

14 Three Tricks for Microvascular Fibular Grafting of Osteonecrosis of the Femoral Head

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14.1 Introduction	116
14.2 Endoscopically Assisted Removal of the Necrotic Bone	117
14.3 Modified Approach and Donor Vessels	117
14.4 Shaping of the Fibula	118
14.5 Conclusions	118
References	118

14.1 Introduction

In our practice we have performed microvascular fibular grafting for osteonecrosis of the femoral head since 1996. Our indications for the procedure are a symptomatic hip with grade I–II disease and age less than 50 years [3]. In patients younger than 40 years, grade III disease is also considered an indication for microvascular reconstruction. We have followed the technique described by Urbaniak in 1995 [3]. This technique was described in detail again in 2004 [1]. In our practice we

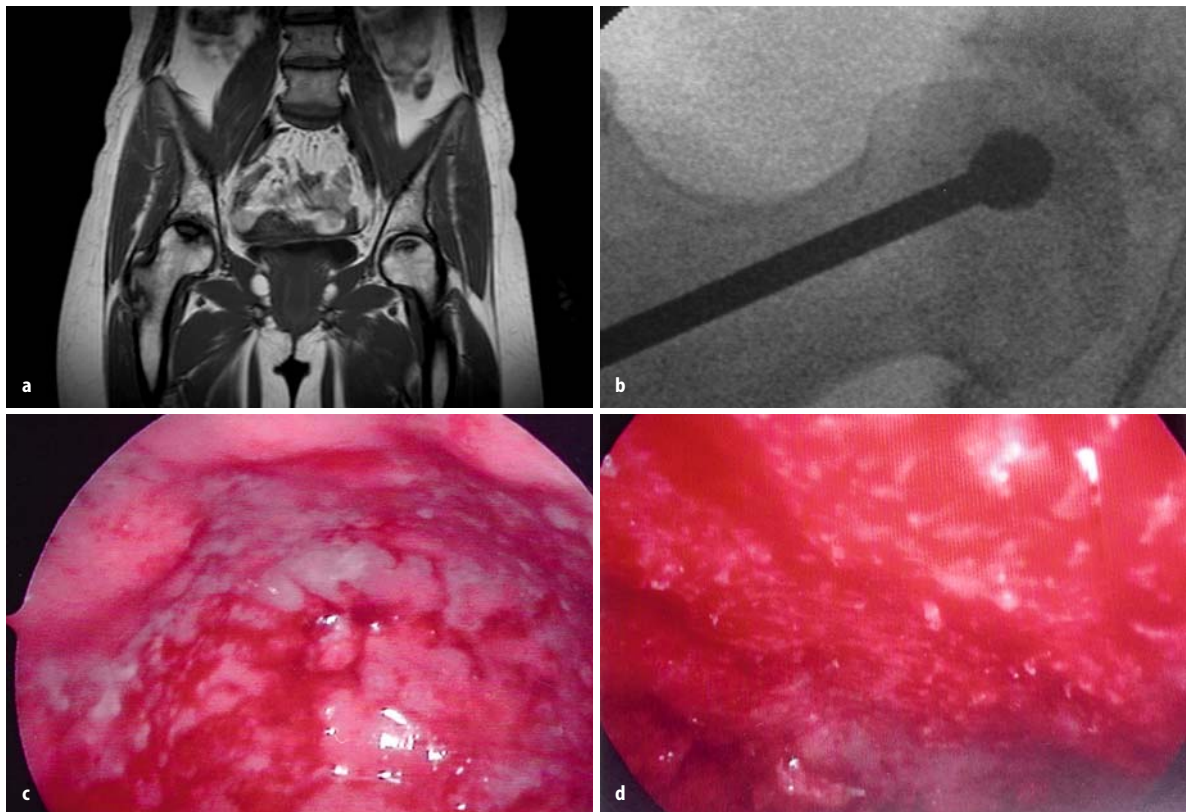


Fig. 14.1. **a** Femoral head necrosis, grade II on the right side and grade I on the left side, in a 20-year-old woman after massive corticosteroid treatment. The symptomatic right hip was operated on. **b** Peroperative X-ray to control the removal of the necrotic bone. **c** Primary peroperative endoscopy through the drill hole. White necrotic bone is seen on top of the drill hole. **d** Endoscopic view after removing the dead bone. Bleeding bone is seen over all the defect

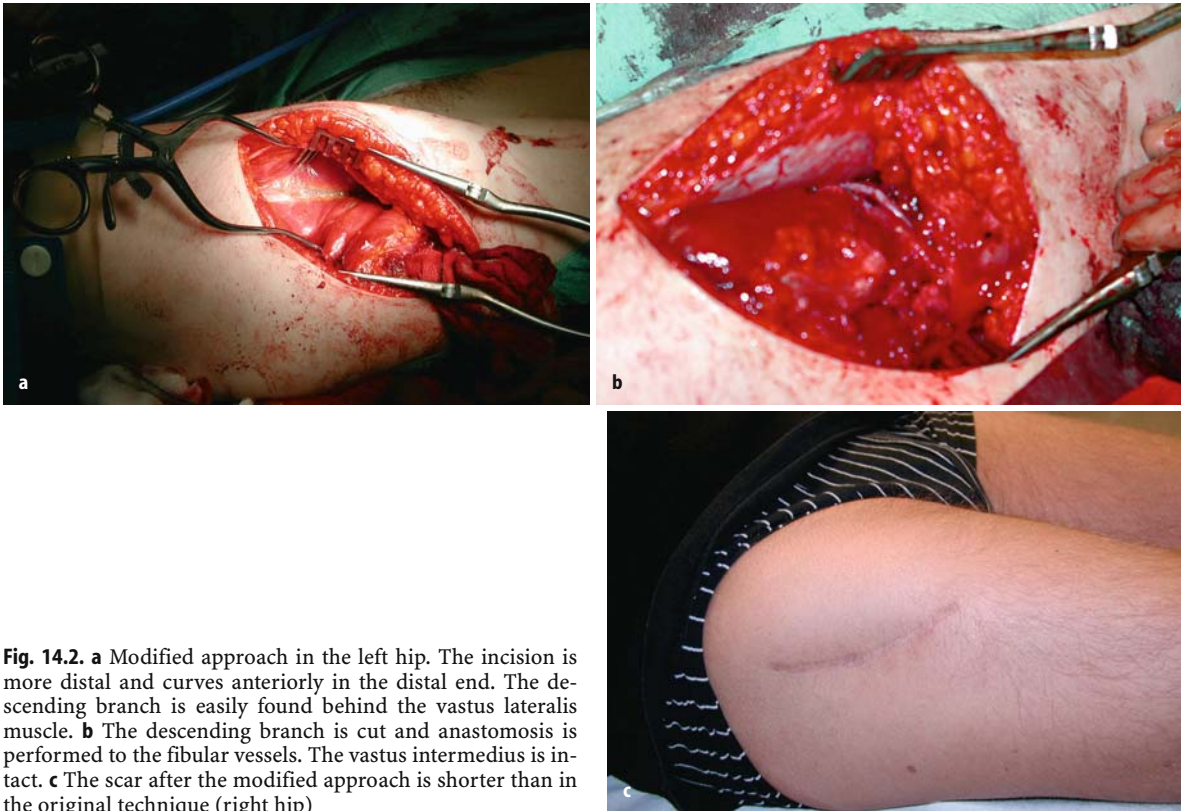


Fig. 14.2. **a** Modified approach in the left hip. The incision is more distal and curves anteriorly in the distal end. The descending branch is easily found behind the vastus lateralis muscle. **b** The descending branch is cut and anastomosis is performed to the fibular vessels. The vastus intermedius is intact. **c** The scar after the modified approach is shorter than in the original technique (right hip)

have developed some modifications to the basic technique which we find to be helpful for the operation. The modifications are described in detail in this article.

14.2 Endoscopically Assisted Removal of the Necrotic Bone

Primarily we remove the necrotic bone under peroperative X-ray control. The MRI images are used as a map in order to localize the dead bone (Fig. 14.1a). However, there has been some uncertainty as to whether all the dead bone is removed properly. This is because the disease itself is not visible on the plain radiographs (Fig. 14.1b). Different techniques such as computer assisted drilling or contrast medium imaging of the defect have been suggested to make the removal of the diseased bone more reliable [1, 2].

In order to make sure that a healthy level of bone is reached, we decided to try endoscopic visualization inside the drill hole. This method is easy with a long straight scope planned for hip arthroscopies. With the endoscope the necrotic bone can be seen from inside the femoral head (Fig. 14.1c). Sufficient removal of the dead bone can be confirmed by the endoscope when the bleeding level of bone is reached (Fig. 14.1d).

14.3 Modified Approach and Donor Vessels

In the original method the ascending branch of the lateral femoral circumflex artery and the concomitant veins are used as donor vessels for microvascular anastomosis. However, these vessels can occasionally be quite small. In addition, when using the ascending branch, cutting of the vastus intermedius muscle is needed to be able to reach the fibular vessels without tension [1].

After getting used to the anterior lateral thigh flap and its pedicle, the descending branch of the same origin, we tried using it as a donor vessel in femoral head reconstruction (Fig. 14.2a, b). The artery of the descending branch and its concomitant vein are normally nearly the same size as the fibular vessels. In addition, we have found harvesting of the descending branch easier. If the descending branch is used, the incision of the skin is done more distally than in the original technique and it can be shorter (Fig. 14.2c). Cutting of the intermedius muscle is not normally needed when the descending branch is used.

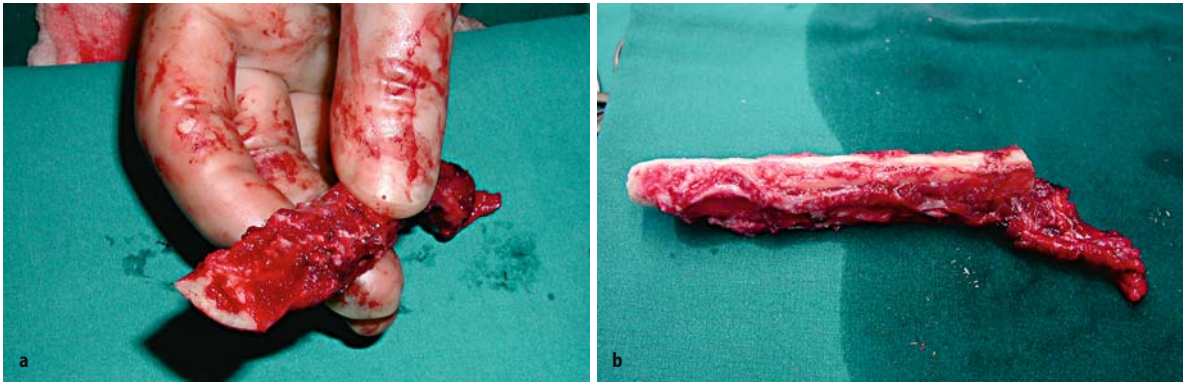


Fig. 14.3. **a** The natural shape of the distal tip of the fibular graft. **b** The anterior edge of the fibula is removed to make the diameter smaller

14.4 Shaping of the Fibula

The shape of the fibula is not perfect for filling a defect in the femoral head. Sometimes the cut distal tip of the fibula can be quite flat (Fig. 14.3a). A 21-mm reamer is used in the original technique in the femur for a larger fibula. The larger the hole in the lateral cortex, the bigger the risk of a subtrochanteric fracture.

In microvascular reconstruction of the mandible, we have found that even several osteotomies can be made to the fibula without compromising the circulation of the bone. With that experience in mind we started to shape the fibula to make the circumference smaller needed for reaming of the femur. A periosteal incision is made to the anterior edge of the fibula opposite the vascular pedicle. The edge is subperiosteally exposed and a few millimetres is removed with a high frequency round tip burr (Fig. 14.3b). By this method the size of the fenestration in the femoral cortex can be reduced. However, the size of the hole has to be large enough to provide sufficient space for the vascular pedicle. At the end of the operation the bleeding of the grafted fibula is checked to make sure that the pedicle is not in compression.

14.5 Conclusions

In our hands endoscopy of the femoral head makes the operation a little longer but makes the procedure more accurate. The equipment needed for the endoscopy is available in all orthopaedic units and does not produce any extra costs. We feel that using the descending branch as a donor vessel makes the operation faster and less traumatic for the patient. Shaping of the fibula adds to the operation time but minimizes the risk of an iatrogenic fracture of the femur.

References

1. Aldridge J, Berend K, Gunneson E, Urbaniak J (2004) Free vascularized fibular grafting for the treatment of postcollapse osteonecrosis of the femoral head. *Surgical technique. J Bone Joint Surg Am* 86 [Suppl 1]:87–101
2. Beckmann J, Goetz J, Baethis H, Kalteis T, Grifka J, Perlick L (2006) Precision of computer-assisted core decompression drilling of the femoral head. *Arch Orthop Trauma Surg* 126:374–379
3. Urbaniak JR, Coogan PG, Gunneson EB, Nunley JA (1995) Treatment of osteonecrosis of femoral head with free vascularized fibular grafting. A long term follow-up study of one hundred and three hips. *J Bone Joint Surg Am* 77:681–694