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Repair of Acquired Perineal Hernias in Abdominoperineal Excision: A Hybrid Technique and Literature Review

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Abstract

Introduction: Perineal hernias may present as congenital defects, as an acquired weakness secondary to pelvic floor laxity (primary) or as a rare complication (secondary) of radical pelvic operations, such as abdominoperineal resection (APR), coccygectomy, sacrectomy, or pelvic exenteration. While most acquired perineal hernias are asymptomatic, symptomatic hernias should undergo repair. The treatment of perineal hernias has been varied and a consensus on optimal surgical approach has not been defined.

Case Presentation: Here we describe a technique for the repair of an acquired perineal hernia after Extralevator Abdominoperineal Excision (ELAPE) and review of the literature with emphasis on perineal approach. Using four-point fixation and plug-and-patch system we were able to maintain an extraperitoneal repair and extend the stability of the pelvis to support the perineal defect. Gluteal advancement flaps served to both limit mesh erosion and wound infection. Short-term thirty-day outcomes revealed no clinical evidence of wound infection, wound dehiscence or hernia recurrence. The patient returned to his an active lifestyle, remaining asymptomatic and free of pain at one year.

Conclusions: Review of the literature and our own experience suggest that surgical morbidity associated with acquired perineal hernia repair is minimized via a perineal approach utilizing periosteal fixation with a synthetic plug-and-patch system and gluteal flap coverage. Additionally, our use of the Andrews frame optimized exposure. While the rarity of this complication limits prospective testing, there is growing evidence to support the validity of mesh repair via a perineal approach.

Keywords

Perineal hernia; synthetic mesh; plug-and-patch; ELAPE (extralevatorabdominoperineal resection); APR (abdominoperineal resection); acquired hernia; colorectal surgery

Abbreviations

APR: Abdominoperitoneal resection; MRI: Magnetic resonance imaging; PET-CT: positron emissions tomography and computed tomography

Introduction

Acquired secondary perineal hernias present infrequently after radical pelvic operations, such as abdominoperineal resection (APR), coccygectomy, sacrectomy, or pelvic exenteration, and occur in less than 0.3-3% of open APRs [1-4]. However, rates of perineal wound complication and herniation after Extralevator Abdominoperineal Excision (ELAPE) may be substantially higher, ranging widely in the literature from 3-26% [5,6]. Following pelvic surgery, many patients intend to return to an active lifestyle. If a perineal hernia develops in the postoperative period, quality of life may be impacted

secondary to discomfort and unsatisfactory cosmesis. The presence of such hernias may also be complicated by bowel obstruction, urinary retention or maceration and ischemia of the perineal skin.

There have been a wide range of techniques employed to address this rare complication and no clear consensus exists regarding surgical approach. Perineal, abdominal, and combined procedures have been described in case reports and series. Mesh repair via a perineal approach has been shown to be effective [3,7,8]. Yet despite a growing interest and innovation in perineal hernia surgery, the most efficacious treatment continues to be debated. We present a novel technique that incorporates standard concepts of hernia repair, by filling the defect and reinforcing the pelvic floor with the use of a plug-and-patch technique via a perineal approach.

Case Presentation

A 60 year old man with a past medical history of hypertension was diagnosed in 2011 with rectal cancer. Preoperative MRI and PET-CT suggested invasive components involving the internal sphincter, posterior abutment of the right puborectalis and posterior prostate, as well as several suspicious mesorectal and right internal iliac nodes. Based on these findings he underwent neo adjuvant chemoradiation prior to a planned laparoscopic robotic-assisted low anterior resection. Intraoperatively, effects of preoperative radiation were evidenced by scarring of the levator hiatus which extended to the distal mucosal margin. Extensive fibrosis and a concern for residual tumor necessitated resection of the levator muscles in the right pelvis as well as near total resection of the left levator muscles. Due to these intraoperative findings, anastomosis was not attempted and an extralevatorabdominoperitoneal excision (ELAPE) was performed with primary closure of the perineum. R0 resection was achieved and final staging on pathology was ypT2 N0/15.

Initial postoperative visits were unremarkable and no signs of perineal wound dehiscence or hernia were noted. The patient proceeded with planned adjuvant Capecitabine and Oxaliplatin chemotherapy. However 18 months postoperatively, physical exam revealed a well-healed perineal incision with a non-tender, reducible hernia. (Image 1) The patient was initially managed conservatively, but represented at two years with complaints of pain, increased discomfort on ambulation and an inability to sit comfortably. Risks and benefits of surgery were discussed at length and a repair via perineal incision was planned.

In the operating room, the patient was positioned in prone jack-knife using an Andrews operating table frame to provide adequate exposure of the hernia. (Image 1, Figure A) The perineal defect was incised in an ellipse, encompassing the old scar. (Figure B) The hernia sac was then exposed and entered. Adhesiolysis was performed and adherent small bowel was freed from the pelvic floor. The sac was then closed with running 3-0 vicryl suture and reduced into the pelvis. A Marlex plug was used to fill the hernia defect and was secured with 2-0 prolene sutures by three -point bony fixation: to the coccyx and to the ischial tuberosity bilaterally. A fourth point of fixation was completed anteriorly to the perineal fascia. (Image 2, Figure C, D) A Marlex mesh patch was placed in an overlay fashion in the perineum to cover the plug and was secured with interrupted 2-0 prolene sutures. (Image 3, Figure E) Similarly, the gluteus maximus muscles bilaterally were elevated off of the coccyx and distal sacrum allowing for medial advancement and full coverage of the underlying implanted mesh.(Figure F) The skin and subcutaneous tissues were closed in a layered fashion with 3-0 vicryl deep dermal interrupted and 2-0

nylon vertical mattress sutures.

Initial recovery was uneventful. He was discharged to home on postoperative day two tolerating diet and no longer requiring oral pain medication. Evaluation at 30-days postoperatively revealed a well-healed incision without evidence of hernia recurrence, wound infection or dehiscence. He reported complete resolution of his presenting symptoms, denying pain or discomfort with ambulation or sitting. On follow-up at one year he continues to maintain an active lifestyle and remains asymptomatic.

Discussion

One of the earliest published reports of a perineal hernia following rectal exicision was relayed in the 1929Proceedings of the Royal Society of Medicine. There Sir Lionel E. C.Norbury, a celebrated Council member to the Royal College of Surgeons, remarked: "The operation was followed by a large hernia… This does not cause much discomfort. Such hernias are more likely to occur when the operation necessitates removal of much bone." Perineal hernias represent a rare complication of radical pelvic surgery. While more often asymptomatic, patients may present with pain, discomfort, bulging, skin changes, obstructive symptoms or, in the most dramatic instances, evisceration [9,10] As noted by Sir Norbury, extended en block resections, certainly of the bony structures of the pelvis, but also with that of levator muscles may leave patients more susceptible to hernia formation [5]. Yet, a growing body of literature supports ELAPE, citing decreased risk for rectal perforation and improved local recurrence rates [11-15].

Risk factors for postoperative perineal hernia formation include extent of dissection, infection, radiation exposure, length of small bowel and female gender [3,16]. While some studies have targeted hernia prevention toward pelvic floor reinforcement with mesh, [17,18] others have attempted to fill the hernia defect. By obliterating the potential pelvic space, small bowel and other intraabdominal contents are displaced out of the pelvis and in toward the abdomen, limiting risk for incarceration. Bulut and colleagues, in a novel approach, chose to obliterate the pelvic space with an inflated foley catheter placed at the TME site at the time of the initial pelvic dissection, which was subsequently removed 10 days postoperatively. After a median follow up of 36 months, none of the 15 patients included in the series developed a perineal hernia [19]. Myocutaneous flaps are more commonly used to fill, cover and support the perineal defect in the setting of radiated tissues. Large defects with inadequate viable skin coverage also benefit most from this approach [20]. Several techniques have been described in the literature which utilize various biologic and prosthetic materials, though results have varied and outcomes may be complicated by adhesions, fistulas, surgical site infection and abscess [6,21,22].

Our patient did undergo a VRAM flap in his initial surgery, employed to reduce risk for wound infection and herniation. Yet, reinforcing techniques in perineal closure are still susceptible to hernia formation [23]. In this patient, the extent of excision and history of radiation were likely contributing factors. As acceptance grows for extralevator /cylindrical APR in the setting of locally advanced disease, the incidence of perineal hernias may increase. Attenuated tissues at reoperation, poor wound healing secondary to radiation, adhesions, loss of clear fascial planes and patient risk factors, such as smoking, obesity, diabetes and malnutrition, complicate this repair.

The abdominal approach to perineal hernia repair is appealing in that it offers a true tension-free repair [24]. Recent literature promotes the use of laparoscopy over open repair, citing improved

visualization and reduced recovery time [1,24,25]. Yet, a laparoscopic approach can be limited by body habitus, adhesions from previous surgeries and risk associated with achieving pneumoperitoneum [1]. The curvature of the pelvis may also limit visibility of the anterior border of the defect [26]. Rectus abdominus muscle (VRAM) flap failure has been reported, secondary to iatrogenic injury of the inferior epigastric pedicle during laparoscopic hernia repair [25]. Given these concerns, we believe that aperineal approach may in fact be the more minimally-invasive for operative treatment of perineal hernias and can provide a durable repair by extending the stability of the pelvic outlet to support a reconstructed pelvic floor.

Perineal technique has evolved over time. Biologic, metal and synthetic meshes have all been trialed. Yet, placement of sandwiching titanium mesh is technically challenging and biologic mesh incurs substantial cost [27-29]. In 2001 Fernandez et al reported a case in which synthetic mesh was sew to the sacral periostium via a perineal incision [30]. In this repair the hernia sac was excised after exploration of the abdomen and reduction of the small bowel. We elected in our repair to close the peritoneum in an effort to limit risk for mesh erosion into abdominal viscera, protect the bowel from adhesion and to prevent fistula formation. Additionally, suggestion has been made that hernias develop when the peritoneum is left open; thus routine closure of the hernia sac has been recommended [31].

Tacks and bone anchors, such as Mitek Sutures have been used in several case reports to affix mesh to the ischialtuberosities and pelvis [7,32,33]. Although the incidence appears to be low, there have been reports of osteomyelitis and osteitis pubis secondary to direct bony fixation in the urology literature [34-36]. Martijnse et al describe an evolving approach to hernia repair over nearly a decade that found the most lasting repair was that of “high tension” with running sutured sacrotuberal and coccygeal fixation [29]. Thus we chose to obviate this risk by securing the mesh via periosteal sutures.

One other goal of hernia repair is that of filling the perineal defect. Alternatively, Ali and colleagues at Cambridge University Hospital, United Kingdom used tissue expanders to fill the hernia defect. This technique offered the ability to postoperatively alter the size of the expander in response to potential symptoms. Eventually the expander was removed, leaving a fibrosed capsule to maintain the pelvic floor. Their results were varied; some patients experienced resolution of symptoms, while others experienced leak, infection and migration of the implant. This process was extended over time and required vigilant follow up and adjustment. Myocutaneous flaps have also been used in the reoperative setting to help to obliterate perineal defects. However, these surgeries are more labor intensive and require substantially longer OR times. By using the plug-and-patch system we were able to reduce the size of the perineal defect and the gluteal advancement flaps brought well perfused and supportive tissues to the site of wound closure.

Both synthetic and biologic meshes have been employed in perineal hernia repair. To our knowledge, our case is the first reported use of the plug-and-patch system. The Andrews frame allowed for greater lateral distraction of the thighs in prone jack-knife position and maximized exposure of the perineal defect for a more controlled entry into the pelvis. Crucial to this plug-and-patch repair is the exploration and closure of the perineal sac; intraabdominal contents are released from the pelvic floor and the mesh plug remains isolated from the peritoneal viscera. The mesh plug fills the perineal defect and is secured to the coccyx and bilateral ischialtuberosities. This coverage is then further stabilized by a mesh overlay, which is anchored to the same structures. Three-point bony fixation limits the potential for

mesh displacement or migration and draws on the static structural support of the pelvis. The advancement of gluteal muscle to cover the meshinhibits erosion through what may be attenuated, in many cases radiated, skin and limits the risk of wound infection. The plug-and-patch approach via the perineum combines reinforcement of the pelvic floor with obliteration of the pelvic defect. This technique is minimally-invasive, the materials are readily available and, in comparison to alternative modalities, may be achieved with technical ease.

Conclusion

In this case report, an acquired perineal hernia repair was successfully achieved utilizing a pre-existing and readily available synthetic mesh plug-and-patch system via a perineal incision. This approach was associated with minimal perioperative morbidity and an excellent thirty-day and one year outcome. The Andrews frame allowed for excellent visibility of and access to the defect. While many techniques for the repair of acquired perineal hernias have been trialed, and literature consists primarily of case reports and series, perineal mesh repairs have increased in prevalence. The use of a synthetic plug-and-patch system with gluteal flaps via a perineal approach shows great promise, particularly for patients with multiple comorbidities. However, further experience will be necessary to validate durability.

Figures

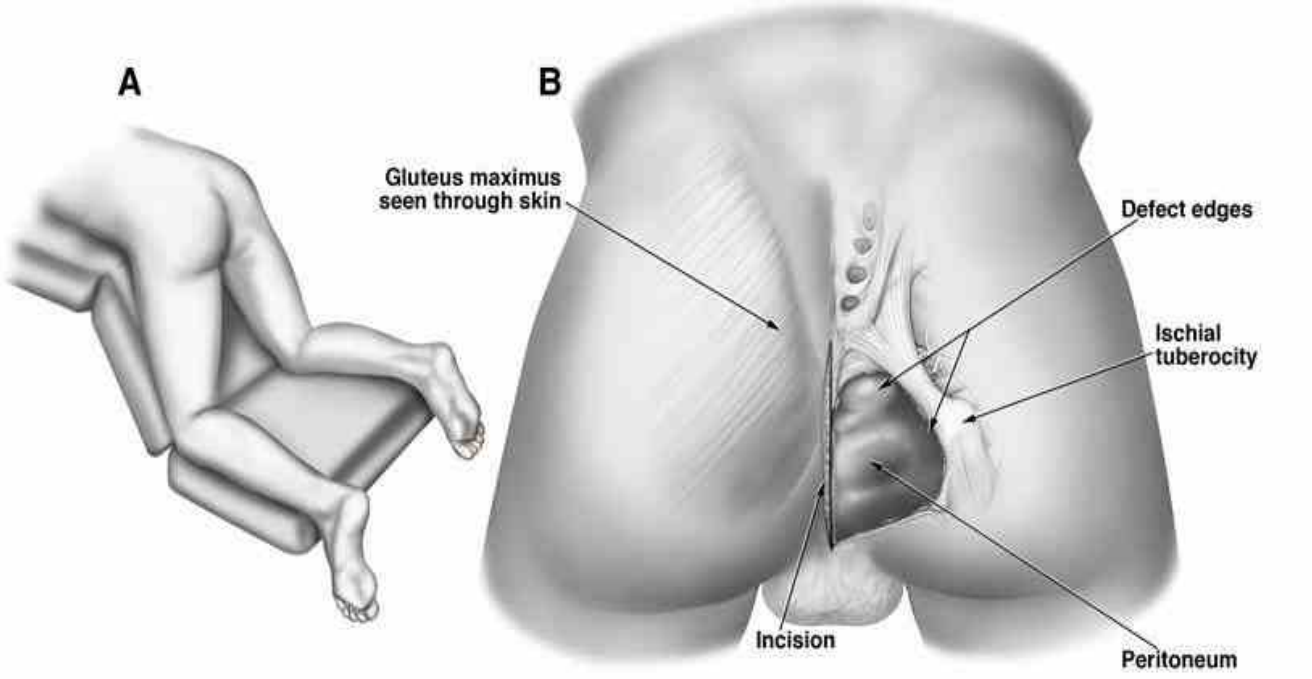

Figure (A) Patient placed prone on Andrews Frame (B) Perineal defect before and after incision and exposure

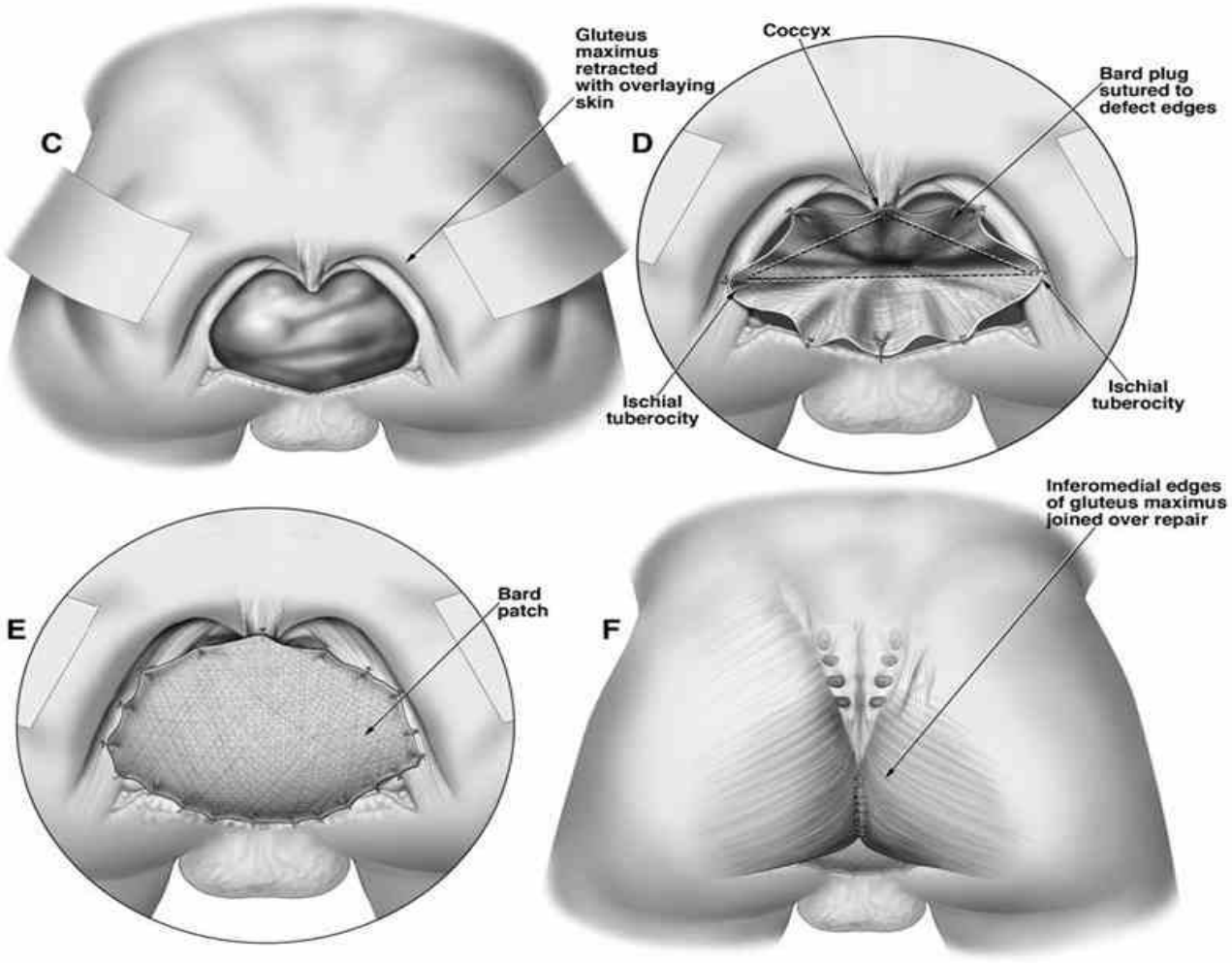

Figure (C) Perineal defect (D) Plug placed in defect with 3 point bony fixation and fourth point to perineal fascia anteriorly (E) Mesh overlay (F) Medial mobilization of gluteus maxiumus to cover mesh

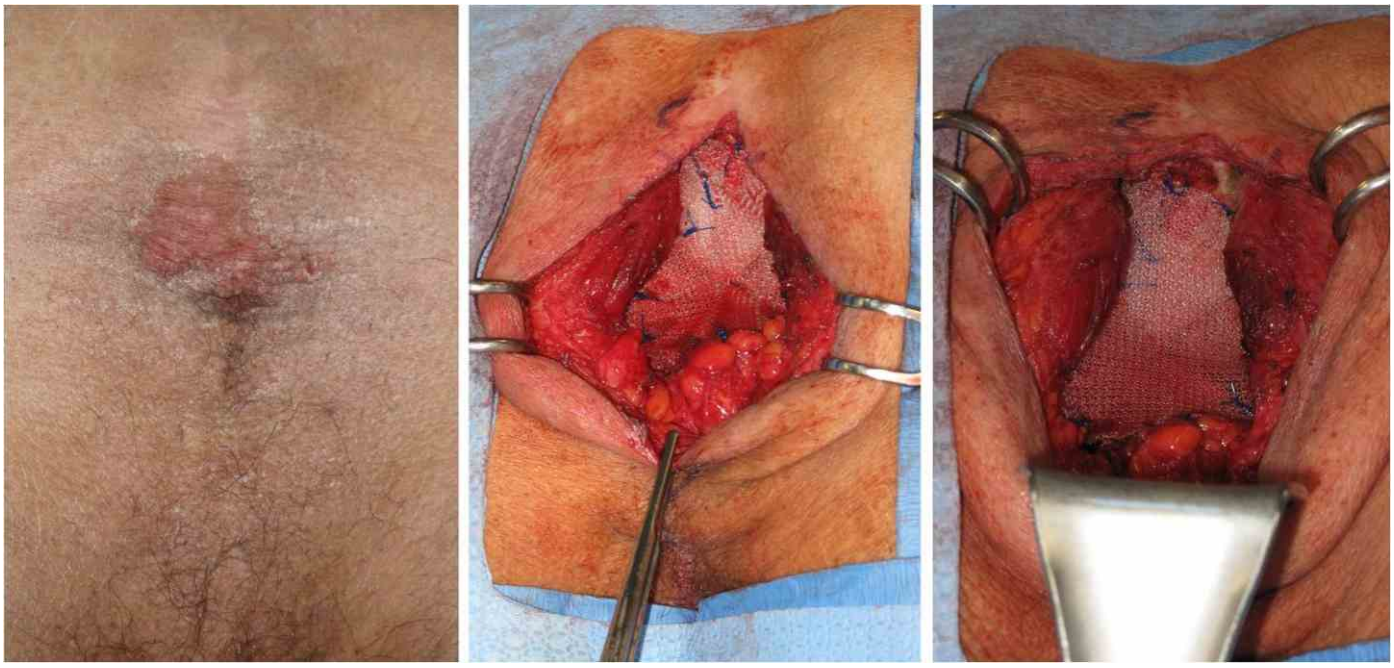

Image (1) Perineal hernia with attenuation of overlying skin (2) Perineal defect with placed mesh (3) Perineal defect with placed mesh overlay

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