CASE REPORT

Simultaneous endovascular stent and renal stent placement for acute type B aortic dissection with malperfusion of kidney

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Acute aortic dissection frequently causes life-threatening organ ischemia. The optimal therapy for acute type-B aortic dissection is still controversial. Surgery for acute dissection with organ malperfusion is known to carry a high morbidity and mortality; however endovascular treatment is becoming an alternative form of treatment. We report a clinical case of emergency percutaneous thoracal aorta endovascular stenting and renal artery stenting in a patient who had renal malperfusion and acute renal failure due to acute type-B dissection. The present case is a fundamental examples of collaboration between the cardiologist and cardiovascular surgeon in a hybrid procedure.

Keywords: Aortic dissection, Endovascular stenting, Renal stenting

Acute aortic dissection (AD) is a life-threatening clinical entity that may cause organ ischemia during the acute stage. Approximately 30% of patients with AD develop organ malperfusion increasing surgical mortality and morbidity ranging from 50% to 80% [1]. We report a case of percutaneous thoracic aorta endovascular stenting and renal artery stenting in a patient who had renal malperfusion due to acute Stanford type-B dissection.

Case

A 59-year-old man was admitted to our hospital with back pain. His blood pressure was 220–90/ mmHg and his pulse rate was 78 beats/min. He had chronic hypertension, dyslipidemia and a history of heavy smoking. Physical examination showed no signs of visceral ischemia. ECG and chest roentgenogram were normal. Peripheral arterial pulses were well palpable in the upper and lower extremities. Laboratory data were unremarkable except for increase in white blood cell count. Contrast enhanced CT revealed an acute aortic dissection extending from the descending aorta to the right and the left common iliac arteries (Fig. 1). Intimal tear located within the aorta just distal to the origin of the left subclavian artery made certain diagnosis of Stanford type-B dissection. Initially we did not observe any end organ

Received 20 October 2011; revised 21 December 2011; accepted 5 February 2012.
Available online 13 February 2012

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Peer review under responsibility of King Saud University.
URL: www.ksu.edu.sa
doi:10.1016/j.jsha.2012.02.002

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Figure 1. Type B acute aortic dissection lies through to the left renal artery.

Figure 2. Endovascular graft closing the proximal aortic tear flap and aortic false lumen.

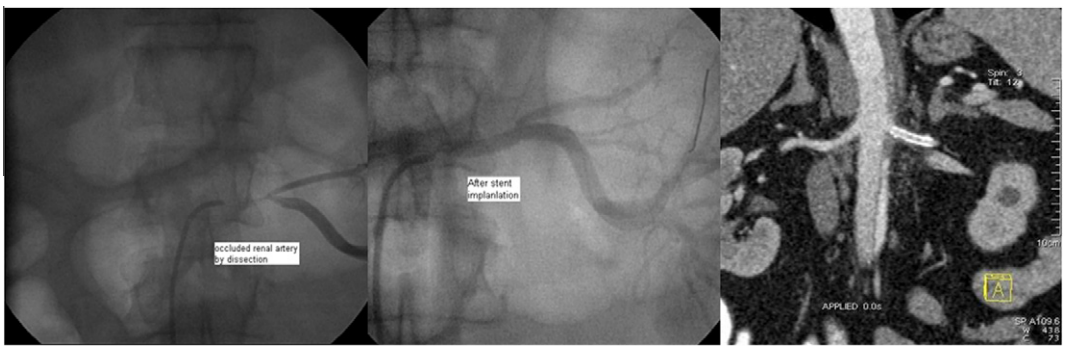

Figure 3. Renal artery occlusion by dissection and successfully implanted stent in left renal artery.

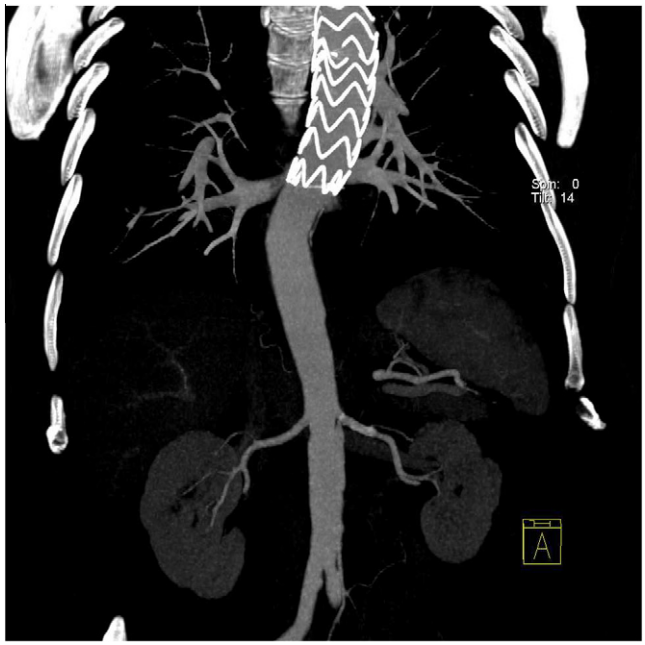

Figure 4. Third month CT aortography shows aortic graft stent and left kidney stents.

damage so we decided to follow up in the ICU with medical therapy. Approximately 20 h later, his BUN and creatinine levels (6.2 mg/dl) began to increase and he was taken to the catheter room where he received an improved thoracic aorta endovascular graft stent and renal artery stent replacement in the same setting. We first placed a 36 mm × 15 cm range Valiant Captiva graft into the descending aorta (Fig. 2). Afterward, on control aortography we observed a totally occluded left renal artery with extending false lumen and we placed two bare metal stents (4.5 × 18 mm) into the left renal artery (Fig. 3). Procedure was completed successfully without any complications. During the hospital stay, the patient's creatinine levels decreased and normalized. We discharged the patient uneventfully after eight days. After three months, CT aortography revealed stable and open aortic and renal stents with an almost closed false lumen (Fig. 4).

Discussion

Although the etiology of AD remains unclear predisposing factors have been defined. The most important predisposing factor for AD is hypertension coexisting in the range of 70–90% and more common in distal than in proximal dissections. Other predisposing factors are congenital disorders of the connective tissue, in particular Marfan syndrome and to a lesser extend Ehler–Danlos syndrome [2]. Dissections are predominate in male patients by a ratio of 3:1 [3].

In this case, the left renal artery was totally occluded and right kidney was subjected to severe malperfusion due to a large aortic false lumen which is the possible mechanism of acute renal failure and the creatinine rise.

The optimal therapy for acute type-B aortic dissection with visceral organ ischemia remains controversial [4]. There is a consensus that medical treatment is better than surgery for uncomplicated type-B dissection [4]. Emergency surgical intervention with replacement of the descending aorta is the only effective therapeutic option for patients with life threatening complications, such as rupture and impending rupture with rapid increase of aortic diameter and refractory pain [1]. Different surgical techniques have been successfully used, such as the adventitial inversion technique which obliterates the false lumen and converts a dissected aorta into a conduit with tough adventitia on the inside and outside [5], the proximal local aortic prosthetic approach [6], femoral–femoral bypass, axillo-femoral bypass or surgical fenestration [7]. Another option is making fenestration via retroperitoneal approach; however in our clinic we prefer percutaneous approach without surgery if rapid organization is possible. We routinely perform endovascular intervention for type B dissection when there is proper anatomy. Despite improving surgical techniques and accumulated experience, open surgical repair is still accompanied by high mortality; the mortality rate is up to 27% in elective procedures and over 50% under emergency conditions

[8]. However, classical graft replacement using cardiopulmonary bypass in acute phase is accompanied by high risk. As for such cases with visceral or lower extremity ischemia, mortality and morbidity will increase due to ischemia-reperfusion injury for malperfused organs and the systemic effects of metabolites [9]. The advent of endovascular prostheses to treat descending thoracic aortic lesions offered an alternate approach in patients with dissections and severe co-morbidities who were poor candidates for open surgery. The potential benefits of endovascular surgery for dissections include low access trauma, minimal loss of blood, no need for aortic cross clamping, early recovery from perioperative stress, shorter intensive care unit and hospital stays, decreased morbidity and mortality and finally, cost-effectiveness.

During the endovascular approach of type B dissection, one of the possible complications is the extension of the dissection retrogradely to the proximal segment. In this case we did not observe this dissection complication but operators must be cautious in this regard.

Treatment of AD by endovascular grafting carries some risks. The most serious is rupture of the aorta and the another is leakage which can occur in 25% of patients. Also we have observed thromboembolism in 8% of patients. All these complications are more commonly observed in the emergent cases of acute dissections rather than chronic ones [4]. On admission to the emergency room, our case had only back pain without end organ damage or rupture. We decided to follow up with medical treatment in the intensive care unit. After 20 h his creatinine and BUN levels began to increase and he was taken to the angiography theatre where we placed an endovascular stent in the descending aorta where we found the dissection entry. We then we performed renal angiography and observed that the left renal artery was occluded by intimal flap. We placed two stents in left renal artery and then left kidney was very well perfused. Upon follow-up the patient's creatinine and BUN levels gradually decreased and became normal by the third day. We discharged him without pain or end organ damage.

Conclusion

As a result we think that as an alternative approach to surgery, endovascular stenting and other hybrid interventions should be performed as soon as possible in Stanford type B dissections and acute renal failure as safe. Acute renal failure induced by acute aortic dissection and occluded renal artery might be treated safely with stent implantation in the same setting of the endovascular aortic graft procedure, but we need more experience and more patients to observe long term results. In recent times hybrid procedures are rapidly increasing with the collaboration of cardiologists and cardiovascular surgeons and this case is a prominent example of the collaboration with cardiologist and cardiovascular surgeon in a hybrid procedure.

Disclosure

No conflict of interest.

Conflict of interest

None.

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