Case Report

Traumatic nonanastomotic axilloprofundal PTFE-bypass rupture: a case report

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A 76-year-old male patient was admitted to our emergency department with painful swelling of the right lateral chest after a fall. Imaging revealed a hematoma, secondary to rupture of a synthetic axilloprofundal bypass. In an emergency surgical procedure, the spelled hematoma was evacuated and the graft legs were successfully ligated. The patient was discharged after an uneventful hospital stay. Traumatic bypass rupture because of blunt trauma is an exceedingly rare event; however, it must be taken into consideration in a patient with bypass surgery in his/her history.

Introduction

A traumatic disruption of an axillofemoral bypass is a very rare event, with potentially significant mortality. Most of the ruptures occur because of a tear of the proximal anastomosis, with an estimated incidence of up to 5\% \cite{1}. We are presenting a patient sustaining a complete rupture of a polytetrafluoroethylene (PTFE) axilloprofundal bypass in his thoracic midportion after proven blunt trauma. Until now, only 3 authors have reported similar cases \cite{2-4}.

Case report

A 76-year-old male patient (GB) was admitted to our emergency department with painful swelling of the right lateral chest. The swelling began after he fell a few hours before being admitted. The patient was well known to us, since he had been in therapy for severe peripheral artery disease over several years at our institution.

In summary, since 2011, the patient had undergone several surgical, including iliocrural PTFE-bypass surgery and several peripheral interventional procedures on the left side. A right-sided axilloprofundal PTFE-bypass surgery (after a chronic occlusion of a femorocrural bypass previously implanted in 1999) was performed in 2009, followed by an infect-complicated postoperative course and lower leg amputation.

The physical examination on admission showed a slightly tender, erythematous, nonpulsatile mass over the right lateral hemithorax, which had obviously developed rapidly over the last couple of hours. This observation was confirmed by chest x-ray (Fig. 1).
Doppler sonography (Fig. 2) and a successive CT-angiography (Fig. 3) revealed a chest-wall hematoma (ca 800 mL) and a proximally disrupted axilloprofundal PTFE bypass with clear signs of active contrast agent extravasation. The distal leg of the bypass was occluded.

Meanwhile, rapid worsening of the patient’s condition required a transfer to the intensive care unit for management of the on-setting shocking anemia. Furthermore, the patient was at this point overanticoagulated (international normalized ratio 3.9) and had been under medication with a platelet inhibitor. Because of progressive hemodynamic instability, immediate surgery was performed.

After initial evacuation of the spelled hematoma, the site of the rupture was located as expected centrally over the lateral hemithorax behind the pectoral muscles. By the time of surgery, there was no more active extravasation detectable. The detached graft sites were distracted by 4 cm. Subsequently, the graft legs were ligated with Ethibond and Prolene 4-0. We dispensed with a graft reconstruction because of the complete obliteration of the distal bypass leg and the apparently sufficient perfusion of the partly amputated right leg via profundal collaterals and relics of the common and external iliac artery, respectively. The postoperative course was uneventful and the patient was discharged in good general condition.

Discussion

Postoperative complications after axillofemoral bypass surgery include proximal anastomotic disruption, upper extremity thromboembolism, graft infection, plexus brachialis lesions, arterial steal syndrome, and seroma formation. Aneurysms occur with an estimated incidence of 5%-10% [5]. The incidence of proximal anastomotic disruptions, termed “pullout syndrome,” has been estimated at about 5% [1] occurring mainly in the early postoperative period due to technical errors in anastomosis, mechanical distress, and infections [5–7].

Apart from several case reports of disrupted bypasses without proven trauma history, 3 authors reported pseudoaneurysms in nonanastomotic regions of an axillofemoral graft because of preceding trauma [2,3]. The patients were treated either with an interposition graft. A similar case was presented by Mousa et al [4], in which a man suffered incomplete disruption of an axillofemoral bypass at the midshaft level after a fall that was repaired endovascularly. In these patients, no specific underlying graft pathology could be identified.

To our knowledge, this is the first case of a peripheral bypass rupture, specifically of an axilloprofundal PTFE bypass, located in the thoracic midportion after proven blunt trauma. We did not submit graft material for microscopic analysis, because there was no suspicion of infection, a fact that may be considered as a limitation. In our opinion, technical errors...
might have placed the graft under too much tension in the longitudinal direction, thereby causing disruption—a hypothesis which was already postulated by Akiyama et al [8] in a similar case; however, without proven trauma. Moreover, graft biodegradation over the past years might have predisposed the graft for failure in the setting of trauma, as proposed by Shiraishi et al [5], but this conclusion remains speculative.

Conclusion

Although exceedingly rare, traumatic bypass rupture can occur and must be taken into consideration as a possible differential diagnosis when confronted with a trauma patient with bypass surgery in his/her history, because missing the diagnosis could be deleterious.

References

[1] Taylor Jr LM, Park TC, Edwards JM, Yeager RA, McConnell DC, Moneta GA, et al. Acute disruption of polytetrafluoroethylene grafts adjacent to axillary anastomoses: a complication of axillofemoral grafting. J Vasc Surg 1994;20:520–6. discussion 526–528.
[2] Krüger K, Landwehr P, Kristen F, Gossmann A, Lackner K. Unusual pseudoaneurysm of an axillofemoral bypass caused by seat belt trauma: case report. J Trauma 1999;46:189–91.
[3] Kitowski NJ, Gundersen SB. Traumatic fracture of polytetrafluoroethylene axillofemoral bypass graft. Vasc Endovascular Surg 2010;44:131–3.
[4] Mousa AY, Nanjundappa A, Abu-Halimah S, Aburahma AF. Traumatic nonanastomotic pseudoaneurysm of axillofemoral bypass graft: a case report and review of the literature. Vasc Endovascular Surg 2013;47:57–60.
[5] Shiraishi M, Kimura C, Takeuchi T, et al. Late-stage nonanastomotic rupture of axillo-bifemoral bypass graft. Ann Thorac Cardiovasc Surg 2012;18:485–7.
[6] Yeager RA, Taylor Jr LM. Axillary artery anastomosis to avoid axillofemoral bypass disruption. Semin Vasc Surg 2000;13:74–6.
[7] Sullivan LP, Davidson PG, D’Anna Jr JA, Sithian N. Disruption of the proximal anastomosis of axillobifemoral grafts: two case reports. J Vasc Surg 1989;10:190–2.
[8] Akiyama K, Hirota J, Shiina Y, Ohkado A, Ohsawa S, Kainuma Y. Thrombotic obstruction of a reinforced ringed expanded polytetrafluoroethylene graft caused by formation of a pseudoaneurysm at a nonanastomotic site: report of a case. Surg Today 1996;26:936–9.