Overview of CARTIHEAL◊ AGILI-C◊ Cartilage Repair Implant clinical study publications

April 2025

Study	Design	Joint	n=	Follow-up	Key findings
Conte P, et al. *Int Orthop.* 2024;48(12):3117–3126.[1] Available at: International Orthopaedics	RCT	Knee (with or without concurrent mild to moderate OA)	164 (CARTIHEAL AGILI-C Implant group) 83 (SSOC group; microfracture or debridement)	4 years	In patients with knee cartilage defects in the femoral condyles and trochlea, including patients with mild to moderate OA (KL grade 0–3), compared to SSOC, patients that received the CARTIHEAL AGILI-C Implant demonstrated: ▪ Significantly higher KOOS overall score in condylar defects, trochlear defects and mixed-lesions at 48 months (all p≤0.0198) – The absence or presence of OA did not affect the greater performance of CARTIHEAL AGILI-C Implant ▪ Significantly higher IKDC scores in all lesion locations at 24 and 48 months (all p≤0.023) ▪ Significantly superior MRI imaging outcomes at 24 months showing ≥75% defect fill: – 93.9% in condylar defects (vs 39.0%; p<0.0001) – 62.5% in trochlear defects (vs 18.2%; p=0.012) – 97.6% in mixed lesions (vs 18.8%; p<0.0001) ▪ Significantly higher responder rate (>30 point improvement in KOOS overall) in all lesion locations at 24, 36 and 48 months (all p≤0.004) ▪ Significantly lower treatment failure rate in condylar defects and mixed lesions at 48 months (p=0.001 and p≤0.017, respectively) – Lower treatment failure rate in trochlear defects, but not statistically significant (p=0.099) ▪ Significantly lowers risk of TKA or osteotomy by 87% – Significantly fewer patients required a TKA or osteotomy at 48 months (1.2% vs 9.5%; p=0.003)

Study	Design	Joint	n=	Follow-up	Key findings
de Caro F, et al. *Cartilage*. 2024;15(4):399–406.[2] Available at: CARTILAGE	Prospective case series	Knee (isolated chondral or osteochondral lesions)	12	6.5 years average follow-up (range: 5–8 years)	In patients affected by isolated chondral or osteochondral lesions (ICRS grade 3–4) of the femoral condyle or trochlea, treatment with the CARTIHEAL AGILI-C Implant at latest follow-up demonstrated: ▪ Significant increase in KOOS by 41 points compared with pre-operative scores (86 vs 45; p≤0.05) ▪ Significant increase in KOOS subscales (all p≤0.05) – Pain increased by 44 points (92 vs 48 points) – Symptoms increased by 25 points (91 vs 66 points) – ADL increased by 30 points (90 vs 60 points) – Sport increased by 52 points (75 vs 23 points) – QoL increased by 50 points (77 vs 27 points) ▪ Mean MOCART score was 64, indicating a moderate level of cartilage repair ▪ A defect filling ranging from 75–100% in all patients ▪ Complete integration of the implant, with cartilage formation and bone remodeling observed, without any significant bony abnormalities (n=8) – Remaining patients had a split-like defect <2mm present (n=4) ▪ One patient failed and was revised with a custom-made metal implant Further analysis of these results showed: ▪ Patients without previous cartilage surgery experienced significantly improved KOOS, compared to patients with previous cartilage surgery (p=0.044)
Altschuler N, et al. *Am J Sports Med*. 2023;51(4):957–967.[3] Available at: The American Journal of Sports Medicine	RCT	Knee (with or without mild to moderate OA)	167 (CARTIHEAL AGILI-C Implant group) 84 (SOC group; microfracture or arthroscopic debridement)	2 years	In patients affected by joint surface lesions, including patients with mild to moderate OA (KL grade 2–3), compared with SSOC, treatment with the CARTIHEAL AGILI-C Implant demonstrated: ▪ Increased KOOS overall post-operatively – With the change being significantly greater than SSOC at each time point (p≤0.001) – A greater change in KOOS pain, QoL and ADL subscales ▪ Substantially higher post-operative improvements in IKDC than the MCID at each time point – Significant superiority was observed (p<0.001) ▪ At 2-year MRI assessment: – 88.5% had >75% defect fill (vs 30.9%; p<0.0001) – 1.3% had <50% defect fill (vs 50%; p<0.0001) ▪ At 2 years a responder rate (increase of ≥30 KOOS overall) of 77.8% (vs 33.6%; p<0.0001) ▪ Significantly lower treatment failure rate (defined as any secondary intervention in the treated joint, regardless if related or unrelated to the original treatment) 7.2% (vs 21.4%; p=0.002) ▪ A robust improvement regardless of age (<50 vs ≥50), lesion size (≤3cm^2 vs >3cm^2), or presence of OA (KL 1–2 vs 2–3)

Study	Design	Joint	n=	Follow-up	Key findings
Kon E, et al. *Am J Sports Med*. 2021;49(3):588–598.[4] Available at: The American Journal of Sports Medicine	Prospective case series	Knee (with mild to moderate OA)	86	2 years	In patients with knee joint surface lesions with mild to moderate OA (KL grade 2–3) treatment with the CARTIHEAL AGILI-C Implant demonstrated: ▪ Significant improvement on KOOS overall and all subscales (pain, ADL, sport, QoL, symptoms; p<0.001) and IKDC subjective score (p<0.001) at 2-year follow-up, compared with baseline ▪ Significant increase observed in the area of the defect covered by cartilage – At 2-years MRI assessment showed a significant increase in defect filling (up to 78.7% ± 25.3%; p<0.001 vs 6 months) ▪ Treatment failure (defined as removal of the CARTIHEAL AGILI-C Implant for any reason during the follow-up period) occurred in eight patients (9.3%) ▪ Histology of an explant specimen from one patient showed newly formed hyaline cartilage, rich in collagen type II and proteoglycans integrated within the adjacent native cartilage and bone
Kon E, et al. *Injury*. 2016; 47 Suppl 6:S27–S32.[5] Available at: Injury	Case control	Knee	21	1 year	In a study comparing the treatment of chondral and osteochondral lesions, with either tapered shaped implants or cylindrical shaped implants, results showed: ▪ A significant improvement in all clinical scores (IKDC subjective score, Lysholm score and KOOS subscales: pain, symptoms, ADL, QoL and sport) was documented in both groups compared to pre-operative scores (p<0.005) ▪ MRI findings revealed graft integration with good bone and cartilage formation in both groups ▪ A lower revision rate in patients who received the tapered CARTIHEAL AGILI-C Implant with no implant removals (0 vs 10.5%)

References

1. Conte P, Anzillotti G, Crawford DC, et al. Differential analysis of the impact of lesions' location on clinical and radiological outcomes after the implantation of a novel aragonite-based scaffold to treat knee cartilage defects. *Int Orthop*. 2024;48(12):3117–3126. **2.** de Caro F, Vuylsteke K, Van Genechten W, Verdonk P. Acellular aragonite-based scaffold for the treatment of joint surface lesions of the knee: a minimum 5-year follow-up study. *Cartilage*. 2024;15(4):399–406. **3.** Altschuler N, Zaslav KR, Di Matteo B, et al. Aragonite-based scaffold versus microfracture and debridement for the treatment of knee chondral and osteochondral lesions: results of a multicenter randomized controlled trial. *Am J Sports Med*. 2023;51(4):957–967. **4.** Kon E, Di Matteo B, Verdonk P, et al. Aragonite-based scaffold for the treatment of joint surface lesions in mild to moderate osteoarthritic knees: results of a 2-year multicenter prospective study. *Am J Sports Med*. 2021;49(3):588–598. **5.** Kon E, Robinson D, Verdonk P, et al. A novel aragonite-based scaffold for osteochondral regeneration: early experience on human implants and technical developments. *Injury*. 2016;47 Suppl 6:S27–S32.

Abbreviations
ADL = activities of daily living; ICRS = International Cartilage Restoration and Joint Preservation Society; IKDC = International Knee Documentation Committee; KL = Kellgren-Lawrence; KOOS = Knee Injury and Osteoarthritis Outcome Score; MCID = minimal clinically important difference; MOCART = mean Modified Cincinnati; OA = osteoarthritis; QoL = quality of life; RCT = randomized controlled trial; SSOC = surgical standard of care; TKA = total knee arthroplasty.

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