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The Management of Enteroatmospheric Fistula Development After Bridectomy Associated With Appendectomy

Apendektomiye Bağlı Bridektomi Sonrası Gelişen Enteroatmosferik Fistülün Yönetimi

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Abstract

Enteroatmospheric fistula, which is a fearsome complication of abdominal surgery, has a high rate of mortality despite the developments in open abdomen management. Management of a patient with enteroatmospheric fistula requires a multidisciplinary approach and a multifaceted treatment from a team of experienced surgeons and expert nurses. This article was written in order to present nursing bottle teat technique combined with vacuum-assisted closure treatment with a modified method specific to the individual in a Grade 4 patient with open abdomen

Öz

Abdominal cerrahinin korkulan bir komplikasyonu olan entero-atmosferik fistül, açık karın yönetimindeki gelişmelere rağmen ciddi mortalite oranına sahiptir. Entero-atmosferik fistüllü hastanın yönetimi, deneyimli cerrahlar ile uzman hemşirelerin yer aldığı multidisipliner bir yaklaşımı ve çok yönlü tedaviyi gerektirir. Bu makale Grade 4 açık abdomenli hastada, vakum yardımlı kapama tedavisi ile kombine edilen bebek biberon emziği tekniğini bireye özgü modifiye ettiğimiz yöntemi sunma amacıyla yazılmıştır.

Keywords:

Open abdomen; fistula; vacuum-assisted closure.

Anahtar Sözcükler:

Açık karın; fistül; vakum-yardımlı kapatma.

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Introduction

Enteroatmospheric Fistula (EAF) is a condition that creates an opening from the gastrointestinal system which develops without a soft tissue on (Tarım and Kuş, 2018). EAF, which develops after a trauma or an abdominal surgery, is mostly associated with electrolyte abnormality, malnutrition and sepsis which is fatal (Ulukent et al., 2016). EAF is known to develop in 25% of patients (Ulukent et al., 2016) and have a mortality rate ranging between 42-75% (Leang et al., 2018; Marinis et al., 2014; Taraconi et al., 2019; Ulukent et al., 2016).

EAF can be classified according to its anatomy (proximal/distal), output (low <200 mL, moderate 200-500 mL and high >500 mL) and also according to its position (deep penetrating/superficial) (Di Saverio et al., 2016). Open abdomen classification of The World Society of the Abdominal Compartment and Björck's revision of the classification system is present Table 1 (Björck et al., 2016).

Table 1. Open Abdomen Classification System

Classification of The World Society of the Abdominal Compartment (2009)	Amended Classification System (2016)
1A: Clean open abdomen without adherence between bowel and abdominal fixity	1A: Clean, no fixation
1B: Contaminated open abdomen without adherence	1B: Contaminated, no fixation
	IC: Enteric leak, no fixation
2A: Clean open abdomen developing adherence	2A: Clean, developing fixation
2B: Contaminated open abdomen developing adherence	2B: Contaminated, developing fixation
	2C: Enteric leak, developing fixation
3: Open abdomen complicated by fistula formation	3A: Clean, frozen abdomen
	3B: Contaminated, frozen abdomen
4: Frozen open abdomen with adherent/fixed bowel, unable to close surgically, with or without fistula	4: Established enteroatmospheric fistula, frozen abdomen

* Björck, M., Kirkpatrick, A. W., Cheatham, M., Kaplan, M., Leppäniemi, A., De Waele, J. J. (2016). Amended classification of the open abdomen. *Scandinavian Journal of Surgery,* 105(1), 5-10.

EAF is not a true fistula as it is not covered with a tissue or having a fistula tract and it is quite difficult to close spontaneously (Ulukent et al., 2016). While low output distal fistula without distal obstruction, and that does not contain an extraneous particle can close spontaneously, proximal, high output fistulas have a low probability of closure without surgery (Ramsay and Mejia 2010; Ulukent et al., 2016; Wright and Wright, 2011). Surgical treatment is mostly multi-phased. Following an accurate confirmation and classification, it requires individualized treatment considering EAF type and characteristics (Di Saverio et al., 2016; Eğin et al., 2019). The most definitive surgical method is the resection of the bowel containing the fistula opening. A resection surgery may not be possible due to common peritoneal adhesions (frozen abdomen). In this case, it is essential to control EAF leakage (Eğin et al., 2019; Wirth et al., 2018; Wright and Wright, 2011). As an out-of-control EAF leakage sets back wound recovery due to constant contamination around the irritation of the skin (Eğin et al., 2019). Frozen open abdomen complicated with EAF is classified as Björck 4 open abdomen (Björck et al., 2016). In patients with Björck 4 open abdomen, constant contamination and chemical irritation caused by EAF may not be possible to recover in all cases. In these patients, if EAF isolation fails, it results in mortality due to sepsis (Eğin et al., 2019).

In this case report, we aim to present our modified method of nursing bottle teat technique combined with Vacuum-Assisted Closure (VAC) on a Björck 4 open patient with high output fistula leakage, for the treatment of EAF on the open abdomen.

Case Report

A 69-year-old male patient appealed to emergency service 20 days after acute appendectomy with complaints of stomachache and over-sensitivity. In abdomen tomography of the patient, bowel loops with abdominal fluid around were observed. Bride resulting from prior appendectomy and 4-cm ischemic tissue was detected. The patient was operated on and had bridectomy and segmental small intestine resection with anastomosis. The patient, who could tolerate oral intake, was discharged one week after the completion of treatment. Two weeks following the discharge, the patient appealed to the emergency service with complaint of leakage around the wound. A single output EAF on the upper side of the wound in the abdomen around the umbilical region was observed and the patient was re-hospitalized.

Oral intake was discontinued, and a total parenteral nutrition (TPN) was initiated. The patient was observed for a week as gastric contents of the fistula were aspired. Resulting from the location of the fistula, however, fistula isolation failed due to constant fecal contamination of the wound and its high output (600cc/day). The use of nursing

bottle teat technique combined with VAC treatment was decided on for the treatment of the patient with Björck 4 open abdomen in order to transform fistula opening into a stoma.

In practice by stoma and wound care nurses; a sterile environment was created in the patient's room. The fistula had an opening of 1x1 cm (Figure 1). Enteric direction was examined and it was observed that it was at two o'clock direction. Silicone teat of a nursing bottle was cut with a sterile scalpel and placed on fistula opening (Figure 2). Thus, a small pool that does not leak enteric contents was created. Open abdominal region around the pool was covered with surgical sponge, extra sponge and a sterile drape (Figure 3). A hole was cut on the cover. Bottle teat edges were fixed on EAF with a drape and it was isolated with hydrocolloid in order to prevent leakage. Stoma adapter was cut and placed on hydrocolloid, and distal edges of the bottle teat was removed from stoma adapter. The fistula was completely isolated by supporting distal edges of the teat and adapter edges by stoma paste. A stoma bag was placed on the stoma adapter and Negative Pressure Wound Therapy (NPWT) was initiated (Figure 4, 5). VAC system with an open abdomen cover (Visceral Protective Layer and standard foam) was used for negative pressure therapy. VAC was kept running on constant mode at low pressure (-75 mmHg). After applying for two sessions, EAF was transformed into a stoma. Following five sessions of VAC at intervals of 48-72 hours by stoma and wound care nurses, open abdomen closed and double-barreled fistula opening transformed into a stoma.

Figure 1. Enteroatmospheric fistula with an opening of approximately 1x1 cm

Figure 2. Placing the silicone teat of a nursing bottle opening into the fistula opening.

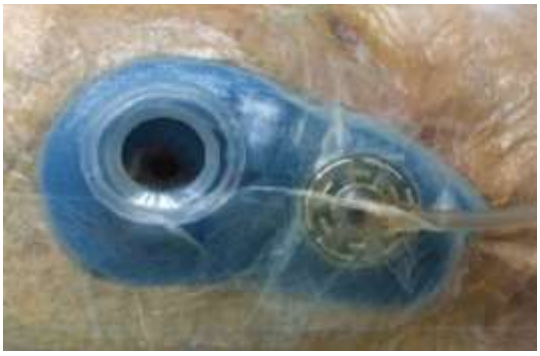

Figure 3. Closure of open abdominal region with surgical sponge, extra sponge and a sterile drape.

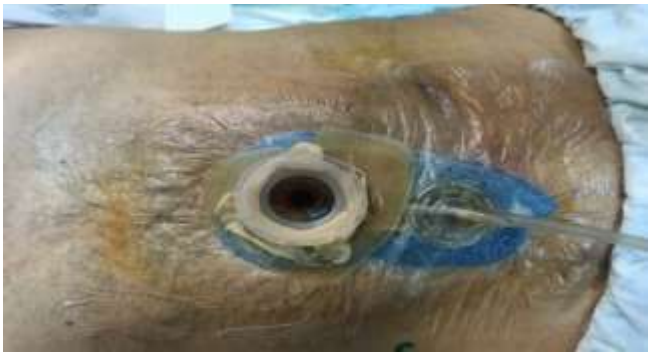

Figure 4. Punching hole on the cover, fixing the bottle teat edges with drape on the EAF and isolating with hydrocolloid to prevent leakage. Isolating the fistula by supporting with stoma paste of the distal edges of the teat and of the adapter edges.

Figure 5. Placement of a new bag in the stoma adapter and initiation of negative pressure wound therapy.

During the process of stoma care on the umbilical region, surrounding tissue was preserved with VAC drapes and supported by stoma paste and powder to protect peristomal skin. Fistula was managed for 52 days along with stoma care until the planned surgery.

During the follow-up, the patient was observed in case of liquid-electrolyte abnormalities, nutritional deficiencies and infections. The patient had growth of Escherichia coli and C-Reaktive Protein range 183 mg/dl in blood culture, so a sensitive antibiotic therapy (Tazobactam) along with infection consultation was planned for the patient. According to the results from blood culture 12 days later, no sign of bacterial growth was found. Considering biochemical values, the patient, who had an albumin level of 1.8 gr/dl, was given a 20% albumin replacement. For liquid-electrolyte balance, daily liquid level was kept at plus 500. To counter low potassium and calcium levels, IV potassium and calcium support was provided. In addition, the patient did not have a sufficient oral intake, thus he was provided with parenteral nutrition with protein and vitamin support. Wound healing was accelerated and thus an efficient EAF management was assured.

Ethical considerations

An informed consent was obtained from the patient and his family. Also for the case report, approval was obtained from the Clinical Research Ethics Committee of a City Hospital (Date/number 22.07.2020/2020/514/182/21).

Discussion

EAF in the open abdomen is a feared complication that might cause mortality. When EAF develops, it gets more difficult to treat patients with open abdomen and the probability of morbidity and mortality increase (Eğin et al., 2019; Tarasconi et al., 2019). In case of a development of EAF, it must be diagnosed as soon as possible, and a definitive surgical treatment must be conducted after tissue recovery (Ulukent et al., 2016). In the management of EAF, a multidisciplinary team approach is critical and stoma and wound care nurses are essential elements of the team (Tarasconi et al., 2019).

Ideal results of negative pressure wound therapy application in the management of fistula are reported in many case reports and series (Tarasconi et al., 2019). A diversion of proximal enteric contents on patients with Björck 4 open abdomen is not possible (Eğin et al., 2019). In addition, it is possible to isolate enteric contents for the management of EAF on these patients. These methods were identified by D'Hondt et al. and Jannasch et al. in 2011 (D'Hondt et al., 2011; Jannasch et al., 2011). Moreover, Marinis et al., (2013) identified some methods such as floating stoma, fistula VAC, tube VAC, nipple VAC, ring and silo VAC (Marinis et al., 2013). Despite the variation in application, all these techniques are based on the individualized combinations of the tools used in stoma car and include optimal wound care approaches. Basically, they all include the placement of a stoma bag on VAC dressing (Wirth et al., 2018).

Another method for EAF isolation is nursing bottle teat technique identified by Layton et al., in 2010 (Layton et al., 2010). Layton et al., enabled drainage by placing a soft standard latex or silicone baby bottle teat on fistula and connecting foley catheter to the teat (Layton et al., 2010; Ulukent et al., 2016). In our case, the technique named nursing bottle teat in combination with the VAC method was individualized due to the fact that the fistula was highly dynamic and the foley catheter was ejected. Thus it was possible to isolate and stabilize EAF.

Patients with EAF are hypercatabolic due to severe liquid and electrolyte losses, hypoalbuminemia, hypoproteinemia and vitamin deficiencies. Therefore, their need for nutrition and energy must be met by providing protein and vitamin support (Marinis et al., 2013). In our case, the patient was provided with parenteral nutrition support and hypoalbuminemia was countered with albumin replacement and his liquid balance was assured (Eğin et al., 2019; Ulukent et al., 2016). Antibiotic therapy was applied against wound infection and sepsis (Marinis et al., 2013; Terzi et al., 2014).

In studies reporting prior experience related to negative pressure wound therapy in management of EAF on open abdomen, it is stated that EAF management was assured in an average of 50 days and that VAC catalyzes wound healing (Layton et al., 2010; Terzi et al., 2014; Ulukent et al., 2016). Similarly in our case, EAF was transformed into a stoma through the use of a modified isolation method of nursing bottle teat technique combined with VAC. EAF on open abdomen recovered at the end of a 52-day management. The care of the patient was continued as a stoma care procedure until the planned surgery. The patient was discharged after assuring stabilization after surgical treatment.

As a result, contamination and sepsis were prevented through successful isolation. Keeping the wound clean facilitated tissue recovery. Our method of using a modified nursing bottle teat technique combined with VAC can be implemented successfully for EAF treatment on patients with Björck 4 open abdomen.

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