Osteochondral Allograft Transplantation for the Unstable Capitellar Osteochondritis Dissecans Lesion: An Anconeus Preserving Approach

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Background: Osteochondritis dissecans (OCD) of the capitellum can be a disabling condition that typically affects adolescent, overhead athletes. To date, a variety of different surgical treatment options have been described.

Indications: Surgical indications for osteochondral allograft transplantation (OCA) for capitellar OCD lesions include failure of nonsurgical management or prior surgery and unstable, full-thickness lesions of almost any size affecting both bone and cartilage. The anconeus preserving approach specifically provides wide access to nearly the entire capitellum and can be used for lesions in almost any location.

Technique Description: The anconeus preserving approach for OCA utilizes the interval between the anconeus and the ulna. With the patient positioned supine and the elbow flexed on an arm table, an incision is made approximately 1 cm lateral to the olecranon and is carried down to the fascia. Electric cautery is used to dissect the interval between the ulna and the anconeus. The anconeus is elevated off the ulna and retracted laterally to expose the underlying joint capsule. An L-shaped capsulotomy is performed over the center of the capitellum, just proximal to the annular ligament of the radial head. A pin is placed into the center of the lesion, perpendicular to the capitellum. A cannulated reamer 0.5 mm smaller than the lesion is used to ream the lesion to a depth of approximately 5 mm. Depth measurements are taken at all 4 poles of the defect. About 3 cc of bone marrow aspirate harvest is then obtained from the ulna using a cannulated needle. The oscillating saw is used to cut the graft to size using the prior measurements. The bone marrow aspirate is placed onto the osseous side of the graft before the osteochondral graft is impacted into the recipient site. The capsulotomy is then closed, and the anconeus is repaired back to the ulna. Postoperatively, patients begin range of motion as soon as tolerated, initiate strengthening at 6 weeks, and initiate return-to-sport programming at 3 months.

Results: Lesions treated with OCA typically demonstrate improvement in all outcome measures, including functional scores, graft incorporation, articular surface congruity, and return-to-sport. Complications and graft failure is rare.

Discussion/Conclusion: OCA using an anconeus preserving approach is a reliable option for surgical management of unstable OCD lesions.

Patient Consent Disclosure Statement: The author(s) attests that consent has been obtained from any patient(s) appearing in this publication. If the individual may be identifiable, the author(s) has included a statement of release or other written form of approval from the patient(s) with this submission for publication.

Keywords: osteochondral allograft transplantation; capitellar osteochondritis dissecans; unstable lesions; functional outcomes; surgical technique

VIDEO TRANSCRIPT

In this video, we will demonstrate our preferred technique for osteochondral allograft transplantation for unstable capitellar osteochondritis dissecans (OCD) lesions using an anconeus preserving approach.

OCD lesions of the capitellum can be quite disabling. These injuries typically affect overhead adolescent athletes, especially baseball players, other throwers, and gymnasts.[5,7] To date, a number of different surgical options have been described, ranging from simple debridement to osteochondral reconstruction.[3-5]

The most common surgical indications for osteochondral allograft transplantation include failure of nonsurgical management or prior surgery, presence of an unstable, full-thickness defect that affects both bone and cartilage, and this technique can be used to treat lesions of nearly

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any size.[3-5,8] There are a number of different surgical approaches that have been described.[1,2]

In this technique, we will demonstrate an anconeus preserving approach that utilizes the interval between the anconeus and the ulna. This provides wide access to nearly the entire capitellum and can be used for lesions in almost any location.[6]

Our patient is a 15-year-old right-hand-dominant boy who is a multi-sport athlete. He is now 8 months out from a previous open debridement performed at an outside hospital with recurrent symptoms, including pain and mechanical symptoms. Of note, he also has bilateral knee OCD, in addition to involvement of his contralateral elbow.

On examination, he has palpable and audible crepitus. He also has tenderness and reproducible clicking at the radiocapitellar joint. He has a positive radiocapitellar shear test. His strength and range of motion are all normal.

X-rays demonstrate open physes and a large capitellar OCD lesion. The magnetic resonance imaging shows bony and cartilage involvement with detachment of the progeny fragment from the host bone.

The surgical plan is for an osteochondral allograft reconstruction. For this, the equipment required will be an osteochondral allograft, a 9.5-mm low-profile cannulated reamer, and a small oscillating saw. The patient will be positioned supine with the arm on an arm table, and the surgery will be performed with the elbow in a flexed position.

Range of motion of the elbow is assessed. The olecranon is marked. The typical incision sits about 1 cm lateral to the olecranon. In this patient, he already has a more laterally based incision, so we will plan to utilize that. The incision is carried down to the fascia. Here you can see the interval between the ulna (to the left of the screen) and the anconeus (to the right of the screen). Electric cautery is used to dissect between these 2 layers, and a small cuff of fascia is left intact to the anconeus so that it can be repaired at the end of the case. A small elevator is used to elevate the anconeus off the ulna and to expose the underlying joint capsule. Once this is done, a small bent Hohmann retractor is placed between the capsule and the anconeus so that the anconeus can be retracted laterally. This gives excellent visualization of the capsule. Using a sharp knife, an L-shaped capsulotomy is performed. This is centered over the capitellum. It is performed just proximal to the annular ligament of the radial head so that the annular ligament is not violated. The apex of this capsulotomy is then tagged to facilitate for later repair.

The Homan retractors are then placed inside the capsule so that they can be retracted and the entire capitellum can be visualized. Here we can see the previous OCD lesion, and the frayed and fragmented cartilage. This is then trimmed and debrided to allow us to get a better assessment of the actual size of the lesion. In this case, a 10-mm sizer seems to fit quite nicely. A pin is then placed in the center of the lesion, perpendicular to the capitellum. A 9.5-mm cannulated reamer is then used to ream the lesion to a depth of approximately 5 mm to remove all loose debris, cartilage, and unstable bone. The area is then thoroughly irrigated and cleaned. And a knife is used to trim the chondral edges to remove any frayed fragments. Once this is completed, depth measurements are taken at all 4 poles of the defect.

Attention is turned to the ulna for a bone marrow aspirate harvest. A cannulated needle is impacted into place, and then advanced into the lateral border of the ulna. This is done until the vents from the needle are recessed below the bony surface, and then a syringe is used to aspirate about 3 cc of bone marrow aspirate. This is set aside.

The osteochondral graft is brought up to the table, and the depth is then marked at the 4 poles of the graft, which corresponds to the previous measurements at the recipient site. A sharp, oscillating saw is then used to cut the graft to size based on these measurements. Great care is taken to ensure that the graft is secure while cutting it. The edges of the base of the graft are then beveled to allow for a secure fit. The base is then etched in a tic-tac-toe fashion to allow some compression of the deep aspect of the graft to prevent it from sitting too proud. After preparation, the proximal aspect of the graft is then marked so that we can maintain appropriate orientation during implantation. The osseous side of the graft is then thoroughly irrigated with pulsatile lavage and compressed surgical CO2 to try to remove as many of the allograft marrow elements as possible. Once the allograft marrow elements are removed, the previously harvested bone marrow aspirate is then placed onto the graft and allowed to soak into the graft and fill all of the interstices of the subchondral bone.

Attention is returned to the elbow. The recipient site is once again thoroughly cleaned, and the graft is brought up to the table. Taking care to maintain the orientation, it is impacted into place using thumb pressure and then a few gentle taps can be applied with a mallet to help with orientation and to ensure that the graft sits recessed with the host cartilage. Afterward, the capsulotomy is closed, and the anconeus is repaired back to the ulna using the fascial sleeve that was preserved at the beginning of the case.

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A few tips and tricks to keep in mind: For exposure, the L-shaped capsulotomy should be tagged which facilitates repair at the end of the case. Small bent Hohmann retractors can be particularly helpful. For graft preparation, both pulsatile lavage and compressed surgical CO2 can be used to remove allograft marrow elements, and the autograft bone marrow aspirate from the ulna or humerus is used to saturate the graft. To get an adequate press fit, be sure that the graft depth is at least 5 mm to allow adequate stability but still permitting fast incorporation. Underream the recipient side by half a millimeter to allow for a stable press fit. The graft is inserted under thumb pressure, but you can add a few small taps from a mallet if needed for graft orientation and to ensure that it sits in a recessed position.

Postoperatively, patients are placed in a compressive dressing and a simple sling. Range of motion begins as soon as tolerated. It is then advanced during the first 6 weeks, and there is no lifting greater than 5 pounds during this time. From weeks 6 through 12, strengthening is gradually progressed. Return-to-sport programming is generally initiated 3 months postoperative. Criteria for returning to sport include radiographic evidence of union, full motion, full strength, no pain, and successful completion of a return-to-sport progression. The goal for timing of return to sport varies by sport, with soccer and track athletes typically getting back at 3 months, contact athletes (including basketball, football, and hockey) typically returning at 6 months, and higher demand upper extremity athletes (including baseball, gymnasts, and wrestlers) returning around 6 to 9 months.

Currently, there are relatively limited outcomes on osteochondral allograft. However, a recent systematic review of 446 capitellar OCD lesions that were treated either by osteochondral autograft or osteochondral allograft was published. In this, patients treated with osteochondral autograft had reliably good outcomes and improved functional scores, high rates of graft incorporation, and high rates of return to play with low complication rates. In the one study of patients treated by osteochondral allograft, there was an improvement in all outcome measures and the return-to-play rates were 100%.[4]

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