

large raw surface involving the entire anterior aspect of the neck was covered with four large split-skin grafts which were removed from the thigh and sutured into the neck wound. The grafted area was covered with a pressure dressing kept moist continuously with 0.5 per cent chloramine solution.

These grafts "took" completely but several smaller grafts were necessary later to produce complete healing of the chest wounds. Figure 1B shows the result one year after the initial graft. Further improvement could be accomplished by additional split-skin graft.

CASE 2.—A boy, age 14, suffered a deep burn of the right side of his face, September, 1937. The accident occurred when he became asphyxiated and fell unconscious

with his face against a hot water heater in the bathroom of his home.

The resultant burn destroyed the right side of his face as shown in Figure 2A. This photograph was taken approximately four months after the burn, and shows a defect which can be repaired only by means of a large pedunculated flap. In this instance it seemed advisable to use a rolled pedunculated flap. The lower end of the flap was lined with a full-thickness skin graft to give an inner surface to the reconstructed cheek. The photographs in Figure 2 show various stages in the manipulation and utilization of the rolled flap. Ten operations were required. Figure 2D shows the result two years after the injury. Further improvement could be obtained but the patient, at the present time, is satisfied with the result.

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## THE TREATMENT OF COMPLETE DISLOCATION OF THE OUTER END OF THE CLAVICLE

### An Hitherto Undescribed Operation

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AS IS WELL-KNOWN by all surgeons, dislocations at the acromioclavicular joint are more frequently incomplete; to this type of injury the term subluxation is usually applied. It is generally recognized that such injuries usually repair without disability if adequate fixation of the two bones in proper position is maintained for a suitable length of time. It is not my intention in this contribution to refer to this type of lesion.

Less commonly there is a complete dissociation of the lateral end of the clavicle and the acromion. In such cases, the end of the clavicle overrides the acromion and complete rupture of all the ligaments taking part in the acromioclavicular joint occurs. The statement has been so frequently made, that in addition to rupture of the acromioclavicular ligaments in such a lesion rupture of the coracoclavicular ligament also occurs in these cases, that the accuracy of this statement has been very generally accepted. My own experience indicates that this is not so.

Practically all text-books on anatomy and on surgery, including those specifically

dealing with fractures, make the statement that it is the function of the clavicle to support the scapula and to act as a strut which fixes the shoulder at the proper distance from the sternum. Although when the clavicle is fractured in the usual position at about the junction of the middle and outer third, the outer end of the proximal fragment has a tendency to become elevated and the shoulder and outer fragment of the clavicle to drop, and although there is usually present more or less overriding of the fragments, it would appear that these deformities are the result rather of the original injury than due to loss of continuity of the bone.

The clavicle does not act as a strut nor does it support the shoulder. That these statements are true is proven, I believe, by the fact that complete removal of the clavicle is not followed by either shortening of the distance from the tip of the shoulder to the midline of the body nor by dropping of the shoulder on the affected side. The major function of the clavicle is to act as an attachment or a *point d'appui* for the muscles attached to it, more especially the pec-

toralis major, the deltoid, the sternocleidomastoid, and the trapezius. It would appear evident that the proper position of the shoulder is dependent upon adequate functioning of these muscles and not upon the mechanical support given by the bone.

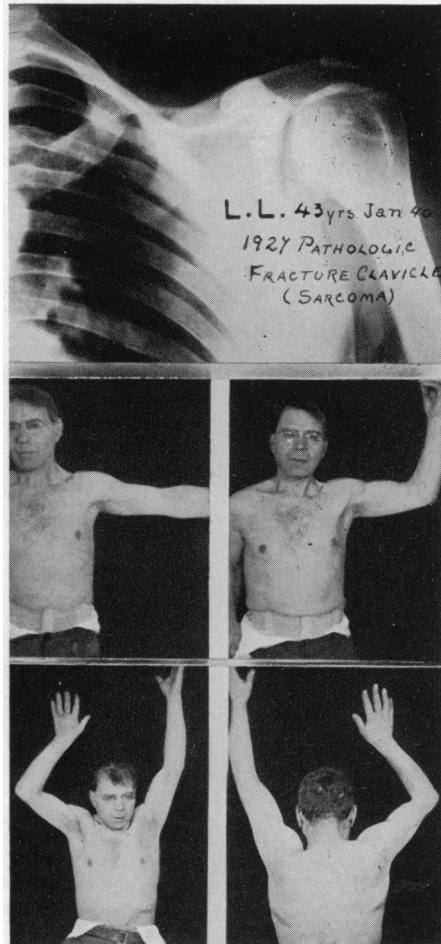
The fact that the clavicle is practically functionless in the human being was first drawn to my attention when, in 1912, the left clavicle was completely resected, together with its periosteum and with the muscles immediately attached to it, on account of small round cell sarcoma in a child, age 14. Although the patient died four years later of metastases, recurrences in different parts of the body having been controlled in the meantime by radiation therapy, the fact that no shoulder deformity nor loss of function occurred, impressed me greatly. In this case, following removal of the clavicle, the muscles which had been attached to it were securely united to one another so that each acted as a point of fixation for the other. In January, 1927, the following case was operated upon:

**Case 1.**—L. L., age 30. While in the Russian Army, 1916, machine-gun bullet wound of the right elbow. Three months' leave, no treatment. Return to full duty in the army and afterward worked as a common laborer. Prior to admission he was working as a pedlar, pulling a sleigh. He felt something crack in the left clavicle. Examination showed him to be suffering from a pathologic fracture about the middle of the clavicle. He was operated upon and a complete resection was performed of the left clavicle together with periosteum and approximately 2 cm. of muscles attached on all borders. The divided muscles were carefully sewn to one another. A diagnosis of round cell sarcoma was made.

He returned to work about two months after operation, and has continued at work more or less continuously since that time. Six months after the operation upon his shoulder, he was again operated upon and a machine-gun bullet removed from the right elbow on account of pain and loss of function of that joint.

This man has remained well. At the present time he is engaged as a shipper in a wholesale vegetable establishment, in consequence of which from morning to night during a long day he is continuously handling heavy packages up to 150 pounds in weight. Although he suffers a substantial disability referable to the right elbow joint region he is emphatic in his statement that

there is no disability referable to the left shoulder. The accompanying photographs prove, on the one hand, that the left clavi-



Top.—FIG. 1. Case 1: Roentgenogram, January, 1940, 13 years after complete resection of left clavicle. Note scapula in normal position.

Middle and bottom.—FIG. 2: Case 1: Photographs, January, 1940. Note scar at site of removal of left clavicle; absence of deformity of shoulder; and presence of full range of movement in all directions of left shoulder joint.

cle is completely missing and, also, that there is no deformity nor limitation of movement.

In December, 1939, a man presented himself with complete clinical dislocation of the outer end of the clavicle:

**Case 2.**—Hospital No. 7634-39: A. A., age 26. This patient was first seen December 13, 1939. He gave the history

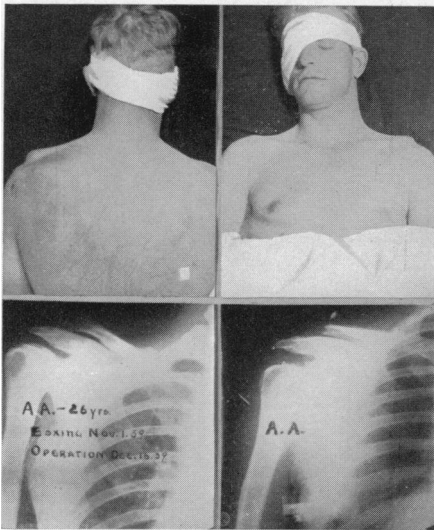
that he had been injured, November 1, 1939, while boxing. Examination showed a complete dislocation of the lateral end of the right clavicle, with overriding of approximately 2 cm. of this bone on to the superficial surface of the acromion. Correction of the deformity could not be carried out.

Based upon a conviction that the clavicle is in fact one of the spare parts of the human anatomy, it was decided to resect the lateral third of this bone. A curved incision below the distal half of the clavicle and extending to the tip of the acromion, so placed that it would lie beneath the line of the clavicle and be away from pressure points, was employed. This incision was

seemed evident, therefore, that the ligament was intact.

The periosteum was removed from approximately the distal third of the clavicle and, with the finger in the wound pressed against the coracoclavicular ligament, that portion of the clavicle distal to this point was resected. For this purpose Bethune's rib-cutting shears were employed; two bites being necessary to divide the bone. There was no evidence whatever of any ligamentous structure in the neighborhood of the acromioclavicular joint nor was there any evidence of a joint surface on either clavicle or acromion.

The wound was carefully closed in layers—No. 0 chromic catgut for the deeper



Top.—FIG. 3: Case 2: Photographs prior to operation. The overriding of the outer end of the clavicle on top of the acromion is clearly illustrated.

Bottom left.—FIG. 4: Case 2: Roentgenogram of shoulder showing overriding of clavicle on top of acromion process.

Bottom right.—FIG. 5: Case 2: Postoperative roentgenogram showing resection of outer end of clavicle. Note absence of displacement of scapula.

carried down through the skin and subcutaneous tissue to the fascia covering the muscle, and the flap thus made turned upward. A small incision was made through the medial portion of the deltoid muscle in order that the coracoid process might be examined and the integrity of the coracoclavicular ligament established. It was found to be impossible to pass a finger between the coracoid and the clavicle. It

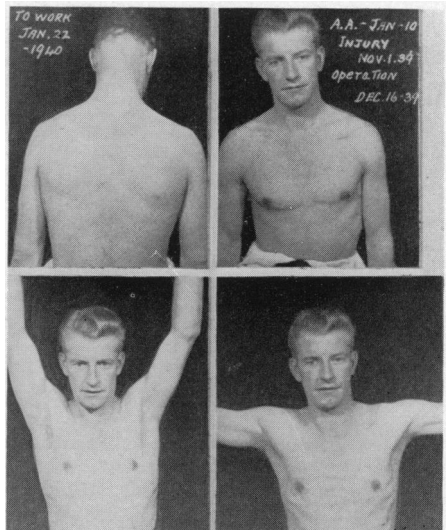


FIG. 6: Case 2: Photographs illustrating complete movement in all directions, without deformity of right shoulder joint.

structures and No. 00 plain catgut for the subcutaneous tissues; clips were employed to close the skin. Care was taken to so place the deep sutures that the periosteal tube was obliterated and the muscles attached to the anterior and posterior borders approximated.

A small dressing was applied and the patient returned to bed, the wrist being tied to the head of the bed and the latter elevated six inches. This position was comfortable, and was maintained for five days, at which time the clips were removed and the arm gradually brought to the side by the patient.

December 26, the eighth postoperative

day, the patient was allowed out of bed with the arm in a sling. He was discharged from the hospital January 2, 1940, and returned to work February 1, 1940.

As this young man is employed as the operator of a steam shovel, which is a two-handed job, requiring very considerable strength in both upper extremities, and

put my opinions with regard to the clavicle to the test.

Not long after my satisfactory experience with Case 2, the following patient was admitted to my service:

**Case 3.**—Hospital No. 1732-40: H. B., male, age 29, fell, March 20, 1940, a distance of ten feet from a ladder landing on the tip of the left shoulder. On examination, a complete dislocation of the outer end of the clavicle on the acromion was noted.

Five days following injury, March 25, 1940, under cyclopropane anesthesia an operation similar to that described for Case 2 was carried out. Again the integrity of the coracoclavicular ligament was established and this structure used as a marker for removal of the outer end of the clavicle. As in Case 1, no remains of ligamentous tissue about the acromioclavicular joint, which might have been used in an attempted repair of this joint, could be identified.

The patient was returned to bed, again, with the wrist tied to the top of the bed and the latter raised. Clips were removed May 30, and the arm allowed to be brought to the side. On the eleventh post-operative day, April 5, he was out of bed and was discharged from hospital three days later.

He returned to work, May 1, as mechanic in a locomotive works. He has since been accepted for service in the C.A.S.F., and is, consequently, not available for further check-up.

Operation in the two cases reported was carried out in exactly the same way in both. A curved incision, convexity downward, was made just below the outer half of the clavicle, through skin and subcutaneous tissue. The flap so fashioned was turned upward so as to expose the outer third of the clavicle. The periosteum was removed from the clavicle so that approximately the outer third of the bone was bared. At this stage, the left index finger was inserted beneath the clavicle and pressed medially against the coracoclavicular ligament, which was evidently intact. Using the index finger as a guide, the clavicle was cut off at this point, for this purpose Bethune's rib shears were employed. The periosteal bed, together with the muscles attached to it, was then carefully closed, using for the first case No. 0 chromic sutures and for the second, fine black silk. The flap was replaced with a subcutaneous suture and clips to the skin.

FIG. 7.

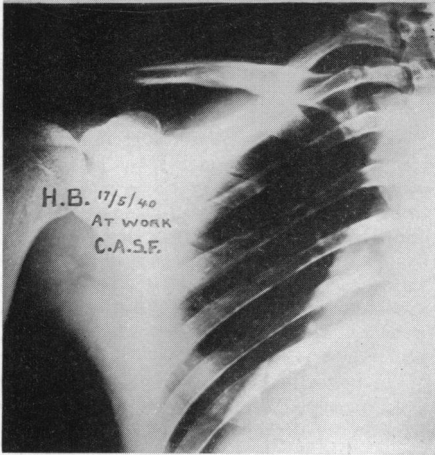
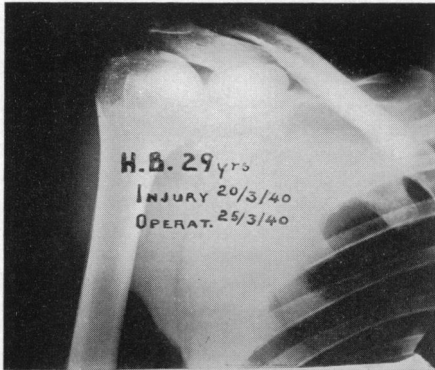


FIG. 8.

FIG. 7.—Case 3: Preoperative roentgenogram showing overriding of outer end of clavicle above acromion.

FIG. 8.—Case 3: Postoperative roentgenogram showing resection of lateral end of clavicle, without deformity of scapula.

since he has been able to continue with his work, it is evident that he suffers no disability due to the loss of a portion of the clavicle. The importance of his disability and the fact that other forms of treatment would be, on the one hand, more hazardous and, on the other, more complicated, induced me in this case to

The wrist was tied to the head of the bed and the latter raised a distance of about six inches. This position was maintained for five days when the clips were removed and the patient allowed up three days later.

As compared with the more radical method of attempting to repair the disorganized joint, particularly in long-standing cases, by the method of fascial suturing of the clavicle to the coracoid and the acromion to the clavicle, the method described, and recommended, is one which, on the one hand, is much less time-consuming at operation and, consequently, less likely to be followed by infection; and on the other hand, since the period which need elapse before return of function is attempted is only dependent upon the time required for soft tissue healing, the period of invalidism is substantially shortened.

## SUMMARY

Proof has been offered that the general opinion as to the function of the clavicle is wrong. It would appear that the clavicle is of importance only for cosmetic reasons and to serve as a *point d'appui* for muscle action.

A simple operative procedure is recommended for complete dislocation of the lateral end of the clavicle for both early and late cases. The period of hospitalization and the time required before return of full physical activity are considerably shorter than when more intricate procedures are employed. Physiotherapy is not required.

The number of cases reported is admittedly small but they are, I believe, sufficiently important to justify the recommendations made.

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## PROGRESS IN THE MANAGEMENT OF SEVERE SUPRACONDYLAR FRACTURES OF THE ELBOW

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DURING THE COURSE of the past two decades or so, our ideas of the care of these severe supracondylar fractures have progressively changed. In the early years we, like most other surgeons, were accustomed to attempt reduction by manipulation under anesthesia, and followed this by immobilization of the arm in plaster. We found, however, that, too often, the trauma incident to these maneuvers added much insult to the already severely damaged soft tissues and, too often, also failed to accomplish satisfactory reduction even after repeated attempts, with consequent impairment of function and frequently marked gross deformity at the elbow.

About two years ago, there was admitted a boy having great damage to the soft tissues in the region of his elbow, associated with a supracondylar fracture, with extensive blistering of the skin, obstruction of his radial pulse, and complete paralysis of the median nerve. None of the methods of treatment with which we were familiar could be employed, and we were much concerned about saving his arm. This situation prompted us to devise a different method of procedure, one which could under

all circumstances accomplish accurate reduction without adding injury to the soft tissues, avoid the necessity of an open operation, and perhaps even eliminate a general anesthesia. We agreed that such a method should involve an apparatus which was very simple and inexpensive. It should be applicable in a few minutes' time to any style of hospital bed, and should allow, easily, for necessary changes in the position of the bony fragments. We were about that time greatly impressed with the work of Dunlop, of Pasadena, on this same problem and, also, were cognizant of the success of a simple method of skeletal traction by means of a screw in the ulna which had been employed for several years in adults by Doctors Cubbins, Callahan, and Scuderi of the Cook County Hospital, of Chicago.

In principle, this method (which we have routinely employed on all severe supracondylar fractures in our ward at the County Hospital since January, 1939) does away with the old ambulatory treatment, and substitutes in its place slow reduction by traction and suspension with the patient in bed for a period of about three weeks. In detail, the procedure is as follows: On