Emergency Rescue Endovascular Stent Grafting of Ascending Aorta to Relieve Life-Threatening Coronary Obstruction in a Case of Acute Aortic Dissection

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Myocardial ischemia associated with acute aortic dissection is frequently a fatal complication, and the emergent management still remains a challenge. We report a patient with life-threatening myocardial ischemia due to acute aortic dissection managed by rescue stent grafting of the ascending aorta. Coronary blood flow improved immediately with this endovascular procedure, hemodynamic status was ameliorated dramatically, followed by uneventful open repair.


Myocardial ischemia due to coronary malperfusion is one of the life-threatening complications associated with acute aortic dissection. To save these critically ill patients, prompt coronary revascularization and aortic repair are required, but myocardial damage due to coronary ischemia may be fatal. To troubleshoot this problem, some bridge therapies by catheter interventions have been reported, such as intracoronary stenting or positioning of a coronary perfusion catheter.

In this report, we describe the bridge therapy for myocardial ischemia by the stent grafting of the ascending aorta for expanding the true lumen in a case with the false lumen obstructing the coronary ostium. With this procedure, the true lumen of the ascending aorta is expanded certainly, and coronary blood flow is improved promptly.

A 66-year-old woman with a history of hypertension presented to her family physician because of throat pain, and transferred to our institution with the diagnosis of acute coronary syndrome because of ST-segment abnormality on her electrocardiogram. At the time of presentation, the electrocardiogram showed the ST-segment depression in II, III, aVF, and V3–6; transthoracic echocardiography showed global left ventricular dysfunction and mild aortic insufficiency. The intimal flap in the ascending aorta was not clear. Although acute coronary syndrome was suspected and emergent coronary angiography was performed, the false lumen of the ascending aorta was enhanced. Diagnosis of myocardial ischemia due to acute aortic dissection was made, and enhanced computed tomography was performed to define the anatomy of the dissection. The CT scan showed an intimal tear located at the origin of the innominate artery (Fig 1A), collapse of the true lumen (Fig 1B), and coronary ostium compressed by the expanding false lumen (Fig 1C, 1D). In the meantime, the patient’s hemodynamic state progressively declined, with ventricular arrhythmia; respiration was exacerbated rapidly, and intratracheal intubation was performed. We made a decision that the endovascular treatment would be preferable in the catheterization laboratory rather than transferring the patient to the operating room, because there was not enough time to prepare the operating room and cardiopulmonary bypass.

In the catheterization laboratory, the right carotid artery was opened, and the guidewire and catheter were advanced into the true lumen of the ascending aorta, with confirmation by angiography. A Gore Excluder (WL Gore & Associates, Flagstaff, AZ) aorta extender (28.5 mm × 3.3 cm) was placed above the sinotubular junction to enlarge the true lumen and to augment coronary flow as a bridge therapy to operation. The true lumen was successfully enlarged, and we confirmed coronary flow (Fig 2). After that, the patient’s hemodynamic status stabilized and the arrhythmia vanished dramatically. The patient was then transferred to the operating room in a stable vital condition. Under general anesthesia, the replacement of ascending aorta with reconstruction of innominate artery was carried out in usual fashion without difficulties. The stent graft implanted in the ascending aorta was removed (Fig 3). The patient’s postoperative course was uneventful, and CT scan showed no residual dissection with patent coronary ostia. She was discharged in good condition.

Comment

Myocardial ischemia associated with acute aortic dissection is relatively rare, but it may have a fatal result. The incidence of myocardial ischemia due to acute aortic dissection has been reported at 6.1% to 11.3% in all type A aortic dissections [1–4]. The management of this condition is challenging, and mortality ranges 20% to 33.3% in the cases treated by appropriate surgical treatment [1–4]. The mechanism of myocardial ischemia due to acute aortic dissection is retrograde dissection of the aortic root reaching the coronary ostia [1, 5], and it causes static or dynamic obstruction of the coronary artery. The only way to save these patients is prompt coronary revascularization and aortic repair. To achieve this aim, aortic replacement and coronary artery bypass graft surgery is performed in many cases. However, the case that requires a mechanical support postoperatively is not rare [4]. The key to saving these critically ill patients is to reduce myocardial damage and to improve their hemodynamic status before surgical repair. Several investigators have reported coronary stenting as a bridge...
therapy to the operation [6, 7], but these techniques are not straightforward procedures, owing to the presence of intimal flaps, and the effect is unclear because of the intimal flap compressing the coronary ostium.

In our case, the coronary artery was not dissected, and the intimal flap blocked the flow of the right and left coronary arteries in the diastolic phase. Because the patient’s hemodynamic status deteriorated rapidly, we judged that it was faster and safer to perform rescue therapy in the catheterization laboratory than to wait for the preparation of the operating room and cardiopulmonary bypass. We thought that to expand the true lumen of ascending aorta in the diastolic phase was the best way to improve coronary flow; therefore, we used a self-expanding stent graft. We used the aorta extender because a short stent graft was required so as not to obstruct any branches, and expansion of the true lumen above the sinotubular junction was needed as a bridge therapy. We selected the right carotid artery as an approach site, because there was not enough length of the device to reach the ascending aorta from the femoral artery, and a relatively large sheath was required to implant a stent graft. After that, the patient’s hemodynamic status was improved in a marked fashion, and she was transferred to the operating room safely.

Our approach was very successful in this case because the entry existed at the origin of the innominate artery, there was not another intimal tear in the ascending aorta, the coronary arteries were not dissected, we could catch the true lumen of ascending aorta easily, and the required...
A stent graft was in hand. Although this method is not workable in all coronary malperfusion cases, it may be one option for the management of myocardial ischemia due to acute aortic dissection as a bridge therapy.

In conclusion, we describe a case successfully managed by rescue stent-grafting of the ascending aorta for life-threatening myocardial ischemia due to acute aortic dissection as a bridge therapy before operation. This method may be useful for the management of myocardial ischemia associated with acute aortic dissection in selected patients.

References


