Restoration of the mechanical axis of the lower limb—a case report of perichondrium grafting of the medial femoral condyle

Anders Lindstrand[1], Thomas Fridén[1], Sören Toksvig-Larsen[1], Leif Ryd[1] and Per Åkesson[2]

Departments of [1]Orthopedics and [2]Diagnostic Radiology, University Hospital, S-221 85 Lund, Sweden. Tel +46 46-171000. Fax -130732
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A 21-year-old man had osteochondritis dissecans of the medial femoral condyle of the left knee. After twisting his leg a major fragment became loose in September 1990. The fragment was fixed with 6 Biofix pins. Postoperatively, the patient developed severe synovitis and the fragment as well as part of the medial femoral condyle became necrotic. Synovectomy and resection of the necrotic part of the condyle, performed in November 1990, were reported by Fridén and Rydholm (1992). An infection could never be proved. There was a large cystic defect in the medial femoral condyle and weight-bearing radiographs showed joint reduction similar to gonarthrosis stage I of the medial femoro-tibial joint (Ahlbäck 1968) (Figure 1) with a deviation of the mechanical axis of 7 degrees in varus, compared to 1 degree in varus of the healthy side (Figure 2). The preoperative Lysholm score was 80 (Lysholm and Gillquist 1982) and the activity level was 4 (Tegnér and Lysholm 1985).

In September 1991 the large lesion was treated by transplantation of perichondrium from the 6th rib (Homminga et al. 1990). The perichondrial transplant was inverted and fixed by Tisseel® (Schlag and Redl 1986). The patient was immobilized for 14 days in a cast, after which active joint motion and static muscular training started. Protected weight bearing was implemented during weeks 3–12. Then full weight bearing and gradually more advanced training started. At the 1-year follow-up, the mechanical axis was normalized (Figure 3) and identical with the healthy side. Close-up radiographs showed that the graft was partly calcified and possibly integrated (Figure 4). MRI just

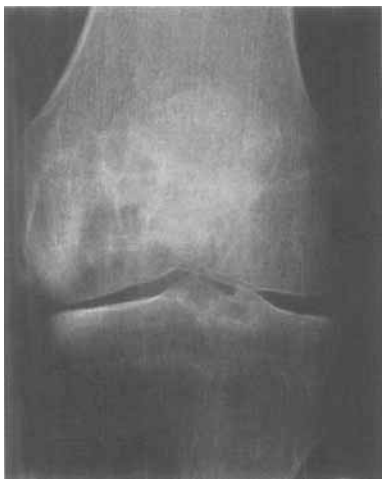


Figure 1. A large cystic defect of the medial femoral condyle of the left knee. The AP weight-bearing radiograph shows joint reduction similar to gonarthrosis stage I of the medial femoro-tibial joint.

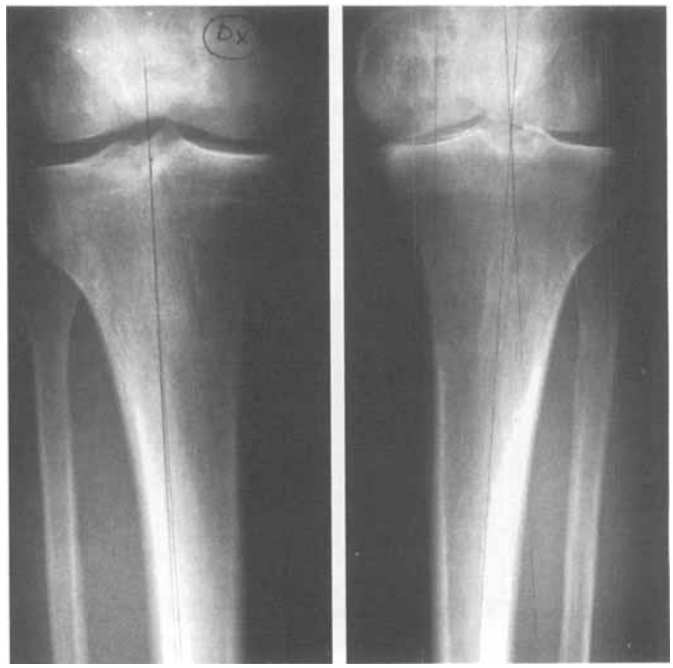


Figure 2. HKA (Hip-Knee-Ankle) weight-bearing radiograph of the lower limb showed a deviation of the mechanical axis of 7 degrees in varus compared to 1 degree in varus of the healthy side.

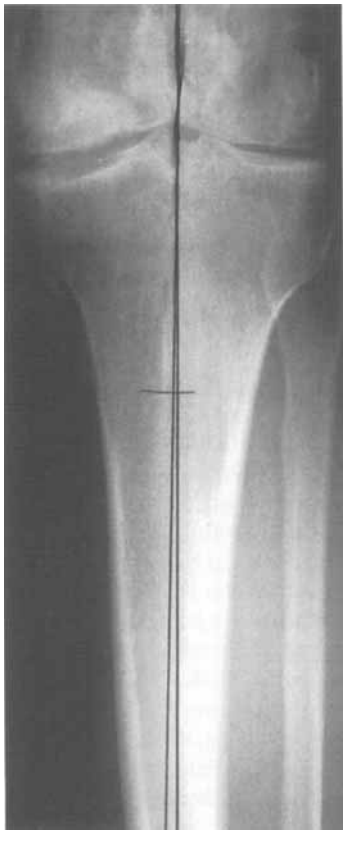


Figure 3. At the 1-year follow-up, the weight-bearing HKA (Hip-Knee-Ankle) mechanical axis was normalized and identical with the healthy side.

before and 1 year after the transplantation of the perichondrium (Figure 5) showed reconstitution of cartilage of the medial femoro-tibial compartment. At a 6-year follow-up, the patient was asymptomatic, had a normal and symmetrical position of the limbs and normal findings on clinical examination. The Lysholm score was 100 and the activity level 9. The weight-bearing mechanical axis was equal to that of the right side.

Discussion

Human perichondrium can form hyaline cartilage (Bulstra et. al. 1990) with the same visco-elastic properties as hyaline cartilage (Woo et al. 1987). Perichondral grafting has been used to repair cartilage defects experimentally (Homminga et al. 1989) and clinically (Engkvist and Johansson 1980, Homminga et al. 1990). In the early postoperative period, arthroscopy has shown that the formed tissue was raised above the surrounding cartilage, indicating a large growth potential (Homminga et al. 1990).

Osteochondritis dissecans lesions may sometimes be large and involve most of the medial femoral condyle. If diagnosed in childhood or in a teenager, the prognosis is usually favorable (Lindén 1977). When a fragment is partly loose, surgical procedures like drilling and fixation by screws or pins is used to stimulate healing and, even after a fragment has become loose in the knee joint, such surgery may be justified. Fixation by Biofix pins has also been used, but it has had drawbacks like foreign body reactions and aseptic synovitis, as in our case (Böstman et al. 1990, Fridén and Rydholm 1992).

Before the index procedure, the situation for this young man was difficult, with radiographic changes similar to arthrosis and increasing symptoms, when the prognosis is usually poor (Odenbring et al. 1991). The lesion was 3 cm long and involved most of the condyle, leaving a minor peripheral and central ridge of normal cartilage. An osteotomy would have been a justifiable therapeutic alternative. However, instead we decided to perform perichondrial grafting in an at-

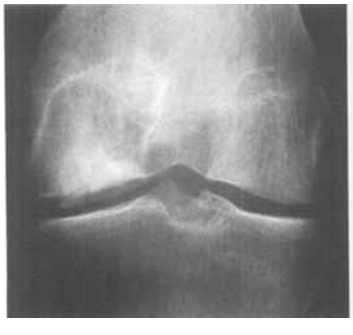
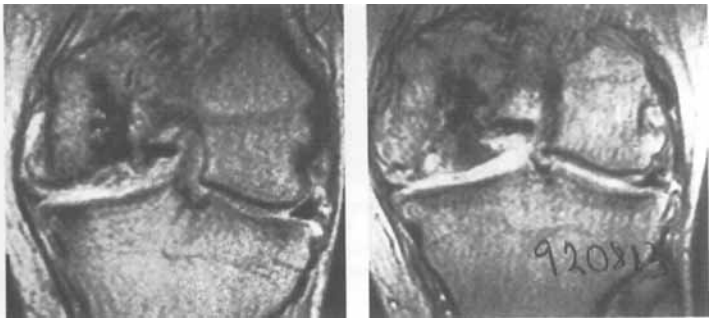


Figure 4. Close-up radiographs indicate that the graft was partly calcified and possibly integrated.



Figures 5. MRI before the perichondrium grafting (left) shows a fragmentation of the osteochondritis dissecans area and a clear cartilage reduction. MRI 1 year after the perichondrium grafting (right) shows that the fragmented area has been replaced by solid tissue and the cartilage area of the medial femoro-tibial joint space is clearly visible again.

tempt to replace the necrotic and fibrotic tissue by hopefully viable cartilagenous tissue. As a second procedure, osteotomy, was anticipated. This has, however, not yet been necessary as the perichondrial graft has shown a substantial regenerative capacity (Homminga et al. 1990) and reconstituted the mechanical axis, simply by growth. As far as we know, such a pronounced regeneration in a knee, restoring normal mechanics, has not been reported before.

The present clinical status of this patient is impressive, with no pain and a high level of activity. However, complications have been reported in one third of the patients after 2.5–5 years (Bulstra et. al. 1993). Perichondrial grafting must be regarded as an experimental procedure and this patient runs a clear risk of future failure, either by loosening or wear of the graft.

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Monstrous congenital macrodactyly with syndactyly of the foot—a case report

Helmut Lauschke[1] and Seppo Salminen[2]

Departments of [1]Orthopaedics, Oshakati Regional Hospital, P/Bag x 5501, Oshakati, Namibia. Tel +264 6751-20211. Fax -20303; [2]Surgery, Oulu University Hospital, Kajaanintie 50, 90220 Oulu, Finland. Tel +358 8 315-2011. Fax -5318

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A 16-year-old Ovambo girl came cumbrously walking to the Oshakati Regional Hospital with an extremely bulky congenital deformity of the left foot (Figure 1). This girl, weighing 48 kg and 155 cm tall, showed also a thickening of the left leg and major labium. The left foot was 48 cm long, the right was 25 cm long. Chromosome analysis (blood) revealed a normal karyotype 46 XX.

The first 4 toes were grossly enlarged and misplaced, including the metatarsal bones. The oversized toes were stiff. The distal end of the big toe appeared as a short stump out of the dorsum of the foot. The normal-sized little toe looked like a small rudiment on this monstrous foot.

Radiographically, the misplaced metatarsal and phalangeal bones were markedly enlarged, but normally linked and articulated (Figure 2). The tarsal bones were also enlarged compared with the normal foot.

. The foot was amputated through Lisfranc's joint. Lipectomy on the medial aspect of the lower leg and thigh, and on the foot sole were also performed. After lipectomy on the sole of the left foot, the skin on the frontal and frontomedial plantar aspects of the stump