SECONDARY AORTODUODENAL FISTULA: AORTOBIFEMURAL BY-PASS COMPLICATED WITH INFECTION AND GASTROINTESTINAL BLEEDING – A SURGICAL EMERGENCY

Bogdan Florin Dumbravă[1], Ummar Shamim[1], Ani Stefania Grecu[2], Robert Untea[1], Afrodita Panaitescu[1], Ecaterina Rinja[1]

[1]Clinical Department of Gastroenterology, Bucharest Emergency Clinical Hospital, Bucharest, Romania
[2]Clinical Department of Gastroenterology, Carol Davila Central Emergency University Military Hospital, Bucharest, Romania

CASE REPORT

Doi: 10.33695/rojes.v3i2.47
Accepted: 20.11.2021

Corresponding author:
Bogdan Florin Dumbravă
bogdan92.dumbrava
@gmail.com

Abstract

Aortoduodenal fistula is a fatal condition that involves a pathological connection between the aorta and the duodenum. Secondary aortoduodenal fistulas are a complication of aortic surgery. The presentation symptoms include upper gastrointestinal bleeding (most common), unexplained fever, pulsatile abdominal mass, bowel obstruction and abdominal pain. A 69-year-old patient known with systemic mastocytosis JAK2 positive myeloproliferative neoplasm as well as aortoiliac occlusive disease, for which in 2018 it was performed an aortobifemoral Dacron graft bypass, followed by multiple complications, presented at our hospital for melena. During the upper gastrointestinal endoscopy, it was revealed that the vascular graft had penetrated the third part of the duodenum, causing active bleeding. The patient was transferred immediately to the cardiovascular surgery department. Emergency surgical intervention was performed by a multidisciplinary team (cardiovascular surgeon, general surgeon), the procedure consisted of complete excision of the aortobifemoral Dacron graft, aortofemoral suture and transverse duodenorrhaphy; 24 hours after surgery septic shock, as well as multiple organ system dysfunction syndrome occurred, and the patient died. Diagnosis should be established immediately and then the principles of treatment must be applied promptly and should be taken into account for all patients with a history of cardiovascular abdominal surgery. Even if the treatment is applied correctly, it is associated with multiple complications and an increased risk of perioperative death.

Keywords: aortoduodenal fistula, aortobifemoral bypass, graft, gastrointestinal bleeding, sepsis, emergency surgery

Introduction

Aortoduodenal fistula is a rare complication associated with an abdominal aortic aneurysm and severe atherosclerosis [1], when it is considered to be primary, due to the spontaneous formation of a communication

between the lumen of an aortic aneurysm and the duodenum [1].

Secondary aortoduodenal fistulas are common after aortic surgery, they can be caused by erosion of the aortic graft into the duodenum, its incidence reaching 0.77–1.6% in patients after prosthesis implantation due to abdominal aortic aneurysm [2]. It can complicate 0.36 %–1.6 % of aortic grafts. Most of the fistulas are located in the third and fourth parts of the duodenum [3]. Typical presentations include upper gastrointestinal bleeding (80%), sepsis (44%), pulsatile abdominal mass (56%), bowel obstruction, and abdominal pain (30%) [2]–[4].

The management of aortoduodenal fistulas consists of graft explantation, aortic stump closure, and lower limb revascularization with axillobifemoral bypass grafting[5].

Untreated aortoduodenal fistulas are associated with significant morbidity and mortality rates; an adequate treatment is associated with a high risk of complications and perioperative death, depending on the surgical method-open surgery or endovascular treatment[2].

Case report

A 69-year-old patient known with systemic mastocytosis, JAK2 (Janus Kinaza 2) positive myeloproliferative neoplasm and aortoiliac occlusive disease underwent surgery in 2018, during which an aortobifemoral Dacron graft bypass was placed; the patient had multiple complications:

- right femoral pseudoaneurysm with bleeding from the anastomosis and secondary hematoma, for which the repair of the right femoral pseudoaneurysm was practised with the evacuation of the hematoma and suture of the anastomosis leakage;
- postoperative wound bleeding, with anastomotic disruption that required partial excision of the Dacron graft from the right inguinal region and placement of a femoral interposition graft, at the bifurcation of the superficial femoral vein, which was harvested from the right thigh;

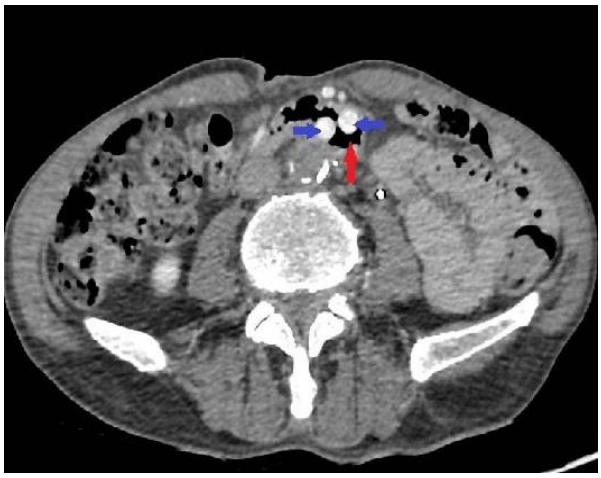

Figure 1 – Computed tomography image shows ectopic gas (red arrow) adjacent to the left and right segment of the graft (blue arrows)

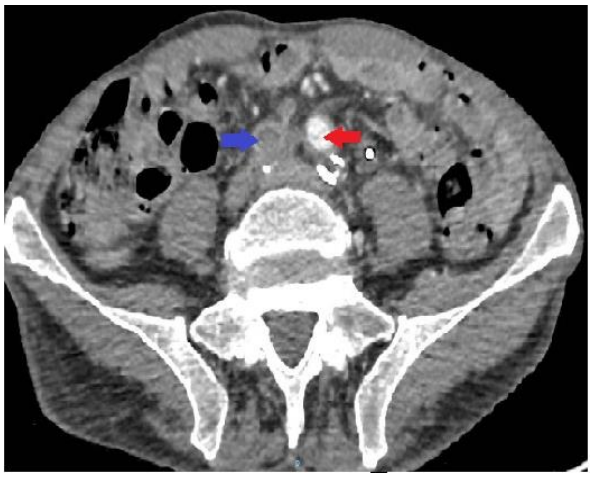

Figure 2 – Computed tomography image shows occlusion of the right segment of the graft (blue arrow) and patency of the left segment (red arrow)

- hemorrhagic shock due to active right inguinal bleeding from the vein graft dehiscence and the thrombosis of the right branch of the Dacron graft, which required excision of the vein graft and suture of the leakage; 24 hours after the intervention, irreversible ischemia of right inferior limb occurred for which right thigh amputation was performed. Moreover, the bacterial cultures

from the Dacron graft and the vein graft were positive for Candida parapsilosis and Candida albicans, respectively.

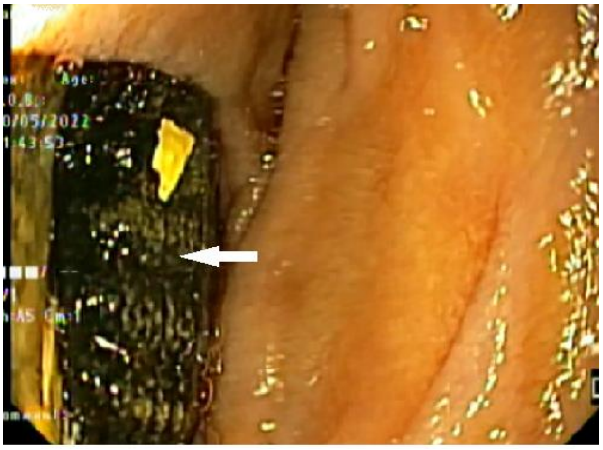

Figure 3 – Endoscopic image shows aortic graft (white arrow) penetrating into the third part

Figure 4 – A ctive bleeding of the duodenum

The patient presented at the emergency department for melena, reported for 3 days, and severe anemia (Hb – hemoglobin at admission was 5,3 g/dL, compared to a level of 8,8 g/dl documented the previous week). An abdominal and pelvic CT scan was performed, which pointed out air leakage at the proximal end of the vascular graft (Figure 1) and the complete occlusion of the iliac-femoral right segment (Figure 2). An upper endoscopy was performed, which signalled that the vascular graft penetrated the third portion of the duodenum with active bleeding (Figure 3 and 4). The patient was transferred to the cardiovascular surgery department where the emergency surgical intervention was performed by a multidisciplinary team (cardiovascular surgeon, general surgeon); the procedure consisted of complete excision of the aortobifemoral Dacron graft, aortofemoral suture and transverse duodenorrhaphy; 24 hours after surgery, the patient developed sepsis with multiple organ system failure, and irreversible ischemia of left inferior limb, for which it was practised left thigh disarticulation. However, the patient developed septic shock and died. Bacterial culture from the excised Dacron graft pointed out: yeasts, Klebsiella pneumoniae MDR (multidrug resistant), Escherichia coli ESB (Extended-Spectrum β-Lactamases), Enterococcus faecium van A+. In addition, the blood culture was positive for Candida krusei.

Discussion

The secondary aortoduodenal fistula is a rare condition caused by erosion of the aortic graft into the bowel [2]. The mechanism underlying the pathological development of secondary aortoenteric fistulas remains unknown, but the literature mentions two hypotheses [6]: firstly, it is suggested that continuous stimulation due to aortic pulsation directly affects the walls of the intestinal tract and arteries [6]. This hypothesis is supported by the fact that the majority of secondary aortoenteric fistulas involve the third or fourth portions of the duodenum, which are compressed between the superior mesenteric artery and abdominal aorta, in the retroperitoneal space [6]. The second hypothesis incriminates the local inflammatory response due to prosthesis infection during primary surgery [6].

The diagnosis of an aortoduodenal fistulas is based on clinical grounds and invasive and non-invasive investigations: abdominal computed tomography, aortography, selective angiography, upper

gastrointestinal endoscopy, endoscopy with push enteroscopy, a wireless capsule endoscopy and technetium-labelled red blood cell scintigraphy [7], [8].

CT scan may help with identifying an infection or an abscess [7] and is the first-line diagnostic modality for evaluation of suspected aortoduodenal fistulas, followed by endoscopy and arteriography [9]. Endoscopy must be performed when signs of bleeding are present and it is the best choice for diagnosis as well as for differential diagnosis amongst other causes of gastrointestinal bleeding [8].

To summarize, the treatment for aortoduodenal fistula consists of bleeding control, infection control (closure of the gastrointestinal fistula, drainage, debridement), removal of infected blood vessel prostheses and revascularization [10].
The outcomes of aortoduodenal fistula depend on infection control with broad-spectrum antibiotics, surgical repair of the vascular defect, maintenance of the adequate flow of the lower limb as well as maintaining hemodynamic stability [7].

Factors that decide clinical outcomes depend on the timeliness of the procedure, the revascularization approach (open vs. in situ), the type of surgery (emergent vs. non-emergent), or the type of the used graft [7]. For the aorta repair, fistula treatment at an early stage is preferred with extra-anatomic bypass graft and aortic ligation to prevent the use of a prosthetic graft at the infected site [11]. The perioperative mortality rate of this technique is 25%–90%[11]. For duodenal repair, simple closure or wedge resection of the wall may be performed if the defect is about 1 cm, to one-third of the circumference, or if it is larger, partial resection with duodenal reconstruction is required [11]. These patients require frequent admission and intensive care unit management[12].

Earlier administration of broad-spectrum antibiotics that cover Gram–positive, Gram-negative and anaerobes is indicated [7]. Fungal infections of the vascular graft infection are rare [9], but as it was revealed, the patient had positive blood culture for Candida krusei. The infected aortic graft should be surgically excised, replaced or repaired because it carries a high risk of sepsis and increased mortality in 60% of the cases [7]. The antibiotics should be chosen according to the result of blood culture, tissue specimen culture and wound secretions culture [7].

The prognosis in patients with secondary aortoduodenal fistula depends on the hemodynamic status of the patient at presentation, the surgical technique performed and the time of surgery [7].

A delay in surgical exploration increases mortality because an uncorrected secondary aortoduodenal fistula is almost always fatal [7].

The particularity of the case consists of the numerous surgical interventions that the patient underwent with multiple complications that appeared after each intervention (vascular leakage with hemorrhagic shock, gastrointestinal bleeding, infection of graft) and the immunosuppression due to the haematological malignancy that contributed to the fungal and bacterial infection and the installation of the septic shock followed by death.

Conclusion

Aortoduodenal fistula is a severe condition with significant mortality and morbidity rates. Diagnosis of this disease should be established immediately in the emergency department and afterwards, the principles of treatment must be applied promptly (bleeding control, infection control, removal of infected blood vessel prostheses, and revascularization). Even if the treatment is applied correctly, it is associated with a high risk of complications and perioperative death.

Acknowledgements

Author's contributions: BFD, ASG, US wrote the paper and provided the technical details, BFD, RU detailed the history of the patient and reviewed the paper. ER and AP reviewed and approved the final version.

Conflicts of interest: All authors declare having no competing interests associated with thispublication.

Funding resources: This research did not receive any specific grant from funding agenciesin the public, commercial, or not-for-profit sector.

Informed Consent: The informed consent was obtained from the patient for publicationand any accompanying images.

Statement of Ethics: The accompanying manuscript does not contain any studies carriedout by the authors on humans or animals.

Ethical Approval: The treatment strategy/study protocol was approved by a local board/ethics committee.

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