ABDUCTION CONTRACTURE OF THE SHOULDER FROM CONTRACTURE OF THE INTERMEDIATE PART OF THE DELTOID

Report of Three Cases

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Adduction contracture of the shoulder is quite common; abduction contracture is very rare. Cellarius (1948) and Lerch (1949) discussed the condition but there is no mention in the literature of abduction contracture caused by shortening of the intermediate part of the deltoid muscle. This paper concerns three patients with abduction contracture of the shoulder caused by that condition. All were Indian; their ages at the time of first attendance were respectively fourteen, fourteen and twenty-one years; the condition was unilateral in one patient and bilateral in two; in all, great improvement was achieved by removal of the affected part of the deltoid muscle.

CASE REPORTS

Case 1—A lad of fourteen was first seen in May 1961 because of inability to bring the arms to the sides. The first indication of this condition was seen when the boy was four: he was then noticed to have some deformity of the shoulders. The diagnosis of rickets was made and treatment was started accordingly, but the deformity progressed steadily until the boy was ten. The circumstances of birth had been quite normal; there was no history of past illness and there was no history of similar affection of other members of the family.

FIG. 1

FIG. 2

FIG. 3

Case 1. Figures 1 to 3—Appearance of left shoulder before operation. Note the groove in the intermediate part of the deltoid, the abduction deformity and the rotation of the scapula. The right shoulder has been operated on one year previously, and now appears normal.

Examination showed prominent scapulae and abduction deformity of about 30 degrees of both shoulders. The acromia were depressed, but the medial borders of the scapulae were rotated upwards to give an appearance like that of Sprengel's shoulder. There was a vertical depression over the middle part of each deltoid muscle. The heads of the humeri were prominent anteriorly (Figs. 1 to 3). A cord-like structure could be felt in the middle part of each deltoid muscle extending from the acromion to the deltoid tuberosity. All movements except for adduction were full and painless; attempted adduction caused all the deformities to appear more prominent. The humeri were of equal length.

FIG. 4

FIG. 5

FIGS. 4 TO 6

Case 3. Figures 4 to 6—Appearance of the shoulders before operation. Note the abduction deformity, the rotation of the scapula and the depression in the intermediate part of the deltoid.

FIG. 6

FIGS. 7 TO 9

Case 3. Figures 7 to 9—Radiological appearances. Figure 7—Antero-posterior view. Note the prominence of the deltoid tuberosity and the vertical disposition of the acromion. Figures 8 and 9—Axial views in 90 degrees abduction and with attempted adduction. Note the anterior subluxation of the head of the humerus when adduction is attempted.

FIG. 7

FIG. 8

FIG. 9

Radiographs showed no defect of bone or joint: with active adduction there was some tendency to anterior subluxation of the humeral head. No abnormalities were found in the blood or urine.

Treatment—At operation in June 1961 the right deltoid muscle was exposed through a T-shaped incision. A depressed fibrous cord occupied the site of the intermediate part of the muscle. The anterior and posterior parts looked normal. The cord was detached from the acromion, dissected down for about two and a half inches and removed. As soon as this had been done the arm could easily be brought to the side. The anterior and posterior parts of the deltoid muscle were brought together and the skin was closed. The arm was bandaged to the side and movements were begun ten days later.

A year later a similar procedure was done on the left deltoid muscle: the findings were similar to those on the right. Eighteen months after the second operation both shoulders showed a full painless range of movement.

Histological examination—Sections of the fibrous cord showed disintegration of muscle fibres and marked collagenisation.

Case 2—A boy of fourteen came in September 1962 complaining that for six years he had been unable to adduct the left shoulder. Slight prominence of the left scapula had been noticed when the boy was five years old. There was no history of past serious illness, of injection or of injury and there was no history of similar affection of other members of the family.

Examination showed an abduction contracture of 30 degrees, with prominence of the scapula and with a depression over the middle part of the deltoid muscle. There was prominence of the humeral head that was increased by attempted adduction. All movements except adduction were full and painless. A cord-like structure could be felt in the intermediate part of the deltoid muscle, extending from the acromion to the humerus.

Radiographs showed no major lesion of bone or joint, though there was perhaps some widening of the acromio-clavicular joint. Examination of blood and urine showed no abnormalities.

Treatment—At operation in October 1963 the deltoid muscle was exposed. A depressed fibrous cord was found to occupy its middle part. This was removed and at once full adduction could be achieved. The deltoid muscle and skin were closed; mobilisation began ten days later.

Two months after operation the patient had a full painless range of shoulder movement; six months later there had been no recurrence of the contracture.

Histological examination—Sections showed disintegration of muscle fibrils with much collagenisation. The cord was divided like a muscle bundle by septa of connective tissue. There was no evidence of inflammatory or ischaemic change.

Case 3—A man of twenty-one came in April 1962 with long-standing inability to bring the arms to the sides. His mother said that prominence of the scapulae had been noticed when the patient was six, soon after an illness that had been diagnosed as meningitis. Circumstances of birth had been quite normal.

There was an abduction contracture of 30 degrees of both shoulders, but all other movements of these joints were full and painless. The shoulders appeared to droop and the scapulae were high and mobile. There was a vertical groove in the intermediate parts of each deltoid muscle and in this a hard cord-like structure was felt to extend from the

FIG. 10

Case 3—Appearance at operation. The fibrous cord has been detached from the acromion and is being followed distally before removal.

acromion to the deltoid tuberosity (Figs. 4 to 6). Attempts at adduction caused the humeral heads to move upwards and forwards. No other abnormalities were found.

Radiographs showed prominence of the deltoid tuberosities, some irregularity of the humeral heads and rather vertical disposition of the acromia. Axial views showed subluxation of the humeral heads on attempted adduction (Figs. 7 to 9).

Treatment—Operation was done on both shoulders in March 1964. On each side an incision was made over the depression in the deltoid muscle and the fibrous cord in the muscle was identified, detached from the acromion, cut as far distally as possible and removed (Fig. 10).

FIG. 11

FIG. 12

Case 3. Figures 11 and 12—Histological appearances. Muscle fibres undergoing collagenisation.

Even after removal of the cord full adduction was not possible, so any fibrous septa made taut by adduction were then divided. Even then full adduction could not be achieved. The muscle and skin were closed.

Movement was started eight days after operation, and six months later the range of shoulder movement was practically full.

Histological examination—Sections from all parts of the fibrous cord showed degeneration of muscle fibres and collagenisation (Figs. 11 and 12).

DISCUSSION

This condition of abduction contracture of the shoulder is clearly caused by fibrosis of the intermediate part of the deltoid muscle. It is perhaps comparable to the fibrous contracture of the quadriceps muscle described by Hněvkovský (1961), Fairbank and Barrett (1961) and Gammie, Taylor and Urich (1963).

It is suggested that the intermediate part of the deltoid muscle, having an anatomical structure different from that of the anterior and posterior parts, is either fibrotic at birth or gradually undergoes fibrosis after birth (Figs. 13 and 14). Growth at the upper humeral epiphysis causes abduction and partial anterior subluxation of the shoulder. This is compensated by upward displacement and rotation of the scapula until that can go no farther and the abduction deformity becomes obvious.

The condition was bilaterally symmetrical in two patients, and in all three there was a history of gradual progression. In all three, good and lasting relief was obtained after removal of the fibrotic cord. Sections showed collagenisation but there were no inflammatory or ischaemic changes suggestive of dermatomyositis or scleroderma.

FIG. 13

FIG. 14

Figures 13 and 14—The anatomy of the normal deltoid muscle (redrawn from Grant's *Anatomy*), and the conversion of the intermediate part to fibrous tissue.

SUMMARY

1. Three cases of abduction contracture of the shoulder caused by fibrosis of the intermediate part of the deltoid muscle are described.
2. Treatment by removal of the affected part of the muscle was successful in each case.
3. Histological findings are described and the nature of the condition is discussed.

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