Surgical Management and Risk of Osteoarthritis Following Knee Osteochondritis Dissecans: A 20-Year Retrospective Analysis

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INTRODUCTION: Osteochondritis dissecans (OCD) is a joint disorder characterized by disruption of the subchondral bone and overlying cartilage, most commonly affecting the knee, ankle, and elbow in young athletes. Its multifactorial etiology includes repetitive microtrauma, vascular insufficiency, and genetic factors. OCD lesions compromise subchondral blood supply, causing bone necrosis, cartilage instability, and, if untreated, loose intra-articular fragments and osteoarthritis (OA). Patients with a history of OCD are at increased risk of developing OA earlier—often by their 40s—compared to typical onset (50–60s), significantly affecting quality of life.

Surgical management of OCD ranges from drilling and fragment fixation to cartilage restoration procedures. However, long-term effects of these interventions on OA progression remains unclear, with prior studies offering conflicting results, particularly regarding fragment excision versus preservation. Moreover, existing research on OCD is limited by a small patient population and longitudinal follow-up. To address these gaps, we leveraged the Epic Cosmos database to analyze a large, geographically diverse patient cohort. This study aims to clarify the long-term relationship between OCD surgical treatments and OA development, and to see if diagnosis age plays a role.

METHODS: We conducted a retrospective cohort study using the Cosmos database which contains health records from over 290 million patients across hospitals and clinics in the U.S. The primary outcome was the subsequent diagnosis of OA within twenty years after an initial OCD diagnosis. In total, across all ages, 54,854 patients with OCD were identified, of whom 10,706 developed OA. Patients between 10 and 30 years old diagnosed with OCD of the knee between June 6, 2005, and June 5, 2025, were identified using ICD-10 codes which yielded 32,491 patients (67.28% male and 32.72% female). CPT codes were used to identify eleven surgical procedures commonly performed to treat OCD of the knee such as arthroscopic excision of loose fragment, repair/fixation (preservation), and grafting. Surgical interventions were included if they occurred within three years of OCD diagnosis. Patients were stratified into treatment groups: excision, preservation, and grafting. To assess OA risk, we used 2x2 contingency tables and calculated risk ratios (RR), 95% confidence intervals (CI) using the Wald method, and p-values from χ^2 tests. Each treatment group was further divided into diagnosis age groups, 10-20 (peak onset) and 20-30 (adult), to evaluate differences in OA risk by age range.

RESULTS SECTION: Overall, we compared risk ratios for OA following OCD diagnosis across multiple intervention groups stratified by age. In total, irrespective to surgery, of the 25,162 peak onset patients, 700 developed OA within 20 years. Likewise, of the 7,329 adult patients, 1,049 patients developed OA within 15 years. Before OA diagnosis and across both age groups, there were 874 patients in the excision group, 3,493 patients in the preservation group, and 2,846 patients in the grafting group. Among peak onset patients who received excision surgery, they had a significantly higher risk of developing OA compared to patients receiving preservation surgery (RR= 1.85, CI= 1.15 - 2.97, p= 0.017). When grafting (minimally invasive or open) was compared with excision and preservation, there was no statistically significant difference in long-term osteoarthritis risk ($p > 0.1$ for both).

DISCUSSION: This large retrospective study demonstrates that long-term OA risk following knee OCD surgery varies by surgical type. Fragment preservation had the lowest OA risk compared to excision and grafting - likely reflecting greater lesion severity or failed treatment for those surgeries. In conclusion, joint-preserving surgery appears most protective against early OA, while excision carries higher long-term risk. Grafting showed no significant difference compared to other approaches, suggesting its benefit may depend on patient or lesion factors. These age-stratified results show that adolescents diagnosed at 10–20 years had relatively low rates of OA even after two decades of follow-up, while adults diagnosed at 20–30 years developed OA more frequently and within a shorter timeframe. The markedly higher incidence in adults underscores that age at diagnosis is a key determinant of long-term risk and supports age-stratified management, with joint-preserving surgery and early intervention prioritized in younger patients and closer surveillance warranted for adults.

The EPIC Cosmos database contains a vast amount of patient information; however, it does have its limitations. These include reliance on coding accuracy, lack of lesion-level specifics, rehabilitation data, and potential unmeasured confounding factors such as activity level or BMI. Despite these, the large sample size and long follow-up strengthen the generalizability of our findings.

SIGNIFICANCE/CLINICAL RELEVANCE: This study, one of the largest to date on surgical outcomes in knee OCD, highlights the influence of surgical approach and age at diagnosis on OA progression. Joint-preserving surgery offered the greatest protection, while excision and adult-onset disease were associated with higher OA risk and warrant closer follow-up.

IMAGES AND TABLES: