INFRASPINATUS PARALYSIS DUE TO SPINOGLENOID NOTCH GANGLION

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We describe five patients, seen since 1984, with posterior shoulder pain and isolated wasting and weakness of the infraspinatus. In four of these a ganglion in the spinoglenoid notch was demonstrated by MRI and in one recent case ultrasound scans were positive.

Three patients have been treated by operation, but there was recurrence in one after five years. In each confirmed case, the ganglion straddled the base of the spine of the scapula, extending into both supraspinatus and infraspinatus fossae. The nerve was either compressed against the spine or stretched over the posterior aspect of the ganglion. Adequate surgical exposure is essential to preserve the nerve to the infraspinatus and to allow complete removal of the ganglion. This is difficult because of the location and thin-walled nature of the cysts.

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Reports of compression lesions of the nerve to the infraspinatus caused by ganglia first appeared in the Japanese literature (Aratani, Kato and Torigata 1970; Maruyama et al 1973; Okido et al 1974) and further cases have been described by Ganzhorn et al (1981) and Ogino et al (1991). A similar clinical syndrome has been attributed to entrapment of the nerve by the inferior scapular ligament at the junction of the glenoid and scapular spine (Aiello et al 1982). Localised wasting of the infraspinatus has also been reported in the absence of a space-occupying lesion such as a ganglion or an entrapment neuropathy; this may result from traction or friction injury around the base of the spine of the scapula (Hama et al 1992).

The location of ganglia in the spinoglenoid notch seems fairly constant, but their origin is uncertain and the relationship to the nerve has not been well described. We have reviewed our experience with such lesions since 1984 and report five cases, which emphasise the difficulties of management.

CASE REPORTS

Case 1. A 36-year-old panel-beater gave a nine-month history of pain in his right (dominant) shoulder. He was unable to lift heavy loads above his head and had some difficulty in combing his hair. On examination there was marked wasting of infraspinatus (Fig. 1) with tenderness below the lateral end of the spine of the scapula. The power of external rotation was considerably reduced and EMG confirmed complete denervation of only the infraspinatus. MRI showed a ganglion straddling the base of the spine of the scapula (Fig. 2). Ultrasound examination confirmed the anechoic, cystic nature of the lesion (Fig. 3).

At operation through an incision parallel to and slightly below the spine of the scapula, the deltoïd was detached and the infraspinatus fossa explored. The ganglion was immediately apparent, but the infraspinatus nerve was found with difficulty, being adherent to the posterior aspect of the ganglion and stretched along its length (Fig. 4). The nerve was released from the ganglion and traced back into the supraspinatus fossa. The ganglion...
was ruptured at this stage and its walls were excised without the possibility of tracing its neck to its origin.

After the operation, pain was relieved and one year later the power of external rotation had improved considerably although muscle bulk was not fully restored. **Case 2.** In 1984, before we were aware of the possibility of ganglion, a 24-year-old man was referred with an 18-month history of pain in his right (dominant) shoulder. This was relieved by resting the arm in an abducted position. There was marked wasting of the infraspinatus muscle and weakness of external rotation. Plain radiographs and tomograms showed a benign cartilaginous tumour in the greater tuberosity, and an arthrogram was normal. EMG studies confirmed isolated complete denervation of the infraspinatus.

At operation the suprascapular nerve was explored. There was no evidence of compression at the suprascapular notch but the superior transverse ligament was divided, and the nerve traced across the supraspinatus fossa. A tense ganglion was found plunging around the scapular spine into the infraspinatus fossa. The ganglion was cleared from the nerve, but its thin walls were punctured, making it impossible to identify the neck and to ensure complete excision.

Pain was relieved for about four years and EMG showed some evidence of reinnervation. Discomfort in the posterior shoulder recurred in 1990 and the patient became unable to throw a ball. The clinical findings were as in 1984; MRI showed a large recurrent ganglion at the spinoglenoid notch extending into the infraspinatus fossa (Fig. 5). The patient decided not to have any further surgery.

**Case 3.** A 22-year-old cricketer was seen elsewhere in 1990 with a three-month history of pain in his right (dominant) shoulder, relating it to a direct blow sustained at work. He had difficulty in elevating his arm and could...
not throw a ball. There was marked wasting of the infraspinatus muscle and weakness of external rotation but also some weakness of the biceps, triceps and pronator teres. An EMG showed complete denervation of infraspinatus with partial denervation and some reinnervation of supraspinatus. MRI showed a ganglion, but this was erroneously reported to be in the supraspinatus fossa. This was subsequently explored but no ganglion was found, and the suprascapular ligament was divided.

He was referred to our unit; review of the MRI showed a ganglion in the usual location at the base of the spine of the scapula. The patient refused further surgery. Case 4. A 25-year-old right-handed upholsterer complained of persistent pain in the posterior shoulder for three months, which he attributed to an incident at work while lifting a lounge frame.

There was wasting of the infraspinatus, weakness of external rotation and slight weakness of abduction. EMG showed severe denervation of infraspinatus with sparing of supraspinatus. MRI revealed a large ganglion, again erroneously reported to be in the supraspinatus fossa. The suprascapular fossa was explored but no ganglion was found. A repeated MRI again showed the ganglion at the spinoglenoid notch.

At exploration, this time of the infraspinatus fossa, a 2 × 3 cm ganglion was identified compressing the suprascapular nerve against the spine of the scapula. It did not appear to arise from the posterior capsule of the glenohumeral joint. One year later, the patient is pain-free, and has returned to work. The power of infraspinatus has improved.

Case 5. The fifth, probable case located from our records was a 30-year-old male factory worker, who presented in 1985 with a six-month history of posterior shoulder pain starting spontaneously at night. Pain was worse on activity and relieved by resting the arm in an abducted position. There was wasting and weakness of the infraspinatus muscle with tenderness below the spine of the scapula, and EMG confirmed denervation of only the infraspinatus. The patient refused surgery and was lost to follow-up.

DISCUSSION
A ganglion in the spinoglenoid notch should be suspected in patients with non-specific posterior shoulder pain and localised wasting of the infraspinatus muscle with no other clinical signs or radiological evidence of a rotator-cuff tear. Such ganglia have been reported only in men, usually those involved in heavy manual work or strenuous sports such as weight-lifting. EMG and nerve-conduction studies are essential to exclude a suprascapular nerve lesion at the suprascapular notch or a more widespread neurological condition such as brachial neuritis. EMG usually succeeds in localising the lesion but cannot distinguish between a ganglion, the rare entrapment by the inferior scapular ligament (Aiello et al 1982), and a traction lesion of the nerve round the base of the spine of the scapula.

Confirmation of the nature of the lesion is essential if surgery is contemplated. Ferretti, Cerullo and Russo (1987) studied 96 international volleyball players and found isolated but asymptomatic wasting of the infraspinatus in 12. Three of these patients had EMG studies which confirmed the paralysis but did not establish the cause. Black and Lombardo (1990) described four patients with clinical and EMG evidence of isolated infraspinatus wasting, but all responded to conservative management, became asymptomatic and returned to normal activities. Liveson, Bronson and Pollack (1991) reported three patients with identical clinical and EMG findings which again settled after conservative treatment.

None of these patients had MRI or ultrasonography to exclude the presence of a ganglion at the spinoglenoid notch and therefore the cause of infraspinatus paralysis.
remains uncertain. There is evidence, however, that this clinical picture can occur in the absence of entrapment or a space-occupying lesion: Hama et al (1992) reported three patients who had negative surgical exploration. No ganglia were found and shaving of the lateral edge of the spine of the scapula resulted in good recovery of function in the infraspinatus.

A ganglion was demonstrated by MRI in four of our five patients. We have seen no patient with EMG-confirmed denervation of the infraspinatus and normal scans. In our small series, the ganglia were all at a constant site, although this was at first incorrectly reported.

In our case 1, as described by Takagishi et al (1991), ultrasonography showed the nature of the lesion; this non-invasive procedure appears to be a cheap and reliable screening method, especially if MRI is not available.

Our surgical experience with these ganglia illustrates the difficulties. An approach from below the spine of the scapula allows only a limited exposure of the ganglion and the nerve; the ganglion cannot be adequately traced to the infraspinatus fossa. The ganglia are usually thin-walled and easily punctured, making complete excision almost impossible. One of our patients already has a recurrent ganglion and we suspect that more will appear.

The relationship between nerve and ganglion varies: in our case 1, the nerve was stretched and adherent to the posterior surface of the enlarging ganglion and in case 5 it was compressed against the spine of the scapula as also described by Ogino et al (1991). Since the nerve must be preserved and the ganglion totally excised if recurrence is to be avoided we consider that exposure of both the supraspinatus and infraspinatus fossae may be the best option.

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REFERENCES


