

Case report

A Case of Above Knee Amputation with Preoperative High Risks

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Abstract

An 85-year-old malnourished man was admitted with ischemia-induced necrosis of the right leg and high-risk factors, including chronic obstructive pulmonary disease, pneumonia, and infection of the necrotic leg. We controlled the infection and provided proper nutrition. Using light general anesthesia and a nerve block, we amputated the leg above the knee. The patient could eat and drink the same day following the surgery, and respiratory rehabilitation was begun the next day. His postoperative course was uneventful. Our case suggests that maintenance of good nutrition may play a key role for high-risk elders undergoing leg amputation.

Key words : leg, amputation, elder, risk, nutrition

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Introduction

Major lower extremity amputations are associated with considerable morbidity and mortality¹⁾. Most older patients who lose a leg have vascular problems commonly associated with systemic arterial sclerosis or diabetes mellitus (DM), and most have ischemic heart disease, stroke, or renal failure due to their basic disease^{1–3)}. In addition, they may have leg ischemia, chronic obstructive pulmonary disease, or infection of an ischemic ulcer of the leg¹⁾.

We performed an above-knee amputation on an 85-year-old man who had an ischemic right leg with necrosis to the ankle. He had chronic obstructive pulmonary disease (COPD) and pneumonia and was poorly nourished and emaciated. Based on previous reports^{1, 2)}, we expected serious complications and possibly death. Because we were

concerned that poor nutrition might mediate pneumonia and infection of the wound, we made a great effort to provide good nutrition, and we obtained a good result.

Case Report

An 85-year-old malnourished man with necrosis of the right leg due to arteriosclerosis bliterans was admitted to our affiliated hospital. He had pneumonia with a fever of 38.8°C, and the necrotic leg was infected. We administered antibiotics for his pneumonia and diclofenac sodium for his leg pain, keeping the wound clean. We provided parenteral nutrition and started respiratory rehabilitation. After 8 days, he began to eat by himself and gradually became better nourished. His body temperature became normal, and his C-reactive protein, 14.1 mg/dl on admission, was 5.21 mg/dl just before the surgery (Figure 1). His necrotic leg became aseptic after 42 days, and he was transferred to our hospital for leg amputation.

Considering his COPD and stiff knee joints and that he had used a wheel chair in a previous hospital, we set his rehabilitation goal based on wheelchair life. His superficial femoral artery was obstructed, but his deep femoral artery was patent. Since we did not need to consider rehabilitation with an artificial leg, we decided to amputate his leg quite proximal to the hip, 10 cm below the groin (Figure 2). We administered β -blockers prior to the surgery⁴⁾. We use mepivacaine hydrochloride (patient's body weight 47 kg; 1 mg/kg) to block the femoral (0.15 mg), sciatic (0.25 mg), and obturator (0.1 mg) nerves. The anesthesiologist injected 200 μ g fentanyl intravenously, used a laryngeal mask airway, and maintained anesthesia with continuous infusion of a low dose (50–500 g/kg/h) of ketamine⁵⁾. Spontaneous respiration was maintained. The operation time was 70 min, and only 80 ml of blood was lost.

The patient awakened quickly after the anesthesia was stopped and did not complain of wound pain. He showed

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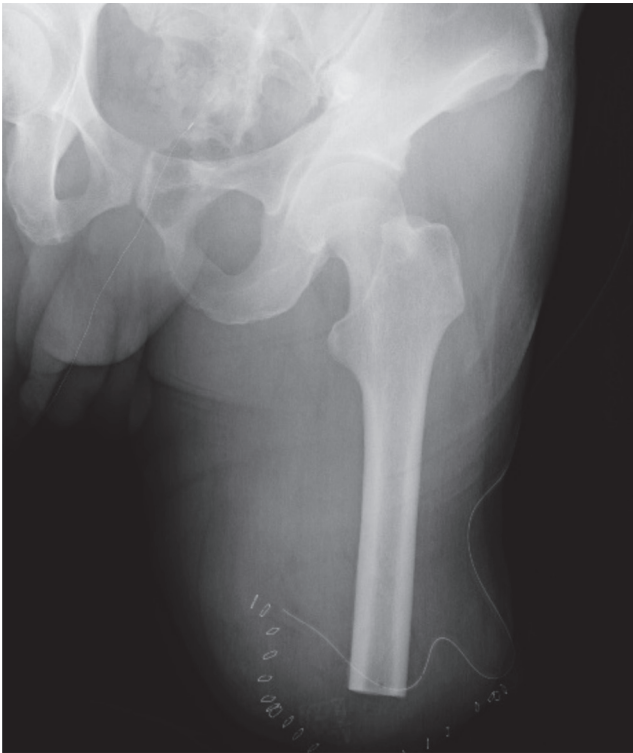


Figure 1 X-ray showing transfemoral amputation level.

a good appetite, eating a full evening meal. He started respiratory rehabilitation the next day, and his β -blocker dose was gradually increased until his heart rate came down to < 80 /min. His wound healed well. The skin staples were removed on day 14, and the drainage tube was removed on day 15. He showed good recovery, and 27 days after the surgery, he moved to his previous hospital for further rehabilitation of his stiff left knee joint. He was still doing well 9 months after the surgery.

Discussion

Most patients who require leg amputation for ischemic necrosis have atherosclerotic arteries in their heart, brain, or kidney, and infection of the necrotic leg is also common^{2, 6}. We believe that the health and quality of life of such patients can be helped most with rapid, minimally intrusive surgery that need not include the participation of an orthopedic team. What is important is control of the leg infection, good nutrition⁷, prevention of complications such as heart or renal failure, and stabilization of circulation to the brain^{2, 6}.

When the invasiveness of surgery and anesthesia are minimized, patients can eat as soon as they regain consciousness, and good nutrition increases the likelihood of an uneventful postoperative course⁷. To reduce surgical

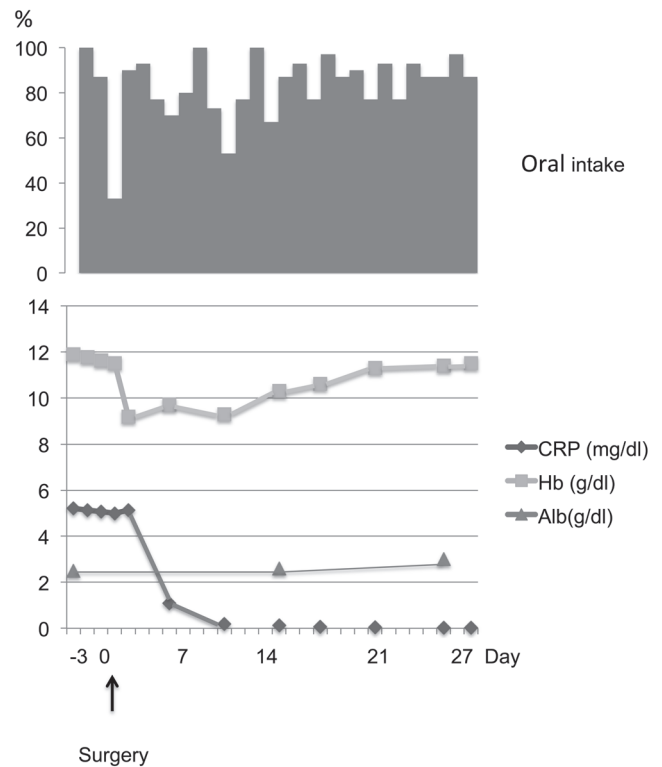


Figure 2 Upper panel shows patient's % intake of 1700 cal/day diet according to number of days after surgery. Lower panel shows serum concentration of C-reactive protein (CRP), hemoglobin (Hb), and albumin (Alb) according to number of days after surgery.

invasiveness, we operated as promptly and rapidly as we could, and we avoided unnecessary blood loss. The patient was taking both anticoagulation and antiplatelet agents, but in the interest of expediency, we did not take the time to convert to intravenous heparin, which is traditionally used for this type of surgery. While proximal thigh amputation (Figure 2) allows for good blood supply through the deep femoral artery, we had to cut a larger amount of muscle in the proximal region than in the distal region, and we used anticoagulation/antiplatelet agents. The operation time of 70 min was a little longer than described by others^{1, 2}, but the amount of bleeding during surgery was only 80 ml. To reduce anesthesia invasiveness, we decided on a nerve block instead of lumbar or epidural anesthesia so as to prevent spinal nerve hematoma. For an additional analgesic effect, the anesthetic team used continuous infusion of a low dose ketamine⁵. Ketamine, originally developed as a general anesthetic, is now seldom employed in wealthy countries due to the relatively high risk of adverse psychotomimetic effects. Low-dose regimens, though, in the range of 0.25–0.5 mg/kg as an initial bolus followed by 50–500 μ g/kg/h, have

been used as an adjuvant for postoperative analgesia and for reduction of exogenous opioid-induced hyperalgesia⁵). In our case, instead of an initial bolus of ketamine, we administered 200 µg of fentanyl. Considering the patient's COPD, fentanyl and ketamine are both good choices, and adjustment of the ketamine infusion rate allowed the patient to maintain spontaneous breathing, which precludes the need for a ventilator after surgery⁵). The concomitant use of a nerve block and low-dose ketamine provided adequate analgesia and enabled the patient to awaken quickly after the surgery.

Good nutrition is important for surgical patients⁷). Malnutrition may cause a delay in wound healing⁷), reoperation, or aspiration pneumonia, contributing to a poor prognosis⁹). Regarding good nutrition, we learned from our patient that reduction of the invasiveness both of surgery and anesthesia plays a crucial role. Total care is important. We examined the patient on admission for complications of atherosclerosis, such as ischemic heart disease, and examined his renal function and cerebral circulation. His renal function was normal, and he did not have DM, but he had a complete atrioventricular block from a myocardial infarction sustained 8 years earlier; an implanted pacemaker enabled a stable heart rhythm and good left ventricular function. Most cases, including this one, require an anticoagulant or antiplatelet agent to protect against stroke and myocardial infarction. In the presence of DM, a high blood sugar level should be corrected if necessary. Appropriate antibiotics and respiratory rehabilitation are quite effective for pneumonia, often complicated, as in our case. Irrigation and debridement of the wound are effective, and antibiotics might be helpful. We achieved wound asepsis, resolved all complications, established good nutrition, and then operated on the patient. This timing was important. After the surgery, the patient maintained a good appetite, eating and drinking by evening. To correct the dehydration caused by fasting during surgery, a drip (1000 ml/day) was administered for one day. The patient was line-free except for a vacuum-assisted

drainage tube anchored inside the wound, and we recommenced respiratory rehabilitation. The drainage tube was left until day 15 with no problems. He maintained a good appetite throughout his stay, and his albumin and hemoglobin levels reflected good nutrition (Figure 1)⁷).

Our case suggests that minimally invasive surgery and anesthesia can help maintain good nutrition and lead to a satisfactory postoperative course for elderly patients with ischemic leg necrosis.

References

1. Ploeg AJ, Lardenoye JW, Vrancken Peeters MPFM, *et al.* Contemporary series of morbidity and mortality after lower limb amputation. *Eur J Vasc Endovasc Surg* 2005; 29: 633–637. [\[Medline\]](#) [\[CrossRef\]](#)
2. Henke PK. Contemporary management of acute limb ischemia: factors associated with amputation and in-hospital mortality. *Semin Vasc Surg* 2009; 22: 34–40. [\[Medline\]](#) [\[CrossRef\]](#)
3. Rajamani K, Colman PG, Li LP, Best JD, *et al.* Effect of fenofibrate on amputation events in people with type 2 diabetes mellitus (FIELD study): a prespecified analysis of a randomised controlled trial. *Lancet* 2009; 373: 1780–1788. [\[Medline\]](#) [\[CrossRef\]](#)
4. Bouri S, Shun-Shin MJ, Cole GD, *et al.* Meta-analysis of secure randomised controlled trials of β -blockade to prevent perioperative death in non-cardiac surgery. *Heart* 2014; 100: 456–464. [\[Medline\]](#) [\[CrossRef\]](#)
5. Berti M, Baciarello M, Troglia R, *et al.* Clinical uses of low-dose ketamine in patients undergoing surgery. *Curr Drug Targets* 2009; 10: 707–715. [\[Medline\]](#) [\[CrossRef\]](#)
6. Lázaro-Martínez JL, Aragón-Sánchez J, García-Morales E. Antibiotics versus conservative surgery for treating diabetic foot osteomyelitis: a randomized comparative trial. *Diabetes Care* 2014; 37: 789–795. [\[Medline\]](#) [\[CrossRef\]](#)
7. de Aguilar-Nascimento JE, Bicudo-Salomao A, Portari-Filho PE. Optimal timing for the initiation of enteral and parenteral nutrition in critical medical and surgical conditions. *Nutrition* 2012; 28: 840–843. [\[Medline\]](#) [\[CrossRef\]](#)