CASE REPORT

A new technique of closing a gastroatmospheric fistula with a rectus abdominis muscle flap

Rahul Gupta,¹ Harjeet Singh,¹ Shibojit Talukder,¹ Ganga Ram Verma²

¹Department of General Surgery, Post Graduate Institute of Medical Education and Research, Chandigarh, India
²Surgical Gastroenterology Division, Department of General Surgery, Post Graduate Institute of Medical Education and Research, Chandigarh, India

Correspondence to
 Professor Ganga Ram Verma,
 grverma@gmail.com

Accepted 3 March 2015

SUMMARY

Proximal enteroatmospheric fistulae are difficult to manage and carry high mortality from sepsis and electrolyte imbalances. Conservative management with total parenteral nutrition, exclusion of fistula, resection and anastomosis are conventional methods of treatment with low success rate. Providing muscle cover to manage an enteroatmospheric fistula is a noble concept. A postoperative high-output gastroatmospheric fistula (GAF) was repaired by superior epigastric artery-based rectus abdominis muscle flap (RAMF). Postoperative recovery was uneventful. This technique may be useful for closure of proximal enteroatmospheric fistulae that fail to heal through medical and conventional surgical management.

BACKGROUND

An enteroatmospheric fistula (EAF) is one of the most devastating complications to occur following abdominal operations.¹ When bowel repair gives way, or postoperative wound infection exposes intestine to the atmosphere, it leads to bowel desiccation and fistulisation. These fistulae do not close spontaneously as there is no fistulous tract or surrounding tissue cover to allow healing.¹ A muscle pedicle flap provides well vascularised thick tissue cover and allows tension-free closure of EAFs.² We describe a case of a gastroatmospheric fistula (GAF) managed successfully using a rectus abdominis muscle flap (RAMF).

CASE PRESENTATION

A 54-year-old man presented to our emergency services with perforative peritonitis secondary to duodenal ulcer. Graham patch closure and peritoneal lavage was performed. The patient was re-explored for copious bile leak and found to have a necrosed omentum, gross contamination and an oedematous duodenum. Tube gastrostomy (TG), tube duodenostomy (TD) and feeding jejunostomy (FJ) were performed and the main wound was closed with a Bogota bag application to avoid postoperative intra-abdominal hypertension. After 2 months of aggressive supportive care, the patient gradually improved and the duodenostomy tube was removed. The dehiscence of the infected main wound led to widening of the TG site and dislodgement of the gastrostomy tube resulting in a large GAF (figure 1).

INVESTIGATIONS

Upper gastrointestinal endoscopy revealed an opening in the anterior wall of the body/antrum of the stomach with no distal obstruction.

Figure 1 Large gastroatmospheric fistula in the centre of the 'open abdomen'.

DIFFERENTIAL DIAGNOSIS

- Gastrocutaneous fistula (GCF)
- GAF

TREATMENT

After optimisation with enteral and total parenteral nutrition, surgery for closure of GAF was planned. A right paramedian incision was made from

Figure 2 Right rectus abdominis muscle flap closing the gastroatmospheric fistula.

CrossMark

To cite: Gupta R, Singh H, Talukder S, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-209309

Figure 3 Abdominal wound on postoperative day 12 after the use of rectus abdominis muscle flap for gastroatmospheric fistula.

subcostal margin to right iliac fossa. The rectus sheath was divided in the line of incision, and the rectus abdominis muscle (RAM) was separated from posterior rectus sheath from medial to lateral side. The muscle was then divided transversely at the umbilicus level and superior epigastric artery-based RAM pedicle flap was constructed. The pedicle muscle flap was secured over the GAF in a circular manner with 2-0 vicryl, taking the seromuscular layer of the stomach and full thickness of muscle (figure 2).

OUTCOME AND FOLLOW-UP

Postoperatively, the patient received octreotide for 7 days. Oral sips started on postoperative day 8 and he was discharged 12 days after surgery with a healthy granulating wound (figure 3). One month after surgery, the wound had completely healed.

DISCUSSION

A GAF, a subset of GCFs, occurs after abdominal surgeries involving the stomach with fistulous communication between gastric mucosa and ‘open’ wound.¹ GAF following gastrostomy tube removal has not been reported in the English literature. Ordinarily, the gastrocutaneous tract closes within a few days of tube removal. When the fistula persists, surgical or endoscopic primary closure of GCF has a high success rate.^{2 3} In the index case, secondary wound infection and subsequent wound retraction led to widening of the fistula and its conversion into a GAF. Poor nutritional status of a patient, a hostile abdomen and local inflammation around the enterocutaneous fistula can lead to a high failure rate when using conventional techniques.^{1 4} Hence, it is recommended that the patient be optimised nutritionally before being subjected to surgical intervention. Vacuum-assisted closure is a useful ‘bridge therapy’ in cases of EAF as it facilitates wound contraction, keeps the wound clean

and minimises nursing care.⁵ EAF with protruding mucosa always requires surgery for its closure. In the index patient, the wound was initially managed by draining the intestinal effluent through a plastic bag connected through a tube and, simultaneously, the patient was optimised nutritionally for 3 months. Since the large fistula bearing anterior gastric wall was densely adherent to granulation tissue, it was not possible to perform excision and closure. The slender rectus abdominis muscle has good blood supply and is known to withstand infection, hence, it was considered as a viable alternative to cover the defect. It has been previously used to close duodenal fistulae by either covering the repaired duodenum⁶ or pulling its end through the fistula from the inside, with the help of a Ryle’s tube.² An RAMF allows tension-free closure of a GAF without extensive dissection and tissue handling, and at the same time hastens healing by augmenting blood flow to the diseased area.⁷ Yoshida *et al*⁸ hypothesised that myoglobin may also be a contributing factor in wound healing.

Learning points

- ▶ Gastroatmospheric fistulae (GAFs) rarely undergo spontaneous closure.
- ▶ Successful treatment of a GAF involves improvement of nutritional status of the patient, treatment of underlying infection and tension free surgical closure of the GAF.
- ▶ A rectus abdominis muscle flap provides tension-free closure without excessive tissue handling.

Contributors RG contributed to the writing, editing and final approval of the manuscript. HS contributed to data collection, editing and final approval of the manuscript. ST contributed to data collection, review of the literature and final approval of the manuscript. GRV contributed to editing and final approval of the manuscript.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Majercik S, Kinikini M, White T. Enteroatmospheric fistula: from soup to nuts. *Nutr Clin Pract* 2012;27:507–12.
- 2 Agarwal P, Sharma D. Repair of duodenal fistula with rectus abdominis muscle ‘pull in’ flap. *Indian J Surg* 2005;67:253–6.
- 3 Kouklakis G, Zeros P, Liratzopoulos N, *et al*. Endoscopic treatment of a gastrocutaneous fistula using the over-the-scope-clip system: a case report. *Diagn Ther Endosc* 2011;2011:384143.
- 4 Marinis A, Gkiokas G, Argyra E, *et al*. “Enteroatmospheric fistulae”—gastrointestinal openings in the open abdomen: a review and recent proposal of a surgical technique. *Scand J Surg* 2013;102:61–8.
- 5 Terzi C, Egeli T, Canda AE, *et al*. Management of enteroatmospheric fistulae. *Int Wound J* 2014;11:17–21.
- 6 Carey JN, Sheckter CC, Watt AJ, *et al*. Intra-abdominal pedicled rectus abdominis muscle flap for treatment of high-output enterocutaneous fistulae: case reports and review of literature. *J Plast Reconstr Aesthet Surg* 2013;66:1145–8.
- 7 Chander J, Lai P, Vinod K, *et al*. Rectus abdominis muscle flap for high-output duodenal fistula: novel technique. *World J Surg* 2004;28:179–82.
- 8 Yoshida E, Ohmura S, Sugiki M, *et al*. A novel function of extraerythrocytic hemoglobin: identification of globin as a stimulant of plasminogen activator biosynthesis in human fibroblasts. *Thromb Haemost* 2001;86:1521–7.

Copyright 2015 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow