Core Decompression for Nontraumatic Osteonecrosis of the Humeral Head
A Technique Article

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Abstract

Core decompression may used in the management of early stage, precollapse nontraumatic osteonecrosis of the humeral head. We propose a technique without risk of complications associated with injury to the biceps tendon or the blood supply to the humeral head.

Osteonecrosis of the shoulder, also called avascular necrosis or aseptic necrosis, was first described by Heimann and Freiberger,1 in 1960, and by Cruess and colleagues2 in 1968. The disease may be classified as primary, in that no clear etiology has been established, or secondary to a variety of causes.3 Osteonecrosis of the humeral head also can be described as posttraumatic or nontraumatic. There are few reports describing the natural history and treatment for this disease, despite the fact that the humeral head is the second most common site of symptomatic osteonecrosis, after the femoral head.4-7

The incidence of humeral head osteonecrosis is difficult to determine accurately, because the disease is often asymptomatic during its early course. Investigators such as Cruess noted that the patients with humeral head disease often are affected in other areas as well, particularly the hip. In patients with sickle cell disease, the incidence has been determined to be approximately 5%.8-10

There are several causes of nontraumatic osteonecrosis, some of which include corticosteroid therapy, hemoglobinopathies, dysbarism, Gaucher’s disease, alcohol abuse, Cushing’s syndrome, systemic lupus erythematosus, chemotherapy, pancreatitis, chronic dialysis, and pregnancy. The etiology is likely multifactorial, but all the causes share similarities. The disorder appears to be related to disruption of the blood supply to the humeral head, resulting in subchondral bone death.

The normal blood supply of the humeral head consists of extraosseous and intraosseous vessels. The ascending branch of the anterior humeral circumflex enters the proximal humerus at the upper end of the bicipital groove or via branches into the greater and lesser tuberosities. At this point, the intraosseous vessel may be termed the arcuate artery and pursues a tortuous posteromedial course below the epiphyseal scar to become the principal blood supply of the humeral head. It is proposed that osteonecrosis compromises the humeral head blood supply in one of four ways: 1. mechanical disruption of blood vessels; 2. injury to or compression of the arterial walls; 3. arterial inflow obstruction, such as thrombosis and embolism; and 4. venous outflow obstruction.1-3,10

The size of the lesion and its location influence disease progression. Typically, the superior central portion of the humeral head is the most common site of collapse. This may, in part, be due to the fact that this region is normally in contact with the glenoid at 90° of forward elevation.

The Cruess classification system for humeral head osteonecrosis evaluates the radiographic appearance of humeral head changes and is based on the Ficat and Arlet classification for the hip. Stage 1 disease does not demonstrate abnormalities on plain radiographs but is visible by magnetic resonance imaging (MRI) or bone scanning. Stage 2 disease is seen radiographically as sclerosis of the superior central portion of the humeral head. Stage 3 disease is characterized by the crescent sign. This sign is the result of a subchondral fracture through necrotic bone, resulting in a flattening of the humeral head. The crescent sign is best seen on an axillary view or

the anteroposterior (AP) view, with the arm in external rotation. Stage 4 disease is advanced collapse of the humeral head. Stage 5 involves disease of the glenoid and advanced glenohumeral incongruity.6,7

Core decompression has been used in the treatment of osteonecrosis of the femoral head and found to be effective in early stages of the disease, prior to collapse.12 The goal of the procedure is to decrease intraosseous pressure and promote revascularization of the subchondral bone. The literature is limited with respect to the use of core depression in the management of osteonecrosis of the humeral head.3,10,13

A technique of core decompression has been described by using a small incision in the anterior axillary fold above the pectoralis major tendon. The deltopectoral interval is bluntly exposed. A reamer is inserted lateral to the bicipital groove and directed under fluoroscopic guidance to a point just inferior and lateral to the lesion. The reamer is replaced by a coring device that manually extracts a core biopsy.3

Surgical Technique

We employ a technique with the patient in the beach chair position. The fluoroscopic equipment is placed in an anterior to posterior position, ensuring that appropriate AP and axillary views are obtainable and the lesion is well visualized. An arthroscopy is performed in order to evaluate the articular cartilage and rule out any other intra-articular pathology. Next, the arthroscopic equipment is withdrawn. The core decompression begins with a 1 cm lateral skin incision approximately 2 to 3 cm distal to the acromion. A deltoid split is performed, with care taken not to propagate distally and injure the axillary nerve. Under fluoroscopic guidance, a guidewire, followed by a reamer, is directed toward the lesion (Fig. 1). Adjustments in shoulder abduction and rotation allow the guidewire to be placed in the correct position. Curettes are also used to remove additional necrotic bone. We believe this technique requires a less invasive approach and avoids the risk of injuring or causing instability of the biceps tendon, which may occur if a deltopectoral approach is used. Furthermore, a lateral approach avoids potential injury to the ascending circumflex artery, thereby preventing further loss of blood supply to the humeral head.

Summary

Core decompression has been reported to be successful in the management of early stage, precollapse nontraumatic osteonecrosis of the humeral head. We propose an alternative technique to perform core decompression safely and without risk of complications associated with injury to the biceps tendon or the blood supply to the humeral head.

Disclosure Statement

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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