Case reports

Chondrolysis of the shoulder following a "color test"-assisted rotator cuff repair—a report of 2 cases

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Case 1

After a fall on her right hand during a volleyball game in 1989, a 34-year-old woman elite-level volleyball player developed pain in her right shoulder with tenderness over the supraspinatus tendon and a painful arc sign. Plain radiographs were normal. Arthrography showed no extravasation of the contrast medium into the subacromial bursa. Corticosteroid was injected into the subacromial bursa once, which improved her symptoms only transiently. We explored the rotator cuff in 1990 because we suspected a partial-thickness tear. At surgery, a 10-mm tear was found on the bursal surface, accompanied by a horizontal lamination of the tendon. A communication with the articular surface of the cuff was excluded after injection of gentian violet in a 0.4% aqueous solution into the glenohumeral joint cavity ("color test"). The torn portion of the cuff was then successfully repaired, but postoperatively the patient complained of slight discomfort in her shoulder when playing volleyball or swimming. The pain increased 3 years postoperatively and radiographs showed a markedly narrowed joint space. Reoperation with an endoprosthesis in 1995 revealed loss of articular cartilage in most of the humeral head and glenoid fossa. The rotator cuff and the synovium appeared normal on inspection and palpation. The result of culture for purulent and anti-acid bacilli was negative. Histology of the excised specimen showed subchondral cysts and active new bone formation, with sparse inflammatory response, and loss of articular cartilage (Figure).

Case 2

A 52-year-old woman who was an active skier complained of pain and dysfunction in her right shoulder after a fall while skiing. She had tenderness over the greater tuberosity and atrophy of the spinati muscles. Radiographs were normal, while arthrography showed extravasation of a small amount of contrast medium into the subacromial bursa. At surgery, the extent of the cuff rupture was not apparent when first seen from the bursal surface, therefore a "color test"

Case 1.

3 years after the color test. Narrow joint space, but no peripheral osteophytes.

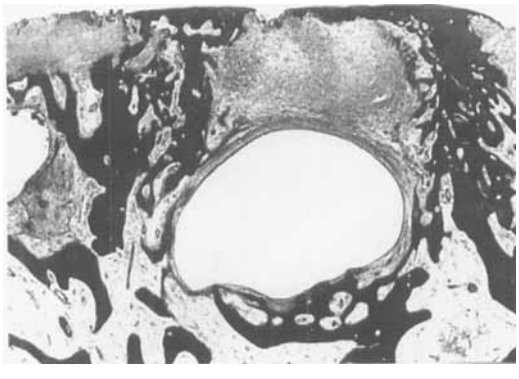
Intraoperative photograph of the right humeral head.

with gentian violet in a 0.4% aqueous solution was carried out. The pathological portion of the tendon thus identified was repaired successfully. She returned to her sport activities, but on a lower competitive level because of pain in the right shoulder. She had slight weakness in shoulder abduction and external rotation, but no impingement sign was elicited. 3 years postoperatively, she had progressive shoulder pain, associated with a narrowed joint space on radiographs. Arthrography showed no re-tear of the cuff. The result of a bacterial culture was negative. She finally received an endoprosthesis for pain relief. The intraoperative and histological findings were similar to those in case 1.

Discussion

In repairing a joint-side tear and a pin-hole or a small full-thickness tear of the rotator cuff, it is not always easy to identify the extent of the torn portion when viewed from the bursal surface. Fukuda et al. (1978, 1992) devised the "color test", an intraoperative staining test, and reported no apparent complications using indigo carmine or methylene blue. Oglesby (1992) reported a similar technique using methylene blue during arthroscopy.

Gentian violet has been applied topically for the control of superficial infections such as oral thrush in infants. Many clinical reports, however, have described irritation and necrosis of the skin or mucosa as an adverse reaction to this dye, although little is written in textbooks (Piatt 1992). In addition, animal studies have shown that this dye has cytotoxic or carcinogenic potential (Hodge et al. 1972, Thomas and MacPhee 1984, Littlefield et al. 1989). The use of gentian violet is now restricted to application to intact skin (Reynolds 1989). We experimentally injected 0.33%, 0.1%, and 0.01% aqueous solutions of gentian violet into the rat knee joint and, 7 days later, found chondrocyte death in the superficial layer of the articular cartilage (unpublished data). Thus gentian violet may be harmful to the articular cartilage as well as to the skin and mucosa. We have inadvertently used this dye at cuff surgery in 12 patients so far, of whom 2 developed arthropathy, as described here.



Photomicrograph of the excised humeral head. Intraosseous cysts and loss of cartilage (HE, ×5).

The clinical course and pathological findings in our patients are consistent with those in the case reported by Yoshida et al. (1991) and in the 4 cases by Fukuda and Hamada (1996), who developed loss of articular cartilage without osteophytes after a cuff repair, although both authors are inconclusive as to the pathogenesis of this condition. We conclude that the gentian violet color test in rotator cuff repair surgery may cause chondrolysis and we warn against the use of this technique.

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