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Unusual techniques in the management of enteroatmospheric fistula. Report of a case

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ABSTRACT

INTRODUCTION: Enteroatmospheric fistula (EAF) is one of the most challenging postoperative complications following gastrointestinal surgery. Different techniques have been reported for managing the open abdomen and controlling the effluent released from an EAF.

PRESENTATION OF A CASE: We herein report the case of a patient who underwent bowel resection, complicated by the failure of the staple line, in the setting of an open abdomen. A male external catheter was anastomosed to the EAF opening to control the effluent and divert it away from the wound. In addition, Teflon pledgets were used to successfully patch a second, small EAF opening.

DISCUSSION: An essential element in managing EAFs is wound care and controlling the effluent from the EAF to protect the wound. Different innovative techniques have been described to manage an EAF in the setting of an open abdomen. Anastomosing the male external catheter to the EAF opening is a simple and quick technique to control the EAF effluent. Other techniques can be applied at the same time to manage the wound.

CONCLUSION: EAF is a very challenging complication. We presented a simple and effective technique to control the EAF effluent. Multidisciplinary teams are required to manage these patients successfully.

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1. Introduction

Enteroatmospheric fistula (EAF) is defined as an abnormal communication between the gastrointestinal tract and the atmosphere. This phenomenon is considered to be one of the most challenging postoperative complications for a general surgeon following gastrointestinal surgery. One of the major objectives when treating an EAF is to control the bowel effluent and divert it away from the abdominal cavity and the retracted skin, in order to protect the surrounding tissue and allow the wound to heal. However, achieving this goal is difficult. Several different techniques have been developed to manage this problem. The aim of this report is to describe a case where simple and effective methods were used to successfully control the EAF effluent. This work has been reported in line with the SCARE criteria [1].

2. Presentation of a case

A 25-year-old female patient, who was known to be on dialysis for end stage renal disease and to suffer from systemic lupus ery-

thematosus, underwent bowel resection. Her postoperative course was complicated by an anastomotic leak, leading to reoperation. The abdomen was left open due to massive bowel edema. Consequently, the patient developed a frozen abdomen with two concurrent EAFs; the first of these arose from a failed staple line, and the second from a failed repair of an enterotomy.

2.1. Male external catheter sutured to the EAF

The large EAF was leaking effluent into the surrounding area (Fig. 1). Initially, in order to prevent this leakage, a Foley catheter was placed inside the EAF and the balloon was insufflated to form a controlled fistula, with a vacuum-assisted closure (VAC) system placed around it (Fig. 2). However, due to the size of the EAF opening, there continued to be leakage around the Foley catheter, causing the foam dressing (Granufoam™, KCI, San Antonio, TX, USA) of the VAC to become saturated with effluent and resulting in the failure of the VAC apparatus. A simple technique to control the effluent exuding from the EAF and protect the skin is to suture a Rochester UltraFlex Self-Adhering Male External Catheter (BARD INC, Covington, GA, USA) to the edges of the bowel [2]. This method is useful when the opening of the fistula is large and the mucosa is protruding, as in our case. The base of the male external catheter (Fig. 3) is flexible and can be narrowed to match the size of the EAF by placing few sutures to the side of the base (Fig. 4). Then, the male external catheter is sutured to the EAF using non-

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Fig. 1. Enteroatmospheric fistula secondary to the defect in the staple line observed in the setting of an open abdomen.



Fig. 3. A Rochester UltraFlex Self-Adhering Male External Catheter.



Fig. 2. A Foley catheter is inserted in the opening of the enteroatmospheric fistula and a VAC dressing is applied.



Fig. 4. The Rochester UltraFlex Self-Adhering Male External Catheter base is narrowed from the side by introducing a few sutures, thus allowing the catheter to exactly fit the EAF opening.

absorbable monofilament suture with a round needle, taking full thickness bites of the bowel in a continuous fashion. A leak test can be performed by injecting saline through the top of the catheter using a 60 ml catheter tip disposable syringe (Fig. 5). At this stage, if there is a large leak, the area can be reinforced with more sutures. The VAC is then applied around the male external catheter, using a hole created in the plastic lining of the VAC system for the catheter. Multiple techniques and modifications have been reported for positioning the VAC in the setting of the EAF [3,4]. The Granufoam™ is cut and fashioned to cover the whole abdomen except the EAF. To prevent leakage from the EAF, a stoma paste is placed around the male external catheter, and the Granufoam™ dressing is applied. The VAC is connected to continuous low suction and the male external catheter tip is connected to continuous wall suction to prevent



Fig. 5. A leak test is performed using a 60 ml catheter tip disposable syringe.

accumulation of the effluent in the catheter, which could exert pressure on the catheter base and lead to a leak.

2.2. Pledgets to close a small EAF

The second, smaller EAF was managed using multiple techniques, such as direct suturing, glue, and a purse-string suture in the setting of the open abdomen. However, due to the condition of the bowel, all these techniques failed, with the fistula reopening. Alternatively, three Teflon pledgets (Péters Surgical, Bobigny, France) (Fig. 6) were sutured together using a Keith needle to form a patch, which was then sutured to the edges of the EAF in order to seal the opening (Fig. 7). After a few weeks, the pledgets were still in place with no leakage from EAF site (Figs. 8 and 9). To our knowledge, the use of pledgets to patch an EAF has not yet been reported.

3. Discussion

EAF is considered to be one of the most challenging postoperative complications to handle following gastrointestinal surgery. One of the paramount steps in the management of an EAF is to control the effluent discharged from the EAF, to enhance wound care and skin protection [5]. If the effluent from the EAF is not adequately contained, it may lead to a leakage into the abdominal cavity. Subsequent local and systemic sepsis and a worsening of the inflammatory response of the surrounding tissues may occur, causing impairment of wound healing. Several different techniques for managing the EAF effluent have been reported, with variable degrees of success. Usually, a combination of multiple techniques is eventually required during the different stages of wound healing. The fistula VAC technique is a simple method that has been used successfully for managing EAFs, where a Xeroform gauze is applied to the open abdomen wound, excluding the EAF. The foam is then placed on the Xeroform dressing, and the polyurethane drape and



Fig. 6. The Teflon pledgets that were used to patch the EAF opening.

suction is applied [6]. However, the wound base might not always be level and a stoma appliance can be difficult to apply to such a complex wound, especially during the early stages of the EAF. In our case, a Foley catheter was inserted through the EAF opening and the balloon was inflated to prevent any leakage, allowing the VAC system to be implemented. However, due to continuous leakage around the Foley catheter, the foam of the VAC became saturated, and the effluent started to leak around the VAC dressing. A very simple, quick, and effective technique is to suture a male external catheter to the edges of the EAF [2,3] which can be tested immediately. If any leakage is observed, the anastomosis between the catheter and the bowel can be re-enforced with more sutures. Subsequently, the VAC dressing can be applied around the EAF and the male external catheter can be connected to wall suction. This will empty the catheter immediately, preventing the accumulation of effluent and avoiding any tension in the anastomosis between



Fig. 7. Teflon pledgets are used to patch the EAF opening.



Fig. 8. The Teflon pledgets are still in place a few weeks after placement.

the catheter and the bowel. The anastomosis between the male external catheter and the opening of the EAF will last for several weeks, and the catheter can be replaced by a new one as needed, until the wound around the EAF closes. Following wound closure, a stoma appliance can be placed on the wound around the EAF, which can then be treated as an ileostomy. In our case, a different method was used to address the smaller EAF opening. Teflon pledgets were introduced to patch the EAF opening and successfully prevented any leakage. To our knowledge, the use of Teflon pledgets to reinforce an EAF has not yet been reported in the literature.

Alternative techniques have been described for this challenging problem. A split-thickness skin graft can be helpful for covering the



Fig. 9. The wound after few weeks from applying the VAC after the EAF was isolated from the wound.

wound around an EAF [7]. It is a simple, quick technique that can be applied as early as a few weeks following the index operation, rather than after wound closure by secondary intention which may take considerable time, and thus allowing for a faster recovery and shorter hospital stay [7]. Another technique that has been described is the floating stoma, where the abdomen is temporarily closed with a plastic silo (Bogota bag) sutured to the skin edges, and an opening is created just on the top of the EAF. Then EAF is covered with a stoma appliance [8].

4. Conclusion

EAF is considered one of the most challenging complications after gastrointestinal surgery. Multidisciplinary teams are needed to manage these patients. Furthermore, the surgeon should be ready to apply different techniques to handle an EAF in the setting of an open abdomen.

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Ethical approval

Ethical approval was not required for this case report, which had de-identified information.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request”.

Author contribution

Abdulaziz Saleem: writing and editing the manuscript
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