

Interval gangrene complicating superficial femoral artery stent placement

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Interval gangrene—necrosis of tissue proximal to a successful distal revascularization procedure—is an exceedingly rare complication. To date, only nine cases have been reported in the literature, and all were secondary to traditional open bypass procedures. We report the first case, to our knowledge, of interval gangrene after endovascular stent placement in the superficial femoral artery. We believe that with the increasing utilization of endovascular techniques to treat limb ischemia, the serious complication of interval gangrene must be revisited. Assessment of collateral circulation, precise stent placement, and the appropriate choice of stents and stent grafts will become increasingly important as more and more of these lesions are treated with endovascular techniques. (*J Vasc Surg* 2005;42:564-6.)

Before endovascular modalities for arterial revascularization, the mainstay of surgical treatment for lower limb ischemia had been amputation or bypass grafting. Interval gangrene, a rare occurrence where tissue necrosis and gangrene occur proximal to a viable distal anastomosis, has only been reported five other times in the literature (nine cases).¹⁻⁵ Each of these cases occurred after successful distal bypass grafting confirmed by palpable pulses in the distal extremity. We report the first case, to our knowledge, of interval gangrene occurring after endovascular stent placement for the treatment of lower limb ischemia.

CASE REPORT

We present a case of a 67-year-old woman with diabetes mellitus who had undergone four angioplasty/stent placements over the last 2 years for treatment of right lower extremity rest pain. The most recent stent placement, 7 weeks before presentation, was complicated by the development of a right thigh ulcer with pain.

After systemic heparin anticoagulation, a superficial femoral artery (SFA) stent was placed under duplex ultrasound guidance. At that time, ultrasonography confirmed patency of the profunda femoris artery. The patient was discharged on aspirin and Plavix (Bristol-Myers Squibb, New York, NY).

Seven weeks later, the patient was found to have a 15- × 10-cm right lateral thigh eschar (Fig 1) and a 5- × 5-cm medial thigh eschar. The patient was transferred to our hospital at that time for further management. Upon presentation, patient was found to have resting leg pain. A pulse exam revealed strong palpable femoral artery pulses bilaterally, triphasic Dopplerable popliteal and dorsalis pedis artery pulses bilaterally, and a biphasic Dopplerable posterior tibial artery. An arterial duplex scan revealed

right SFA stents and patent distal runoff vessels. The ankle-brachial index on the right was 0.64. The patient was subsequently taken to the operating room for diagnostic angiography and wound débridement.

Intraoperatively, the patient was found to have three stents in the superficial femoral artery, with an occluded profunda femoris artery (Fig 2). A significant portion of the proximal SFA showed evidence of stenting. There were no angiographically visible vessels supplying the mid thigh. A large collateral artery was noted proximally, which did not supply flow to the area of necrosis. A stent partially obscured the origin of this artery. Delayed images of the thigh failed to reveal a patent distal profunda femoris artery that would be suitable for any future revascularization options. The SFA was widely patent, with a single vessel runoff to the foot. No endovascular intervention was attempted at this time.

Exploration of the right thigh lesion revealed extensive necrosis of the vastus lateralis and its overlying fascia (Fig 3). The area was débrided until viable muscle was encountered. Exploration of the right medial thigh eschar revealed underlying viable tissue. The patient subsequently underwent a split thickness skin graft to both areas and is healing well.

DISCUSSION

Interval gangrene after direct vascular bypass grafting is an extremely rare complication of limb revascularization. To our knowledge, only nine cases have been reported in literature.¹⁻⁵ Of the nine previous reported cases of interval gangrene after open bypass grafting, five patients required amputations that were more proximal than would have been necessary if the bypass had not been performed, two required microvascular free-flaps, and two required additional bypasses. Each of these authors concluded that in performing vascular bypasses, one should be mindful of the impact of the procedure on the proximal areas of circulation and not just the viability of the distal anastomosis.

Our patient had gangrene of the lateral aspect of the thigh supplied by the lateral circumflex femoral artery, a branch of the profunda femoris that a diagnostic angiogram showed was occluded. The profunda femoris was patent before the most recent stent placement. It is likely that the

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Competition of interest: none.

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Fig 1. Photograph demonstrating 15- × 10-cm eschar on the lateral aspect of the patient's right thigh.

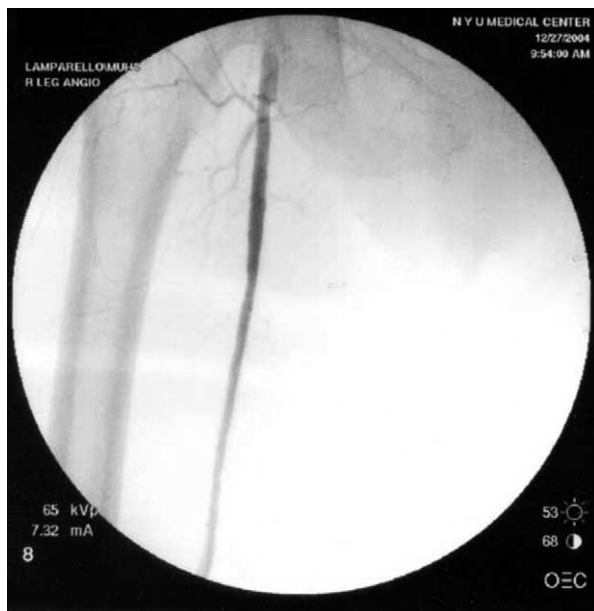


Fig 2. Intraoperative angiogram of the right extremity depicting several stents in the superficial femoral artery. The profunda femoris artery is occluded. There are no angiographically visible vessels supplying the area of necrosis, the lateral right thigh.

most recent endovascular SFA stent placement inadvertently caused the occlusion of the profunda or resulted in dislodgement of atheroembolic material occluding a supplying branch of the lateral thigh. This resulted in necrosis of the vastus lateralis. The continued viability of the vastus medialis was likely due to retrograde perfusion from the

superior medial geniculate branch of the popliteal artery from the still-patent superficial femoral artery. The importance of the geniculate collaterals in maintaining vastus medialis viability in the setting of interval gangrene has been outlined by other authors.^{1,3} Additional collateral circulation circuits arising from the hypogastric arteries may also exist in this patient.

There is great interest in the utilization of stenting in the treatment of SFA disease.⁶ However, long term patency rates for SFA stents, though promising, still lag behind that of traditional bypass surgery.⁷ The proposed mechanism of the high restenosis rate is neointimal buildup through the struts of the stent. Newer technologies such as polytetrafluoroethylene (PTFE) coated stents and prophylactic radiotherapy are being developed to combat this problem.^{8,9}

With these newer stents, the possibility exists for additional complications. Our case illustrates the potential complication of interval gangrene associated with SFA stent placement. It is conceivable that with increased SFA stent deployment and the use of covered stents, clinicians will encounter this rare complication more frequently. Amid the increased interest in endovascular techniques to treat post inguinal stenosis and occlusion, one must be wary not only of the consequences to the distal target circulation but also to the collateral flow in the area of stent deployment.

Before transferring to our facility, the patient had undergone stent placement under ultrasound guidance. Although patency of the profunda femoris was confirmed by an ultrasonography report at that time, there is a possibility that the entire artery (specifically the more proximal portion) and its branches may have not been visualized adequately in the study. A major disadvantage of sonographically as opposed to angiographically placed stents is the

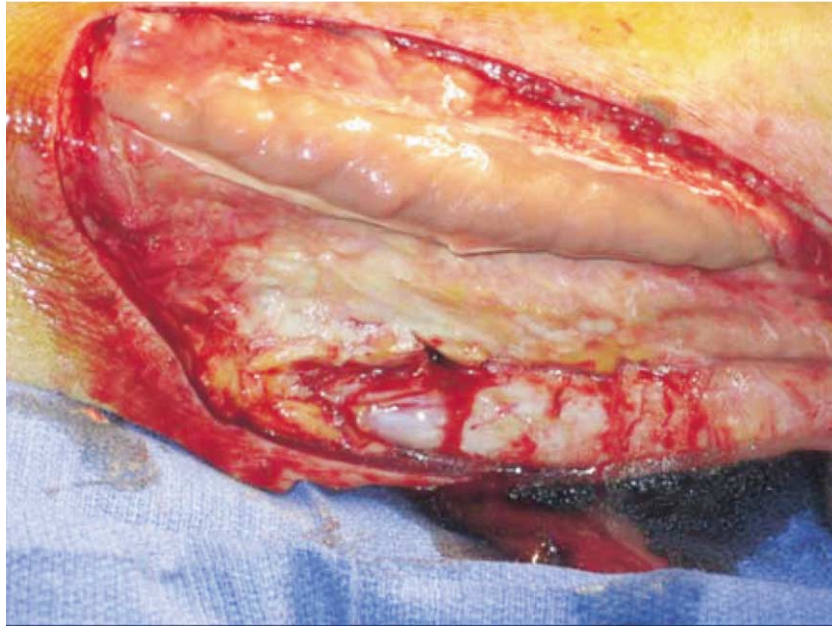


Fig 3. Intraoperative photograph showing the lateral thigh wound with overlying eschar débrided off. The vastus lateralis is devitalized and has undergone liquefaction.

inability to confirm with confidence the effect of the intervention to the entire arterial tree. This complication underscores the importance of performing a completion angiogram after endovascular interventions.

CONCLUSION

We believe that with the increasing utilization of endovascular techniques to treat limb ischemia, the serious complication of interval gangrene must be revisited. Fortunately, endovascular procedures allow for complete angiograms to be done at the time of the intervention. It is important to completely access the arterial flow to both the distal segment and proximal collateral flow. Additionally, the choice of the type of stent and placement is important especially in the infrainguinal region.

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