# Three Overlapping Balloon-expandable Stents Applied in Coeliac Artery Dissection

Case Report and Literature Review

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## INTRODUCTION

Coeliac artery dissection (CAD) is usually secondary to aortic dissection, and it is detected more often after multislice computed tomography angiography (CTA) is performed in the diagnosis of abdominal pain. We report a case of secondary coeliac artery dissection treated with three overlapping balloon-expandable stents, and discuss the techniques of endovascular repair for coeliac artery dissection.

## CASE REPORT

A 56-year old male Uyghur presented to the emergency department with lumbar and abdominal pain. A CTA of the thoracic aorta revealed type B aortic dissection. The patient was taken to our department and underwent endovascular repair. He had intermittent fever and hyperhidrosis with the highest body temperature of 39 °C on the second day after operation.

Brucella was detected in blood plasma. We found that he had experienced intermittent low-grade fever and had been exposed to cattle and sheep. He was taken to the department of communicable diseases and discharged after antibiotics were administered for one week.

The patient occasionally had mild lumbar and abdominal pain with fever and nausea after discharge and the symptoms gradually worsened. He presented to our department again. A CTA of the aorta was performed and revealed the covered stent in good shape, thrombosis in the proximal false lumen and a false lumen with the biggest calibre of 5 cm distally and the coeliac artery had a high-grade stenosis (Fig. 1). We considered that the lumbar and abdominal pain was caused by the pressure on the coeliac artery resulting in persistent dilatation of the distal false lumen. Therefore, we decided to recover the blood flow of the coeliac artery, using endovascular techniques.

The right femoral artery was entered with an 8-F introducer sheath, and then a 0.035 inch guidewire and a tagged pigtail catheter were extended upward to the twelfth dorsal vertebra for performing an angiography. The angiography revealed that the superior mesenteric and renal arteries were normal, and the tear was around the coeliac

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- Fig. 1: Preoperative CTA (computed tomography angiography) shows a highgrade stenosis of the coeliac artery.
- Fig. 2: Superselective catheterization and angiography shows a high-grade stenosis of the coeliac artery.
- Fig. 3: Six months later, CTA shows stent patency and disappearance of the false lumen.

artery. A superselective catheterization and angiography of the coeliac artery was performed with a 0.014 inch guidewire and a cobra catheter (Terumo, Tokyo, Japan) through an 8-F renal double bent catheter (RDC). It revealed that the coeliac artery had a high-grade stenosis and the tear was 1.5 cm away from the ostium of the coeliac artery; the coeliac artery was separated into the true and false lumens by the tear and the tear communicated with the false lumen, and the dissection did not involve the common hepatic, splenic and left gastric arteries (Fig. 2). The cobra catheter was replaced with a 0.018 inch guidewire (Boston Scientific, Natick, USA) which was extended to the common hepatic artery as much as it could to prevent it from bouncing out of the coeliac artery during the course of releasing the stents. Then the RDC was extended to the ostium of the coeliac artery and an angiography was performed to locate the tear. Two overlapping 6 x 15 mm balloon-expandable stents were firstly released, and then another 5 x 15 mm balloon-expandable stent was released at the same place because endoleak still existed. There was no obvious endoleak after the procedure, the true lumen was patent, and the coeliac, left gastric, common hepatic and splenic arteries had normal angiography images. The patient's abdominal pain disappeared after the operation. He was given anticoagulant and antiplatelet therapy and discharged three days postoperatively. Six months later, a follow-up CTA of the coeliac artery showed patency of the coeliac artery and its branch arteries (Fig. 3) and he remained asymptomatic.

## DISCUSSION

The conservative management options of coeliac artery dissection include strict blood pressure control, anticoagulant and antiplatelet therapy (1), and follow-up should last for at least three months (2). Once the conservative management

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has failed, an open surgery or endovascular procedure should be performed as soon as possible based on the severity of dissection and haemodynamic status (3), and the indications included mainly rupture of dissection, ischaemia of the coeliac organ and rapid expansion of dissection (4). An open surgery should be performed on the patients who could not be treated with endovascular procedures or had contraindications for angiography. Five endovascular techniques were applied in coeliac artery dissection.

Fenestration was used to recover blood flow in the coeliac artery in the early stage, but long-term complications were bound to occur because the false lumen existed (5); a single naked stent could be applied to repair smaller tears but not bigger tears because endoleak could not be eliminated (6); naked stents associated with spring coils applied in coeliac artery dissection had an immediate therapeutic effect and thorough elimination of endoleak, but the technique was complex in manipulation and had the risk of rupture of dissection. It was suitable for local dissection and not for dissection with a big false lumen (7); covered stents were the best option for patients with rupture of coeliac artery dissection because bleeding could be stopped promptly (8). But previous covered stents had guide catheters with bigger calibres and bad compliance, so it was difficult for them to be entered into the coeliac artery with a bigger angle against the abdominal aorta, and arteries were easily damaged. In addition, most covered stents were self-expandable and could not be located exactly. In the future, covered stents will be commonly used in coeliac artery dissection if they have good compliance and exact location.

The advantages of using several overlapping stents were simple manipulation and safety, and location was exact when balloon-expandable stents were used (9). The disadvantage was that there was still slight endoleak after the stents were released. We repaired the tear of the dissection using three overlapping stents and the therapeutic effect was very good. Based on our experience, 1) an operative approach should be chosen based on the angle between the coeliac artery and aorta. The approach *via* the femoral artery was suitable for a smaller angle and the brachial artery for a bigger angle. 2) A guide catheter with an optimal calibre should be used and a guidewire should be entered in the common hepatic artery or splenic artery as much as it could, to release stents easily. 3) A CTA could reveal slight endoleak immediately after releasing the stents but the endoleak would disappear in two weeks because the pressure would be low in the false lumen after releasing the stents. 4) Anticoagulant and antiplatelet therapy was necessary for preventing thrombosis in a stent (10).

#### **AUTHORS' NOTE**

All the authors declare that there is no conflict of interests.

#### REFERENCES

- Zainoun B, Geffroy Y, Weber-Donat G, Chavihot C, Teriitehau C, Minvielle F et al. A rare cause of epigastric pain: isolated spontaneous dissection of the coeliac artery, a case report. J Mal Vase 2009; 34: 275– 8.
- Zhang WW, Killeen JD, Chiriano J, Bianchi C, Teruya TH, AbouZamzam AM. Management of symptomatic spontaneous isolated visceral artery dissection: is emergent intervention mandatory? Ann Vase Surg 2009; 23: 90–4.
- Batt M, Baque J. Successful percutaneous embolization of a symptomatic coeliac artery dissection with aneurysmal dilation with detachable vascular plugs. J Vase Surg 2011; 54: 1812–5.
- Nordanstig J, Gerdes H, Kocys E. Spontaneous isolated dissection of the coeliac trunk with rupture of the proximal splenic artery: a case report. Eur J Vase Endovasc Surg 2009; 37: 194–7.
- So YH, Chung JW, Park JH. Balloon fenestration of iatrogenic coeliac artery dissection. J Vase Interv Radio1 2003; 14: 493–6.
- Zhang T, Zhang XM, Zhang XM, Jiang JJ, Zhou BY. Endovascular treatment of isolated spontaneous coeliac artery dissection. Vascular 2012; 20: 118–20.
- Zhao J, Sai L-K, Bing XH. Combined use of bare stent and coils in the treatment of aortic dissection with distal tear at coeliac trunk. Natl Med J Chin 2012; 47: 3333–5.
- Neychev V, Krol E, Dietzek A. Unusual presentation and treatment of spontaneous celiac artery dissection. J Vase Surg; 58: 491–5. doi: 10.1016/j.jvs.2012.10.136.
- Mauricio OD, Bahaeddin S, Kathryn G. Spontaneous celiac artery dissection: case report and literature review. Tex Heart Inst J 2012; 39: 703–6.
- Oh S, Cho YP, Kim JH, Shin S, Kwon TW, Ko GY. Symptomatic spontaneous coeliac artery dissection treated by conservative management: aerial imaging findings. Abdom Imaging 2011; 36: 79– 82.