Gudas R, Gudaite A, et al. Ten-year follow-up of a prospective, randomized clinical study of mosaic osteochondral autologous transplantation versus microfracture for the treatment of osteochondral defects in the knee joint of athletes. Am J Sports Med 2012;40(11):2499-508.

Design: Randomized clinical trial

Purpose of study: to compare the outcomes of mosaicplasty versus microfracture in athletes with osteochondral defects of the knee

Population/sample size/setting:

- 57 patients (35 men, 22 women, mean age 24) who were treated for osteochondral defects of the knee in an earlier (Gudas 2005) randomized clinical trial by the study authors in the orthopedics department of a university hospital in Lithuania
- Inclusion criteria were a grade 3 or 4 articular cartilage deficit of the medial or lateral femoral condyle in an otherwise stable knee between 1 and 4 cm^2, age under 40, and competitive or well-trained athletic level of sports participation
    - "Competitive" meant playing in regional or national levels
    - "Well-trained" meant playing active sports at least 6 times per week
- Exclusion criteria were any osteoarthritis or other systemic diseases, ligamentous problems of the knee, or any alignment problems of the extremities

Interventions:

- All patients underwent arthroscopy of the injured knee under spinal or general anesthesia
- 60 patients were initially randomized to mosaic osteochondral autologous chondrocyte transplantation (OAT, n=30) or microfracture (MF, n=30)
    - OAT patients had harvesting of plugs of 5.5 mm diameter from the lateral or medial margin of the femoral trochlea (range 3 to 6 plugs) which were press-fit to the chondral defect; all patients received prophylactic antibiotics at the time of surgery and at 6 and 12 hours postoperatively
    - MF patients received multiple holes with an arthroscopic awl approximately 2 to 4 mm wide without damaging the subchondral plate between the holes
- All patients had identical rehabilitation programs involving initial quadriceps contraction and active movements of the knee joint aimed at achieving full range of motion in the first few days or weeks, with partial weightbearing (20 kg) permitted after 4 weeks progressing to full weightbearing at 8 weeks; braces were not used
    - Gradual return to sports was permitted 4 to 6 months postoperatively
    - The participants had full compliance with the rehabilitation program

Outcomes:

- The main clinical outcome was based on the International Cartilage Repair Society (ICRS) “cartilage standard evaluation form” (Brittberg 2003)
    - Brittberg 2003 refers the reader to two clinical evaluation forms, one of which is based on the 2000 International Knee Documentation Committee (IKDC) subjective knee evaluation form, which may be the outcome the authors are alluding to in saying “cartilage standard evaluation form”
    - The IKDC form is completed by the patient, and has items for severity of pain, stiffness of the knee, the highest level of activity the patient can complete without pain, swelling, or giving way, how the knee affects their ability to go up and down stairs, kneel, squat, rise from a chair, sit with the knee bent, run straight ahead, jump and land on the affected leg, and start/stop quickly
    - The IKDC form is scaled from 0 to 100, with 0 as the worst score and 100 the best score
- Each intervention group was composed of two types of knee pathology: osteochondritis dissecans (OCD) and posttraumatic full-thickness articular cartilage defect (ACD), and four groups were distinguished for purposes of outcome comparison:
    - OAT-OCD, n=14
    - OAT-ACD, n=16
    - MF-OCD, n=12
    - MF-ACD, n=18
- The authors broke down the patients into these groups because there were significantly better average baseline IKDC scores in the patients who had ACD than in those who had OCD:
    - OAT-OCD, IKDC=50.9
    - OAT-ACD, IKDC=61.3
    - MF-OCD, IKDC=50.9
    - MF-ACD, IKDC=64.8
- At the 10 year followup, the patients with each knee pathology type had higher average IKDC scores if they had OAT than if they had MF:
    - OAT-OCD, IKDC=87.5
    - OAT-ACD, IKDC=92.9
    - MF-OCD, IKDC=73.9
    - MF-ACD, IKDC=78.2
- Return to sport at 10 years also was more frequent in patients who had OAT than in those who had MF; the vast majority of OAT patients returned to sport, but only about half of MF patients returned to sport:
    - OAT-OCD, n=12/14 (86%)

    - OAT-ACD, n=14/15 (93%)
    - MF-OCD, n=5/11 (46%)
    - MF-ACD, n=10/18 (56%)
- The operation was considered to have failed if the patient needed a reoperation in the 10-year period because of symptoms due to primary defects:
    - There were 4 such failures in the OAT group and 11 failures in the MF group

Authors' conclusions:

- Both OAT and MF procedures yielded significant improvements in clinical status of athletes with osteochondritis dissecans and with posttraumatic full-thickness articular cartilage defects
- However, OAT has more favorable long-term outcomes, with higher rates of return to sport, higher scores on patient-reported functional abilities, and fewer failures leading to reoperation

Comments:

- The acronym OCD appears to refer to both osteochondral defect and osteochondritis dissecans, which had less favorable outcomes than post-traumatic full-thickness cartilage defects, whose acronym seems to have been ACD
    - Brittberg 2003, the author of the ICRS classification system used by the authors to classify lesions of the knee, this system distinguishes osteochondritis dissecans (OCD) from traumatic injury to the knee; it appears that the ACD patients in this study with "full-thickness" defects would be classified as grade 4 in the ICRS system, which extend into the subchondral bone
    - For OCD, grade III is a lesion with complete discontinuity but not yet dislocated when probed, and lesions with a dislocated fragment are OCD grade IV
    - The original inclusion criteria of ICRS grade 3 and 4 lesions (specified in Gudas et al 2006, the first published report of this RCT population) make it difficult to interpret Table 5, which describes OAT and MF patients with ICRS grades 1 and 2 on biopsy-histology, which is not described in Brittberg's discussion of the ICRS classification system
- The patients were all extremely active in sports prior to injury; all of them played sports at least 6 times per week
    - In addition, consistent with the level of sports activity above, is the fact that all patients in both treatment groups were fully compliant with the rehabilitation program prescribed by the authors

Assessment: adequate for some evidence that in highly athletic patients with osteochondritis dissecans or with posttraumatic full-thickness chondral lesions of the knee, who are fully compliant with an active postoperative rehabilitation program, an OAT procedure is more likely than a microfracture procedure to lead to return to sports, to higher functional knee scores, and fewer reoperations during the ten years following treatment of the injury

References:

Brittberg M, Winalski CS. Evaluation of cartilage injuries and repair. JBJS Am. 2003;85(supplement 2):58-69.

Gudas R, Stankevicius E, et al. Osteochondral autologous transplantation versus microfracture for the treatment of articular cartilage defects in the knee joint in athletes. Knee Surg Sports Traumatol Arthrosc 2006;14:834–842