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A NEW METHOD OF ARTHRODESIS OF THE SHOULDER

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Arthrodesis of the shoulder is an excellent method for treating paralysis of the abduction muscle. Abduction of the shoulder is compensated for by the function of the scapula. Encouraging results are obtained if it is used properly. We have a good number of cases of arthrodesis of the hip, knee and ankle and elaboration of the techniques can be obtained, but there are only a few cases of shoulder arthrodesis. In addition, various unfavorable conditions, such as the following, exist:

1. The contact area of the scapula and humerus is small.
2. The articular surface of the glenoid is flat and is further flattened by shaving the cartilage. It is therefore difficult for the head of the humerus to sit on the glenoidal fossa with stability.
3. The weight of the arm pulls the head of the humerus down and gives no compression effect on the joint.
4. In the cases of anterior poliomyelitis and paralysis of the brachial plexus, the bone and the muscles are atrophic and sufficient compression power cannot be obtained by the power of these muscles.

The author has studied numerous sorts of shoulder arthrodesis in the domestic and foreign literatures (Crenshaw 1963). Solid union can be obtained by any one of them. However, the common weak point of these methods is that perfect positioning of the joint is very difficult on the operation table, and no correction of alignment can be accomplished after surgery because of metal fixation.

In 1957, however, Carroll tried to solve this problem. His method is an excellent one. The position can be changed after the operation. To my regret his procedure has not been commonly used. With the same basic idea in mind, the author tried a simpler operative technique in 1955 and has had remarkable results.

MATERIAL AND METHODS

With the patient under general anaesthesia and lying on the unaffected side, a longitudinal incision is made on the anterior aspect of the shoulder, extending from the acromio-clavicular joint downward on the arm a distance of 10 cm. The deltoid muscle is retracted laterally. The subscapular muscle and the joint capsule are exposed and incised. From a point 3 cm inferior to the greater tuberosity, a drill hole is made through the head of the humerus into the center of the glenoid in the proposed position of the arthrodesis. A hole big enough to contain the tip of the screw is chiseled in the center of the glenoid. Joint cartilage is removed completely from the glenoid and the humeral head. A long screw is driven into the drill hole of the humerus. This screw should be long enough to project 1 to 1½ cm from the head of the humerus (Figure 1). In this way the tip of the screw is snugly fixed in the hole of the glenoid. Then the head of the screw is tied to the acromion with four pairs of double loop of thick silk thread (Figure 2). Joint capsule, subscapular muscle, deltoid muscle and skin are sutured in layers.

A simple abduction splint of the shoulder is used for two weeks and then a spica cast is applied after appropriate positioning of the shoulder with the patient sitting on a stool (Barr et al. 1942).

The plaster cast is used for 8 to 12 weeks; then a plastic splint is applied and active exercise of the shoulder and the elbow is encouraged. This splint is removed

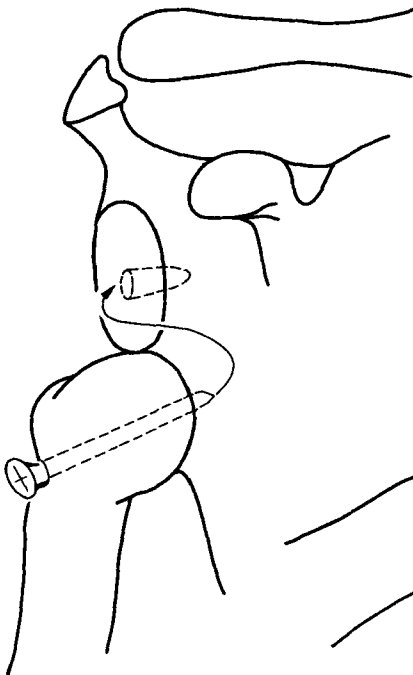


Figure 1.

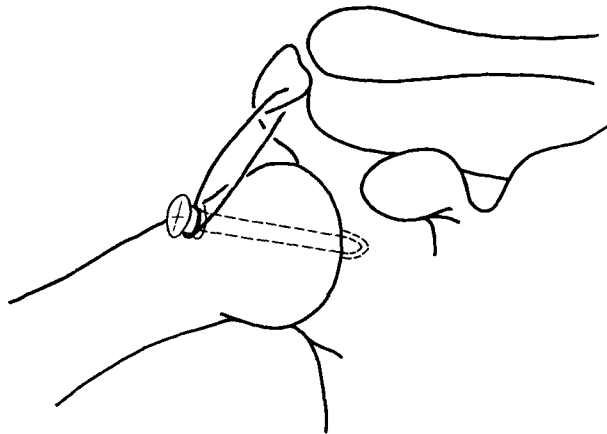
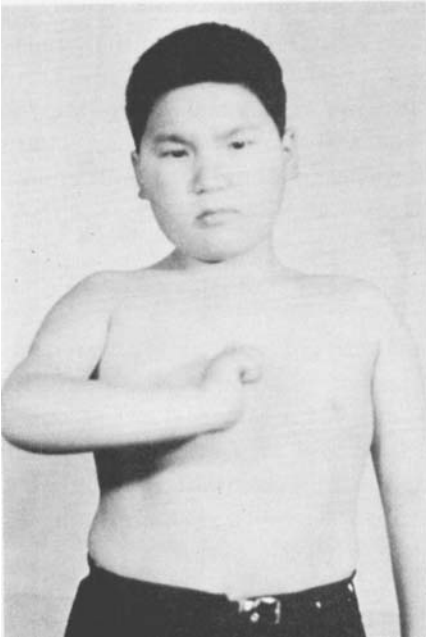


Figure 2.

*Figure 3 a.**Figure 3 b.*

after solid union of the bone is ascertained by radiographic examination, usually 6 months after the operation.

The advantages of the present method are as follows:

1. Following the operation, the proper position of the shoulder can be obtained quite easily, with the patient sitting on a stool so that he can be observed from all sides.

2. By means of silk thread loop fixation of the screw head to the acromion, compressing force is produced by adduction, forward flexion or external rotation. This is a kind of compression arthrodesis (Charnley 1951).

3. Stability of the joint is obtained by insertion of a single screw, the tip of which provides the fulcrum of the compressive power.

The present method can easily be performed and does not require any particular skill.

RESULTS

Ten patients were operated on. At the follow-up examination, 2 to 17 years after the operation, solid fusion had been obtained in a satisfactory position in all 10 cases.

One case is presented here. The patient was an 11-year-old boy. He was affected by anterior poliomyelitis and could not move his right

upper extremity. No active abduction was possible before surgery. The operation was performed on January 24, 1968. Bony fusion was proved radiographically after 100 days. In December, 1968, the screw was removed. Figure 3 shows the position of his right shoulder. In this case, Steindler's tendon graft was planned for his right elbow, but it was proved to be unnecessary because he regained enough flexion force of the right elbow after this operation.

SUMMARY

The weak point of the previous methods of shoulder arthrodesis, namely, difficulty in obtaining the proper position on the operation table under general anaesthesia, is discussed. A new method of shoulder arthrodesis has been introduced. Insertion of a screw gives stable positioning of the humeral head and the alignment of the joint can be easily corrected after the operation. No special technique nor instrument is needed.

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