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Successful treatment of nonocclusive mesenteric ischemia after aortic valve replacement with continuous arterial alprostadil infusion: A case report



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ABSTRACT

INTRODUCTION: Nonocclusive mesenteric ischemia (NOMI) after surgery has an extremely poor prognosis with a mortality rate of 30–100%. We report a patient with NOMI following aortic valve replacement who failed to improve despite continuous intra-arterial infusion of papaverine, but was successfully treated with alprostadil (prostaglandin E1 [PGE1]) infusion.

PRESENTATION OF CASE: The patient is a 77-year-old man who underwent aortic valve replacement. Due to elevated serum lactate levels five hours after intensive care unit admission, superior mesenteric arteriography was performed, establishing the diagnosis of NOMI. Although continuous intra-arterial infusion of papaverine was begun, lactate levels remained elevated. Repeat angiography and laparotomy revealed extensive ischemic changes of the intestine. The vasodilator was changed to PGE1, which improved arterial spasm. The patient ultimately needed an ileocecal resection, but the extent of the resection was limited with concomitant PGE1 administration.

DISCUSSION: In the present patient, although NOMI was unresponsive to appropriate treatment including intra-arterial infusion of papaverine, continuous intra-arterial infusion of PGE1 salvaged most of the intestine.

CONCLUSIONS: In a patient with recurrent NOMI despite appropriate treatment including intra-arterial infusion of papaverine, continuous intra-arterial infusion of PGE1 may limit the extent of intestinal resection needed. Continuous intra-arterial infusion of PGE1 may be a useful treatment for patients with refractory NOMI.

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1. Introduction

Nonocclusive mesenteric ischemia (NOMI) is a condition in which mesenteric artery spasm causes ischemia and necrosis of the intestine in the absence of vascular obstruction. Although the incidence of NOMI following open heart surgery is as low as 0.2–2%, the prognosis is extremely poor with a mortality rate of 30–100%

[1–4]. It has been suggested that early detection and prompt intervention may improve the outcomes [5]. We report a patient who developed NOMI following aortic valve replacement who failed to improve despite continuous intra-arterial infusion of papaverine, but was successfully treated with alprostadil (prostaglandin E1 [PGE1]) infusion. This work has been reported in line with the SCARE criteria [6].

2. Presentation of case

The patient is a 77-year-old man who underwent aortic valve replacement for aortic stenosis. The operative time was 9 h and 23 min, and the cardiopulmonary bypass time was 257 min. He was admitted to the intensive care unit (ICU) postoperatively.

At the time of ICU admission, the serum lactate level was 2.92 mmol/L, but 5 h after ICU admission, the serum lactate markedly increased to 10.96 mmol/L, raising suspicion for the

Abbreviations: NOMI, nonocclusive mesenteric ischemia; PGE1, Prostaglandin E1; ICU, Intensive Care Unit; CT, Computed Tomography; SMA, superior mesenteric artery.

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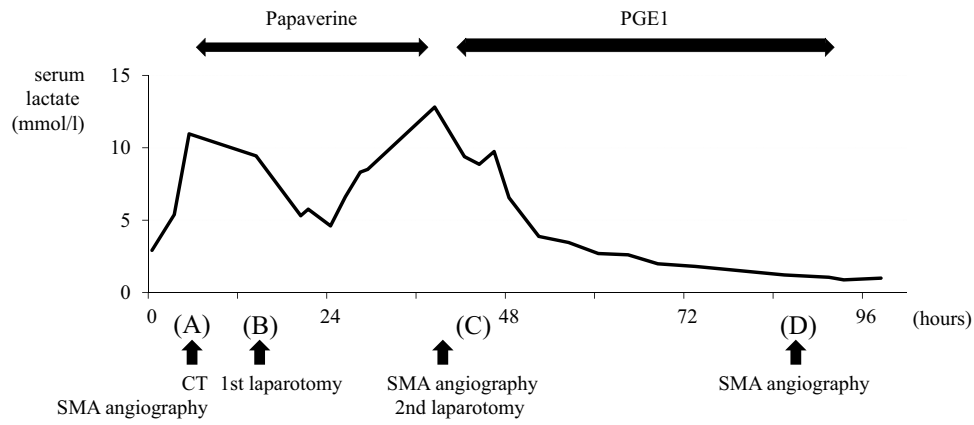


Fig. 1. The serum lactate levels and clinical course in the Intensive Care Unit.

development of intestinal ischemia. Contrast-enhanced computed tomography (CT) scan of the abdomen and angiography of the superior mesenteric artery (SMA) were performed (Fig. 1(A)). Although there was no evidence of occlusion of the SMA on the CT scan, poor contrast enhancement was found in some areas of the small intestine with narrowing and blocking of distal branches of the SMA (Fig. 2), leading to the diagnosis of NOMI. Continuous intra-arterial infusion of papaverine was started via a catheter placed in the SMA.

Despite a 9-h infusion of papaverine, the serum lactate level was still 9.46 mmol/L. Emergent exploratory laparotomy was then performed (Fig. 1(B)), with no obvious ischemic changes of the intestine seen intraoperatively. Postoperatively, the intra-arterial infusion of papaverine was continued, with moderate improvement in serum lactate level. However, serum lactate level again increased markedly to 12.81 mmol/L after 33 h of intra-arterial infusion therapy. Angiography was performed again, which showed diffuse narrowing and lack of flow in distal branches of the SMA with suspicion of dislocation of the intra-arterial infusion catheter. During the procedure, a trial of alprostadil injection into the SMA was performed, resulting in dilatation of narrowed arteries. The decision was made to perform a second exploratory laparotomy (Fig. 1(C)). Intraoperative findings showed ischemic

changes in the celiac artery distribution extending from the stomach to the descending limb of the duodenum with extensive segmental ischemic changes in the SMA distribution (Fig. 3), but no areas appeared to require resection at that time. The decision was made to leave the abdomen open with continuous intra-arterial infusion of alprostadil postoperatively. Lactate levels decreased and eventually returned to a normal level of 1.44 mmol/L with no symptoms suggestive of intestinal necrosis after 48 h of infusion. Another angiography study showed no narrowing or arterial obstruction (Fig. 1(D)). Eight days after the second operation, inspection of the bowel during abdominal wall closure revealed no ischemic changes of the intestinal tract. The patient was discharged from the ICU two days later.

However, the patient developed fever and right lower quadrant abdominal pain two days following ICU discharge. A third laparotomy was performed, and ileal necrosis was found 20 cm proximal to the ileocecal valve, requiring resection and ileostomy. Postoperatively, the patient was admitted to the ICU for continuous intra-arterial infusion of alprostadil for another 48 h. The patient was discharged to a chronic care facility 62 days after the original operation.



Fig. 2. Superior mesenteric arteriography. Superior mesenteric arteriography shows discontinuous flow (arrow) with multiple areas of stenosis (arrow heads).



Fig. 3. Intraoperative findings at the second laparotomy, 38 h after Intensive Care Unit admission. Extensive segmental ischemia is observed.

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