Post-traumatic giant fistula between the aorta and the left renal vein: A case report

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A unique case of post-traumatic aorto-left renal vein fistula (ALRVF) is presented. Some specific features of diagnosis and treatment of post-traumatic and postaneurysm ALRVF are discussed. The importance of careful planning of the operative strategy is emphasized

Post-traumatic fistulas between the aorta and the left renal vein (LRV) are extremely rare – there are only seven reported cases (1-7). The first report of successfully repaired post-traumatic aorto-LRV fistula (ALRVF) originated from DeBakey et al in 1958 (7). The case discussed below presents a patient with an ALRVF following an abdominal stab trauma. At the time of urgent intervention, the fistula was not recognized. Five months later, however, a second intervention was necessary.

CASE PRESENTATION

A 19-year-old man was stabbed in the epigastrium in June 1997. The urgent laparotomy executed by the general surgeon in the County Hospital of Stara Zagora, Bulgaria, revealed lesions of the liver and pancreas, as well as a large retroperitoneal hematoma. The liver and pancreas were sutured, and the hematoma was drained. The retroperitoneal hematoma, described as 'stationary', was not revised. The patient was discharged in 'good condition' on the 14th postoperative day. Five months later at control checkup, an inexplicable tachycardia (over 100 beats/min at steady state) was found and the consulted vascular surgeon detected a loud systolic-diastolic murmur at the site of the former intervention. Because a traumatic arteriovenous (AV) fistula with significant shunting was suspected, the patient was admitted to the Vascular Surgery Clinic in the Military Medical Academy in Sofia, Bulgaria, for further investigation. X-ray contrast aortoarteriography via the femoral artery revealed significant shunting of the contrast media through the AV opening between the aorta and the enormously enlarged LRV, flowing into the distended inferior vena cava (IVC) (Figure 1). According to the investigations, the renal function was intact, with normal blood creatinine and urea levels. Only microhematuria (four to five red blood cells in the urine) was found, while all other laboratory investigations showed no abnormal results.

In view of the large size of the AV fistula and its deleterious shunting effect on the cardiovascular system, surgical correction

because substantial blood loss may lead to serious intraoperative complications and frequently necessitates autohemotransfusion. The 10-year follow-up confirmed that direct reconstruction was the appropriate procedure, with no indications that an endovascular procedure would have been preferable. Direct reconstruction may also be valuable in treating postaneurysm ALRVF.

Key Words: ALRVF; Aorto-left renal vein fistula; Post-traumatic

Figure 1) Transfemoral arteriogram revealing a large fistula between the infrarenal abdominal aorta and the left renal vein (LRV); the LRV and inferior vena cava (IVC) are typically extremely enlarged

was chosen. On November 11 of the same year, the patient was operated through the left thoracophrenolaparotomy approach via the 11th intercostal space. The LRV was found to be enlarged to 5 cm in diameter at its largest point and was easily identified by a strong thrill. The aorta was dissected and controlled proximally (just below the diaphragm) and distally (at bifurcation level). Due to the numerous adhesions from the first intervention, it was almost impossible to dissect the enlarged IVC and control the blood flow through it. The attempt to prevent backbleeding from the IVC by introducing a balloon catheter via the left femoral vein into the LRV failed

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Figure 2) An artist's sketch of the post-traumatic aorto-left renal vein (LRV) fistula. IVC Inferior vena cava

because of the discrepancy in the diameters of the vein and the balloon. A careless incision in the anterior wall of the LRV was followed by substantial blood loss (estimated to be more than 1500 mL every 5 min), leading to intraoperative hypotension, surmounted with difficulty by the anesthesiologist, assisted by numerous blood and fluid transfusions, as well as rapid auto-transfusion. The bleeding was later controlled by manual and swab stick pressure over the IVC distally and proximally, and over the LRV, and by replacing the proximal aortic clamp below the left renal artery. After the bleeding was stopped, a fistulous oval opening between the back wall of the LRV and the front wall of the aorta was found, measuring 15 mm × 5 mm (Figure 2). The front wall of the aorta was oversewn by a 3/0 polypropylene continuous suture together with the back wall of the LRV after careful air evacuation. The front vein wall was closed consecutively by a 5/0 polypropylene continuous suture that reshaped the venous diameter to approximately normal dimensions, again only after careful air elimination. The aorta clamping time was 33 min.

The first two postoperative days in the intensive care unit were not easy – significant blood and infusion replacements as well as some drugs supporting the blood pressure and renal function had to be applied (dopamine, etc). There were no serious postoperative complications, the temporarily elevated creatinine level returned to its normal value at the third postoperative day and the heart rate returned to physiological frequency (less than 70 beats/min at steady state). The control angiogram revealed no AV shunting, with normal renal perfusion (Figure 3).

Figure 3) Two weeks following the second operation, the postoperative transfemoral control angiogram shows no residual arteriovenous communication

The patient was discharged on the eighth postoperative day, followed monthly for the first six months, and then yearly for the next 10 years. After the first six months, the patient already showed full uneventful recovery and was in satisfactory mental and physical condition without complaints. There were no signs of reappearance of the fistula on the yearly duplex Doppler control studies, and the patient exhibited normal creatinine values and urine investigations. One year after the second operation, the patient started working again, and is still working as a truck driver without any restrictions.

DISCUSSION

Pathological communications (fistulas) between the abdominal aorta and the LRV (ALRVF) are extremely rare (1,2,8-10). In most cases, such fistulas are found as a complication of aortic aneurysms, mostly when the LRV is in an anomalous retroaortic position, which has been reported in 26 cases so far (8,11-16). The pathology is well described in the literature and is known as the 'abdominal pain, hematuria, silent left kidney' syndrome (8). This complication presents similarly to ruptured aortic aneurysm and indicates urgent investigation and intervention (8,11,12,15,16).

The other extremely rare cause of fistulas between the aorta and the LRV (only seven cases have been reported so far) is simultaneous trauma to both vessels. Penetrating abdominal trauma caused by gunshot injuries (1,4-6), knife stab wounds (3,7) or even a bicycle brake (2) have been reported. Post-traumatic ALRVF does not usually have a dramatic presentation, but has been reported to have an attenuated clinical picture (6,7,16). This may explain why the ALRVF was not recognized during the first operation or even several months later. This is not unusual, because similar delays in accurate diagnoses have been reported, ranging from seven days to 17 years (2,3,16). An important clinical sign, although rarely reported, was inexplicable tachycardia during bed rest in the young man, without the presence of cardiovascular disease. Another important sign was the systolic-diastolic murmur on the

abdominal wall just over the umbilicus (1-7). These signs were explained by the significant AV shunting through the fistulous opening from the aorta into the IVC, similar to pathological situations in congenital heart defects. This bruit alerts the surgeon to refer the patient for vascular imaging investigation (duplex Doppler, classic x-ray angiography, digital subtraction angiography, computed tomography angiography) as in our case (8,9,14-16). These investigations are of utmost importance for the diagnosis. Renal function is not appreciably impaired in post-traumatic ALRVF, in contrast with postaneurysm fistulas (close to normal creatinine level, microhematuria and/or microproteinuria only) (3,4,15). Other investigations, such as LRV saturation level detection, central venous pressure measurements and renal perfusion studies, are mostly oriented to scientific research calculations (3,4,15).

The operative closure of a traumatic ALRVF is considered mandatory (1-7). Some authors suggest total circulatory arrest and/or profound hypothermia during the procedure, but such techniques may only be necessary in cases with several AV fistulas coupled with an aortic aneurysm, or after unsuccessful repair of traumatic ALRVF (4,5). The thoracoabdominal approach gives sufficient access to the ALRVF, the abdominal aorta and the IVC, although total midline laparotomy may also be adequate. A fistulous LRV is easily identified in its anatomical position by its very large dimensions and palpable thrill (2,3,15). Proximal and distal blood control from the aorta is necessary, but it is also very important to control the venous bleeding from the IVC and LRV, which may be severe and even life-threatening, as it was in our case. In most cases, the dissection of the LRV, or even the IVC, may be dangerous or impossible, as in the case presented. In such a situation, manual, swab or pad compression over the LRV and IVC may help, in combination with massive blood transfusion and especially with rapid blood autotransfusion (2,15). Introducing the balloon catheter into the IVC may be helpful but was useless in

the case presented (1,4). After blood control is accomplished, the horizontal incision on the centre of the front wall of the enlarged LRV gave satisfactory access to the fistulous opening between the LRV rear wall and the front wall of the aorta. The closure of the fistula may be performed in one layer by an interrupted or continuous 3/0 suture, followed by similar closure of the front venous wall by a 5/0 continuous suture, after careful air evacuation (1-3,5). In some very complicated cases with several fistulas and/or aneurysm formation, ALRVF repair may be very difficult or even impossible, which may make ligation of the LRV unavoidable. This should be performed close to the IVC to save renal venous outflow via the gonadal and adrenal collateral venous pathways (1,3). Nephrectomy was necessary in only one case described by Brickman et al (5), while in all other patients the kidney and its function were kept intact, as in our case. The modern endovascular technique, advocated by some authors for risky patients with postaneurysm ALRVF (9,10), was not considered as a therapeutic option for post-traumatic ALRVF until now, possibly due to the simple and effective repair of healthy vessels in relatively young people. The appropriateness of the treatment strategy described above was confirmed by the operative results – the death rate following surgery of post-traumatic ALRVF is 0% up to now, compared with 14% in postaneurysm ALRVF cases (2).

CONCLUSION

Post-traumatic ALRVF is accompanied by hemodynamic disturbances, as in the presented case, and requires surgical repair. Careful planning of the intervention is important because the danger of substantial operative blood loss should be taken into consideration; a powerful autotransfusion device, an experienced team, etc, should be ready at the operating table. The extended follow-up confirmed the operative strategy as being appropriate, because the precise intervention benefitted the patient for an extremely long period of time.

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