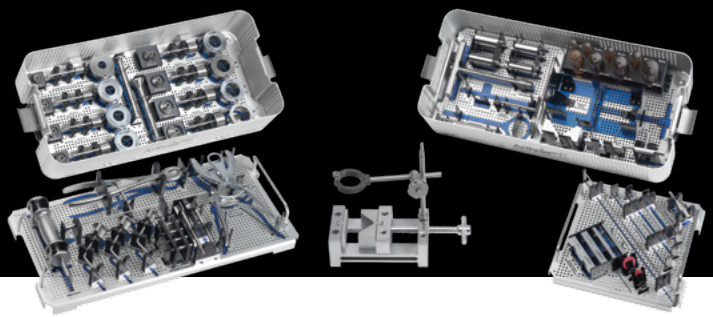

# Allograft OATS® System

**Scientific Update**

The allograft OATS system facilitates harvesting large-diameter osteochondral/hyaline cartilage cylinders from allograft tissues. The core is recovered by placing the condyle into the workstation and harvesting with the donor harvester. The exact depth of the allograft to match the socket is obtained with the depth measurement guide, and the allograft is trimmed to the same depth, taking care to match patient surface contour. Dilation of the socket results in a line-to-line fit once the donor allograft is inserted into the recipient socket. Final seating of the allograft is achieved with an oversized tamp, resulting in a flush, press-fit graft.

Wang T,
Gao SL,
McCauley JC,
Densley SM,
Bugbee WD

Outcomes after osteochondral allograft transplantation of the medial femoral condyle in patients with varus and nonvarus alignment. *Am J Sports Med.* 2024;52(12):3013-3020. doi:10.1177/03635465241273947

- Cohort analysis comparing OCA transplantation graft survivorship between patients with either varus or nonvarus alignment
  - Mean mechanical tibiofemoral angle for patients with varus alignment was 3.9° varus and for patients with nonvarus alignment was 0.02° valgus
- 70 patients (74 knees) undergoing OCA transplantation of the medial femoral condyle were included; 43 knees (58.1%) had varus alignment and 38 (41.9%) had nonvarus alignment. Overall mean follow-up duration was 7.2 years. No significant difference in height, weight, or BMI was observed.
- Overall OCA failure rate was 5.4% (4/74). Graft survivorship at 5 years was 95.3% in the varus group and 95.8% in the nonvarus group ($P$ = .918). Both the varus and nonvarus groups reported statistically significant improvements on PROMs (IKDC, KOOS, and modified Merle d'Aubigne–Postel) after surgery. However, there were no statistically significant differences in PROM score improvement between groups.

**Takeaway**

Patients undergoing fresh OCA transplantation of the medial femoral condyle demonstrated excellent graft survivorship and PROMs improvement at a mean of 7.2 years regardless of varus or nonvarus alignment.

Arthrex®

Allahabadi S, Quigley R, Frazier L, Joyce K, Cole BJ

Outcomes and return to sport after knee osteochondral allograft transplant in professional athletes. *Orthop J Sports Med*. 2024;12(2):23259671241226738. doi:10.1177/23259671241226738

- Retrospective return-to-sport analysis of professional athletes undergoing OCA transplantation with at least 2-year follow-up available. Professional leagues represented in this cohort included the National Football League (NFL), Major League Baseball (MLB), National Hockey League (NHL), and others.
- 15 professional athletes undergoing primary OCA transplantation were included. Mean follow-up duration was 4.91 years, and mean age of this cohort was 25.6 years. Only one failure was noted across the entire cohort, giving an overall success rate of 93.3%.
- 11 (73%) athletes returned to sport at a mean of 1.22 years, and of the 8 undergoing isolated OCA, 7 (87.5%) returned at 1.28 years. Significant improvements were seen in each assessed patient-reported outcome score at final follow-up. 2 of the 3 (66.7%) patients who underwent concomitant meniscal allograft transplant were able to return to sport at the same or higher than pre-surgery.

**Takeaway**

The majority of professional athletes undergoing OCA transplantation were able to return to sport at a similar or higher level than before surgery. Patient-reported outcomes all significantly improved after OCA transplantation.

Krych AJ, Pareek A, King AH, Johnson NR, Stuart MJ, Williams RJ 3rd

Return to sport after the surgical management of articular cartilage lesions in the knee: a meta-analysis. *Knee Surg Sports Traumatol Arthrosc*. 2017;25(10):3186-3196. doi:10.1007/s00167-016-4262-3

- A meta-analysis comparing rates of return-to-sport outcomes for microfracture (MFX), osteochondral autograft transfer (OAT), osteochondral allograft transplantation (OCA), and autologous chondrocyte implantation (ACI)
- Reviewed 44 studies involving 2549 patients with a minimum of 2-year follow-up
- OAT and OCA had the highest rates of return-to-sport at 93% and 88%, respectively. MFX had the lowest rate at 58%

**Takeaway**

OAT and OCA recipients showed exceptional return-to-sport rates in comparison to those who underwent MFX. Additionally, the ACI group exhibited a lower return-to-sport rate and slower recovery time than OCA recipients.

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Sadr KN, Pulido PA, McCauley JC, Bugbee WD

Osteochondral allograft transplantation in patients with osteochondritis dissecans of the knee. *Am J Sports Med*. 2016;44(11):2870-2875. doi:10.1177/0363546516657526

- Study reviewed 135 patients who underwent fresh OCA transplantation for osteochondral dissecans (OCD) of the knee with a minimum of 2-year follow-up
- OCA survivorship was 95% at 5 years and 93% at 10 years, demonstrating good long-term durability and excellent survivorship
- 95% of patients were satisfied with their outcomes
- OCA reconstruction resulted in substantial and significant reductions in pain and improvements in function in a majority of patients

**Takeaway**

Long-term evaluation of osteochondral allograft transplantation demonstrated excellent outcomes in regard to survivorship, patient-reported outcomes, and functional improvements.

Briggs DT, Sadr KN, Plido PA, Bugbee WD

The use of osteochondral allograft transplantation for primary treatment of cartilage lesions in the knee. *Cartilage*. 2015;6(4):203-207. doi:10.1177/1947603515595072

- A long-term clinical outcome study of 61 knees (mean age = 32.9 years) found significant improvements to pain and function ($P < .01$) in patients undergoing OCA transplantation in the knee
- OCA survivorship was 89% at 5 years and 74% at 10 years
- Failure of previous treatment(s) is not a prerequisite for OCA transplantation
- The majority of patients (86%) were “extremely satisfied” or “satisfied” following OCA transplantation

**Takeaway**

OCA transplantation is a safe and acceptable treatment method for many large chondral and osteochondral defects in the knee, with high rates of patient satisfaction and functional improvement.

Mologne TS, Cory E, Hansen BC, Naso AN, Chang N, Murphy MM, Provencher MT, Bugbee WD, Sah RL

Osteochondral allograft transplant to the medial femoral condyle using a medial or lateral femoral condyle allograft: is there a difference in graft sources? *Am J Sports Med*. 2014;42(9):2205-2213. doi:10.1177/0363546514540446

- A comparison study to determine whether plugs harvested from a lateral femoral condyle (LFC) provide a suitable surface match for medial femoral condyle (MFC) defects
- 20 mm plugs were created from the medial and lateral femoral condyles and measured via µCT images for fit
- Confirmed that LFC allografts fit as well as MFC allografts for 20 mm defects in the MFC

**Takeaway**

MFC defects represent the majority of cartilage defects in the knee, leading to high demand for MFC allografts. This study demonstrates excellent OCA surface match of both MFC and LFC grafts for common MFC defect sites, suggesting both are acceptable graft options for MFC defects.

Arthrex®

Cotter EJ, Christian DR, Frank RM, Abyar E, Wischmeier D, Yanke AB, Farr J, Cole BJ

Survivorship of patellofemoral osteochondral allograft transplantation. *Arthrosc Sports Med Rehabil*. 2019;1(1):e25-e34. doi:10.1016/j.asmr.2019.06.003

- A midterm survivorship analysis of patients treated with patellofemoral OCA transplantation using either a plug or shell technique
- 50 patients (mean age = 37.43 years), all with ICRS grade 3 or 4 cartilage defects of the patella, femoral trochlea, or combination
- Patients with plug allografts demonstrated 100% and 66% survival at 5 and 9.8 years respectively, significantly higher than patients receiving shell allografts

**Takeaway**

Plug OCA of the patellofemoral compartment can be an efficacious procedure with quality midterm outcomes.

Mistry H, Metcalfe A, Smith N, Loveman E, Colquitt J, Royle P, Waugh N

The cost-effectiveness of osteochondral allograft transplantation in the knee. *Knee Surg Sports Traumatol Arthrosc*. 2019;27(6):1739-1753. doi:10.1007/s00167-019-05392-8

- A systematic review of evidence on clinical effectiveness and economic modelling of OCA transplantation in the knee
- Review found mean long-term OCA survival rates to be 87% at 5 years, 79% at 10 years, and 73% at 15 years
- Economic analysis finds that—despite its higher cost—OCA transplantation remains highly cost effective due largely to its ability to reduce total knee arthroplasty procedures needed over a patient's lifetime, as well as an increase in quality-adjusted life-year (as compared to patients who do not receive OCA transplantation)

**Takeaway**

Economic modeling shows OCA transplantation to be highly cost effective, with costs per quality-adjusted life-year much lower than those for many other available treatment options.

Sochacki KR, Varshneya K, Calcei JG, Safran MR, Abrams GD, Donahue J, Chu C, Sherman SL

Comparison of autologous chondrocyte implantation and osteochondral allograft transplantation of the knee in a large insurance database: reoperation rate, complications, and cost analysis. *Cartilage*. 2021;13(1_suppl):1187S-1194S. doi:10.1177/1947603520967065

- Cost analysis comparing reoperation rate, risk factors for reoperation, complication rates, and cost differences between autologous chondrocyte implantation (ACI) and osteochondral allograft transplantation (OCA) in the knee across a large insurance database
- A total of 909 subjects (315 ACI and 594 OCA) were included (mean follow-up 39.2 months). Demographics were similar between groups except subjects in the OCA group were statistically older (32.1 vs 30.2 years old, $P = .014$)
- There was a significantly higher reoperation rate after index ACI compared with OCA (67.6% vs 40.4%, $P < .0001$). Concomitant osteotomy at the time of index procedure significantly reduced the risk for reoperation in both groups (odds ratio [OR] 0.2, $P < .0001$ and OR 0.2, $P = .009$). The complication rates were similar between ACI (1.6%) and OCA (1.2%) groups ($P = .24$). Day-of-surgery payments were significantly higher after ACI compared with OCA ($P = .013$).
  - The higher cost of ACI trend occurred at all time points in the study, with a total 2-year cost of ACI at $56,578 compared with the 2-year cost of OCA of $33,426, including reoperations ($P < .0001$)

**Takeaway**

Autologous chondrocyte implantation had significantly higher reoperation rates with similar complication rates compared with OCA. ACI also had significantly higher day-of-surgery and associated healthcare costs across all time points.