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Aortic bifurcation tear following blunt trauma in childhood

Shlomo Yellinek [a], Dimitri Gimelrich [b], Ofer Merin [c], Petachia Reissman [a], Marc Arkovitz [a,*]

[a] Department of Surgery, Shaare Zedek Medical Center, Jerusalem, Israel
[b] Division of Vascular Surgery, Shaare Zedek Medical Center, Jerusalem, Israel
[c] Department of Cardiothoracic Surgery, Shaare Zedek Medical Center, Jerusalem, Israel

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ABSTRACT

Rupture of the abdominal aorta from blunt trauma is rare and aortic biforcation tear is extremely rare. We will present the management of a 2 year old boy who suffered blunt abdominal trauma and was operated in urgent fashion in our institution.

Injury of the abdominal aorta from blunt trauma is extremely rare in the pediatric population. In a Review of the National Trauma Database, the incidence of pediatric vascular injuries (patients younger than 16 years of age) was 0.6%, with a low proportion of blunt vascular injuries. Only 3.3% of all pediatric vascular injuries were abdominal aortic injuries [1]. There have only been a few cases of aortic injury reported in the literature [2–8]. Of these, even fewer have described damage to the aortic bifurcation [4] and in all of them the patient was stable, and laparotomy followed CT scan.

We here present a unique case of a two year old infant who suffered blunt trauma to the abdomen and was found to have a tear of the aortic bifurcation.

1. Case presentation

A two year old infant boy was brought to our emergency room by ambulance. The EMS reported that the infant jumped onto a heavy, marble table and then fell off of it onto his back. The top of the table was not secured to the legs and it subsequently fell on top of him, crushing his chest and abdomen. The emergency medical services arrived at the scene 5 min after the event and during transport, which took about 10 min, intubation and fluid resuscitation were performed.

Upon arrival, the patient was unconscious, ventilated, blood pressure was 50–60/40–30, heart rate 130–150, no obvious external injuries were noted. His abdomen was mildly distended and he had a small contusion on the lower abdomen. Peripheral pulses were equal and strong bilaterally and rectal tone was normal.

His initial arterial blood gas analysis was significant for a pH of 7.01, base excess was −14, PCO2 was 65 and Lactate of 2.3. Hb level was 10. A Chest x-ray was normal. FAST U/S examination demonstrated fluid in Morrisons pouch and splenic recess and a suspected retroperitoneal hematoma.

The initial management included boluses of blood and crystalloid fluid without response in either his blood pressure or heart rate. The child was brought to the operating room for laparotomy.

At laparotomy, the abdomen was entered through a midline incision. No intraperitoneal blood was noted and there were no injuries to the bowel or other intra-abdominal structures. There was a large, expanding central, right and left sided retroperitoneal hematoma that extended from the diaphragm to the pubis. The hematoma was bright red.

A left thoracotomy with supradiaphragmatic aorta clamping was performed prior to the retroperitoneal exploration in order to obtain vascular control. Cattel Brasch and Mattox manuvers were performed. Upon mobilizing the right colon to the aorta we found a

* Corresponding author.
E-mail address: drarko@gmail.com (M. Arkovitz).

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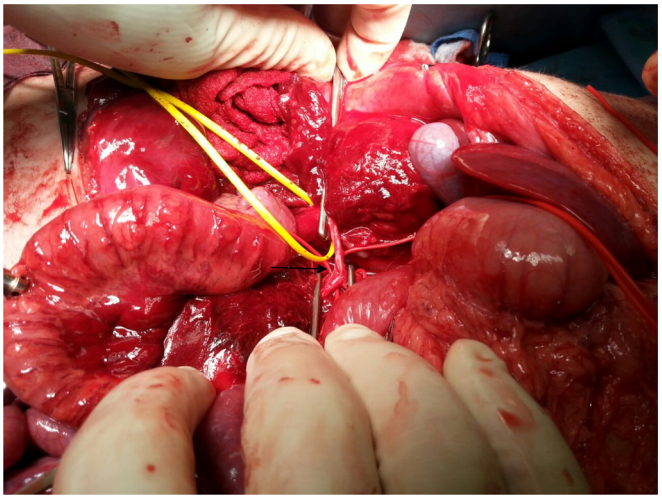

Fig. 1. Operative photograph of intraoperative findings. Aorta has been dissected and tear is seen crossing both iliac arteries (black arrow).

1.5 cm transverse linear tear at the undersurface of the bifurcation of the aorta, with active bleeding, crossing both common iliac arteries (Fig. 1).

Vascular clamps were placed on the infra renal aorta and both Iliacs and the thoracic aortic clamp was removed. The total aortic cross clamping time was less than 15 min. Primary repair of the tear using Prolene 6.0 was performed. At the conclusion of the repair, good pulsations were palpated and Doppler signals were heard bilaterally over the common iliac arteries. No other bleeding or injuries were noted in the retroperitoneum. Due to a core temperature of 35°, the skin was closed rapidly without closing the fascia and the child was taken, hemodynamically stable with good urine output, to the pediatric intensive care unit. During the procedure, 2 units of packed cells and 4 units of FFP were administered. His first arterial blood gas analysis after the operation had a pH of 7.37 with a base excess of −2.

After initial stabilization and warming in PICU, the child underwent total body CT angiogram. No head injury and no other injuries of the chest or abdomen were note. Both iliac arteries were open with normal luminal diameter, the aortic bifurcation was intact with no contrast extravasation.

On POD #2 the child was returned to the operating room for formal abdominal wall closure, he was extubated on POD 6, and was discharged home on POD 10 in good condition, without any neurological deficit and with normal motor function of both legs.

He was seen in follow up clinic two months later with normal motor and sensory function and a normal Doppler examination of his aorta and iliac arteries.

2. Discussion

The reported mortality rate in traumatic abdominal aortic injury in the pediatric population in patients who make it to the hospital is 10–40% [9]. In the cases so far reported in the literature of aortic injuries at the bifurcation all the children were stable at presentation and underwent CT scanning [4,6]. Here we present a unique case of a large aortic injury in an unstable patient.

In an unstable patient with a rapidly expanding retroperitoneal hematoma the first operative maneuver is to obtain proximal aortic, and possible caval, control. Due to the size of the hematoma and an absence of a normal peritoneal plane we decided to obtain vascular control above the diaphragm. Next a stepwise exploration of the major vascular structures was undertaken to determine the exact location and nature of the injury. The supra-renal aortal and both renal arteries and veins were intact. Next we explored the infra-renal aorta and found the injury. Once diagnosed, the aorta was clamped closer to the injury, the supradiaphragmatic clamp removed and the tear repaired.

The exact mechanism of this tear is not clear to us, but one possibility is that due to the sudden compression force of the table plate on the infant's abdomen against the spinal column, both common iliac arteries were stretched laterally and torn, i.e. a combination of shearing force and a sudden increase in pressure produced the tear. Such injuries in infancy are extremely rare, especially a tear at this location [2,9].

3. Conclusion

Pediatric blunt vascular trauma is rare. Retroperitoneal aortic injury is even rarer. This case highlights the importance of a rapid diagnosis, a quick decision to operate and an orderly, stepwise approach to the vascular exploration including proximal arterial control in these cases. This injury would have almost certainly been lethal had the aortic tear been intra-peritoneal and not retro-peritoneal.

References

[1] Barmparas G, Inaba K, Talving P, David JS, Lam L, Plurad D, et al. Pediatric vs adult vascular trauma: a National Trauma Databank review. J Pediatr Surg 2010; 45:1404–12.
[2] Bairdain S, Modi BP, Kim HB, Mooney DP, Durkin E, Vakili K. Pediatric blunt abdominal aortic injury and the use of intra-operative aortic ultrasound for surgical decision making. J Pediatr Surg 2013;48:1584–7.
[3] Amin A, Alexander JB, O'Malley KF, Doolin E. Blunt abdominal aortic trauma in children: case report. J Trauma 1993;34:293–6.
[4] Blanco FC, Powell DM, Guzzetta PC, Burd RS. Aortic bifurcation rupture after blunt abdominal trauma in a child: a case report. J Pediatr Surg 2011;46: 1452–4.
[5] Diaz JA, Campbell BT, Moursi MM, Boneti C, Kokoska ER, Jackson RJ, et al. Delayed manifestation of abdominal aortic stenosis in a child presenting 10 years after blunt abdominal trauma. J Vasc Surg 2006;44:1104–6.
[6] Lin PH, Barr V, Bush RL, Velez DA, Lumsden AB, Ricketts J. Isolated abdominal aortic rupture in a child due to all-terrain vehicle accident–a case report. Vasc Endovascular Surg 2003;37:289–92.
[7] Nucifora G, Hysko F, Vasciaveo A. Blunt traumatic abdominal aortic rupture: CT imaging. Emerg Radiol 2008;15:211–3.
[8] Papazoglou KO, Karkos CD, Kalogirou TE, Giagtzidis IT. Endovascular management of lap belt-related abdominal aortic injury in a 9-year-old child. Ann Vasc Surg 2015;29. 365.e11–e15.
[9] Anderson SA, Day M, Chen MK, Huber T, Lottenberg LL, Kays DW, et al. Traumatic aortic injuries in the pediatric population. J Pediatr Surg 2008;43: 1077–81.