

A Case of Abdominal Aortic Injury Caused by a Traffic Accident

Noriyoshi Kutsukata, Kunihiro Mashiko, Hisashi Matsumoto, Yoshiaki Hara,
Yuichiro Sakamoto, Kenkichi Takei and Nobuyuki Saito

Department of Emergency and Critical Care Medicine, Graduate School of Medicine, Nippon Medical School
Shock and Trauma Center, Nippon Medical School Chiba Hokusoh Hospital

Abstract

A 30-year-old man was injured when the large motorcycle he was riding crashed into a power pole. Upon arrival at our institution, the patient complained of abdominal pain; blood pressure at admission was 160/70 mmHg, and the heart rate was 112 bpm. Abdominal ultrasonography showed a small collection of fluid in Morrison's pouch. A chest X-ray film showed a right rib fracture. Multidetector computed tomography (MD-CT) revealed pleural effusion, a hepatic lesion, and a dissection of the abdominal aorta distal to the renal artery. Because of the complicated intraluminal injuries, the insertion of a stent graft was difficult. On the 34th day after injury, elective surgery was performed. Because dissection of the lumen was observed, the vessel was replaced with an artificial graft. Medial degeneration of the aorta wall was not observed upon pathological examination, and no degenerative disorders have occurred. The postoperative progress was favorable, and the patient was discharged from hospital.

(J Nippon Med Sch 2008; 75: 337–339)

Key words: abdominal aortic injury, traumatic aortic injury, traffic accident

Introduction

Traumatic aortic injuries usually occur in the descending aorta near the origin of the left subclavian artery. Abdominal aortic dissection after blunt trauma is uncommon. Here, we report a case of abdominal aortic dissection after blunt trauma sustained during a traffic accident.

Case Report

A 30-year-old man was injured when the large motorcycle he was riding crashed into a power pole. Upon arrival at our institution, the patient was fully conscious and complained of abdominal pain.

Physical examination at the time of admission revealed a blood pressure of 160/70 mmHg, a heart rate was 112 bpm, and a respiratory rate of 24 breaths per minute. Abdominal ultrasonography showed a small collection of fluid in Morrison's pouch. A chest X-ray film showed a fracture on the right 6th rib. Multidetector computed tomography (MD-CT) revealed pleural effusion, a hepatic mass, and dissection of the abdominal aorta distal to the renal artery. The hepatic mass was an intrahepatic hematoma. No hematoma was seen on the retroperitoneum around the abdominal aorta. According to the Abbreviated Injury Scale, the patient had an injury severity score of 35 and a probability of survival score of 0.972. Because the patient was not in shock and had stable vital signs,

Correspondence to Noriyoshi Kutsukata, Shock and Trauma Center, Nippon Medical School Chiba Hokusoh Hospital, 1715 Kamagari, Inba, Inba, Chiba 270-1694, Japan
E-mail: moonsong@nms.ac.jp
Journal Website (<http://www.nms.ac.jp/jnms/>)

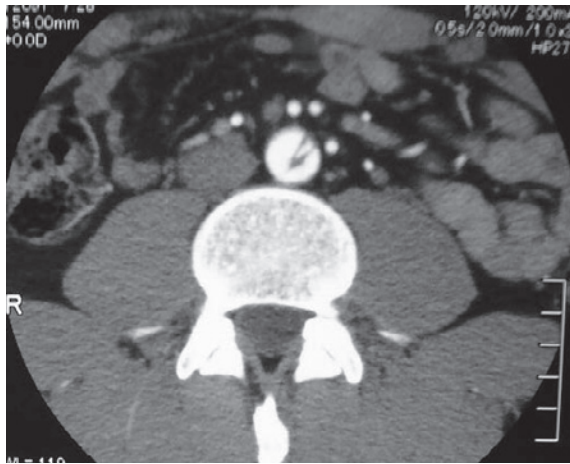


Fig. 1 Abdominal CT

The dissection of the aortic intima has not improved, and the intima has peeled away and collapsed, creating a complicated triple-layered structure.



Fig. 2 Angiography

A dissection of the terminal aorta is visible.

he was admitted to the intensive care unit for observation.

A follow-up MD-CT examination performed on the 14th day after injury showed that the aortic intima had not healed and instead had peeled away and collapsed, forming a complicated triple-layered structure (**Fig. 1**). Angiography showed a similar dissection of the terminal aorta (**Fig. 2**). Treatment with a stent graft was considered to be difficult, because of the complicated lumen and concerns that stent insertion might cause further injury. Therefore, elective open surgery was performed on the 34th day after the injury.

Under general anesthesia, the abdominal aorta distal to the renal artery was approached through a

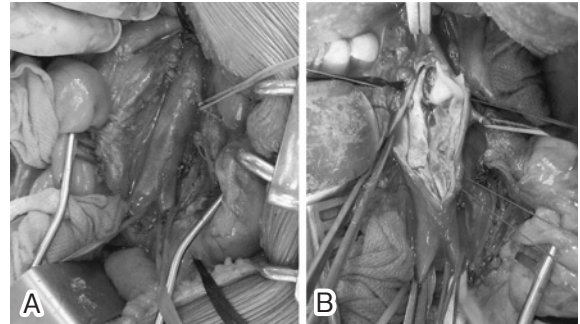


Fig. 3 Intraoperative findings

Intraoperative examination show a thin, dark-red outer lining of the terminal aorta, indicating an acute-phase dissection (A). The intima has peeled away from almost the entire circumference and has partially collapsed, creating a complicated structure (B).

median abdominal incision. Intraoperative examination revealed a thin, dark-red outer lining of the terminal aorta, indicating an acute-phase dissection (**Fig. 3A**). Under systemic heparinization, the abdominal aorta was incised after being cross-clamped. The intima was found to have peeled away from almost the entire circumference and to have partially collapsed, creating a complicated structure (**Fig. 3B**), in agreement with the preoperative findings. The vessel was thus replaced with an 18-mm straight woven Dacron artificial blood vessel. The operation time was 180 minutes, and blood transfusion was limited to autologous blood transfusion using a Cellseparator.

Because pathological examination of the resected specimen showed no medial degeneration of the aorta wall, a degenerative disorder was considered unlikely. The patient remained in the intensive care unit for 1 day and was discharged 2 weeks after the surgery. He was soon able to return to his daily routine. A follow-up CT examination 1 month after surgery showed a patent graft.

Discussion

Aortic injury after blunt trauma typically results from a shearing force created by acceleration or deceleration during such events as traffic accidents and falls from height. Most blunt aortic injuries occur in the thoracic aorta, especially in the intercalated portion of the descending aorta, and

immediate death occurs in about 90% of such cases.

In the present case, the blunt aortic injury and accompanying liver injuries were sustained during a motorcycle crash. Whether the abdomen had been bruised during collision with the motorcycle, road, or power pole could not be determined from the injuries or the accident report. Because a hematoma on the retroperitoneum around the abdominal aorta was not observed, the cause of the trauma was difficult to determine at the time of admission. However, because intraoperative examination revealed acute-phase dissection, and pathological examination ruled out a degenerative disorder, the accident was ultimately concluded to be the cause of the blunt aortic injury.

Brathwaite and Rodriguez have reported that abdominal aortic impairments were found in 0.05% of more than 8,000 patients with blunt trauma¹. Parmley et al have reported that in an autopsy series of 8,710 injured patients, 400 aortic injuries were identified; of these aortic injuries, only 4% involved the abdominal aorta². Thus, the abdominal aorta may be the second-most common site of aortic injury after the aortic isthmus. During CT evaluations after blunt trauma, particular attention should be given to the possibility of abdominal aortic injury.

In 1998, Picard et al reported favorable results from the endovascular treatment of 3 cases of abdominal aortic injury³. Thereafter, Berthet et al treated 7 cases by means of stent grafts over a 7-year period and reported that endovascular treatment is a safe and efficient therapeutic method for traumatic infrarenal aortic dissection⁴. Concerning the use of grafts, Halkos et al have also reported the use of a bifurcated graft⁵. At present, no consensus exists regarding the criteria for selecting endovascular intervention or open surgery. Michaels et al have proposed that surgical repair of abdominal aortic injuries is preferable for patients whose condition is unstable or for patients with threatened extremities⁶.

In the present case, the hemodynamics were stable, and no concomitant limb injuries were present. Nonetheless, conventional open surgery was scheduled as an elective procedure because MD-CT had revealed a complicated intraluminal structure.

Conventional open surgery was thus considered safer on the basis of discussions amongst a radiologist, a vascular surgeon, and a trauma surgeon. In recent years, however, endovascular interventions have made remarkable progress, and many institutions now use them. Whether endovascular interventions can be performed in patients with complicated dissections of the abdominal aorta should be investigated.

Concerning preoperative imaging diagnosis, Soares et al have reported the use of intravenous digital subtraction angiography in a child⁷. In the present case, because the patient's hemodynamics and condition were stable, aortic angiography was performed; however, no new information was obtained with this examination. Because imaging diagnosis with MD-CT has advanced remarkably, angiography may not be necessary if endovascular intervention is not performed.

In conclusion, we have reported a rare case of abdominal aortic injury after blunt trauma which had a favorable outcome after open surgery.

References

1. Brathwaite CM, Rodriguez A: Injuries of the abdominal aorta from blunt trauma. *Am Surg* 1992; 58: 350-352.
2. Parmley LF, Matting TW, Manion WC, et al: Nonpenetrating traumatic injury of the aorta. *Circulation* 1958; 17: 1086-1101.
3. Picard E, Marty-Ane C-H, Vernhet H, et al: Endovascular management of traumatic infrarenal abdominal aortic dissection. *Ann Vasc Surg* 1998; 12: 515-521.
4. Berthet J-P, Marty-Ane C-H, Veerapen R, et al: Dissection of the abdominal aorta in blunt trauma: Endovascular or conventional surgical management? *J Vasc Surg* 2003; 38: 997-1004.
5. Halkos ME, Nicholas J, Kong LS, et al: Endovascular management of blunt abdominal aortic injury. *Vascular* 2006; 14: 223-226.
6. Michaels AJ, Gerndt S, Taheri PA, et al: Blunt force injury of the abdominal aorta. *J Trauma* 1996; 41: 105-109.
7. Soares G, Ibarra R, Ferral H: Abdominal aortic injury in a child: intravenous digital subtraction angiogram (IVDSA) for the diagnosis of pediatric vascular trauma. *Pediatr Radiol* 2003; 33: 563-566.

(Received, June 3, 2008)

(Accepted, July 1, 2008)