A rare shoulder

DAVID J. FULLER
M.B., B.S.

*Senior House Officer,
Rowley Bristow Orthopaedic Hospital, Pyrford, Surrey*

RUPTURE of the supraspinatus component of the rotator cuff is not an uncommon occurrence. The diagnosis and treatment of this event is well accounted for in surgical texts. An entirely unrelated condition which is also thoroughly described in the literature is traumatic paralysis of the deltoid muscle. The performance of abduction at the shoulder joint is normally achieved by supraspinatus and deltoid working in harmony and should either of the above two events occur, such abduction that remains possible is very much a function of the other intact mechanism. Isolated deltoid paralysis, in fact, results in very little disability whereas a complete tear of the supraspinatus tendon usually represents a severe handicap.

Case report

The patient is a 58-year-old business man. He is right-handed.

1924

At the age of 15 he was involved in a road accident with a horse and cart, and he suffered a dislocation of the left shoulder which was reduced at a nearby hospital. The injury resulted in permanent damage to the left circumflex humeral nerve with total paralysis of the deltoid muscle. This incident in no way prevented the patient from leading an active sporting life—as a young man he was a serious oarsman and competed in several major rowing events.

1965

In October of this year he developed a classical right-sided supraspinatus tendinitis and was therefore seen by an orthopaedic surgeon who confirmed that the left deltoid was still paralysed. For the next 8 months this painful right shoulder resulted in greater use of the left arm than normal.

1966

In July, at the same time as the symptoms in the right shoulder were finally subsiding, he first became aware of weakness in the left arm. He was, in fact, on a motoring holiday at this time and his progressive difficulty in controlling the steering wheel of the car with his left arm revealed to him that all was not well.

In October, 3 months later, he presented to this unit complaining of disabling loss of voluntary movement at the left shoulder joint. Pain was not a symptom.

Examination revealed a right shoulder of normal contours with full active range of movement and full power. On the left side the deltoid muscle was completely wasted. There was no anaesthesia in the area supplied by the superficial branch of the circumflex nerve. The left shoulder could be moved passively without pain through the entire normal range. The active movements, however, of flexion, extension and abduction were reduced to some 15° each. When the left arm was passively guided to a point 20° or more from the trunk and then the supporting hand was removed, the arm collapsed to the side.

A diagnosis of complete rupture of the supraspinatus tendon in a shoulder previously afflicted with traumatic paralysis of the deltoid muscle was made. The patient was offered surgery; the alternatives being attempted repair of the ruptured tendon or arthrodesis of the shoulder. A pause of 8 weeks convinced the patient that the disability was severe and he elected to have the tendon repaired operatively.

Operation. The repair was performed on 12 January 1967. The exposure was effected by the posterior approach described by Debeyre, Patte & Elmelik (1965). Through an incision which runs above and parallel with the scapular spine and out across the acromion, the trapezius was divided, the acromion osteotomized and reflected forwards on the acromio-clavicular ligament and the atrophied remnant of the deltoid was identified. This exposure reveals the whole length of the supraspinatus and its tendon and in this case the latter was found to be completely ruptured leaving a triangular defect in the cuff through which the sub-acromial bursa and the shoulder joint communicated. The defect was repaired by simple apposition and suture of healthy tissue plus two stout silk U-sutures transfixing the greater tuberosity. Advancement of the supraspinatus in its fossa, as performed in twelve out of thirty-three cases by Debeyre *et al.* (1965), to relieve

tension on the suture line was not necessary in this case. Post-operatively the arm was supported in 90° abduction in a thoraco-brachial plaster spica.

Six weeks after the operation the plaster was removed and the patient was able to actively abduct the left arm to 100°.

Discussion

This case has been put on record essentially because of its rarity and the following brief discussion will indicate a few brief points of interest that it demonstrates.

(a) *The paralysed deltoid*

The patient was exceedingly unfortunate to receive a permanently paralysed deltoid muscle as a complication of his dislocated shoulder. A transient paresis is not uncommon but an anatomical interruption of the nerve very rarely follows shoulder dislocation. The absence of any demonstrable anaesthetic patch of skin over the shoulder suggests that the nerve injury occurred distal to the circumflex humeral nerve's division into deep and superficial branches, although the phenomenon of overlap could account for this finding.

(b) *The rotator cuff rupture*

The essential pathology of 'degenerative/inflammatory' tendon lesions is not yet fully understood although it is known that all thick tendons have a tendency to become avascular in the middle. At the present time, however, surgical treatment depends more upon an understanding of the natural history of the condition rather than its essential pathology. This knowledge of natural history informs us that degeneration and inflammation often occur in the rotator cuff in an otherwise healthy body, but the processes are self-limiting and spontaneous recovery is the rule. The degenerative area can be very painful. It can also be the site of a mechanical breach. Probably, the greater the vascular reaction of attempted repair the more intense is the pain that the patient experiences.

It appears probable in the case under discussion that during 1965 and 1966 degenerative processes were active in both right and left shoulders. The right side was painful, the left side was not. Perhaps the excess load of activity borne by the left shoulder compensating for its painful fellow on the other side was a factor in the subsequent rupture. Certainly the left supraspinatus tendon would have been degenerate at this time because tendon rupture occurs as an event in the chronic process of degeneration, not suddenly in a healthy tendon.

It is unusual for supraspinatus tendinitis to be

concurrently bilateral and this unlucky man, by suffering pain on the right and tendon rupture on the left, escaped neither of the unpleasant clinical manifestations of this condition.

(c) *The abduction disability*

For many years it was taught that supraspinatus initiates and deltoid completes abduction at the shoulder joint. This was demonstrated to be clearly untrue by the studies of Inman, Saunders & Abbott in 1944. They showed that the two muscles contract more synchronously than was thought, whilst the short rotators do their very important work of supplying the coupling force that holds in the humeral head.

This case illustrates that the supraspinatus muscle can play perhaps a greater role in abduction than is generally appreciated. Without his deltoid muscle the patient experienced practically no disability for a period of over 40 years. When he lost the use of his supraspinatus he was completely incapable of holding any abductive force at all above 15°. Clearly, he had been relying upon his intact supraspinatus for elevating his arm in the coronal plane. We know that when the roles are reversed, and the power of supraspinatus is lost whilst the deltoid muscle remains intact, the power of abduction is grossly diminished—a fact that is normally made use of when diagnosing complete supraspinatus tendon tear.

The conclusion is that perhaps appearances are deceptive and that the comparative size of the deltoid and the supraspinatus is no index of their actual roles in shoulder abduction. Providing that all other factors are normal, the deltoid muscle might well be very much the understudy of supraspinatus in normal abduction.

Summary

The first documented case of supraspinatus tendon rupture and paralysed deltoid co-existing in a shoulder is recorded.

The surgical treatment selected and the early results of the operation are described.

The significance of the parts played by each of the two muscles in the performance of abduction of the arm is emphasized.

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