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## Case Report

# Aortobifemoral prosthesis infection

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### ABSTRACT

**Introduction:** Vascular prosthesis infection constitutes one of the most serious complications in vascular surgery and is associated with a high risk of extremity amputation or death. Possibilities of conservative treatment are limited. The only radical procedure effecting the regression of inflammation is the removal of the infected prosthesis. This usually necessitates vascular reconstruction in the involved extremities. An ideal way to reconstruct blood flow in the lower extremities does not exist.

**Aim:** This work aimed at presenting possibilities for managing complications in a patient with an aortobifemoral prosthesis.

**Case study:** The described patient developed symptoms of intermittent claudication at the age of 38 years. When he was 39 years old he had a myocardial infarction, and afterwards problems concerning his lower extremities exacerbated. This necessitated the implantation of aortobifemoral prosthesis. After 5 years, the patient was operated on due to an anastomotic pseudoaneurysm in the left groin area, and then due to hemorrhage from the anastomotic pseudoaneurysm in the right groin area with symptoms of prosthesis infection. In January 2000, the infected prosthesis was removed surgically and a bypass polytetrafluoroethylene (PTFE) graft to both femoral arteries was implanted with a good result. In 2005, the patient was operated on due to a cerebral aneurysm.

**Results and discussion:** The bypass graft has been functional in the described patient for 11 years, despite progressive atherosclerosis, smoking, three surgeries due to a graft thrombosis and an anastomotic pseudoaneurysm.

**Conclusions:** Despite the enumerated complications and progressive atherosclerosis, the patient did not manage to give up his addiction (smoking). His case illustrates various difficulties in the course of treating an infected prosthesis, even when bacteria are very sensitive to antibiotics.

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## 1. Introduction

Vascular prosthesis infections are among the most serious complications in vascular surgery.<sup>12</sup> The current frequency of such complications as reported in literature ranges from 1.3% to 6.0%.<sup>13</sup> An increasing number of vascular surgeries involving grafting contributes to an increased number of patients with infected prostheses. The consequences of this complication can be very serious, with a mortality rate of 75%, depending on the type of complications caused by the infection.<sup>2</sup> One of the symptoms of prosthesis infection is the development of a purulent fistula in the groin accompanied with bleeding that can lead to a life-threatening hemorrhage.<sup>12</sup> When prosthesis infection is limited to the groin area, local surgeries such as graft coverage with a sartorius muscle flap<sup>4</sup> or resection of the infected part and replacing it with a silver impregnated vascular graft<sup>5</sup> and administration of bacteria-specific antibiotics can be effective.<sup>1,2,4,6</sup> However, massive infections of the prosthesis, especially accompanied with bleeding, require a complete removal of the infected prosthesis and vascular reconstruction in the extremities. Reconstructive vascular surgeries vary, depending on the available material.<sup>3,8,9,10</sup> In arterial reconstructive surgeries following a complete removal of the prosthesis both the synthetic materials, the patient's own veins and the allogenic material (arteries from organ donors) can be used.<sup>7,8,9,11</sup>

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## 2. Aim

This work aims at presenting possibilities for managing complications in a patient with an aortobifemoral prosthesis.

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## 3. Case study

A 38-year old patient, habitual smoker, reported to the Vascular Outpatient Clinic on 31 October 1989 due to intermittent claudication with the walking distance of approximately 50 m, associated with a bilateral iliac artery occlusion. He had been treated for arterial hypertension. In both groin areas the pulse was undetectable. Blood cholesterol was at a level of 200 mg%. Conservative treatment was introduced.

On 4 February 1990, the patient, aged 39 at that time, underwent a myocardial infarction with circulatory arrest. Following the infarction, the walking distance in intermittent claudication shortened. Conservative treatment was continued. Lower extremities ailments progressively exacerbated. At the end of 1993, rest pain in both lower extremities occurred. The patient was admitted to the Department of Surgery at the Provincial Specialist Hospital in Olsztyn on 17 December 1993 due to lower extremity ischemic rest pain. On admission the following parameters were recorded: blood pressure (BP) – 160/110 mmHg, electrocardiogram (ECG) – regular sinus rhythm of 118/min, QS syndrome in lead III and AVF complex, condition after an inferior myocardial infarction, blood type – 0 Rh(+); blood test results: WBC  $10.2 \times 10^9/L$ , RBC  $4.82 \times 10^9/L$ , HGB 15.7 g/dL, HCT 47.2%, PLT

$347 \times 10^9/L$ . Surgery was performed on 29 December 1993 and involved implantation of an albumin impregnated aortobifemoral graft. In the postoperative period, lymphorrhea from wounds in both groin areas occurred as well as purulence in the right groin wound and the abdominal wound. Bacterial cultures of the abdominal wound fluid revealed group D streptococci and of the right groin wound fluid single cocci *Micrococcus* species. The wound in the right groin required resuturing. The patient was discharged on 14 January 1994 to be further treated within the outpatient framework, with healed postoperative wounds and palpable pulsation of both feet arteries.

The patient was readmitted to hospital on 22 September 1999 due to pseudoaneurysms in both groins and a purulent fistula in the left groin area. He underwent the left-side pseudoaneurysm surgery: the purulent fistula was resected, pseudoaneurysm was operated on. Leakage from the anastomosis between the prosthesis and the femoral artery laterally into the pseudoaneurysm was observed. The anastomosis was repaired with a running suture. Surgical documentation contains no information concerning the prosthesis infection. A gentamicin-soaked sponge was inserted into the wound before its closure. A control ultrasonograph (USG) examination revealed a hypoechogenic area at the anastomosis between the prosthesis and the left femoral artery, no flow visible on color Doppler images. The patient was discharged on 8 October 1999, the wound healing by first intention, to be treated within the outpatient framework.

On 15 October 1999, the patient was admitted to the Department again due to partial wound dehiscence in the left groin with symptoms of approximate tissues infection, and massive lymphorrhea. Conservative treatment was administered. Bacterial cultures of the wound revealed *Staphylococcus aureus*, a methicillin-susceptible strain. He was discharged on 29 October 1999, with a minor wound purulence to be treated within the outpatient framework.

On 1 December 1999, he was admitted due to bleeding from a purulent fistula in the left groin. Traces of blood on the dressing had appeared 2 weeks before. Bacterial cultures of the purulent fistula fluid revealed *S. aureus*, a methicillin-susceptible strain. A USG examination performed on 3 December 1999 revealed no evident pathologies in the periaortic region and in the proximity of both external iliac arteries (within the range available in the examination); condition after the implantation of an aortobifemoral prosthesis. Initially the patient was treated conservatively and received a culture-specific antibiotic. On 10 December 1999 a surgical procedure was performed. The purulent fistula was managed surgically, the anastomosis between the prosthesis and the artery was exposed. No blood leakage through the anastomosis was detected. Blood was leaking via the prosthesis wall. The prosthesis was covered with granulation tissue. As far as possible, granulation tissue was removed. A granulation swab was taken to be cultured. A gentamicin-soaked sponge was placed over the prosthesis. Both the prosthesis and the anastomosis with the femoral artery were covered with a sartorius muscle flap. A Redon drainage catheter was inserted and the wound was sutured. Bacterial cultures of the granulation tissue from the area approximate to the prosthesis revealed *S. aureus*, a methicillin-susceptible

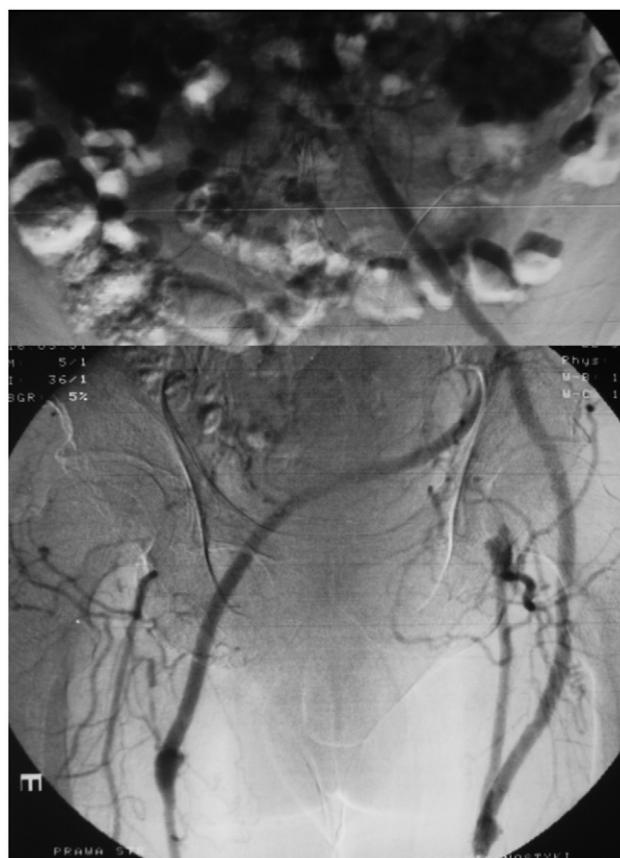
strain. The postoperative course was fever-free. Lower extremities were well supplied with blood. An insignificant postoperative wound exudation was observed. The patient was discharged on 24 December 1999.

On 13 January 2000, the patient was admitted due to bleeding from the purulent fistula above the pseudoaneurysm in the right groin. A compression dressing was placed. No bleeding was detected after the dressing removal. In the left groin area, an insignificant wound purulence, with no features of bleeding, was observed. Pulsation was palpable in both groins; skin warmth of both extremities was within the norm. Blood tests revealed: WBC  $14.5 \times 10^9/L$ , RBC  $3.55 \times 10^9/L$ , HGB 10.5 g/dL, HTC 31.2%, PLT  $234 \times 10^9/L$ , INR 2.9. Arterial BP was 120/80 mmHg. On 15 January 2000, hemorrhage from the right groin occurred. Emergency surgery was performed. Anastomotic dehiscence at a length of approximately 1 cm was detected. The right branch of the prosthesis was ligated. Retrograde bleeding from the femoral artery was controlled with vascular sutures. A swab was taken for culturing and susceptibility testing. Bacterial cultures revealed *S. aureus*, a methicillin-susceptible strain. It was susceptible to the following antibiotics: oxacillin, cephalosporin, gentamicin, netilmicin, tetracycline, erythromycin, clindamycin, quinolones, ciprofloxacin, nitrofurantoin, rifampicin, vancomycin, ampicillin/sulbactam. It was resistant to penicillin. A gentamicin-soaked sponge was inserted into the wound, and a drain into the canal along the prosthesis branch. Interrupted sutures were applied to the wound. The patient received antibiotics consistent with the susceptibility of the cultured bacteria. Postoperatively progressive symptoms of the right lower extremity ischemia developed. The patient was prepared for the surgical removal of the prosthesis and vascular reconstruction in the lower extremities.

The removal of the infected prosthesis was performed on 17 January 2000. The involved aorta was sutured with single vascular sutures. The mesenteric foramen was sutured and omentorrhaphy was applied. Drains were inserted into the canals remaining after prosthesis removal beginning with the groin areas. The aorta below the renal arteries branching-off and above the infection site was exposed. On the left side, in the retroperitoneal space, beyond the infection site, a canal was created running below the inguinal ligament, laterally to the infection site to the adductor canal on the thigh. The skin was cut over the adductor canal on the thigh, below the infected wound in the left groin. The femoral artery below the deep femoral artery branching-off was exposed. A polytetrafluoroethylene (PTFE) graft, 8 mm in diameter, was placed in the created canal and sutured to the side of the aorta below the renal arteries. Above the level of the left inguinal ligament, a PTFE graft, 8 mm in diameter, was sutured end-to-side to the prosthesis. A retroperitoneal canal was created above the level of the inguinal ligament to the right side, above the pubic symphysis, and the prosthesis was traversed to the right thigh, medially from the infected wound. The right femoral artery was exposed below the infected wound in the adductor canal and the prosthesis was anastomosed end-to-side with the femoral artery. Bypass anastomosis between the prosthesis and the left femoral artery was also end-to-side. The outflow of blood was retained bilaterally. The surgical wounds were sutured and drained with the use

of the Redon method. The sutures were loosely tied over purulent wounds in both groin areas. Obtained blood supply to the lower extremities was satisfactory. The postoperative period was fever-free, a culture-specific antibiotic was administered. The postoperative wounds healed by first intention. Wounds in the groin areas healed by granulation. A control angiography is presented in Fig. 1. The patient was discharged on 11 February 2000 to continue treatment within the outpatient framework. A follow-up examination was performed in the Vascular Outpatient Clinic on 18 February 2000. Both lower extremities were well supplied with blood. The postoperative wounds were completely healed. Wounds in the groin areas from the previous surgeries were also healed. Right foot drop was observed. Another follow-up examination was performed in the Vascular Outpatient Clinic on 12 May 2000. Wounds in the groin areas were completely healed, with no signs of infection; blood supply to the lower extremities was good.

The patient was next hospitalized at the Department of Vascular Surgery between 31 January and 16 February 2005 due to stage IV ischemia of the lower extremity with necrosis of the 5th toe of the right foot. A digital subtraction angiography (DSA), performed on 5 February 2005, revealed patent aorta within the visible section with a prosthesis sutured on the



**Fig. 1 – Arterography of the alloplast graft after the removal of the infected prosthesis. Prosthesis anastomosed with the aorta below the renal arteries; suprapubic vascular graft sutured to the side of the prosthesis and traversed retroperitoneally to the right side; bypass anastomosis between the grafts and the superficial femoral arteries.**

left side in its distal part. The prosthesis was patent; its distal section was anastomosed with the left femoral artery in its central part; the femoral artery was patent; the anastomosis was aneurismal, dilated to 25 mm. The central part of the left popliteal artery was occluded. Suprapubic bypass was also occluded; the right femoral artery was atherosclerotic and filling in sections. The right popliteal artery was occluded, along with the site of its segmentation. The patient was operated on 7 February 2005. The surgery involved the restoration of suprapubic bypass patency, restoration of the right femoral artery patency above the anastomosis, transposition of the suprapubic bypass from the superficial femoral artery to the level of the deep femoral artery branching-off. Following the surgery, blood supply to the lower extremities was good. Bacterial cultures of the wound in the right groin were aseptic both in the aerobic and anaerobic conditions. The postoperative wounds healed by first intention.

The patient was hospitalized at the Department of Neurosurgery between 5 and 23 August 2005 due to subarachnoid hemorrhage. An anterior communicating artery aneurysm was diagnosed. Surgery was performed on 12 August 2005 and involved the clipping of the anterior communicating artery aneurysm. The patient was discharged with a completely healed postoperative wound and no neurological defects.

The patient was hospitalized at the Department of Vascular Surgery between 1 and 7 October 2006 due to acute left lower extremity ischemia. He continues to smoke cigarettes (one package a day). The pulse was undetectable in the lower extremities. The left foot was ischemic, with limited active movements and hypesthesia. The right lower extremity presented a normal skin warmth and condition after the amputation of the 5th toe. DSA was performed on 1 October 2006 and revealed: patent aorta approximately 5 cm below the renal arteries branching-off. The prosthesis was patent to the branching-off of the suprapubic graft, which was also patent. Below, the prosthesis was occluded. The left femoral artery was not visualized. On the right side, the deep femoral artery was visualized. Emergency surgery was performed on 1 October 2006 and involved a clotted aneurysm in the anastomosis between the prosthesis and the left femoral artery. The thrombus was removed from both the prosthesis and the femoral artery with the use of a Fogarty catheter. The anastomosis between the prosthesis and the femoral artery was reconstructed. Following the surgery, blood supply to both lower extremities was satisfactory.

The patient was readmitted on 26 November 2006 due to an acute ischemia of the left foot that had lasted for a few hours. The left foot was cold with limited mobility. The pulse was undetectable in both groin areas. After DSA, surgery was performed on 26 November 2006, and involved thrombectomy of the vascular bypass and the left femoral artery. A good inflow and satisfactory outflow were achieved. The anastomosis between the prosthesis and the femoral artery was reconstructed with Vascular-Patch. The postoperative period was complication-free. A control DSA was performed on 4 December 2006 and revealed left-side aortofemoral bypass correctly patent; patent suprapubic bypass; patent right deep femoral artery; occluded right superficial femoral artery and right popliteal artery. Tibial arteries were filled via peripheral

circulation. On the left side, the peripheral part of the femoral artery was occluded as well as the popliteal artery. Within the shank, tibial arteries were visualized. The patient was discharged on 4 December 2006, with the postoperative wound healing by first intention.

He was readmitted to the Department of Vascular Surgery on 28 February 2011 due to an anastomotic pseudoaneurysm on the left side. The aneurysm had grown for 2 years. The patient had a history of hypertension treatment. He did not report any cardiac problems. Computed tomography angiography of the lower extremities, performed on 2 March 2011 (Fig. 2), revealed aorta with uneven contours, not dilated, with small parietal circular thrombus.

Left-side aortofemoral prosthesis was patent. At the anastomosis site between the prosthesis and the left femoral artery there was an aneurysm, approximately 3 cm in diameter. Below the aneurysm, the femoral artery was atherosclerotic. The popliteal artery was occluded. Narrow tibial arteries filled via peripheral circulation. The fibular artery was occluded. The suprapubic bypass was patent and connected to the right deep femoral artery. The superficial femoral artery and the popliteal arteries were occluded. Within the shank, both tibial arteries were visualized and atherosclerotic. Blood tests revealed the following: WBC  $12.89 \times 10^9/L$ , RBC  $5.69 \times 10^9/L$ , HGB 18.0 g/dL, HTC 53.0%, PLT  $250 \times 10^9/L$ . On 3 March 2011, the pseudoaneurysm was



**Fig. 2 – Angiotomography scan after 11 years since the removal of the infected prosthesis. Pseudoaneurysm in the anastomosis between the prosthesis and the left superficial femoral artery.**

operated; a PTFE graft of 6 mm in diameter and a length of about 10 cm was implanted. Bacterial cultures of the thrombus were aseptic both in the aerobic and anaerobic conditions. After the surgery, blood supply to the extremities did not worsen. The patient was discharged on 7 March 2011, with the postoperative wound healing by first intention, to be further treated within the outpatient framework. The follow-up examination was performed in the Vascular Outpatient Clinic on 15 March 2011. The postoperative wound on the left thigh was healed; sutures were removed, skin warmth was within the norm.

#### 4. Results and discussion

This case report is presented because of the patient's young age at which he developed lower extremities problems in the form of intermittent claudication and because of the effective management of the bifurcated prosthesis infection. The patient is a habitual smoker. Despite the enumerated complications and progressive atherosclerosis, he did not manage to give up his addiction. His case also illustrates various difficulties in the course of treating an infected prosthesis, even when the bacteria are very sensitive to antibiotics. After the first surgery, lymphorrhea and wound purulence in the groin areas occurred. Once the wounds were healed, no clinical symptoms of infection were observed. After 5 years, there appeared the symptoms of a purulent fistula within the area of the pseudoaneurysm in the left groin. Attempts at sparing treatment were unsuccessful. After a few months, symptoms of the prosthesis infection in the right groin developed, accompanied with a purulent fistula and wound bleeding.<sup>1,2,3,4,5,6,7,8,9,10,11,12,13,14</sup>

#### 5. Conclusions

The removal of the infected prosthesis and the implantation of the PTFE bypass graft from the aorta to both femoral arteries, placed beyond the infected area, resulted in the elimination of the infection and the healing of the new prosthesis. A follow-up observation period of 11 years allows for a positive assessment of the applied treatment.

#### Conflict of interest

None declared.

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