PARASTOMAL HERNIA AFTER RADICAL CYSTECTOMY WITH ILEAL CONDUIT DIVERSION: A NARRATIVE REVIEW

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Abstract

Radical cystectomy (RC) with ileal conduit urinary diversion has become a common surgical procedure. Stomal complications and particularly parastomal hernia (PH), are the most frequent complications and causes of reintervention after RC with ileal conduit urinary diversion. PH is usually asymptomatic. When PH increases in size and becomes symptomatic, it clearly impairs patients' quality of life in terms of physical limitation, mental distress and social interaction. The aim of this paper was to review the current knowledge on PH after RC with ileal conduit urinary diversion, regarding its natural history, risk factors, prevention and surgical management. There is no strong recommendation on the ideal surgical technique for repair of PH after RC, but laparoscopic Sugarbaker or Sandwich techniques with non-absorbable meshes are emerging as the preferred modern means of PH repair. Techniques for prevention and repair of PH after RC need to be specifically evaluated in future prospective studies.

Keywords:

bladder; cancer; incisional hernia; complication; surgery; technique; abdominal wall; stoma

Abbreviations:

BMI: body mass index; CT: computed tomography; EHS: European hernia society; PH: parastomal hernia; RC: radical cystectomy; 3D: three dimensional

Introduction

Radical cystectomy (RC) with ileal conduit urinary diversion has become a common procedure as bladder cancer incidence is rising. Due to its good functional results, RC is also increasingly performed for benign indications such as neurogenic bladder, congenital anomalies or radiation cystitis. Stomal complications and particularly parastomal hernia (PH), are the most frequent complications and causes of reintervention after RC with ileal conduit urinary diversion [1]. PH is usually asymptomatic. When PH increases in size and becomes symptomatic, it clearly impairs patients' quality of life, in terms of physical limitation, mental distress and social interaction [2]. The main complication of PH on ileal conduit urinary diversion is the occurrence of urinary leaks due to issues with stoma appliance fixation [3]. The volume of PH may also induce aesthetic issues, abdominal discomfort and/or pain, and more rarely intestinal obstruction or strangulation [1].

PH is frequently described and studied after colostomy or ileostomy, and more rarely after RC with ileal conduit urinary diversion [4,5]. Indeed, the specific indications and techniques of surgical repair of PH after RC have not been determined. Up to now, management of PH after RC has been based on the experience with PH after colostomy or ileostomy. The aim of this paper is to review the current knowledge on PH after RC with ileal conduit urinary diversion regarding its natural history, risk factors, prevention and surgical management.

Natural history and risk factors

Clinically, PH after RC with ileal conduit urinary diversion is defined as a visible or palpable bulge related to the ileal conduit. This bulge is caused by the protrusion of intra-abdominal content (fat, intestine, colon) through the abdominal wall defect that allows the passage of the ileal conduit to the skin stoma (Fig 1). PH is the most common stomal complication after RC, but its real incidence is not known as it may vary from 10 to 50% according to various series

[2,4,6-12]. As other incisional hernias, most PH developed within the first two years after RC [9,12-14]. Compared to clinical examination, computed tomography (CT) can detect early asymptomatic PH, increasing the rates of PH diagnosis is some series [15,16]. Multiple studies confirm that PH progresses and enlarges over time.

The risk factors for development of PH after RC have been studied. Obesity, female gender and low pre-operative albumin have been cited in multiples series to be factors with significant association of PH occurrence. Obesity seems to be a strong risk factor for all types of incisional hernia including PH. Obesity induces a higher intra-abdominal pressure resulting in a weakened abdominal wall strength and a poor quantity and quality of the rectus muscles. Concerning specifically PH after RC with ileal conduit urinary diversion, higher body mass index (BMI) was significantly associated with PH even in recent studies [6,9,11]. Liu et al found that severely obese patients (BMI>40kg/m^2) were four times more likely to develop a PH than those with normal BMI [8]. A facial defect larger than 30 mm in diameter was associated with an increased risk of PH [9]. Su et al. also showed in a series of PH after RC with ileal conduit urinary diversion that prior tobacco use might be associated with lower risk of PH. Higher haematocrit and higher pre-operative albumin was also associated to a lower risk of PH [11]. Previous laparotomy is also regularly presented as a risk factor for PH [8]. It is considered that repeated abdominal surgeries may result in scared tissues with poor vascularisation and, therefore, poor healing [17]. At the contrary, corticosteroids, older age, chronic obstructive pulmonary disease, diabetes mellitus, neoadjuvant chemotherapy or radiation therapy and wound infection, were no found for having a statistically significant association with PH in multivariable analysis [5, 6, 9]. Moreover, Su et al found no difference in hernia appearance rate between RC for malignant or benign disease [11].

Symptoms

The majority of PH after RC with ileal conduit urinary diversion are asymptomatic. The proportion of symptomatic PH varies between series from 24% up to 40% [2-7,9,10]. The chronic symptoms most often described are, in order of frequency, abdominal discomfort, difficulties in fitting as stomal appliance, repeated leaks, skin irritation with or without ulceration, fistula or stomal stenosis, and psychological and aesthetic difficulties [3]. When patients become symptomatic, PH has been shown to have a significantly negative impact on quality of life [2]. It is clear that the rate of chronic symptoms increases with the size of the PH. Acute event of strangulated PH after RC is rare.

Classifications

There are several classifications of PH, based on clinical symptoms, imagery or intraoperative findings. The two most frequently used classifications of PH after RC are the Moreno-Matias and the European Hernia Society (EHS) classifications. Moreno-Matias et al. proposed an easy, pre-operative, CT based, classification system for end-colostomy [18]. This classification, based on preoperative content of the hernia, is regularly used in randomised studies and retrospective analyses for all kind of stoma, including PH after RC (Table 1). This classification is illustrated for PH in RC in Fig 2. The EHS classification of PH uses intraoperative findings, including the size of the hernia defect and the presence of a concomitant incisional hernia (Table 2) [19]. In addition, the EHS classification differentiates primary (P) or recurrent (R) PH [19].

Management and surgical repair

It is clear that asymptomatic and/or small PH after RC should not be operated on. In addition, asymptomatic PH should not be searched for, and in case of incidental diagnosis, there is no place for specific regular follow-up of asymptomatic PH after RC. Patients should be

reassured on the very low risk of acute strangulation of PH. Surgical correction of symptomatic PH after RC may be proposed when the subjective symptoms of the patient impair his/her quality of life or when the size of the PH impair the quality of the stoma appliance, with frequent urine leaks or with skin ulcerations. Large size PH might also compress the ileal conduit, favouring recurrent urinary infection.

Repair of PH after RC with ileal conduit urinary diversion is challenging and very rarely described in the literature. Techniques of PH after RC repair derive from the colostomy or ileostomy experiences. Most series of PH after RC repairs are included in larger series of other PH repairs, and their small number excludes to draw any firm conclusion on the ideal technique [20]. Compared to repair of PH after colostomy or ileostomy for digestive diversion, surgical repair of PH after RC could be challenging, as the ileal conduit is isolated from the bowel, as its blood supply is terminal and as one or two ureters are sutured to the conduit and have to be preserved (Fig 1).

Direct defect suture should be abandoned due to inacceptable recurrence rate [5]. Relocation of the stoma is to the authors' view a technique that is particularly difficult in PH after RC with ileal conduit urinary diversion and to the best of the authors' knowledge, stoma relocation has not been described for PH after RC.

All the preferred actual methods of PH repair are using permanent meshes and are often performed by laparoscopy. Laparoscopic approaches of PH require meshes designed for intraperitoneal use, with anti-adhesion surfaces in contact with both the ileal conduit and the abdominal cavity. In laparoscopic repairs of PH after RC, the operator and his/her assistant are placed on the left side of the patient, with three to four trocars placed in the left side of the abdomen (most frequently one lateral 12mm trocar used for the camera and the introduction of the meshes, and two 5mm operating trocars, one in the left hypochondrium and one in the left iliac fossa) to operate on the PH located in the right iliac fossa. The procedure might be

divided in two different phases, the first one being the *dissection phase* that is common to all laparoscopic RH repairs, and the second being a *repair phase* using permanent meshes. During the dissection phase, the first step of the procedure is to laparoscopically dissect the peritoneal adhesions and to reduce the PH content. The hernia sac might be reduced and resected, but this is difficult and not necessary in PH. In a second step, the ileal conduit needs to be mobilized to allow correct mesh placement, with a special attention taken both to the conduit vascularization and to the ureters. After this dissection phase, the most common surgical techniques of PH repair phase are the Keyhole, the Sugarbaker and the Sandwich techniques, first developed for PH on colostomy and ileostomy, and adapted to PH after RC. The Keyhole technique for PH repair is based on passing the stoma through a central hole in a mesh, and was first performed using an open technique and onlay placement of the mesh [21]. This Keyhole technique may be laparoscopically performed with a peritoneal placement the mesh (Fig 3). This mesh can be flat, but recently the use of a new mesh with 3-dimensional (3D) design (IPST, Dynamesh, Germany) was described in PH after RC by Tully et al [22]. In their experience in repair of 40 PH after RC using a mesh, they observed a 7% PH recurrence rate after a median follow-up of 29 months [22]. However, meta-analyses suggested that the recurrence rate of laparoscopic keyhole PH repair might be as high as 30% [15, 16]. The Sugarbaker technique consists in passing bowel laterally through the mesh side [23] (Fig 4). This technique was first described by midline laparotomy, and more recently adapted for laparoscopic repair using intraperitoneal mesh. The Sugarbaker technique has shown in multiple series a recurrence rate from 0 to 10% [13,15,16,18,19]. Finally, the Sandwich technique combines the Keyhole and Sugarbaker procedures (Fig 5). This technique has been described by Berger et al on 47 patients [24]. They found very low rate of recurrence (2%). A very recent study of Bertoglio et al confirms this low recurrence rate of the sandwich technique over a median follow-up of 26 months [21]. The EHS recently recommended

laparoscopic Sugarbaker repair for PH, although the strength of the recommendation is weak [22]. However, given its encouraging results, the Sandwich technique could become the next standard procedure, particularly in PH associated to large parietal defects (Fig 6).

The overall morbidity of PH repair does not differ between the different surgical techniques and varies between 2% and 60% according to the different reports [13,15,16,18,20]. The most frequent postoperative complications are surgical site infections, ileus or occlusion and urinary tract infection [13,16,18]. A mesh infection is rare and the necessity for mesh removal is even more rare [15]. Berger and Bientzle described that the Sandwich technique seemed to cause more stenosis of the stoma loop than the other techniques [21]. However, recently, Bertoglio et al described the opposite by showing no differences between the Sandwich and the Keyhole group in time to first flatus and time to stool passage. Furthermore, no bowel obstruction following a Sandwich technique have been recorded on long term [20].

Prevention

These last years, there has been a clear interest for attempts of PH prevention during the stoma creation, particularly in colostomy and ileostomy [5]. The stoma technique itself has a role in the decrease in the rate of PH. In 2014, Pisters et al studied the interest to anchor the ileal stoma to the anterior rectus sheet, the posterior rectus sheet or the peritoneum, when performing a RC. They concluded that the anterior fascial fixation increases the risk of developing PH [25]. There were no differences between posterior or peritoneum fixations and no fixation. More recently, in 2020, Stephenson reported no clinical or radiological PH after RC with an ileal conduit in 68 patients after a follow-up of 2 years, when the stoma was placed laterally to the rectus abdominis, calling this technique the “lateral rectus abdominis positioned stoma”, or LRAPS [26].

The use of a prophylactic mesh is regularly advised in PH prevention for colostomy and ileostomy, regardless the type of mesh used or its location [27,28]. However the ideal mean of PH prevention is not yet determined and this subject is still matter of debate [29,30]. This possibility was also specifically studied in patients undergoing RC with ileal conduit in a few papers, all using a Keyhole technique using various meshes placed in a sublay position. Using a mix of slowly resorbable meshes, Tenzel et al. did not report any PH at a follow-up of 11 months in 18 patients [31]. In a series of 114 patients, a 14% rate of PH was observed in the 58 patients available at a median follow-up of 32 months after placement of a light-weight, large pore mesh (Ultrapro, Ethicon) [32]. In a randomised study including 242 patients, Liedbreg et al. reported the use of another light-weight mesh (Vypro, Ethicon) placed in a sublay position [33]. They reported a trend to a decrease in clinically detectable PH in the prophylactic mesh group after a median follow-up of 3 year, but no difference in the radiological PH rate. There was no difference in postoperative complications or in the rate of PH repair [33]. The potential PH prevention is still a matter of investigation. If the need of decreasing the rates of PH after RC with ileal conduit is clear, the best type of prevention has to be determined by difficult randomised controlled studies. The potential use of a mesh, the type and the position of this mesh, and the surgical technique (modified Keyhole, modified Sugarbacker, use of an intraperitoneal 3D device) have to be further evaluated.

Conclusions

PH is a common complication after stoma creation, particularly after RC with ileal conduit urinary diversion. Surgical repair is indicated in symptomatic PH. There is no strong recommendation on the ideal surgical technique for PH after RC repair, but laparoscopic Sugarbaker or Sandwich techniques with non-absorbable intraperitoneal meshes are emerging

as the preferred modern means of PH repair. Techniques for prevention or repair of PH after RC need to be specifically evaluated in future prospective studies.

Disclosure:

The authors report no conflict of interest related to the content of this paper.

Legends to the Figures and Tables:

Figure 1: Illustration demonstrating the abdominal bulging of PH after RC, related to the protrusion of abdominal content (blue arrow) through the enlarged abdominal wall defect allowing the passage ileal conduit.

Abbreviations: PH: peristomal hernia; RC: Radical cystectomy

Figure 2: Illustration of the Moreno-Matias classification in cases of PH after RC.

A: CT showing normal aspect of ileostomy after urinary diversion according to Bricker (Type 0); B: CT showing a sac < 5cm (white arrows) containing the meso-ileal fat of the ileal conduit (Type Ia); C: CT demonstrating a significant hernia sac (between white arrows) containing omental fat (Type II); D: CT demonstrating a large sac containing colon (Type III).

Abbreviations: PH: peristomal hernia; RC: Radical cystectomy; CT: computed tomography.

Figure 3: Drawing demonstrating the principle of the Keyhole repair.

The mesh is presented in deep blue, the peritoneum in yellow, the skin in red. In the Keyhole technique, the repair is based on the reduction of diameter of the abdominal wall defect using an intraperitoneal mesh in which a hole is prepared to allow the passage of the ileal conduit (red arrow). It is also necessary to cut the mesh from one mesh side to the hole to allow placement of the mesh around the ileal conduit, and this cut should be repaired using some overlapping.

Abbreviations: Ca: caudal side, Ce: cephalic side; L: lateral side; M: Medial side.

Figure 4: Drawing demonstrating the principle of the Sugarbacker repair.

The mesh is presented in green blue, the peritoneum in yellow, the skin in red. The Sugarbacker repair is based on the closure of the abdominal wall defect using an intraperitoneal mesh with the two sides allowing intestinal contact. The mesh is used to not only to cover the defect but also to fix the ileal conduit between the mesh the abdominal wall peritoneum. The ileal conduit is led out over the mesh to the right lateral abdominal wall (red arrow).

Abbreviations: Ca: caudal side, Ce: cephalic side; L: lateral side; M: Medial side.

Figure 5: Drawing demonstrating the principles of the Sandwich repair that combined the Keyhole and the Sugarbacker principles. The Keyhole mesh is presented in dark blue, the Sugarbacker mesh in green blue, the peritoneum in yellow, the skin in red.

Abbreviations: Ca: caudal side, Ce: cephalic side; L: lateral side; M: Medial side.

Figure 6: Operative views illustrating laparoscopic Sandwich repair of PH after RC

A: Demonstration of the parietal defect, the hernia sac and the ileal conduit; B: First step of the Sandwich technique, with a Keyhole repair using in this case a Ventralight mesh (Bard, USA); C: Second step of the Sandwich technique, with tunellisation of the ileal conduit using in this case a PVDF mesh (Dynamesh, Germany).

Abbreviations: PH: parastomal hernia; RC: radical cystectomy

Table 1: CT classification of parastomal hernia after radical cystectomy, adapted from Moreno-Matias (18)

Abbreviations: CT: Computed tomography

Table 2: EHS classification for parastomal hernia (adapted from ref 19)

Abbreviations: EHS: European Hernia Society; IH: incisional hernia; PH: parastomal hernia.

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