs to be repaired. The "preferred" surgical technique to managing parastomal hernia repair has progressed in time, stimulated by experience and the advancement of new adjunctive options. These options for treatment of parastomal hernia consist of primary repair, re-siting of the ostomy, and reinforced repair utilizing prosthetic or biologic mesh. Primary repair and re-siting are, essentially, historic choices, as the gold criterion is currently a repair with a prosthetic mesh. Primary repair involves reduction of the hernia, excision of the hernia sac as well as the undermined and scar tissue, and the reapproximation of healthy and balanced fascia with suture. This method has largely been abandoned due to unacceptably high reappearance rates. These have been reported to variety in between 50 and 100%. This, in combination with a rate of surgical website infection of 12%, has restricted its existing usage [3], [4], [5], [6], [7].Re-siting of the ostomy is one of the most lately abandoned dogma, mostly because enhancing experience revealed that creation of a new ostomy at a new location is connected with the very same high threat of development of a primary parastomal hernia at the brand-new stoma website [3], [5].Additionally, the operation itself gives added morbidity with a reoccurrence rate of around 36% and complication rate is as high as 88% [3], [5], [9].Additionally, the patient is frequently in jeopardy of developing an incisional hernia at the previous ostomy site [5].

As a result, reinforced repairs are now the most typical and accepted techniques of parastomal hernia repair and presently the criterion of care. Using artificial mesh has substantially decreased the reoccurrence rate of parastomal hernias; however, the rate of neighborhood failure is still noteworthy, varying from 7 to 18% [8].While the difficulty rates for mesh repair work are below for previously utilized techniques, they do introduce the opportunity of difficulties not seen with

other repair work, notably including mesh infection and fistula development, which could have a substantial effect on the patient's recovery and quality of life. It is likewise essential to take into consideration that the majority of the information showing success with mesh repair work success have originated from nonrandomized studies with handful of patients, nonuniform methods, and vast irregularity in follow-up times. Nevertheless, it is clear that enhanced repair services supply clear superiority, and new items with hopefully improved effectiveness and safety accounts continue to be established. When performing a mesh repair, there are lots of various choices that must be thought about to consist of: kind of mesh (synthetic versus biologic versus hybrid), positioning of mesh about the abdominal wall layers, method of repair, and whether to carry out the repair open or laparoscopically.

- **Mesh Options**

The introduction of tissue reinforcement using mesh in hernia repairs has reinvented the treatment of inguinal, forward, and incisional hernias, and currently repairs utilizing mesh have come to be the gold criterion for parastomal hernias also. Mesh options now consist of numerous various sorts of prosthetic and biologic variations (Table 1).

Table 1. Types of mesh available for parastomal hernia repairs

Type of mesh	Material	Pore size	Absorbable	Weight
Vicryl (Ethicon Endo-Surgery, Inc. Cincinnati, OH)	Polyglactin	Small (0.4 mm)	Yes (60–90 d)	Medium weight: 56 g/m^2
Gore-Tex (W.L. Gore & Associates, Inc. Newark, DE)	e-PTFE	Microscopic (3 μm)	No	Heavyweight
Marlex (C.R. Bard, Inc. Murray Hill, NJ)	Polypropylene	Small–medium (0.8 mm)	No	Heavyweight: 80–100 g/m^2
3D Max (Davol, A BARD Company,	Polypropylene			

Warwick, RI)				
Trelex (Meadox Medicals Inc. Oakland, NJ)	Polypropylene			
Atrium (Atrium)	Polypropylene			
Composite mesh				
Parietex (Covidien)	Polyester/collagen	Large (> 3 mm)	Partially (20 d)	Medium weight: 75 g/m^2
Gore-tex Dual Mesh & Dual Mesh Plus (WL Gore)	e-PTFE	Microscopic (3/22 μm)	No	Heavyweight
Vypro, Vypro II (Ethicon)	Polypropylene/PG910	Large (> 3 mm)	Partially (42 d)	Light weight: 25–30 g/m^2
Composix EX, Dulex (Davol)	Polypropylene/e-PTFE	Medium (0.8 mm)	No	Light weight
Proceed (Ethicon)	Polypropylene/cellulose (ORC)	Large	Partially (<30 d)	Light weight: 45 g/m^2
C-Qur (Atrium)	Polypropylene/omega 3	Large (> 1 mm)	Partially (~120 d)	Medium weight: 50 g/m^2
Biologic meshes	**Source tissue**			
Surgisis (Cook Biotech, West Lafayette, IN)	Porcine (small intestine submucosa)			
Fortagen (Organogenesis Inc. Canton, MA)	Porcine (small intestine submucosa)			
Alloderm (Lifecell Corp. Bridgewater, NJ)	Human acellular dermis			
XenMatriX (Davol)	Xenogenic acellular dermis (porcine/bovine)			
SurgiMend (TEI Biosciences Inc. Waltham, MA)	Xenogenic acellular dermis (porcine/bovine)			

- **Technique: Intraperitoneal Mesh Repair**

There have been 2 primary means explained for intraperitoneal mesh repair, the "Sugarbaker" method and the "keyhole" strategy. The Sugarbaker strategy was initial explained in 1985. A laparotomy was carried out, and after the hernia was minimized, the sac resected, and the stoma

trephine minimized to ideal size (adequate to simply confess the doctor's finger), the ostomy opening is covered with an intraperitoneally put prosthetic mesh that is sutured to the fascia. The bowel is lateralized and protected between the mesh and the abdominal muscle, consequently lateralizing the forces which press the bowel ventrally into the abdominal wall, changing them from pushing up towards the flaw and creating these pressures to press ventrally against an undamaged stomach wall. In the influential paper defining this method, there were six frequent and one primary parastomal hernias repaired, without any recurrences reported with a 5-year follow-up [11].In another, slightly bigger study, 20 open parastomal hernia repairs with the Sugarbaker method utilizing a mesh with an overlap of at the very least 5 cm were reviewed retrospectively. There was a 15% reoccurrence rate with a mean follow-up of 42 months. Complications of the procedure consisted of bowel obstruction additional to dense attachments, wound infection, seroma formation, and discomfort at the site of transfascial stitches [12].Preliminary use of this method might create stress and anxiety as a result of the sharp angle created in the huge bowel conduit.Surgeons ought to be assured that with proper method, this will not cause obstruction. If biologic mesh is used, eventually indigenous tissue ingrowth results in, essentially, an extraperitoneal-type colostomy. In general, this method is not utilized for small bowel stomas.

The other primary choice for surgical repair is the "keyhole" technique. In the keyhole method, a cut-out of mesh is made to circumferentially surround the ostomy and cover the whole hernia defect [10], [13], [14].One of the tricks of this method is to not make the keyhole also small so about create a bowel obstruction, however to deficient so large regarding enhance the danger of herniation.

- **Laparoscopic versus Open Repair**

The laparoscopic method has been increasingly adopted over the last two decades. The utility of laparoscopy for the repair of parastomal hernia, although now becoming a commonly utilized technique, has lagged behind using laparoscopy in various other regions of colorectal surgery. In a recent retrospective research study by Halabi and colleagues, using ACS-NSQIP data, records of patients who went through parastomal hernia repair from 2005 to 2011 were systematically examined. Only 10.4% of the 2,167 patients in the research were treated laparoscopically. They assumed this was due to the fact that parastomal hernia repair cases are often related to dense adhesions making laparoscopy harder or unsafe. One more possible explanation of the reduced utilization of laparoscopy that was provided is the absence of the strong clinical evidence demonstrating that laparoscopic parastomal hernia repairs are superior to open repairs, unlike the evidence that exists sustaining the use of laparoscopy for ventral hernia repairs [15].

However, there are multiple theoretical advantages to the use of laparoscopy when managing parastomal hernias. First, it avoids an additional large incision and possible hernia site in the abdominal wound and allows faster postoperative recovery. It also provides a better view of the problem, permitting a more precise repair and reinforcement with mesh and greater overlap of the problem [16], [17].Regrettably, there have been variable levels of success reported in the literature (see Table 2). Most research studies show low infection rates (0-5%) and conversion to an open treatment is infrequent. In Hansson and colleagues' review, they considered 363 laparoscopic repairs and located a conversion to open rate of 3.6% [8].The most typical factors for conversion include unintentional enterotomy and dense adhesions (Table 3) [15].

Table 2. Outcomes of open mesh repairs of parastomal hernias

Study	Number of repairs	Mesh type	Mesh position	Type of repair	Recurrence (%)	Infection (%)	Follow-up (mo) (mean)

Study	Number of repairs	Mesh type	Mesh position	Type of repair	Recurrence (%)	Infection (%)	Follow-up (mo) (mean)
Byers et al[30]	9	Polypropylene	Intraperitoneal	KH	0	11.1	(13.4)
Hofstetter et al[14]	13	PTFE	Intraperitoneal	KH	0	0	Over 96
Morris-Stiff and Hughes[31]	7	Polypropylene	Intraperitoneal	KH	28.6	14.3	60–89 (81)
Stelzner et al[12]	20	PTFE	Intraperitoneal	SB	15	5	3–84 (42)
van Sprundel et al[13]	15	PTFE	Intraperitoneal	KH	13.3	0	5–52 (29)
Longman and Thompson[32]	10	Polypropylene	Sublay	KH	0	0	2–40 (30)
Ballas et al[33]	2	PTFE	Intraperitoneal		0	0	24–60 (42)
Guzmán-Valdivia et al[34]	25	Polypropylene	Sublay	KH	8	8	8–24 (12)

Abbreviations: KH, keyhole; SB, Sugarbaker.

Table 3. Outcomes of laparoscopic parastomal hernia repair

Study	Year	Technique	Mesh type	Number of repairs	Conversion (%)	Recurrence (%)	Infection (%)	Follow-up (mo) (mean)
Safadi[27]	2004	KH	PTFE	9	0	44.4	0	6–33 (24)
LeBlanc et al[28]	2005	KH/SB	PTFE	12	0	8.3	0	3–39 (20)
Muysoms et al[29]	2008	KH/SB	Polyester/PTFE/PP	24	0	41.7	0	4–54 (21.2)
Berger and Bientzle][21]	2007	SB/SW	PVDF/PP	66	1.5	12	4.5	3–72 (median = 24)

Study	Year	Technique	Mesh type	Number of repairs	Conversion (%)	Recurrence (%)	Infection (%)	Follow-up (mo) (mean)
Mancini et al[22]	2007	SB	PTFE	25	0	4	4	2–38 (median = 19)
McLemore et al[23]	2007	KH/SB	PTFE	19	–	10.5	2	(20)
Craft et al[24]	2008	KH/SB	PTFE	21	0	4.7	4.8	3–36 (14)
Pastor et al[20]	2009	KH/SB	PTFE	12	8.3	33.3	16.6	12–72 (13.9)
Hansson et al[17]	2009	KH	PTFE	54	14.5	37	1.8	12–72 (median = 36)
Wara and Andersen [25]	2011	KH	PP/PTFE	66	4	3	4.5	6–132 (median = 36)
Mizrahi et al[26]	2012	KH	PP/PTFE	29	6.9	46.4	3.4	12–53 (median = 30)

Abbreviations: KH, keyhole; PP, polypropylene; PTFE, polytetrafluorethylene; PVDF, polyvinylidene fluoride; SB, Sugarbaker; SW, sandwich.

Laparoscopically, one could repair the problem via a keyhole repair, a changed Sugarbaker, or a "sandwich" technique. The changed Sugarbaker coincides as explained for the open repair, yet with these vital technological factors: the surgeon needs to achieve a minimum overlap of 5 centimeters past the problem, transabdominal suture fixation with long-term suture at 3-5 centimeters intervals, and placement of transabdominal suture on either side of the lateralized bowel [18].Hansson et al found that the laparoscopic keyhole strategy had higher rates of reappearance than laparoscopic Sugarbaker repair work, 34.6 versus 11.6%, specifically [8].It appears that utilizing a strong piece of mesh instead compared to a cut piece of mesh provides a reduced reappearance rate along with much shorter personnel times.

The sandwich method has also been defined for laparoscopic repairs. This is a combination of both the keyhole and Sugarbaker methods, utilizing an item of mesh in the intraperitoneal placement as in the keyhole strategy and afterwards lateralizing the bowel and covering this with one more piece of mesh making use of the Sugarbaker strategy. This method does result in an area of mesh overlapping with mesh, which is usually stayed clear of. There is only one research study taking a look at this strategy, carried out by Berger and colleagues, that includes 42 patients with only a 2.1% rate of hernia reoccurrence [19].This method, although only studied in a tiny team of individuals, did have the cheapest recurrence rate for laparoscopic repairs [8].

In a total comparison made between open and laparoscopic instances using NSQIP information from 2005 to 2011, it was established the laparoscopic strategy is connected with better temporary results than open surgery, to consist of a 3-day decrease in length of hospital remain, a shorter operative time, and a 58% decrease in morbidity and 65% reduction in the probabilities of a superficial skin infection [15]. However, in this study it was noted that patients that undertook laparoscopic repair were likely to be in far better overall health and wellness compared to those that went through open repairs [15].In Hansson's evaluation, it was established that laparoscopy had no advantage over open repair in relation to morbidity, death, and reappearance [8].There is just one study to especially compare open to laparoscopic instances in a nonrandomized retrospective fashion. There was again no distinction in morbidity, mortality, or recurrence, but there was a nearly significant difference in length of hospital stay (3 vs. 5 days) [20].

Conclusion:

Parastomal hernia is an enormously prevalent problem. Actually, nearly every stoma will ultimately cause some degree of parastomal hernia if followed for long enough. The complications of hernia variety from asymptomatic to possibly life-threatening. The traditional

paradigm of straight repair and stoma re-siting has greatly been abandoned due to inappropriate recurrence rates at the first site as well as the new site. The current requirement of care is to perform an appropriate repair of the hernia in situ, with augmented repair utilizing mesh. The present trend and practice, is to use biologic mesh because of the efficacy and favorable safety profile. The sublay or intra-abdominal approach offers the lowest reoccurrence rate, and is our recommendation. The decision whether to approach the repair laparoscopically or open is based on the surgeon's level of experience and comfort. Lastly, due to the known likely development of parastomal hernia in the majority of cases, recommend prophylactic parastomal reinforcement at the time of permanent stoma creation. Provided the increased use laparoscopy at the time of many colectomies, in addition to the ease of placement, a sublay or intraperitoneal method in these situations is favored.

Additional experience as well as advancement of effective and safer biologic meshes will remain to supply surgeons with safer, more effective material to utilize to prevent the development of parastomal hernia.

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