

Autologous Matrix-Induced Chondrogenesis (AMIC®) + Minced Cartilage as a single-stage treatment option for retropatellar cartilage damage



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Prof. Steens is a specialist in orthopaedic surgery for complex knee and hip interventions and a partner at the Orthopaedic Neurosurgery Centre (ONZ) in Recklinghausen, Datteln, Kamen and Dortmund. He performs about 650 procedures on knee and hip joints every year. These include cartilage surgery for extensive defects and joint-preserving procedures. He regularly leads surgical courses and speaks on various surgical techniques at national symposia and conferences.

Selected Memberships

- German Society for Orthopedics and Trauma Surgery (DGOU)
- Society for Arthroscopy and Joint Surgery (AGA)
- Quality Circle for Cartilage Repair and Joint Preservation (QKG)
- AE – German Society for Endoprosthetics (ComGen)
- International Cartilage Regeneration and Joint Preservation Society (ICRS)

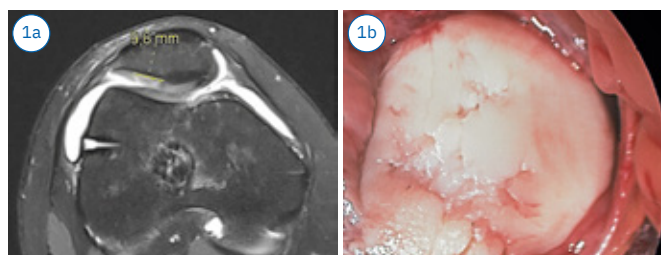


Dr. med. Katharina Kampheuer (formerly Lattka)

Dr Lattka studied medicine at Heidelberg University and is a specialist in orthopaedics and trauma surgery.

Memberships (status as of 2021)

- German Society for Orthopedics and Trauma Surgery (DGOU)
- Deutsche Gesellschaft für Manuelle Medizin (MWE)
- Quality Circle for Cartilage Repair and Joint Preservation (QKG)



Preoperative MR image (Fig. 1a) and intraoperative retropatellar lesion (Fig. 1b)

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Clinical Problem

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The treatment of chondral lesions on the patella poses a greater challenge than on the femur or tibia due to the anatomical complexity of the patellofemoral (PF) joint. Greater support for the body's own regenerative processes is required. AMIC® + Minced Cartilage (MC) is an emerging, single-stage cartilage repair procedure and an approach that, from the perspective of the treating orthopaedic surgeons, can maximize the outcome for patients with this pathology.

Medical History and Diagnosis

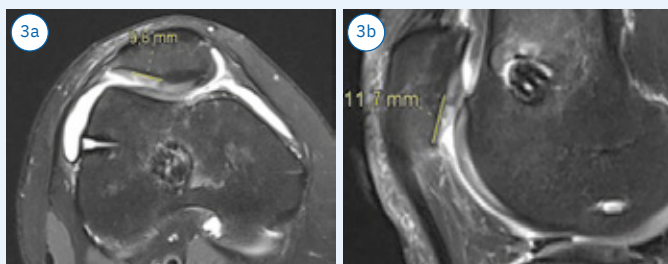
The 35-year-old patient had been experiencing increasing anterior knee pain for months without any history of trauma. In addition, a positive Zohlen sign was observed in the right PF joint. Conservative therapy over several months did not provide any pain relief. Clinical examination revealed stable cruciate and collateral ligaments and stable conditions of the PF joint. The range of motion was normal, and the leg alignment neutral. The patient underwent ACL reconstruction approximately 10 years ago.

Preoperative Imaging

X-rays of the right leg showed a physiological limb alignment (Fig. 2b) and a centrally positioned patella (Fig. 2a).



Preoperative MRI diagnostics revealed a retropatellar chondral lesion (ICRS grade 3–4) measuring approx. 10x12 mm (Fig. 3a axial and Fig. 3b sagittal view).



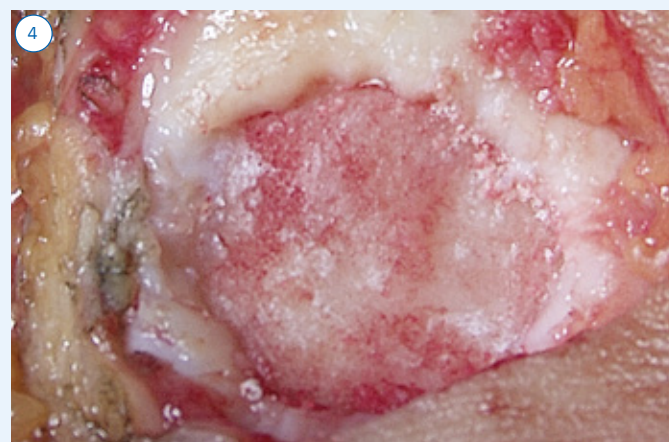
Treatment

The patient was informed about the possible relationship between cruciate ligament reconstruction and retropatellar cartilage damage. As she did not experience any instability, she only wanted the cartilage lesion to be addressed, which was clinically justifiable. Due to the patient's age, the size and location of the cartilage lesion, an AMIC® procedure augmented with autologous minced cartilage tissue implantation and mini-open arthrotomy was chosen as the treatment.

Step-By-Step Surgical Technique

1. Defect preparation and cartilage harvesting

Following diagnostic arthroscopy, necrotic cartilage tissue was removed from the centre to the periphery of the defect using a curette and a sharp spoon. The vital cartilage tissue obtained in this process was stored for later use. Care was taken to prepare a stable cartilage shoulder. The calcified layer was carefully removed with the curette until petechial bleeding appeared (Fig. 4).



2. Production of cartilage chips

The cartilage obtained during defect preparation was minced into approximately 1 mm³ chips using a Torpedo™ shaver attachment and collected in a collection sieve (GraftNet™).

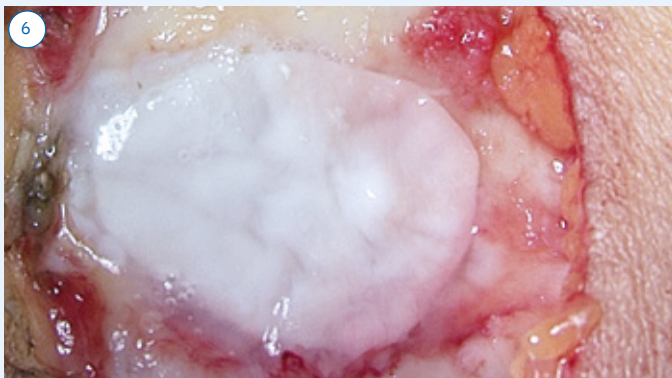
3. Inserting the cartilage chips into the defect



The cartilage chips (Fig. 5a) were carefully placed into the debrided defect using tweezers (Fig. 5b). The defect was filled slightly below the level of the surrounding cartilage to minimize the risk of hypertrophic tissue formation and dislocation.

4. Covering the defect

The cartilage chips were fixed with fibrin glue and covered with a Chondro-Gide® collagen membrane (Fig. 6). The membrane provides the initial primary stability for the regenerate and supports cartilage regeneration. Care was taken to avoid overfilling the defect above the level of the surrounding intact cartilage.



5. Postoperative Rehabilitation

In the first postoperative weeks, restriction of knee flexion using a brace:

- Day 1–2: 0–0–0° (no flexion)
- From day 3: 0–0–30°, additionally 2–6 hours daily passive flexion using a continuous passive motion (CPM) device
- From week 5: 0–0–60°, additionally 2–6 hours daily passive flexion using CPM
- From week 8: free flexion

The postoperative rehabilitation is divided into 3 phases:

Phase 1: protection

Weeks 1–6: partial weight-bearing with 30% of body weight with sole contact, using a 3-point gait with crutches.

Phase 2: loading and mobilization

From week 7: gradual increase in weight-bearing over approximately 2 weeks until full weight-bearing.

Phase 3: return to sport

From week 9: full weight-bearing and unrestricted movement allowed.

From month 3: low-impact sports permitted.

From month 12: high-impact sports permitted.

After 3 Months

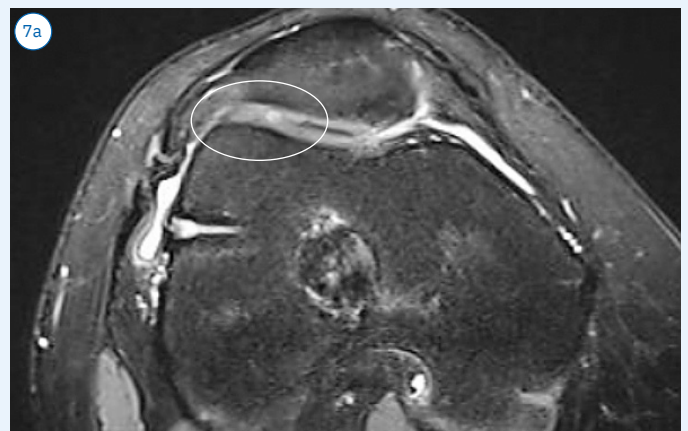
The patient was very satisfied with the surgical outcome and was on schedule with the postoperative treatment plan. The follow-up examination showed a normal healing process with no signs of inflammation. The range of motion of the operated knee joint was 0–0–130°.

The IKDC score improved from 23 preoperatively to 63 points, and the Lysholm score from 47 to 94 points.

After 6 months

The IKDC score further improved from 63 to 75 points, while the Lysholm score remained at 94 points.

The 6-month MRI showed complete defect coverage with good integration into the surrounding cartilage and no subchondral bony reaction (Fig. 7a axial view and Fig. 7b sagittal view).





For further information:
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Materials Used

- Ring curette and sharp spoon
- GraftNet™ autologous tissue collector for cartilage chips (Arthrex, Naples, USA)
- Torpedo™ 4 mm shaver blades (Arthrex, Naples, USA)
- Chondro-Gide® collagen membrane, 30 × 40 mm (Geistlich Pharma AG, Wolhusen, Switzerland)
- Tisseel fibrin glue, 2 ml (Baxter, Deerfield, USA)