

## SUBSPECIALTY PROCEDURES

# OSTEOCHONDRAL AUTOGRAFT TRANSPLANTATION FOR CAPITELLAR OSTEOCHONDritis DISSECANS

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Published outcomes of this procedure can be found at: *J Pediatr Orthop.* 2020;40(2):78-85, *Arthroscopy.* 2020 Jun;36(6):1747-64, and *J Shoulder Elbow Surg.* 2015;24(7):1098-1105.

*Investigation performed at Shriners Hospitals for Children and the Philadelphia Hand to Shoulder Center, Philadelphia, Pennsylvania*

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## Abstract

**Background:** The goal of the osteochondral autograft transplantation (OAT) procedure is to replace both the bone and cartilage that have been compromised by osteonecrosis of the capitellum, a condition known as osteochondritis dissecans (OCD). In children, the vascularity of the capitellum is limited compared with that in adults because the physis acts as a physical barrier to vascular ingrowth from the metaphysis to the epiphysis. The necrotic subchondral bone cannot keep up with the weight-bearing demands of certain high-level athletes such as gymnasts, accumulating microfractures and eventually crumbling. Without the support of the subchondral bone, the overlying cartilage fractures and eventually comes loose, often floating around the joint as a loose body. Fibrocartilage may form to fill the void left behind but cannot restore either the structural integrity of the bone or the gliding and compressive properties of hyaline cartilage. Replacement of both the bone and the cartilage requires an osteochondral transplant. Fortunately, there are regions of the articular surface of the knee in which there is minimal load or contact and that are therefore expendable as donor osteochondral plugs. We prefer a single-plug technique whenever possible because it is easier to perform and only requires union of the plug to native bone across 1 interface. If a single plug will not cover the defect or cannot be made to match the contour of the capitellum, multiple plugs may be used (i.e., mosaicplasty).

**Description:** Place the patient with the operative side up in the lateral decubitus position with the arm in a holder. First, perform a diagnostic elbow arthroscopy. Use the proximal anteromedial portal to insert the scope across the front of the joint. Using a switching stick, make an anterolateral portal. Place a cannula to prevent having to go in and out of the joint multiple times, as this increases the risk of neurologic injury. Perform a synovectomy if necessary and remove any loose bodies. The absence of synovitis is a sign that the lesion has likely healed. Inspect the capitellum and radial head. The anterior margin of the OCD lesion of the capitellum will be barely visible as the joint is brought to extension.

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If the lesion is readily visible in the anterior compartment, the lesion will be too anterior to approach from an anconeus split approach. In this case, some have advocated a takedown of the lateral collateral ligament to aid in visualization from a lateral approach<sup>1</sup>. We have had good success with a direct anterior approach between the brachialis and brachioradialis, mobilizing the radial nerve laterally.

If the chondral injury is extensive or includes the articular surface of the radial head, then the injury is too advanced to successfully treat with an OAT procedure. In these cases, we perform an interposition arthroplasty of the radiocapitellar joint. Radial head resection is not an option in a child because of the high risk of proximal radial migration. Radial head replacement likewise is not an option because of the high risk of failure.

Switch the viewing and working portals again with use of switching sticks and repeat the process for the medial side of the joint. Make a direct posterior and a proximal posterolateral portal. Never debride on or near the medial gutter because the ulnar nerve is immediately adjacent. Establish a soft spot portal and place the scope through it. Loose bodies and extensive synovitis are typically seen in this area when the soft spot portal is used as a viewing portal. The OCD lesion should be visible through the soft spot portal. If the lesion is not readily visible with some elbow flexion, then the lesion is probably too anterior for an anconeus split approach and an anterior approach should be considered.

Challenge the lesion with a probe. If the cartilage is damaged but the subchondral bone holds firm, perform a microfracture technique. If the cartilage is soft or unstable and the underlying bone is compromised, perform an OAT procedure. In the majority of cases in which the lesion is accessible posteriorly, connect the proximal posterolateral portal and the soft spot portal and split the anconeus. The lesion will be visible in deep flexion. There are several options for instrumentation from multiple manufacturers that each have their own advantages and disadvantages. Using a recipient harvester, remove the diseased bone and cartilage to a stable rim, keeping the harvester as perpendicular to the surface as possible.

At the knee, make a 3-cm transverse incision directly over the superolateral corner of the lateral femoral condyle. Harvest an appropriately sized plug from the superolateral corner of the articular surface. Inspect the plug because it will often be slightly thicker on one side. Rotate the plug to match the contour of the defect in the capitellum. Mallet the donor plug into the recipient deficit with gentle taps, using as few taps as possible to limit chondrocyte injury. Fill the defect in the knee with your choice of bone substitute. Close both wounds in layers.

**Alternatives:** Other options include allograft plugs, periosteal resurfacing, bone grafting, retrograde and antegrade drilling, and observation.

**Rationale:** The OCD lesion involves both bone and cartilage. There is now ample evidence that replacing both as a unit yields the best outcomes.

**Expected Outcomes:** Approximately 90% of patients will return to sports participation, and 80% of patients can expect to return to sport at their previous level of participation<sup>1-3</sup>.

**Important Tips:**

- A diagnostic arthroscopy confirms the need for the OAT procedure and identifies other pathologies.
- Remove all of the diseased bone with the recipient harvester.
- Match the size and contour of the lesion as closely as possible with the plug.
- Immobilize the elbow in a cast for 4 weeks.

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