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Successful Treatment of Traumatic Aortic Injury with Endovascular Stenting

Ting-Ying Lee, Chung-Yi Lee, Yi-Chang Lin, Po-Shun Hsu, Yi-Ting Tsai, Chien-Sung Tsai, and Chih-Yuan Lin*

Division of Cardiovascular Surgery, Department of Surgery, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, Republic of China

Traumatic aortic injury is a potentially life-threatening disease that may carry a high mortality risk in the absence of immediate management. With the advances in interventional techniques, endovascular stenting has become a reasonable treatment for traumatic aortic injury. We present a 55-year-old woman with multiple trauma, including blunt chest injury and aortic injury, due to a fall from a height. Endovascular stenting was successfully performed for the aortic lesion.

Key words: endovascular stenting, traumatic aortic injury, TEVAR

INTRODUCTION

In patients with multiple traumas, blunt chest injury may be complicated with tension pneumothorax, hemothorax, pulmonary contusion, rib fracture, and great vessel injury. The incidence of aortic injury is low (1–2%)[1-4]; however, this type of injury is associated with a high mortality rate (80–85% die before arriving at the hospital).[5,6] The main etiology of aortic injury in cases of thoracic blunt trauma is rapid acceleration and deceleration. Because of the presence of intercostal arteries, pleura, and the ligamentum arteriosum, the descending aorta is fixed more rigidly than the aortic arch and the heart during its course through the vertebral sulcus. During a horizontal deceleration trauma, the descending and other parts of the aorta move at different speeds. As a result, the isthmic part of the aorta is under maximum stress, which may result in total or partial rupture of the vessel. Therefore, in order of frequency, rupture occurs at the aortic isthmus, ascending aorta, aortic arch, distal descending aorta, and abdominal aorta.[7,8]

The disadvantages of traditional open repair for traumatic aortic injury include the long operative time, large surgical wound, severe postoperative pain, and greater risk of complications such as stroke, acute respiratory failure, or neurologic injury associated with cardiopulmonary bypass (CPB). Moreover, the addition of heparin to establish CPB for the traditional operation in multiple trauma patients is especially not suitable because of the reported high mortality risk ranging from 24% to 42%.[9] At present, endovascular stenting is used as a less invasive treatment modality for traumatic aortic dissection. We present a case of a 55-year-old woman who fell from a height and sustained multiple traumas, including blunt chest injury and aortic injury. Endovascular stenting was successfully performed for the aortic lesions.

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*Corresponding author: Chih-Yuan Lin, Division of Cardiovascular Surgery, Department of Surgery, Tri-Service General Hospital, National Defense Medical Center, No. 325, Sec. 2, Cheng-gong Road, Taipei 114, Taiwan, Republic of China. Tel.: +886-2-8792-7212; Fax: +886-2-8792-7376; E-mail: l2683336@mail.ndmctsgh.edu.tw

CASE REPORT

The patient was a 55-year-old married Taiwanese woman who had a fall (from about 10 meters in height) and was rescued by an emergency medical team. She had alert consciousness, and her vital signs were in the normal range after immediate resuscitation in the emergency department. Radiologic examination revealed multiple fractures over the scapula, pelvis, lumbar spine, and right forearm. Computed tomography of the chest revealed pseudoaneurysm formation over the aortic isthmus site. Traumatic aortic injury with pseudoaneurysm formation was diagnosed. Emergent endovascular stenting with a 30×80-mm Zenith TX2 endograft (Cook Inc., Bloomington, IN, USA) was done to cover the aortic lesion. The patient was extubated in the operation room after the procedure, and she recovered uneventfully. The outcome was favorable 7 months after the operation.

DISCUSSION

Patients with traumatic aortic injury often immedi-

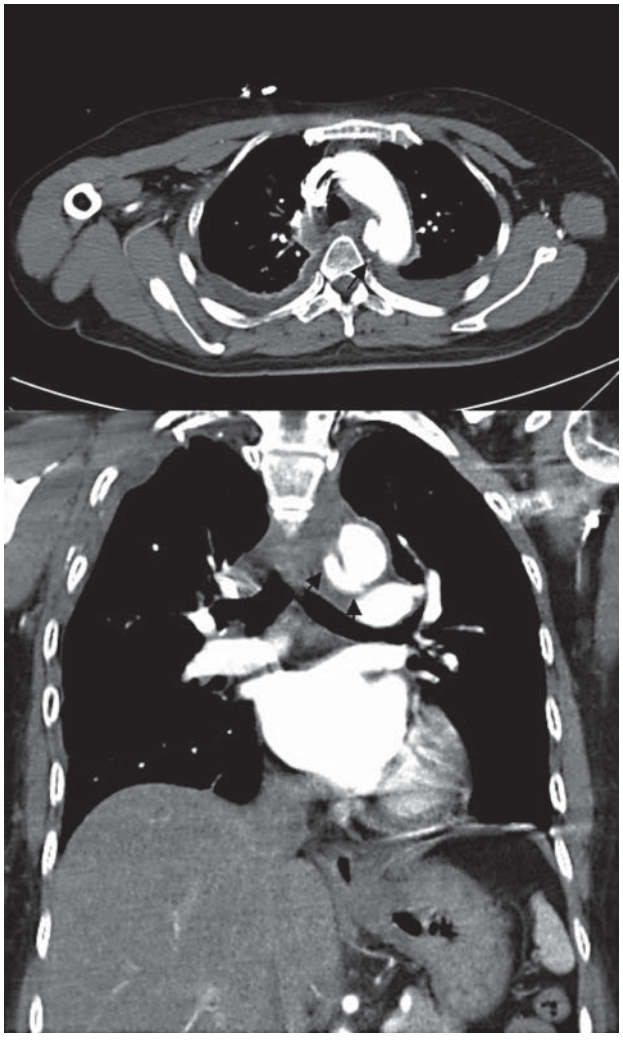

Fig. 1 Chest computed tomography: False lumen with contrast material leaking around the isthmus of the aorta (black arrow)

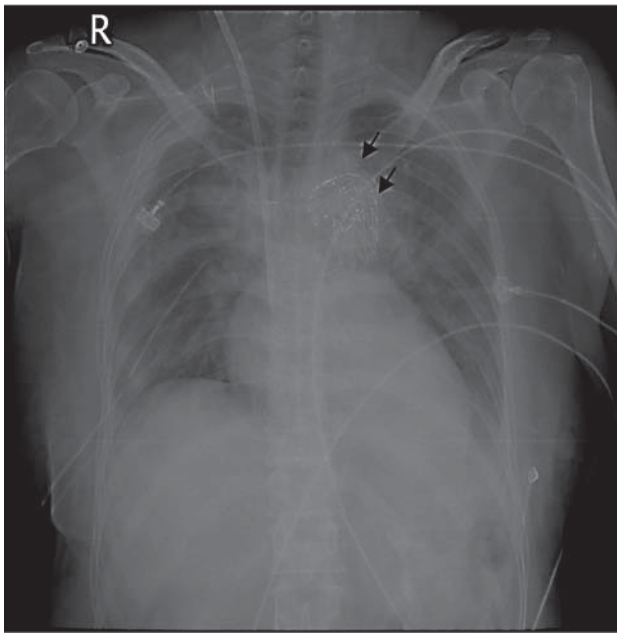

Fig. 2 Chest x-ray scan: An endovascular graft stent was implanted at the isthmus of the aorta (black arrow).

ately die before reaching the hospital, and those who survive usually have multiple injuries, including pulmonary contusions, cranial injuries, multiple fractures, and other solid organ injuries. On the basis of the literature, the traditional open repair for traumatic aortic injury may be risky because it involves thoracotomy and aortic cross-clamping, and in some cases, CPB or single-lung ventilation. These major procedures were reported to have high mortality rates (18–28%).[10,11] Postoperative respiratory complications include respiratory failure and aspiration pneumonia, and endotracheal intubation coming from lung and chest blunting and confounding by thoracotomy, one-lung ventilation, and aortic cross-clamping, especially in hemodynamically or cardiac unstable patients. The technique can be improved by using a shunt for distal perfusion, and CPB seems to have decreased the mortality rate of open repair. However, a high rate of paraplegia has also been reported as a complication due to inadequate brain perfusion and spinal cord ischemia. Some studies advocated both delayed surgical intervention and controlling blood pressure with beta-blocker therapy until the patient is more stable.[12,13] These may improve survival but have also been reported to lead to in-hospital death (2–5%).[14,15]

After the publication of reports about endovascular stent repair for aortic lesions, this minimally invasive procedure became popular in the treatment of thoracic aortic disease. The advantages of endovascular repair include the lower postoperative paraplegia risk (0–5%) owing to the shortened surgical time and the absence of CPB.[16,17] Other advantages are the considerably lower surgical pain and risk of pulmonary complications because of the avoidance of thoracotomy, single-lung ventilation, and aortic cross-clamping. The overall surgical mortality rate was also lower than that of open repair.[18]

However, there are several considerations that must be taken into account before using endovascular aortic repair. Anatomical considerations such as a larger caliber of stent than the abdominal aorta, a longer seal zone (>20 mm) requirement, and the curve of the thoracic aorta all present a challenge in achieving adequate fixation and

seal. Other complications include endoleak, inadequate caliber of stent for the thoracic aorta, and iatrogenic obstruction of the subclavian artery. Some meta-analysis reviews in the literature demonstrated that procedure-related mortality was lower in endovascular repair and that the overall 30-day mortality rate was also substantially lower with this procedure.[18,19] In the present case, endovascular stenting was considered a treatment option because of the multiple concomitant injuries and because CPB may have a high bleeding risk.

In conclusion, endovascular stenting of aortic injury with pseudoaneurysm formation from multiple traumatic and blunt chest injuries has a considerably lower mortality and lower surgical complication rates than open surgical repair. It may be the preferred option for the management of traumatic aortic injury in anatomically suitable patients.

DISCLOSURE

All authors declare that this study has no conflict of interest.

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