Internal fixation devices made of synthetic polymers such as polyactic acid, which are self-absorbing, are being used increasingly in the treatment of fractures and osteotomies. Use of these devices offers significant advantages over metallic fixation. They do not require a removal procedure, thus avoiding the morbidity and cost associated with hardware removal. They also gradually transfer stresses to the healing bone as they decompose thus minimizing stress shielding.

Previous studies reporting use of biodegradable fixation devices (pins and screws) for reduction of humeral capitellum fractures have reported postoperative results comparable to results obtained using other methods. The type 1 capitellum fracture (Hahn-Steinthal) frequently involves a portion of the lateral aspect of the trochlea, described by McKee et al as a "coronal shear fracture" of the distal end of the humerus.

This article reports the treatment of a type 1 humeral capitellum fracture (coronal shear fracture) internally fixed using a biodegradable poly-L-lactide screw, placed in lag screw fashion, from anterior to posterior across the capitellum.

CASE REPORT

A 39-year-old woman sustained a displaced intra-articular fracture of the left capitellum resulting from a fall.

Physical examination revealed pain, swelling, and crepitus with motion of the injured elbow. Radiographs revealed a displaced fracture of the capitellum with a "double-arc" sign, indicating that a portion of the trochlea was sheared anteriorly together with the capitellum (Figure 1).

Open reduction and internal fixation was performed. The elbow was approached via a lateral exposure. The anconeus-extensor carpi ulnaris interval was developed and the joint entered through this interval. The common extensor tendon and collateral ligament were elevated as a sleeve from the lateral epicondyle, allowing adequate visualization of the entire fracture configuration. The capitellum was sheared anteriorly along with the lateral portion of the trochlea. The fracture was reduced and held with a reduction clamp.

A 3.5-mm fully threaded poly-L-lactide screw (SmartScrew, BIONX Implants Inc, Blue Bell, Pa) was placed across the fracture directly through the anterior center of the fracture fragment using standard lag technique by predrilling, overdripping the near cortex, countersinking, tapping, and inserting the screw. A battery powered, sterile, "eye" heated cautery was used to contour the screw head so that it was smooth and flush with the articular surface.

Visible compression of the fracture was achieved, and there was no motion at the fracture site with elbow motion. The radial collateral ligament and anterior muscles were repaired with sutures and the elbow joint and fracture fragment were stable following wound closure. A posterior splint was applied with the elbow flexed to 90 degrees.

Postoperative protected elbow motion began following suture removal 2 weeks postoperatively and progressed as tolerated in a hinged elbow brace for protection.

Sixteen weeks postoperatively, radiographs revealed a completely healed fracture with a painless range of motion from 10 degrees to 110 degrees.

Six months postoperatively, the fracture was well healed without evidence of avascular necrosis and with some calcification in the radial collateral ligament (Figure 2). Physical examination revealed smooth and painless elbow motion from 5 degrees of short flexion to 130 degrees of flexion with full pronosupination.

DISCUSSION

Capitellum fractures have traditionally been classified into three groups: type 1 (Hahn-Steinthal) fracture, involving most of the capitellum; type 2 (Kocher-Lorenz) fracture, involving only the capitellum cartilage and a thin layer of subchondral bone; and type 3, the comminuted capitellum fracture. McKee et al described a fourth type of capitellum fracture.
contracture of 5°-15°, but the elbow was painless in all patients. Two patients developed post-traumatic arthritis at 1-year follow-up and one patient developed a sterile synovitis 8 weeks postoperatively, which subsided with two needle aspirations.

Pelto-Vasenius et al reported 57 patients with distal humeral fractures treated with absorbable implants. Seven cases involved capitellum fractures treated with absorbable pins in combination with absorbable (1 case) or metallic screws (1 case). Five excellent and 2 good results were reported.

Rokkanen et al reported >2500 patients treated with absorbable fixation devices. A noninfectious foreign body reaction was observed in 2.3% of patients treated with polyglycolide implants, but no reaction was reported in patients with polylactide implants.

Makela et al reported biodegradable fixation of distal humeral physeal fractures in children, four of which involved displaced capitellum fractures treated with absorbable pins, all with good results.

These four studies were all from the same institution in Finland and it is unclear whether the patient groups were different.

Partio et al recently reported their operative technique for fixation of capitellum fractures: two divergent K-wires are placed from the articular surface followed by insertion of 2-mm absorbable rods.

The advantage of using a single anteroposterior absorbable lag screw for fixation is that excellent compression is achieved with a single screw placed in the best location of the fracture to achieve fixation. Although rotation could potentially occur around the screw, the interlocking fracture surfaces lock the fracture nicely, as in this case. The theoretical disadvantage of this fixation method is that a portion of the articular surface is removed and replaced with a smooth, absorbable screw head. The advantage of using an absorbable implant over a similarly placed metallic, countersunk, lag screw, is that metallic erosion of the radial head caused by a potentially protruding metal screw head would not occur. Additionally, the absorbable screw head can be contoured using the heat cautery to fit the shape of the articular surface. The ultimate fate of the cartilage defect in the region occupied by the screw is unknown, although it is possible fibrocartilage will fill the area once the screw is absorbed.

A large type 1, or coronal shear, capitellum fracture is successfully repaired using a single anteroposterior absorbable lag screw with excellent radiographic and clinical outcome.

REFERENCES