

CASE REPORT

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Traumatic rupture of the infrarenal inferior vena cava: Successful emergency reconstruction with polytetrafluoroethylene graft

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ABSTRACT

Introduction: Great vessel and cardiac chamber injuries may occur during accidents, open heart surgery or during operations in aorta. Control of bleeding in such cases is a surgical challenge. **Case Report:** Herein, we report a case of a 33-year-old patient who developed severe hypovolemic shock following blunt trauma to the right flank. The patient showed a large collection of intra-abdominal blood on CT scan and underwent an emergency laparotomy. In addition to complete rupture of the right kidney, a 7-cm long rupture of the infrarenal vena cava (IVC) was demonstrated. During surgery, after clamping of the IVC and subsequent improvement of hemodynamic parameters, vascular surgeons chose to reconstruct the IVC with polytetrafluoroethylene graft. The patient was discharged home on postoperative day-12. Four years after surgery, there was radiological evidence of blood flow in the IVC, with a functional prosthetic graft. **Conclusion:** Salvage of patient with rupture of vena cava is very rare considering the fact that a majority of patients die before coming to the hospital. Emergency polytetrafluoroethylene graft repair of the inferior vena cava might be successful, with excellent long-term functional results.

Keywords: Trauma, Inferior vena cava (IVC), Emergency surgery, Reconstruction, Vascular graft

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Received: 09 October 2012

Accepted: 13 October 2012

Published: 15 April 2013

Olluri E, Ukeperaj B, Taner J, Emini L, Abrashit P. Traumatic rupture of the infrarenal inferior vena cava: Successful emergency reconstruction with polytetrafluoroethylene graft. Case Reports International 2012;1:5–8.

Article ID: 100002CRINTEO2013

doi:10.5348/crint-2013-2-CR-1

INTRODUCTION

Great vessel and cardiac chamber injuries may occur during accidents, open heart surgery or during operations in aorta. Control of bleeding in such cases is a surgical challenge. This is especially true for inferior vena cava (IVC) injuries, particularly if they are not directly approachable [1].

CASE REPORT

A 33-year old healthy football player was hit by an opponent's knee in the right lumbar region while playing. Shortly after the trauma, this young man experienced severe pain, difficulty in breathing and was brought to the emergency room of our institution with severe hypovolemic shock. After thirteen minutes, he sought medical assistance and arrived in emergency center of regional hospital of Gjilan (our institution). His health condition got worse even more after 24 hours. Thoraco-abdominal computed tomography (CT) scan showed large amount of intra-abdominal as well as intra-thoracic blood. Due to the large quantity of fluid, the interpretation of CT scan was difficult and the patient was taken to the emergency room by a

multidisciplinary team comprising urologist, digestive and vascular surgeons.

Patient was placed in Trendelenburg position. An emergency midline laparotomy was performed, and complete rupture of the right kidney as well as a rupture of the inferior vena cava (IVC) were found. IVC rupture was located approximately 0.5 cm below the left renal vein, measuring about 6–7 cm in length and extended up to 2 cm caudal to IVC bifurcation. Surgeons proceeded to immediately clamp the IVC proximal and distal to its injured segment, without preventing blood outflow from left renal vein. Subsequently, patient's hemodynamic stabilization was achieved after transfusion of 17 units blood. During surgery, surgeons decided on IVC reconstruction with a polytetrafluoroethylene (PTFE) graft of 20 mm diameter.

The distal graft fixation to the inverted wall of the vena cava was performed, with a Prolene 5.0 running suture. Then, the proximal anastomosis was performed without inversion of the wall of the vena cava, allowing for the renal vein to be emptied into the vena cava from time to time (Figure 1). Both anastomoses were technically adequate and the patient remained hemodynamically stable until the end of the procedure. The patient was extubated in the operating room. Saturation without oxygen was 60% and with oxygen was 90%, heart rate was 110 beats per minute. After laparotomy, thoracocentesis was performed with evacuation of 650 mL of blood and immediate

improvement of oxygen saturation. Postoperatively, the patient was anticoagulated with 5000 IU heparin QID, and was discharged on day-12.

At four month follow-up, abdominal CT scan, magnetic resonance imaging, echo Doppler as well as angio-CT scan all confirmed that the PTFE was functioning adequately (Figures 2–5). A small 3x4 cm periprosthetic fluid collection was under resolution. Four years after surgery, the patient is doing well and has resumed his normal professional activities.

DISCUSSION

We report herein the first case of successful emergency reconstruction of a traumatic rupture of IVC by using a prosthetic graft. In majority of cases, this type of vascular injury results from high energy trauma and patients are likely to die on the scene of the accident with multiple associated thoracic and abdominal injuries. Our patient was a very healthy young male, who had severe but non-life-threatening associated injuries (ruptured right kidney and hemothorax) and who was operated with a very short time delay. In addition, he was managed by a multidisciplinary team of surgeons and anesthesiologists with experience in vascular and abdominal trauma.

Most surgeons, when confronted with this type of surgical challenge, will rightfully choose to ligate the IVC

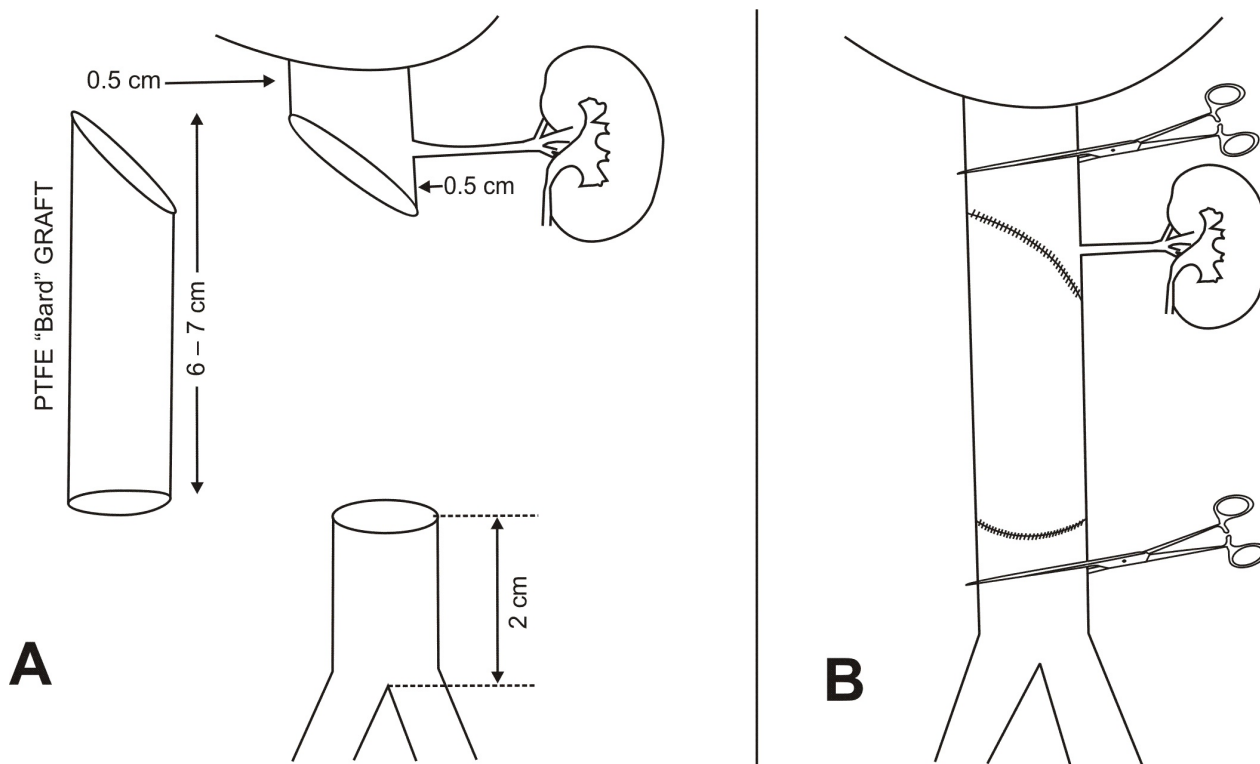


Figure 1: (A, B) Placement of graft, in the inferior vena cava.

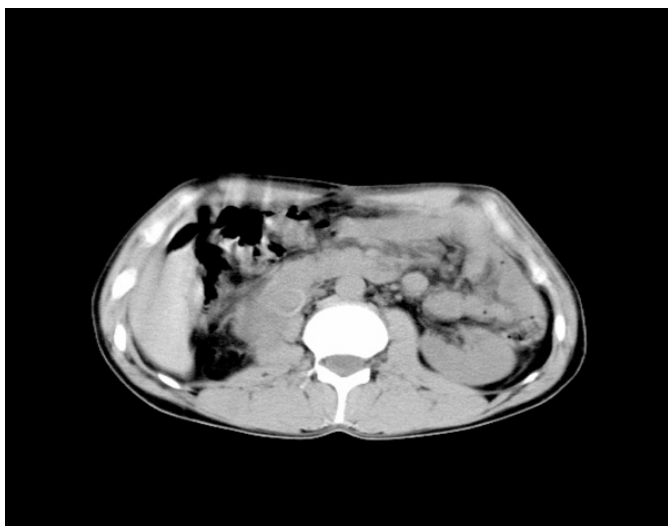


Figure 2: Abdominal computed tomography and vascular graft in the inferior vena cava.

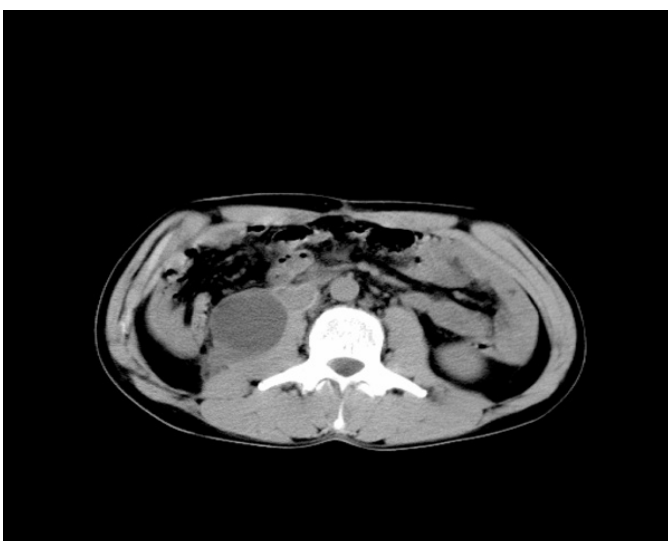


Figure 3: Abdominal computed tomography and graft and collection near the graft.



Figure 4: Angio computed tomography and graft in the inferior vena cava.

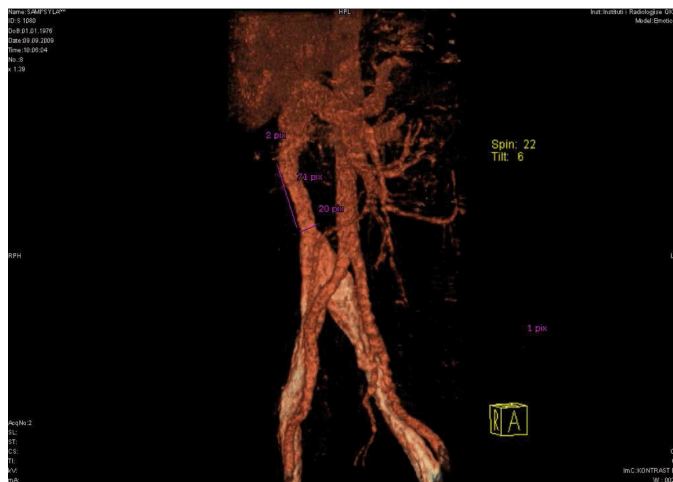


Figure 5: Angio computed tomography and measures of the graft.

right below the renal veins. Ligation of the IVC is an accepted practice in the setting of damage control surgery [2]. However, it remains associated with a high mortality and significant long-term sequelae [3, 4]. The IVC reconstruction is commonly performed in an elective setting, when a tumor has extended through the vessel wall [5]. Nevertheless, emergency repair of the IVC with a PTFE graft is a true surgical challenge which had not been reported previously. This case demonstrates that, when surgical expertise is available, emergency PTFE graft repair of the IVC might be successful, with excellent long-term functional results. The indications for this type of reconstruction are however, extremely rare, since most patients will either: (1) die on the accident scene, (2) present in the emergency room with associated life-threatening injuries, or (3) have significant associated bowel injuries which would represent a contra-indication to prosthetic graft placement [6].

CONCLUSION

Salvage of patient with rupture of vena cava is very rare considering the fact that a majority of patients die before coming to the hospital. When surgical expertise is available, emergency polytetrafluoroethylene graft repair of the inferior vena cava might be successful, with excellent long-term functional results.

Author Contributions

Elmi Olluri – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Burim Ukeperaj – Analysis and interpretation of data, Drafting the article, Revising it critically for important

intellectual content, Final approval of the version to be published

Jusuf Taner – Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Lulzim Emini – Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Preveza Abrashit – Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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