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FRACTURES INTO AND ABOUT THE ELBOW JOINT.*

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Fractures involving the elbow joint, if not properly treated, will often result in impairment of function, amounting in some cases to complete ankylosis, and when we consider that even slight limitation of the movements of this joint may incapacitate an individual from following the trade of his choice, it behooves us to not neglect even apparently trivial injuries of this joint. Motion is limited by either a malposition of the fragments, the overproduction of callus or the interposition of bone fragments in the joint cavity.

The overproduction of callus is sometimes difficult to avoid; but unless the bone be comminuted we can maintain the proper relation of fragments by either nails, wire, staples or plates, and any piece of bone which finds its way into the joint cavity should be removed. Opening of the joint is fraught with much less danger, so far as the subsequent motion is concerned, than leaving the fragments in faulty positions or loose pieces of bone in the cavity.

Before discussing the diagnosis of elbow-joint injuries I will briefly recall the anatomy of these parts, because without this knowledge we are absolutely unable to correct intelligently any of the various injuries which might befall this joint.

The elbow is a hinge joint; the bones entering into its formation are the trochlear surface of the humerus, which is received into the greater sigmoid cavity of the ulna, and admits of the movements peculiar to this joint, viz., flexion and extension; while the lesser, or radial head, of the humerus articulates with the cup-shaped depression on the head of the radius; the circumference of the head of the radius articulates with the lesser sigmoid cavity of the ulna, allowing of the movements of pronation and supination. The articular surfaces are covered with a thin layer of cartilage and held together by means of a capsular ligament, which is thicker on the sides than in front or back. The joint is lined with a synovial membrane, which is attached to the inner surface of the capsular ligament and reflected on the articulating surfaces of the bones, lining the olecranon and coronoid fossæ, and being continuous with the synovial membrane lining the superior radio-ulnar articulation.

On each side of the lower end of the humerus is found a prominence, the external and internal condyle, the

internal being much larger than the external, and therefore more liable to injury.

The articular surface of the humerus is divided by a ridge into two parts, the internal extending lower than the external and known as the trochlea articulating with the greater sigmoid cavity. The outer part is called the radial head or capitellum and articulates with the upper end of the radius. The fact that the trochlea projects below the capitellum produces what is known as the carrying angle of the elbow, so that when the arm hangs naturally with the palm forward there is an angle of ten degrees at the elbow, enabling one to carry a bucket and at the same time rest the elbow on the trunk. Above the trochlea in front is a depression, the coronoid fossa into which fits the coronoid process of the ulna, the

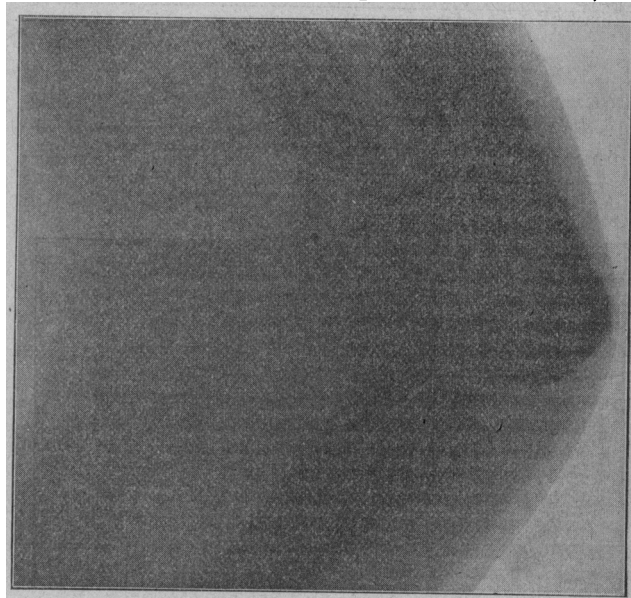


Fig. 1.—Before operation.

olecranon being received into the olecranon fossa just above the trochlea behind. The upper end of the ulna presents two processes and two cavities, the olecranon process is a thick curved piece of bone which is continuous with the posterior border of the ulna and gives attachment to the triceps muscle and the posterior portion of the capsular ligament of the joint; the coronoid process projects horizontally forward from the upper and front part of the ulna, giving attachment at its base to the brachialis anticus and the anterior portion of the capsular ligament. The greater sigmoid cavity is formed by the olecranon and coronoid processes, the lesser sigmoid cavity is a narrow depression in the outer side of the coronoid process which articulates with the side of the head of the radius. The upper extremity of the

* Read before the Alameda County Medical Association at the October meeting.

radius is called the head and presents a shallow depression on top; the circumference of the head is round and smooth and rotates in the lesser sigmoid cavity, being held in place by the orbicular ligament.

A knowledge of the development of the ends of these bones is of great importance in the treatment of fractures in children, and the text-books give only a general idea

tion or that a correct diagnosis can be made by anyone by simply looking at a skiagraph of an injured joint; but I do say that, without one or more well-made skiagraphs taken in the proper planes, no surgeon can venture to make an accurate diagnosis of fractures involving the elbow joint.

In fractures of the shafts of long bones we often get functionally good results, even when the fragments have not been accurately adjusted, but in fractures involving the joints, and especially the elbow joint, we can not expect any such results, and we must see that all the broken parts are placed in their normal positions and retained there until union has taken place.

The following case is of interest on account of its rarity; I have not been able to find one recorded which was similar in character:

G. M., aged 16, was sent to me for examination three weeks after having received a fall on the elbow. The arm had been treated by means of a right-angled splint, which had been removed every few days and readjusted. At the end of three weeks the joint was found to be immovable, allowing neither extension nor flexion. Pronation and supination were almost

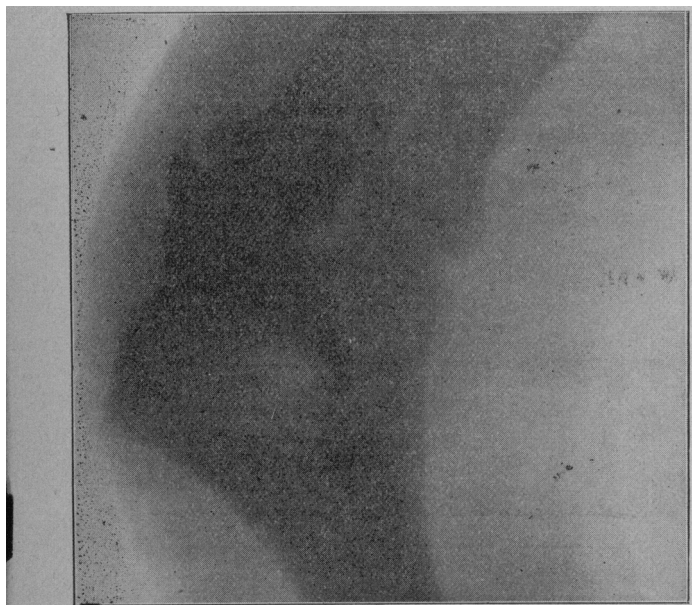


Fig. 2.—Before operation.

of the time and manner of development. I have taken a large number of skiagraphs of elbows of children, the ages varying from 1 to 15 years, and I find that the beginning of ossification in the various centers depends, not only on the age, but on the general development of the child. In some cases a center of ossification would

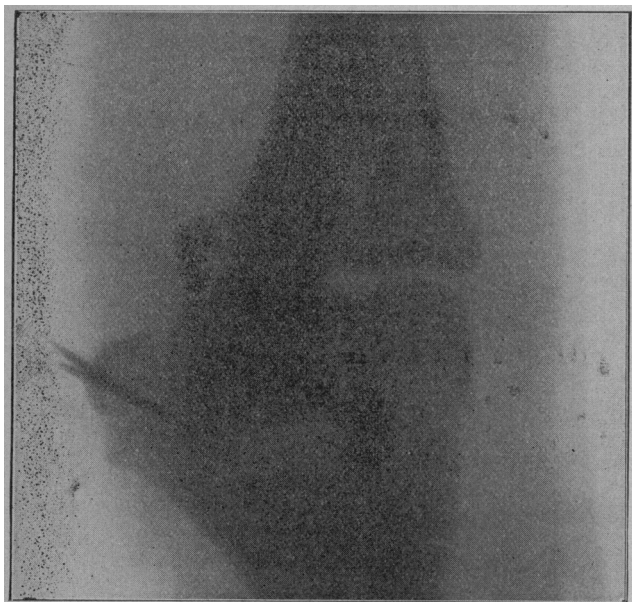


Fig. 3.—Two weeks after operation.

show three years in advance of the text-book time, and in others would be later. It was noticed, however, that, as a rule, the *x*-ray showed the ossific center at least one year sooner than the books would expect.

The diagnosis of fractures of the elbow joint can not be accurately made without the *x*-ray. I do not mean to be understood that the *x*-ray takes the place of palpa-

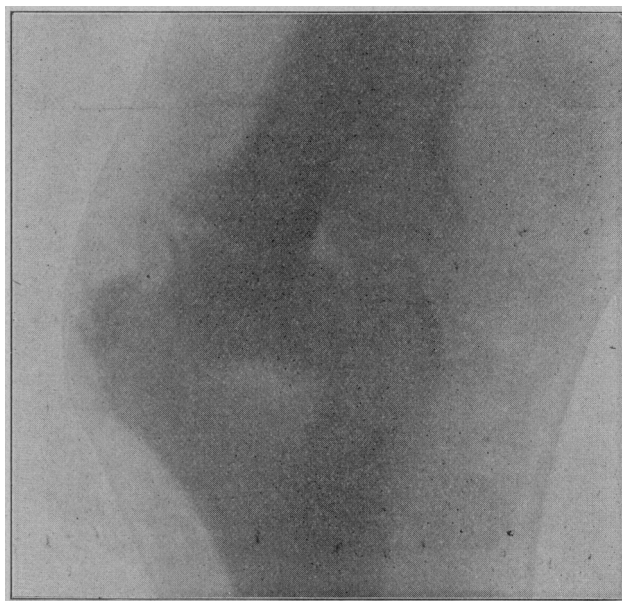


Fig. 4.—Nine weeks after operation.

normal. The carrying angle was very much increased, and the internal epicondyle was much flatter than that of the other arm. Slight crepitus was elicited while making pronation or supination. Two *x*-ray plates were taken at different angles, and showed that the internal epicondyle had been broken off and was lying between the trochlea and the greater sigmoid cavity, with the broken surface in contact with the cavity. The capitellum showed a small piece chipped off, but in proper position.

Operation was advised and accepted. An incision was made directly over the internal condyle down into the joint, and the epicondyle found exactly as shown by the *x*-ray. The flexor and pronator tendons were still attached to it, and their function had not been impaired. The internal lateral ligament had, of course, been torn through and the ulnar nerve was found surrounded by inflammatory tissue, and was dissected loose. The epicondyle was lifted from its position with great difficulty, first on account of the adhesions which had formed and also because it could not be tightly grasped without danger of crushing.

After its liberation it was found that the muscles had contracted to such an extent that it was impossible to bring the fragment to its original position, and it had to remain about one-fifth of an inch lower down than normal. While

in this position I drove two wire nails directly through the epicondyle into the condyle, being careful to avoid entering the olecranon or coronoid fossa. The lateral ligament was brought together with catgut, and the skin with silkworm gut, leaving the heads of the nails protruding.

The arm was put up in a straight splint and left for two weeks, after which one nail was taken out and passive motion begun; the other nail was removed one week later. There was considerable callus surrounding the humero-ulnar articulation, but under massage this is gradually diminishing and the patient is at present, nine weeks after the operation, able to move the joint without much pain, and can extend the forearm almost to a straight line and flex it to beyond a right angle. There is yet some callus to be absorbed, and we may expect that after another month or two the arm will be in almost perfect condition. The carrying angle is still too great, showing that there is some thickening of the synovial surfaces between the ulna and humerus. The small piece which was chipped off from the capitellum is causing very little, if any, disturbance, and appears to be united to the humerus in good position.

To obtain skiagraphs which will show accurately the injury to an elbow we place the arm with the two condyles of the humerus on the same plane as the plate,

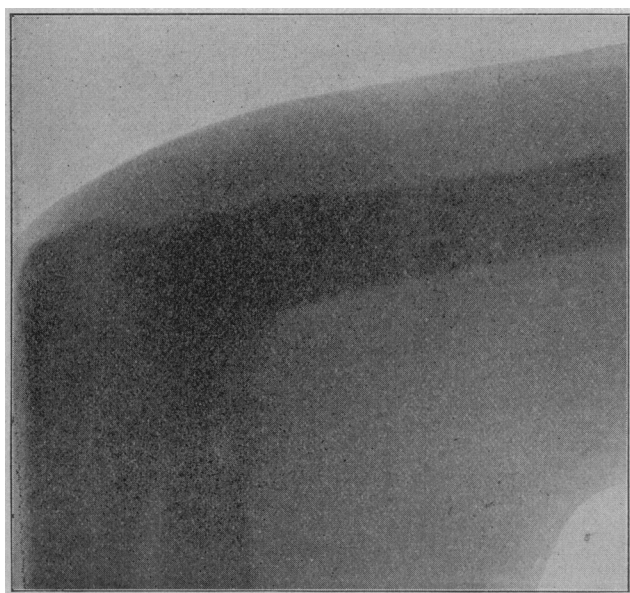


Fig. 5.—Nine weeks after operation.

and the forearm extended as far as it will go, this will show any fracture of the lower end of the humerus, or of the condyles, but will not give an accurate idea of the direction of oblique fractures which run in an antero-posterior direction. It will therefore be necessary to take another skiagraph, with the plane of the condyles at right angles to the plate, and the forearm flexed at almost a right angle and the hand pronated. It may be impossible in some varieties of injuries to get the arm in these positions, but we should strive to come as close as possible, because if we habituate ourselves to certain positions and relations we can with greater ease detect any deviation from the normal, and right here let me remark that no one is capable of interpreting a skiagraph of an injured bone or joint who has not made a study of the skiagraph of bones and joints which are known to be normal.

In diagnosing elbow injuries in children under 18 years of age it is absolutely necessary to take pictures of the sound as well as the affected side, on account of the fact that the epiphyses are either entirely cartilaginous or not yet united to the shaft of the bone. It

may be difficult to tell whether there has been a dislocation of one of the epiphyses by either palpation or x-ray if there is no deformity, but by comparing the skiagraphs of the two sides the slightest abnormality can be detected, and I find it better in all cases to keep the arm splinted for at least two weeks when the child complains of pain or shows a disinclination to use the arm.

Fractures of the olecranon are best treated by driving a long wire nail through the tip of the process down into the shaft of the bone; this may be done without cutting if the fragment can be properly adjusted and there is no blood between the pieces, otherwise it is better to cut the skin and clean out the blood first. Broken-off condyles are retained in position by means of steel staples, one prong of which is driven into the shaft of the bone and the other prong into the fragment. In using staples or nails which have to enter the compact tissue of the bone it is necessary to drill holes before driving them in, being careful that the holes are just small enough to hold the nail or staple tightly. In cancellous bone nails may be driven in without drilling.

First make your diagnosis, then adjust the fragments, and if a splint will not retain them in proper position, make fixation as I have indicated, being particularly careful as to your asepsis, and your results will be very much superior to those obtained by the expectant plan.

590 Sutter Street.

A CASE OF SUCCESSFUL REMOVAL OF AN ENLARGED SPLEEN,

WITH TWISTED PEDICLE, ADHERENT TO THE RIGHT SIDE OF THE PELVIS, IN A WOMAN PRESENTING MULTIPLE NODULATION AND PIGMENTATION OF THE SKIN.

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WITH REMARKS ON THE MEDICAL ASPECTS OF THE CASE.
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NARRATION OF THE CASE.

Mrs. W., Jewess, housewife, aged 38, was admitted to my service in the Presbyterian Hospital, Chicago, Aug. 25, 1902, with pain in the pelvis and lower abdominal region, generally of a dull, aching character, varying in intensity and radiating occasionally to different portions of the upper abdominal and thoracic regions.

The pain is most marked in the right iliac region, where there is a swelling which varies in size and consistence from time to time. The latter is usually tender when palpated. There is always great aggravation of her suffering during menstruation.

She also complains of frequent and occasionally painful micturition, shortness of breath, intense headaches, swollen feet, leucorrhœa, and of occasional bloody stools. She also complains of a swelling in the region of the navel, of discoloration and nodulation of the skin.

Duration and History.—The patient states that she first noticed the swelling in the right iliac region 17 years ago, after the birth of her first child. It was then flat and about as large as her hand. It gradually increased in size, becoming more and more painful and sensitive to pressure. Eight years ago she was seized with intense agonizing pain of a colicky nature, and ever since has suffered from similar attacks every two or three months; they usually last one or two days, and the patient is compelled to inhale chloroform in order to obtain relief.

Frequently after the attacks the urine was noticed to be dark, reddish-brown in color and somewhat foul-smelling.