



Entero-Atmospheric Fistula Managed with Kehr's T-Tube; A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Introduction: A fistula is a communication between two epithelialized surfaces. Entero-atmospheric fistula (EAF) is an enteric fistula occurring in the setting of an open abdomen, thus creating a communication between the GI tract and the external atmosphere. The critical tenets in successful management of gastro intestinal fistulas are recognition of fistula, control of infection and further contamination, restoration of fluid and electrolyte losses, and re-establishment of positive nutritional balance before undertaking major definitive corrective procedures. A case of superficial EAF managed successfully with Kehr's T-tube is presented.

Patient information: A 68-year-old gentleman of rectal trauma managed with loop colostomy with subsequent closure, presented with intestinal obstruction. On laparotomy a small leak with localized faecopurulent collection was present. Resection of the infectious anastomosis bearing segment with fashioning of proximal diversion colostomy with distal mucus fistula was done, post-operative period was uneventful. Restoration of bowel continuity after mobilization of colon and intra peritoneal end to end anastomosis was done at an interval of 6 months. In the post-operative

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period, patient developed grade IV wound sepsis and burst abdomen. Subsequent abdominal examination revealed an EAF in a small bowel loop lying adjacent to anastomotic site with high fistula output. Placement of short limb of Kehr's T-tube in the fistulous bowel loop resulted in reducing the fistula output promoting wound healing and successful management of EAF.

Conclusion: In the superficial high output EAF, negotiation of horizontal limbs of Kehr's T-tube into the fistula bearing bowel loop, helps in reducing the fistula output resulting in better management of fistula, promotion in wound healing and reversion of catabolic state. Subsequently stoma bag/wound manager or effective VAC may be applied to aid the ultimate closure of the fistula. To conclude management of EAF deserve to be individualized and innovative as per the clinical situation for successful outcome.

Keywords: Entero-atmospheric fistula; high output fistula; Kehr's T-Tube.

1. INTRODUCTION

Entero-atmospheric fistula (EAF) is an enteric fistula occurring in the setting of an open abdomen as communication between the GI tract and the external atmosphere. It is not a true fistula as it lacks fistulous tract and is not covered by well vascularized tissue. EAF occurring in the middle of the burst abdomen is the most challenging and feared complication for a surgeon. This is more so if it occurs in a patient with co-morbidities.

We are presenting a case of an EAF in an elderly patient with COPD, malnutrition and with local sepsis, managed successfully by using Kehr's T-Tube for local control of the fistula. Spontaneous closure of an EAF is a rare entity, which was successfully achieved in this case with a unique technique which holds academic interests.

2. CASE PRESENTATION

2.1 Timeline

A 68-year-old gentleman with history of rectal injury 1.5 years back, underwent diversion transverse loop colostomy and subsequent restoration of bowel in a civil hospital situated in Chamba, Himachal Pradesh. Later the patient presented with intestinal obstruction to our institution, on exploratory laparotomy we found a small leak from the anastomotic site resulting in localized faecopurulent collection for which resection of the infected anastomotic segment of colon was done and brought out as proximal diversion colostomy with distal mucous fistula. Post-operative period was uneventful. Restoration of bowel continuity was done at an interval of 6 months after appropriate pre-operative evaluation. Mobilization of colonic bowel loops with end to end intraperitoneal anastomosis was done.

2.2 Clinical Findings

On Post-operative day 3 patient developed grade IV wound sepsis and subsequent burst abdomen, with bile leakage from the main wound. On close examination of the wound there was spontaneous bowel erosion, leading to a 3 cm x 1cm rent in the small bowel loop lying adjacent to the anastomotic site open to the atmosphere forming an EAF. Per abdomen examination of other quadrants of abdomen was normal.

2.3 Diagnostic Assessment

Patients vitals were BP- 90/66 mm of Hg, PR - 104/min, RR – 30/min, SPO₂ – 86% on room air, BMI - 17.9, TLC-18,500 and serum albumin level of 1.7 mg/dl suggesting clinical sepsis and under nutrition status of the patient. Patient also had COPD. Apart from ultrasound of the abdomen, which ruled out intra-abdominal collection other radiological investigations like CECT abdomen was not done in view of hemodynamic instability and as the location of the EAF was evident. Fistula output initially was more than 500 ml per day containing bile and undigested food particles, suggesting a high intestinal EAF. Patient was started on fluid and electrolyte replacement therapy with local wound care. Supplementary TPN and blood transfusion were given to improve the nutrition status of the patient.

2.4 Therapeutic Intervention

On local examination of the fistula, after initial resuscitation, proximal and distal loop were easily negotiated with the little finger. An 18 F Kehr's T-tube made of silicone, was inserted with its shorter limbs negotiated into the proximal and distal opening of the fistulous bowel loop.

Placement of T-tube into the EAF resulted in dramatic reduction of fistula output, converting it into a low output fistula (<100 ml per day). This reduced the local contamination and fluid loss, wound started granulating and contracting and in 3 weeks' post-operative we were able to apply stoma appliance. Patient was discharged with stoma appliance and T-tube in situ (Fig. 2). The T-tube was removed at 2nd week follow up, and the residual fistula healed in another 2 weeks' time.

2.5 Follow up and Outcome

The T-tube was removed at 2nd week follow up, and the residual fistula healed in another 2 weeks' time with contraction of wound (Fig. 3) and spontaneous closure of fistula achieved successfully.

3. DISCUSSION

“Entero-atmospheric fistula (EAF) is not a true fistula as it lacks the fistulous tract and further is not covered by well vascularized tissue” [1]. This lead to delay in wound healing and prolonged morbidity and high mortality in these patients.

“EAF tend to occur within the first week of the open abdomen. The incidence of these fistulas depends on the baseline abdominal problem. In trauma patients managed with open abdomen, the incidence of EAF varies between 2% to 25%” [2]. “The incidence increases to more than 25% in open abdomens with intra-abdominal sepsis, and up to 50% in the setting of infected pancreatic necrosis” [3]. The mortality rate remains high up to 40 % despite modern intensive care and improved surgical technique [4].



Fig. 1. Wound at 3 weeks after placement of Kehr's T-tube (note the surrounding healthy Granulation and healing)



Fig. 2. Wound manager applied with Kehr's T-tube in situ



Fig. 3. Healed residual fistula

The majority (75% to 85%) of gastrointestinal fistulas are iatrogenic as a result of technical complications of surgical procedures and trauma. Aetiologies include anastomotic dehiscence, intraoperative injury to the bowel or its blood supply, erosion from indwelling tubes, retention sutures or prosthetic mesh or misplacement of a suture through the bowel during abdominal closure.

“EAF can either be deep or superficial. A deep EAF is a fistula arising deeply inside the open abdomen and draining into the peritoneal cavity, resulting in peritonitis; whereas a superficial EAF drains on top of a granulating abdominal wound and is relatively easier to approach and manage [4]. Anatomically a fistula arising from stomach, duodenum, jejunum, or proximal ileus is classified as proximal; and the one arising from distal ileus or colon is classified as distal fistula. Depending on the 24-hour fistula output, a fistula can be: low output (<200ml), moderate output (200-500) and high output (>500 ml) fistula” [1,5,6].

Patients with EAF always need a multidisciplinary approach for achieving an optimal outcome. The initial step of nutritional management must be the stabilization of the patients with aggressive treatment of sepsis, rapid correction of any fluids, electrolytes and acid–base imbalances and local skin care. Interval nutrition with TPN should be started as soon as possible.

“As defined EAF has unique features- lacks fistulous tract and uncovered by well vascularised tissue and for these reasons spontaneous closure is very difficult to achieve.

The management of the fistula should be aimed to divert the fistula output, thus allowing a clean granulation of the exposed bowel and promoting the fistula to become a chronic but well-controlled fistula. This result is hard to achieve, because of the extreme fragility of the tissues surrounding the fistula and many a times due to presence of dense adhesions in a frozen abdomen prohibiting any surgical manoeuvre. Moreover, associated systemic derangements, driven by severe dehydration, hyper catabolic status, and ongoing sepsis caused by the spillage of enteric content directly into the peritoneal cavity are other challenges in the management” [4].

A large spectrum of techniques and surgical devices are described in literature to control the EAF and promoting healing. Every surgeon usually develops his own technique, and none of those can perfectly fit well in every kind of clinical situation. Several techniques available include – Negative pressure wound therapy, Primary suture/fibrin glue or cyanoacrylates/biological dressing, Floating stoma, Fistula vacuum assisted closure (VAC), Tube VAC, Pepe’s technique wherein a hole is made in the central part of the VAC foam so as to insert three drains which the drains intestinal effluent toward the aspiration system, Silo VAC, Fistula intubation and conversion to an ECF, Nipple VAC, VAC collapsible fistula isolation device, Fistula plug, Pedicle flap, Suspension/stoma conversion⁴ etc. Many of these VAC techniques are more useful in low output fistulas.

Layton B et al. [7] used “a baby nipple and placed it over the fistula opening, a catheter was placed through the tip of the nipple, a round layer

of colostomy paste spread under the silicon nipple edges, and the entire wound was covered by VAC dressing. This method has the great advantage of being completely atraumatic, but the nipple-tube complex can be easily displaced, especially during the manoeuvres for nursing the patient”.

Di Saverio S [8] is “a refinement of the previous technique, where a small-size Foley catheter is inserted into the fistula hole and the balloon is gently inflated; this improvement is aimed to obtain a better seal and a more effective fistula diversion. The Foley catheter, inflated and secured inside the fistula, may be helpful in better preventing the dislodgment of the baby nipple from over the fistula opening”.

Al-Khoury G et al. [9] intubated “the EAF with Malecot catheters having a size roughly corresponding to the size of the fistula; the wound was then covered with a polyurethane sponge. The Malecot catheters were pulled through it, and the entire device is then sealed and a continuous negative pressure is applied”.

Ramsay et al. [10] technique of “fistula intubation and conversion to an ECF—the EAF is intubated with Malecot catheter which is then tunneled through adjacent mobilized skin-subcutaneous flaps, converting the EAF to a sort of ECF with a long channel, surrounded by a well-vascularized tissue. Finally, this fistula tract may be further injected with a fibrin glue to promote healing”.

Ngian Chye Tan et al. [11] “extraperitoneal method was composed of fistula isolation and excision, intubation with a T-tube, rerouting of fistula track, and primary closure of skin. The small 10- French T-tube allows drainage and prevents leakage of intestinal contents, which will interfere with healing. This approach is based on the understanding that entero-cutaneous fistula tracks that are oblique in nature and in excess of 2 cm tract are considered more favourable for spontaneous closure as they are generally associated with increased flow resistance and reduced output losses. Rerouting of the track with a T-tube changes the fistula from having a short perpendicular course to one having a longer oblique course”.

The primary aim of all these techniques is to isolate and control the fistula so as to avoid the spillage of contents and resultant insult to the surrounding tissue and skin. This obviously results in promotion of wound healing and ultimate closure of the fistula wound.

In the present case we used Kehr’s T-Tube in an attempt to control the fistula output. Aided by the bowel peristalsis and guided by the presence of short limbs of T-tube in the proximal and distal bowel, much of the fistula output could pass into the distal bowel. This resulted in decreased fistula output and conversion of high output fistula into low output, decreasing the surrounding tissue damage and promotion in healing (Fig. 1). Later it was feasible for us to apply wound manager to the open wound, further reducing the fluid loss and tissue damage. We were able to even discharge the patient with T-tube in situ and wound manager applied (Fig. 2) and called for review at regular interval. Any attempt at surgical intervention in this patient with co-morbidities and multiple recent surgeries could have been detrimental and resulted in catastrophic outcome.

4. CONCLUSION

In superficial high output EAF negotiation of horizontal limbs of Kehr’s T-tube into the bowel helps in reducing the fistula output resulting in better management of fistula, promotion in wound healing and reversion of catabolic state. Subsequently stoma bag/wound manager or effective VAC may be applied to aid the ultimate closure of the fistula. To conclude management of EAF deserves to be individualized and innovative as per the clinical situation for successful outcome.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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