

Emergency Thoracic Endovascular Aortic Repair for Traumatic Thoracic Aortic Rupture Could Be Life-Saving

Travmatik Torasik Aort R pt r nde Acil Tevar Uygulamas  Hayat Kurtarıcı Olabilir

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ABSTRACT The thoracic aortic rupture seen in multiple trauma patients is often associated with a sudden deceleration after blunt aortic injury. It has been documented that the patients with blunt aortic injuries have high risks for paraplegia, stroke, and heart, kidney and respiratory failure. The mortality rate reaches to 85-90% if those complications are left untreated.³ Thoracic Endovascular Aortic Repair (TEVAR) enables a rapid control of a bleeding, and ensures rapid blood flow to the internal organs.^{4,5} In our case, a contrast enhanced computed tomography was obtained in a 42-year-old woman who had a car accident. A distal rupture of left subclavian artery was seen, the intima and media of the artery were entirely separated, and the integrity of the vessel was maintained by only the adventitial layer. Afterwards, the patient underwent a TEVAR under emergency conditions, and was brought to the intensive care unit where she was extubated post-operatively. The patient also had additional complications associated with multiple trauma, and was discharged from intensive care unit after 12 days. In this case report, we aimed to emphasize the life-saving potential of interventional procedures like TEVAR/EVAR for traumatic aortic rupture in centers where open surgery is also possible.

Key Words: Aortic rupture; thoracic aorta; endovascular procedures; emergencies, trauma

 ZET  oklu travma hastalarında torasik aortada meydana gelen yırtılmalar,  oğunlukla k nt travma sonrası ani gelişen deselerasyon ile ilişkilidir. K nt aort travması geiren hasta pop lasyonunda y ksek oranda parapleji, inme, kalp, b brek ve solunum yetmezliđi komplikasyonları g zlenmektedir ve tedavi edilmediđi takdirde mortalite oranı %85-90 d zeyindedir. Torasik Endovask ler Aort Tamiri (TEVAR) kanamanın hızlı kontrol ne ve u organlara s ratle kan akışının sađlanmasına olanak verir. Bizim vakamızda 42 yaşımda kadın hastanın ara ii trafik kazası sonrasında ekilen kontrastlı bilgisayarlı tomografisinde torasik aortanın sol subklavyen arterin hemen distalinde r pt re olduđu, intima ve media tabakalarının tamamen ayrıldığı ve sadece adventisiya tabakası tarafından b t nl đ n sađlandığı g r ld  ve hastaya acil şartlarda TEVAR iřlemi uygulandı. Hasta iřlem sonrası yođun bakıma alındı. Ekst basyonu yapıldı. Multitravmaya bađlı ek sorunları da olan hasta 12 g nl k yođun bakım izleminin ardından taburcu edildi. Bu olgu sunumunda travmatik aort r pt rlerinde gerektiđinde aık cerrahinin de uygulanabileceđi merkezlerde TEVAR/EVAR gibi girişimsel iřlemlerin hayat kurtarıcı bir seenek olduđunu vurgulamak istiyoruz.

Anahtar Kelimeler: Aort r pt r ; torasik aort; endovask ler prosed rler; aciller, travma

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Thoracic aorta ruptures that occur in patients with multiple traumas are frequently associated with acute development of deceleration after blunt trauma. The rupture site is at the distal part of the left subclavian artery in 90% of the cases.¹ The remaining 10% occurs at regions



FIGURE 1: Preop DSA



FIGURE 2: Postop DSA.

such as the aortic root or the ascending aorta. Early diagnosis and treatment are crucial. If left untreated, the mortality rate is 85-90%.²

The most commonly preferred surgical procedure includes the placement of an artificial vascular graft under thoracotomy. This surgical procedure is highly invasive, and despite the improvements in anesthesia, surgery and peri-operative mortality and morbidity rates remain high.⁶

Herein we report our case to suggest less invasive TEVAR procedure as a valuable option in patients with a suitable anatomy.

CASE REPORT

A 42-year-old female patient was consulted for urgent intervention for a thoracic aortic rupture after a car accident. A contrast-enhanced computerized tomography (CT) showed a distal rupture in the thoracic aorta, immediately after the left subclavian artery, the intima and media of the artery were entirely separated, and the integrity of the vessel was maintained by only the adventitial layer. The measurements were performed on coronal and sagittal reformatting, 3D, and maximum intensity projection (MIP) images, and it was decided that a sufficient proximally landing zone was present for Thoracic Endovascular Aortic Repair (TEVAR) procedure. The patient was prepared for a TEVAR procedure under emergency conditions. In combination with general anesthesia and endotracheal intubation, and after lining and covering of the appropriate surgical field, an incision was made in the right femoral region, and the right common femoral and deep femoral arteries were identified.

A 5 French introducer sheath (Terumo, Tokyo, Japan) was placed after an incision of the femoral artery, and a 5 French vertebral catheter (Terumo, Tokyo, Japan) was delivered to the ascending aorta with the help of a hydrophilic coated guide-wire (Terumo, Tokyo, Japan). Then the hydrophilic soft guide-wire was exchanged with a 300 cm long Back-up Meier stiff guide-wire (Boston Scientific, USA) through the catheter lumen, and the catheter was retrieved. A pigtail catheter (Terumo, Tokyo, Japan) was used for imaging and also for marking the place of the left subclavian artery, which was placed in the aortic arch via the left brachial artery access. The C-arm of the angiography system (Innova 3100 Angiography System, General Electric, USA) was turned to left-oblique projection for 40 degrees to see the ostia of supra-aortic vessels as well as the proximal landing zone. After maintainig the systolic

arterial blood pressure of the patient under 100 mmHg with i.v. medication, a 30x150 mm Vailant stent-graft system (Medtronic, Minneapolis, MN, USA) was placed distally to the left subclavian artery, by covering the ruptured part of the thoracic aorta under angiographic guidance. The diameter of the aorta at the site of lesion was oversized 20% by the implanted graft system. DSA images obtained after the procedure showed that the left subclavian artery was open proximally. There was no signs of leakage at the site of the graft. Then, the guide-wires and catheters were removed, and the femoral artery incision was closed. A hemovac drain was placed subcutaneously, hemorrhage control was performed, and the layers of incisions at the femoral region were properly closed. No complications occurred during the procedure. The patient was postopera-



FIGURE 3: Preop CT.



FIGURE 4: Preop CT.

tively taken to the intensive care unit, and she was extubated there. The patient also had additional complications associated with multiple traumas, and was discharged from intensive care unit after 12 days.

DISCUSSION

Traumatic thoracic aortic ruptures have a high mortality rate.⁷ Therefore; it is necessary to treat this condition with classic surgery or TEVAR. However, comparison of those two treatment options indicated that surgery has higher mortality rates compared to TEVAR. Davidović et al. reported a mortality rate as 25% in their series of open surgery.⁸ Eleftherios et al. performed a meta-analysis on 17 retrospective cohort studies, and reported the mortality rate as 14% in the open surgery group, and 2% in the TEVAR group.⁹ In another study, Canaud et al. compared the interventions that were performed for thoracic aortic rupture, and documented that the mortality rates associated with surgery were 11.4% in the classic surgery group and 0% in the TEVAR group.¹⁰ TEVAR also appears to have more short-term benefits and a shorter hospitalization time after operation when compared to open surgery.¹¹

The first impact of aortic rupture in patients is shock due to the hemorrhage. The mortality is critically high. Patients who survive the shock undergo a second impact, which is a systemic inflammatory response syndrome. With time, this can lead to a multiple organ dysfunction syndrome. Moreover, the coagulopathy due to hypothermia and massive transfusion may induce a systemic inflammatory response syndrome.¹² Endovascular treatment can reduce reperfusion injury by ensuring the continuity of the distal circulation throughout the process.

CONCLUSION

Since traumatic thoracic aortic rupture is a condition with a high mortality rate, emergency treatment is imperative. The treatment can either be performed with open surgery or TEVAR. We con-



FIGURE 5: Postop CT

cluded that performing TEVAR without losing time might be life-saving. However, TEVAR procedure may have to be terminated, and open surgery may still be necessary due to the operation or inherent factors of the patient. Therefore, the patient must have surgery in a place where both procedures can be performed conveniently. Otherwise, morbidity and mortality rates may increase.

Conflict of Interest

Authors declared no conflict of interest or financial support.

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