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TECHNICAL ADVANCES

Robotic-assisted repair of perineal hernia after extralevator abdominoperineal resection

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Introduction

Perineal hernia is considered to be a rare complication after abdominoperineal resection (APR). However, its true incidence may be higher because of under-reporting. Moreover, there has been a recent change in technique from conventional to extralevator APR (eAPR) for oncological reasons. As the eAPR procedure creates a much wider perineal defect, a significant increase in incidence can be expected in the future. Recent reports show an incidence of 26% after eAPR [1].

Currently, there is no gold standard technique for perineal hernia repair, although various methods have been described.

In this paper, we present our strategy of a robotic-assisted repair using a synthetic mesh and we perform a narrative review of the literature.

Robotic-assisted hernia repair

A 39-year-old female attended our outpatient ward with complaints of sharp perineal pain, causing difficulty sitting and walking. She also noticed a tender perineal swelling that was progressive over time. There were no urinary or other complaints.

On physical examination, a large perineal protrusion was seen. The patient had undergone laparoscopic eAPR without coccygectomy for distal rectal cancer ypT0N0 78 months earlier. Neoadjuvant radiochemotherapy was given because of preoperative cT3-4N1 staging on magnetic resonance imaging (MRI). During the eAPR, the pelvic floor was primarily closed using absorbable sutures. No omentoplasty was performed. There was no postoperative perineal wound infection.

Two weeks after eAPR, she had a laparoscopic loop ileostomy for stenosis of the colostomy. Three months after eAPR, the loop ileostomy was closed and the colostomy revised. She had an open Sugarbaker repair of a parastomal hernia 56 months after eAPR. Computed tomography (CT) scan showed a large perineal herniation of small bowel with a defect size of 7 by 8 cm (Fig. 1). This perineal hernia was visible on the postoperative CT scan 52 months after eAPR but not after 44 months. Since the patient was asymptomatic at that time, we opted to treat her conservatively by regular follow-up.

Because the patient progressively developed symptoms over the years and the hernia increased in size, surgical repair was performed 78 months after eAPR. The patient was placed in the modified lithotomy position, pneumoperitoneum was established and three 8-mm trocars were placed at the umbilical level towards the right side. After docking of the da Vinci Xi® (Intuitive Surgical, Sunnyville, CA, USA) robotic system, one additional 5-mm assistant port was placed. The content of the hernia sac was reduced and the uterus suspended from the anterior abdominal wall using two stitches (Ethilon®, Ethicon, Somerville, NJ, USA) (Fig. 2).

Because of the close adherence of the hernia sac to the extremely thin perineal skin, the sac was not resected. Instead, the peritoneal sac was closed at its base using two running absorbable sutures (V-Loc®, Covidien, Mansfield, MA,USA) (Figs. 3 and 4). There was insufficient levator muscle tissue left to close the muscular defect.

Next, the pelvic floor defect in the levator muscles was measured (Fig. 5) and covered using a non-absorbable synthetic mesh (Symbotex®, Covidien, Mansfield, MA,USA) 25 × 20 cm. Using non-absorbable sutures (Prolene® and Ethibond Excel®, Ethicon, Somerville, NJ, USA), the mesh was fixed on the coccyx and promontorium dorsally, on the

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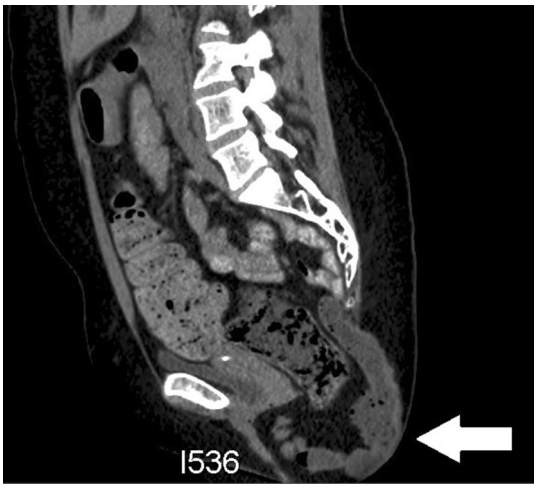

Fig. 1 Sagittal CT view of the hernia (arrow)

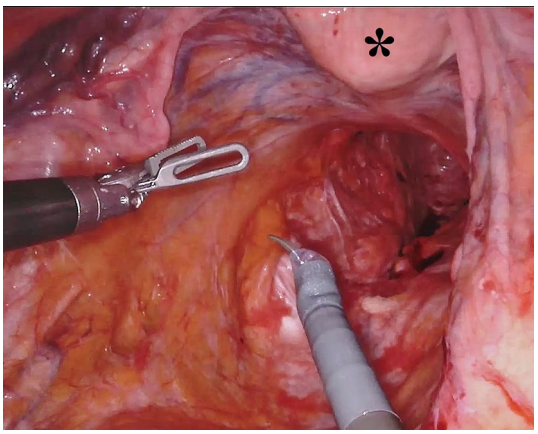

Fig. 2 Reduction of the hernia with suspended uterus (*)

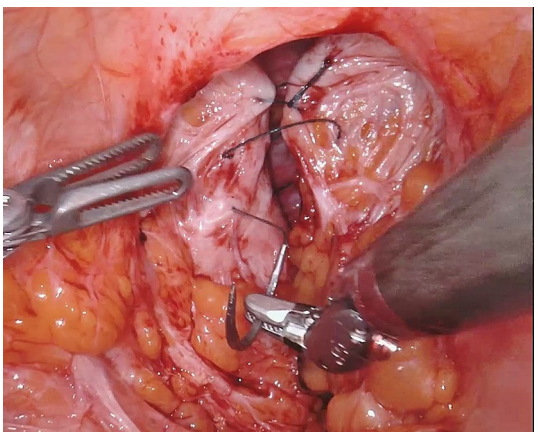

Fig. 3 Closing of the perineal sac with two running sutures

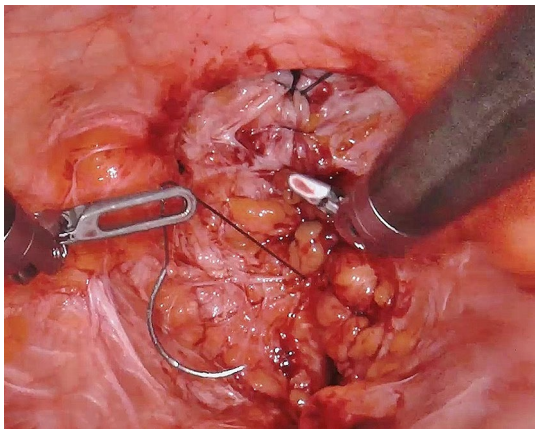

Fig. 4 Closing of the perineal sac with two running sutures

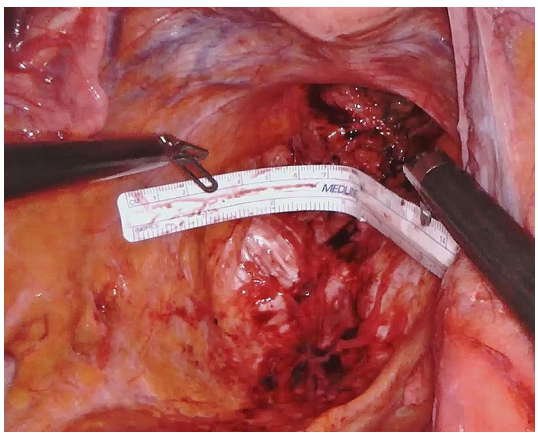

Fig. 5 Measuring of the pelvic floor defect

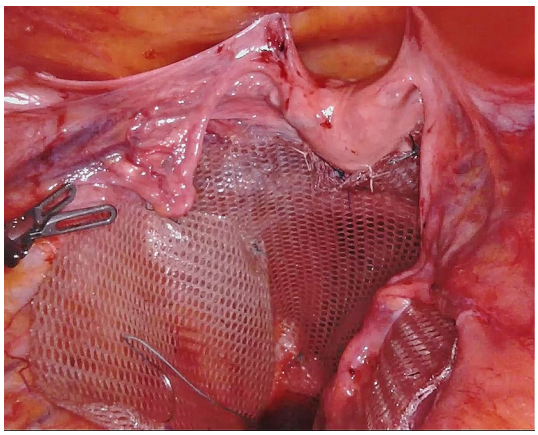

Fig. 6 Placement and fixation of the mesh

cervix and uterus anteriorly and at the pelvic side walls laterally, thus adapting a conical shape (Figs. 6 and 7). After

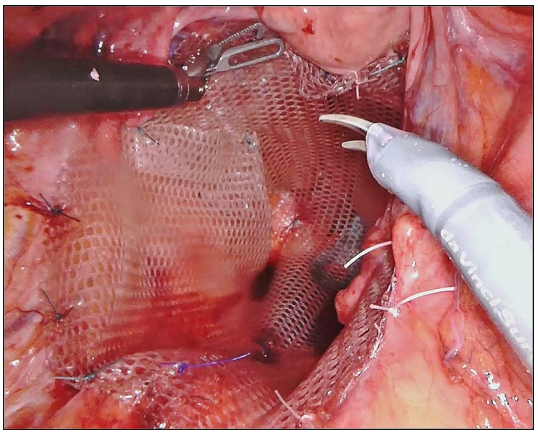

Fig. 7 Placement and fixation of the mesh

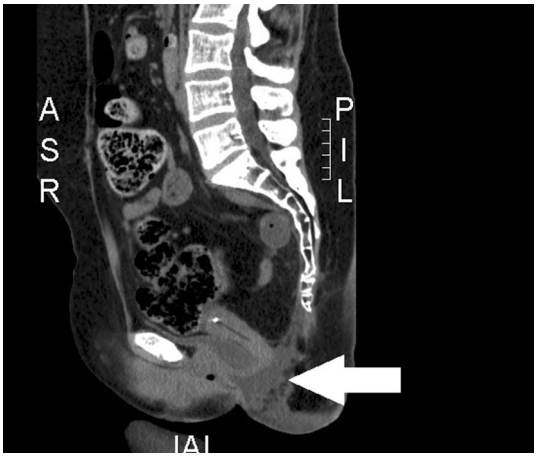

Fig. 8 Postoperative CT view with seroma (arrow)

releasing the uterus, a drain was left in place and the omentum was placed on the mesh.

Postoperatively, the patient was ordered bed rest and antibiotics for 1 day. The drain was removed on the third postoperative day and the patient was discharged after 5 days. No complications occurred.

Clinical and CT follow-up showed good repair of the hernia. An asymptomatic seroma had formed which was treated conservatively (Fig. 8). The patient's complaints had resolved completely and at 9 months postoperatively, there was no recurrence.

Discussion

Perineal hernia is a postoperative complication after APR. Although there is no uniform clinical or radiological definition, it is generally described as a protrusion of abdominal viscera through the pelvic floor.

Up to 20–33% of patients with rectal cancer have an APR [2, 3]. The incidence of postoperative perineal hernia formation is regarded as being low. However, this incidence is based on historical data and true incidence is underestimated due to a lack of consistent long-term and prospective follow-up data. There has been a notable increase in published cases since 2012 [4]. Because of the introduction of eAPR during recent years, it is estimated that the incidence of perineal hernia will rise further, thus forming a significant health care problem.

The concept of eAPR was introduced because of the high circumferential resection margin (CRM) involvement and intraoperative perforation (IOP) rate associated with conventional APR. In a conventional APR, the mesorectum is dissected off the levator ani muscles, resulting in a tapered resection specimen. With eAPR, the mesorectum is resected en bloc with the levator ani muscles which are divided as far laterally as possible, close to the obturator internus muscles. This creates a cylindrical resection specimen with more tissue around the tumor, similar to the original Miles procedure [2]. Although still a matter of debate, eAPR is associated with lower CRM involvement and IOP rates [2]. However, as eAPR leaves a much wider defect in the perineal floor, the risk of perineal wound complications and hernia seems to be much higher [5]. A study of 55 patients undergoing eAPR showed an incidence of perineal hernia formation of 26% after a median follow-up of 38 months. For laparoscopic eAPR, the risk was as high as 45%, which is significantly higher than open eAPR (15%, $p = 0.024$) [1].

Apart from eAPR and laparoscopic APR, other risk factors for perineal hernia described in the literature include female gender, obesity, previous hysterectomy, preoperative pelvic radiotherapy, coccygectomy, postoperative wound infection, a long small bowel mesentery and leaving the pelvic peritoneum open [3]. The relative importance of these individual risk factors remains undetermined. A recent systematic review did show a significant increase in the use of preoperative radiotherapy in patients who developed perineal hernia from 2012 to 2016 compared to the period from 1944 to 2011 (88% versus 42%, respectively, $p = 0.0001$). This could contribute to the increase in published cases [4].

Most perineal hernias are incidentally discovered on imaging and become symptomatic within the first 12 months after APR [3, 4]. Our case was indeed incidentally discovered but turned symptomatic relatively late. Development of symptoms is the most important indication for repair. Emergent repair for bowel obstruction, skin breakdown and evisceration has been described [4].

Various techniques for repair have been performed. These include primary closure of the defect, mesh placement and muscle flap reconstruction. The approach can be open abdominal, open abdominoperineal, perineal, laparoscopic or laparoscopic perineal [3, 4]. The perineal

approach is the most frequently used technique, followed by the laparoscopic approach (70% versus 23%, respectively) [4]. Almost all available data are based on case reports or small retrospective cohort studies. These studies are prone to publication bias and follow-up is limited. The results are very heterogeneous. Therefore, it is impossible to determine a gold standard technique.

As could be expected from data for abdominal wall hernia, mesh placement is favorable compared to primary closure [3]. Several types of meshes have been used for repair, including biological meshes. Recurrence rates varied from 5 to 47%. As stated before, it is impossible to draw definitive conclusions because of small sample size, heterogeneous patient populations and short follow-up.

Since eAPR is associated with more perineal wound problems and leaves a large perineal defect [5], it has been suggested to synchronously reconstruct the pelvic floor after eAPR using a mesh or flap reconstruction. Because of the poor quality of the available data, a multicentre single-blinded randomized control trial was conducted recently. This trial compared perineal closure using a biologic mesh to primary closure in patients who had received radiotherapy [5]. Contrary to previous reviews, there was no difference found between the two groups in short- or long-term wound complication rates. Freedom from perineal hernia though was significantly lower in the mesh group compared to the primary closure group at 1 year (87% versus 73%, respectively, $p = 0.0316$). This suggests the routine use of a mesh is advisable when closing the perineum after eAPR.

Our case is the first published report of a robotic-assisted repair of a perineal hernia following APR. Contrary to most other cases described, the hernia formed only several years after APR. The patient was known to have risk factors such as female gender, laparoscopic APR and eAPR. The relatively short follow-up period is a shortcoming of our case.

Conclusions

With the introduction of the laparoscopic eAPR, perineal hernia becomes more frequent and poses a challenging problem to the surgeon. As of today, there is no gold standard in the treatment of choice.

Our case shows that a robotic-assisted approach with mesh provides a feasible technique for repair. More prospective trials with large patient numbers and sufficient follow-up are needed to determine the optimal treatment strategy.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The study was in accordance with the ethical standards of the UZ Brussel and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was given by the patient both written and orally.

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