High Incidence of New Chondral Lesions Following Osteochondral Allograft Transplantation Is Associated With Female Sex, Elevated BMI

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INTRODUCTION:

Osteochondral allograft transplantation (OCA) has been shown to be an effective surgical approach in the management of symptomatic osteochondral lesions of the knee. Due to the pro-inflammatory environment present in the setting of an osteochondral lesion, novel chondral lesions (NCLs) may develop following the procedure, potentially leading to continued functionally limiting symptoms and progressive degenerative arthritis. The incidence of NCLs following OCA is currently unknown. The current study aims to quantify the prevalence of NCLs on postoperative magnetic resonance imaging performed after OCA and to identify demographic and lesion-specific risk factors for NCL incidence.

METHODS:

A retrospective review of patients who underwent OCA from November 2011 to October 2022 at a single academic institution was performed. Patients were excluded if they had less than two years of follow-up or underwent significant concomitant procedures (high tibial osteotomy, distal femoral osteotomy, meniscal allograft transplant, or anterior cruciate ligament reconstruction). OCA patients with preoperative and post-operative MRIs available for review were included in the assessment. The characteristics of the primary osteochondral lesion were documented on the pre-operative imaging studies including location, size, depth and extent of associated bone marrow edema. Post-operative MRIs were then compared to identify NCLs, defined as any chondral defect present which was not seen on the preoperative MRI or intra-operatively. Patient medical records were reviewed to determine the indication for their postoperative MRI: routine follow-up versus those ordered due to the presence of symptoms. Demographic data and postoperative outcomes were recorded, including reoperations and conversion to arthroplasty. Multivariable logistic regression analysis was performed to determine factors associated with the presence of NCLs on postoperative MRI.

RESULTS:

During the observation period, 129 patients were identified who underwent unilateral, primary OCA and had both preoperative and postoperative MRIs available for review. The postoperative MRIs were obtained a median of 18.5 months after surgery (range: 0.5-9.1 years). Of these, 59 (45.7%) patients had NCLs present on their postoperative MRI, with thirty-three (55.9%) of these NCLs present in the same compartment where the OCA was performed. The incidence of lesions by compartment were 52 (40.3%) medially, 22 (17.1) laterally, and 61 (47.3%) in the patellofemoral compartment.

Postoperative MRI identifying NCLs was obtained later than MRIs showing no new chondral damage (median 25.0 vs. 14.5 months; P=0.003), and patients with NCLs present were significantly more likely to require conversion to arthroplasty during the study period (11.9% vs. 0.0%; P=0.003). When investigating factors associated with the incidence of NCLs, we found that increased BMI (odds ratio [OR]: 1.2; P=0.008), female sex (OR: 4.3; P=0.006), and increased time to postoperative MRI (OR: 1.1; P=0.001) were predictive of NCL incidence. Importantly, the compartment of the original osteochondral defect, the size of that defect, and the presence of bone edema were not associated with a greater risk of NCLs (P>0.05).

DISCUSSION AND CONCLUSION:

In patients who underwent postoperative MRI after OCA, a substantial portion (45.7%) had NCLs present at a median of 25 months after surgery. Patients who developed NCLs following OCA were at an increased risk of requiring conversion to arthroplasty compared to those who did not develop new lesions. Increased BMI and female sex were demographic factors identified as risk factors for post-operative NCL formation, while initial lesion size, affected compartment, and bony involvement did not impact postoperative NCL incidence. Patients indicated for OCA should be counseled on the potential for developing NCLs and the associated risk of conversion to arthroplasty.