Original Articles.

THE TREATMENT OF OLD DISLOCATIONS OF THE SHOULDER.¹

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THE number of old dislocations of the shoulder which present themselves for treatment at surgical clinics is fortunately becoming smaller from year to year. Thanks to the wide publication of the work of Kocher and others on recent dislocations and their reduction, by far the greater number of dislocations are reduced as soon as seen by the surgeon or general practitioner. Notwithstanding this fact, however, a certain number of patients with old dislocations present themselves at the clinics, some of whom have never previously consulted a surgeon, and a few who have been unfortunate in their choice of a surgical adviser. By the personal observation of a few of those, which I have been kindly allowed to examine by members of the visiting staff at the Boston City Hospital, and by personal experience of some of the difficulties of their reduction, I was led to look up the question of their treatment, and see what light, if any, could be thrown upon it by an examination of the literature of the subject and of the hospital records. The result, though not entirely satisfactory, owing perhaps to the small experience in these cases which comes to any one man, and the resulting meagreness of the literature of the subject, has nevertheless been that certain interesting and important points with reference to the treatment of these injuries have been brought out.

In the first place, as is well known, the difficulty of reducing dislocations of the shoulder after the lapse of a very short period, say two weeks, increases directly in proportion to the interval of time. Dislocations of less than two weeks' duration are almost as easy to reduce as fresh dislocations; and since Kocher has shown that all fresh, uncomplicated dislocations are reducible by manipulative methods, all dislocations two weeks or less old are capable of reduction by methods of manipulation. The same anatomical characteristics which render the shoulder-joint the most liable to dislocation of any joint in the body in themselves facilitate reduction. It is comparatively easy for the large globular head of the humerus to slip out of the shallow cup of the glenoid cavity, if the necessary rupture of the capsule is present, and the rupture of the capsule made by the head of the humerus is always big enough to let the head slip back, if it is properly opened by Kocher's, or other methods of manipulation. The free play of the head of the bone under the arch of the acromion, the comparative looseness of the capsule, all render dislocation and reduction comparatively easy. The tendons of most of the muscles about the joint are short, and so intimately blended with the capsule as not to afford obstacles to reduction by slipping in between the head of the bone and the socket. Even the long tendon of the biceps, which at first thought one would suppose most likely to fall in between the head and the socket, so as to prevent reduction, is held up out of the way by its special fibrous channel in the capsule of the joint, from which, in the ordinary subcoracoid dislocation, it is never displaced.

¹ Read before the Surgical Section of the Suffolk District Medical Society, February 3, 1897.

The manipulative methods for reduction of the shoulder-joint, especially the simple, beautiful and efficient method devised by Kocher, of Berne, are too well known to need discussion here. Suffice it to say that Kocher's method is to be preferred in all fresh dislocations, as being the simplest and easiest, as requiring no direct pressure on the axillary vessels and nerves, and as being successful in a large proportion of cases without anesthesia.

Dislocations of the shoulder a week or less old, then, should be reduced in all cases, preferably by Kocher's method.

After the head of the humerus has been out under the coracoid process for two weeks or more, however, difficulties in the way of reduction begin to present themselves. The unruptured posterior portion of the capsule, which has been tightly stretched across the glenoid cavity, has become in old cases rather firmly adherent to that cavity. The head of the humerus has become adherent as it lies nipped between the biceps and coraco-brachialis muscles and the neck of the scapula. The posterior rotators of the humerus, the supra-spinatus, infra-spinatus and teres minor muscles, have become so paralyzed by continued stretching as to no longer afford efficient aid to the surgeon in pulling the head of the bone back into place. In order to successfully reduce the dislocation, the head of the humerus must be freed from the adhesions which bind it into its new position, the adherent capsule must be peeled off from the surface of the glenoid cavity, and the head of the humerus forced back under the acromion, lifting the adherent capsule and the tendons of the posterior rotators out of the way. After a still longer time, say two or three months, has elapsed, the neck of the humerus has become fixed under the coracoid by firm fibrous adhesions, the capsule has become so firmly bound down to the glenoid cup as to actually form a part of it, and the atrophy of the deltoid and posterior scapular muscles bear witness to the fact that even if the dislocation should be reduced, these muscles would require a long course of training in order to recover strength enough to hold the head of the humerus up in place in its socket. The important part played by these muscles in holding the head of the bone in place is shown by the subluxation of the head of the bone which takes place when they have become paralyzed. In paralysis of the deltoid and scapular group without dislocation we have seen the head of the humerus fall downward and forward out of its socket, within the loose capsule of course, to such an extent that the head got over the anterior edge of the glenoid, the arm was lengthened nearly an inch, and this, together with the flattened deltoid, gave a typical picture of a dislocation. By grasping the humerus, however, the head of the bone could be easily lifted into position, but the paralyzed muscle could not hold it.

Now with regard to this adhesion of the posterior portion of the capsule to the glenoid cup. The capsule, of course, is more or less thickened by the inflammatory processes, and fills up the cavity, adhering over its broad surface, so that it cannot be stripped off. It is in this class of cases that we read in the records, that the head was almost reduced, but could not quite be made to get into perfect position, that it remained just on the edge of the glenoid; that although something had been gained, reduction could not be considered quite satisfactory. What has hap-

pened in these cases, is in all probability this: that since the efforts at forcing the head back into place fails to strip the adherent capsule off the surface of the glenoid, the capsule, by the violent efforts at reduction, is ruptured opposite the anterior edge of the glenoid, and the head forced back over the glenoid is kept out of its socket by the part still adherent. Unless that adherent capsule be peeled off, the complete and satisfactory reduction of the head of the bone will be, and is, impossible. The question suggests itself, Why not open the joint in these cases by operation, and peel off the capsule, or gouge it out so as practically to make a new socket, by a method analogous to Hoffa's operation in congenital dislocation of the hip, so as to allow complete reduction of the dislocation? The answer to this query opens up the wide question of operative reduction of dislocations of the shoulder, which will be considered later on.

With reference to the obstacles to reduction in cases of old dislocations of the shoulder, I may refer to Kocher's article in the *Deutsche Zeitschrift für Chirurgie*, 1890, p. 423, in which we find the details of his findings at operation or autopsy on eight cases ranging in age from five weeks to eleven months. In some cases the capsule was adherent to the glenoid, as described above, in others the rent in the capsule had healed so completely behind the head of the bone as to prevent reduction. In seven of the eight cases, the great tuberosity had been pulled off, and in several portions of the capsule were greatly thickened and at times calcified. The glenoid cavity was sometimes filled up with a thick, rough deposit of bone. The head of the humerus had in one case of six months' standing formed for itself a new socket in the front of the neck of the scapula. The familiar picture of such a socket upon a scapula from a case of Sir Astley Cooper's figured in Stimson and Hamilton's work on fractures and dislocations, you will, doubtless, most of you remember. An interesting fact about this case is that in one it is classed among subcoracoid and in the other among glenoid dislocations.

Such being the pathological conditions found in cases of old dislocations of the humerus, what is to be our method of procedure in attempting reduction? In order to answer this question intelligently we must consider the relation of the danger attending attempts at reduction to the severity of the symptoms which we are endeavoring to relieve, the prospect of successful reduction, and the advantages gained thereby.

What are the symptoms for which our patients apply to us for relief? In the first place, we find that these old dislocations of the shoulder present a very different picture from the fresh dislocations. The atrophy of the deltoid and scapular muscles allow the bony landmarks to stand out in bold relief, and the diagnosis is so easy as to admit of no doubt whatever. The elbow is not held away from the side as in fresh dislocations, as the deltoid has been stretched sufficiently to allow it to fall easily in. Rotation of the head of the humerus is absent or nearly so, abduction of the arm is possible only by elevation of the scapula, and very rarely can be carried to a right angle. Forward elevation is possible to a right angle, and backward not at all. All motions of the forearm, elbow and hand are normal. The patient can do light work, fetch and carry, but is usually unfitted for the heavy work of a laborer.

The above picture is doubtless recognized to be

more favorable than certain cases which we have all of us seen, in which pain, edema, paralysis, etc., from pressure of the head of the bone upon the brachial flexus, are present; but it is proposed in this discussion to deal with the average cases. Cases in which the latter symptoms are present, require, of course, more heroic treatment.

Old cases are also occasionally seen in which such excellent motion of the arm has been obtained, that the hand can be easily placed on the head, and almost all movements performed with ease. Such a case has been recently seen by the writer at the Boston City Hospital in the service of Dr. H. W. Cushing.

In the treatment of these cases, manipulative methods, as the simplest and least radical, will, of course, first be tried, and the question be considered as to what manipulative methods combine the greatest effectiveness, with the least danger. And the danger in these cases is of two sorts: first, fracture of the humerus, not a very uncommon accident; and a second and much more serious mishap, rupture of the brachial artery or vein. This accident happened to no less eminent and careful a surgeon than Sir Joseph Lister, who tied the artery, but lost his patient from shock. The autopsy in his case showed, in the first place, atheroma of the vessel, a finding which should make us cautious in the application of violent manipulative methods in aged patients, and also revealed beautifully the mechanism by which the injury took place. Although the attempt was made only eight weeks after the dislocation, at the autopsy was found a "strong fibrous band, connecting the head of the humerus with the coracoid process, and intimately blended by condensed tissue with the sheath of the axillary artery, which lay directly over it. Strong traction made upon this band, was necessarily communicated to the axillary artery, which had a small hole torn in its side. This autopsy is of interest, as showing that rupture of the artery is more likely to take place from traction upon fibrous bands, which is essential to all manipulative methods of reducing dislocations of the humerus, rather than from pressure, as over a pad or heel in the axilla, which pressure, if properly applied, ought to be behind the artery, rather than directly upon it. Although but few cases of rupture of the axillary artery in attempts to reduce dislocations of the shoulder have been published, most surgeons of experience have either seen such cases or heard of them. Violent manipulations should then be avoided in old patients or those with atheromatous arteries.

Stimson² reported 44 cases of rupture of the axillary artery or vein obtained from the literature of the subject up to that date. In more than half the cases, the dislocation had existed less than three weeks. In not more than a third of them was it reasonably certain that the injury was caused by the attempts at reduction and not by the dislocation itself. The danger of the accident is attested by the fact that only 12 of the 44 cases recovered; 31 died, and in one the result was not known. Of 20 cases not operated upon six recovered and 14 died. Of 14 in which the subclavian was tied five recovered and eight died; of six cases in which an incision was made in the axilla and the artery tied above and below the wound all died. Of four in which the limb was disarticulated one recovered and three died.

² *Annals of Surgery*, 1885.

In order to avoid these dangers, Kocher in his article above referred to, advocated the application in these cases of his own method for the reduction of fresh dislocations, slightly modified to meet the requirements arising from the adhesions and other changes present in old dislocations. These modifications consisted chiefly in that the manipulations should be made more slowly, that the elbow should be carried in the first movement a little back of the mid-axillary line instead of directly to the side, that the arm should be held for some time in complete outward rotation, and that during the third movement, lifting the elbow in the sagittal plane, a pad might be placed in the axilla to act as a fulcrum in prying the head of the bone outward into position. Kocher has found this method successful in reducing 25 out of 28 old dislocations, three of them being over four months old. He had fractured the humerus, however, in three cases, a rather large proportion.

The advocacy of this method in old dislocations by so great an authority as Kocher has led to its extensive trial in old dislocations, and in other hands it has apparently not met with such good success. I think it can be shown that this method in reality is attended with great danger of fracture of the humerus. The liability of the humerus to fracture under twisting strains has been shown by Monks;³ and the second movement of Kocher's method, extreme outward rotation, the forearm at right angles and used as a lever, exposes the humerus, if its head is firmly held by adhesions, to a twisting strain of extreme severity.

Morton⁴ reports three cases in which this accident has happened in the attempt to reduce old dislocations by the Kocher method. In his own case the fracture, which was "very oblique through the head and neck of the bone" (probably a spiral fracture), occurred just as the arm, after being completely rotated outward, had been raised to the termination of the third movement, across the chest. Here we have twisting strain combined with leverage, a very dangerous combination if the head of the bone is firmly held by adhesions. The occurrence of at least one other case in which fracture resulted from the employment of this method is known to the writer. As Morton suggests, it is unwise to employ this method in old dislocations unless previous manipulations have already been employed to rupture as far as possible the adhesions that hold the head of the humerus in its new position.

Now what manipulations are the safest and most efficient to employ in breaking up adhesions between the head and neck of the humerus and the scapula? It is self-evident that we must first fix the scapula, before we attempt to move the humerus on it, whatever method we adopt, else the whole shoulder girdle will follow the excursions of the humerus, and no motion between the scapula and the latter will take place. In the reduction of fresh dislocations by Kocher's method, without anesthesia, the scapula is beautifully fixed by involuntary spasm of the muscles, the edge of the glenoid being firmly held as a fulcrum for the motions of the head of the bone. In these old dislocations, however, we will find it necessary to resort to anesthesia in almost all cases, and must find some artificial means of fixing the scapula. This is done rather efficiently by the surgeon's heel as it is forced into the

axilla in Sir Astley Cooper's method, a method which the writer has found efficient in reducing one case of old dislocation, and may be accomplished, though rather inefficiently by the hands of an assistant embracing the trunk of a patient from the opposite side, and clasped over the scapula. The most efficient method, and one which was successful in the remarkable case of Dr. Burrell's, was that of passing folded sheets over the shoulder and around the body, these sheets being held by assistants.⁵

Rapid and forcible rotation of the humerus back and forth, within short limits at first and gradually increasing, is probably the safest method of breaking up adhesions. In performing this rotation the forearm should not be used as a lever.

Extension of the arm above a right angle to the body stretches the axillary vessels and brachial plexus across the head of the humerus, and is attended with danger of injuring them. It should therefore be avoided.

All manipulative methods in old cases require the application of considerable force. The amount of force which it is safe to apply must be left in each individual case to the judgment of the surgeon. Atheroma of arteries and firm adhesions in aged patients contraindicate great force. In young patients a very considerable degree of force, if carefully and intelligently carried out, may be safely employed. Dr. Burrell's successful reduction after eight months, it will be remembered, was in the case of a muscular man twenty-three years of age. The probability of success in these cases, decreases directly with the length of time since the accident happened.

We are now confronted by the question, If manipulative methods fail, shall operative methods be resorted to for reduction? In order to answer this question intelligently we must consider, first, the extent of the disability which we are attempting to relieve; second, how much good will probably result from operative measures; and third, what the danger of such methods is, and their prospect of success.

The first question we have already answered before considering manipulative methods and their dangers.

The second can only be answered by a brief consideration of the various operative methods in turn.

The methods which have been proposed for the operative treatment of old dislocations of the shoulder are, first, osteotomy of the surgical neck with formation of a false joint (Mears⁶); second, subcutaneous section of the capsule and reduction (Pollaillon⁷); third, reduction by open incision; fourth, resection of the head of the humerus.

The subcutaneous section of the neck of the humerus has failed to show good results. The subcutaneous section of the capsule, is a survival of pre-antiseptic methods. The blind section of the adhesions about the head of the humerus is manifestly attended with great danger of wounding arteries and nerves, and the open incision is manifestly simpler, easier and safer. The reduction by open incision and the resection of the head of the humerus, remain as the only methods worthy of serious consideration.

Reduction by open incision was first performed by Wattman of Insbrück⁸ in 1820. He succeeded in

³ Boston Medical and Surgical Journal, January 9, 1895, and March 21, 1896.

⁴ Philadelphia Polyclinic, December 15, 1894.

⁵ Medical and Surgical Reports of the Boston City Hospital, Eighth Series.

⁶ Philadelphia Medical and Surgical Reporter, October 13, 1877.

⁷ Bull. de la Soc. de Chir., 22 Février, 1882.

⁸ Knapp: Bruns Beiträge zur klin. Chir., 1888, 4, 372.

effecting reduction, but (strange to say!) suppuration followed, but healing finally took place, and the patient left the hospital (time not stated) having still great limitation of motion.

The introduction of antiseptic methods naturally encouraged further attempts of the sort; and in 1888 Knapp published a report of 12 cases, of which two died, one of sepsis and the other of delirium tremens. Of the remaining 10, one attempt resulted in fracture of the surgical neck with pseudarthrosis, three in necrosis of the head of the humerus, necessitating subsequent extraction; in two the reports were incomplete, and in the remaining four material functional improvement resulted. Surely not a very brilliant showing for the operation. Of operations by resection of the head of the humerus, he had collected 20 cases, of which four were fatal. Of the remaining 16, the later reports were inadequate in six, leaving 10 cases in which the results were in part equal to those of arthrotomy, and in part decidedly better.

The results of Kocher's experience with bloody reposition, published in 1890,⁹ are scarcely more reassuring. Of eight cases on which he operated he found only one to be uncomplicated by fracture of the tuberosities or of the glenoid rim. In six bloody reposition was done, and in two of these was final improvement in the use of the arm noted. One died of sepsis. Of two resections of the humeral head one gave a good functional result.

Both bloody reposition and resection of the humeral head have, according to the showing of these two writers, not given results sufficiently brilliant to encourage their general adoption. Resection of the humeral head has, however, the advantage that it can be successfully carried out in cases where owing to the filling up of the joint cavity or other causes, bloody reposition is unsuccessful.

We cannot leave the question in 1896, however, exactly where it was in 1890; and let us now see what has been accomplished in this field since that date. The gloomy showing given above naturally failed to encourage many surgeons to attempt operative relief in shoulder dislocations, but a certain number of cases have presented themselves for treatment in which any slight prospect of improvement was to be preferred to the present pitiable condition of the patient, and in which operative relief has been undertaken. Such cases are those in which pressure of the humeral head upon the axillary vessels and nerves has resulted in unbearable pain and swelling of the arm, and two cases in which the patient was rendered absolutely helpless by a double irreducible dislocation. I think it will appear, that the results of these more recent operations have been more satisfactory than those of the earlier cases reported by Kocher and Knapp.

A Pearce Gould¹⁰ reports a case in which he performed reduction by open incision upon a dislocation of fourteen months' standing, after manipulative methods had failed. "After nine months rotation of the shoulder was nearly perfect, and all the usual movements could be performed." The man was able to perform severe and continuous manual labor, the only injury remaining being some disability of the hand, due to damage to the ulnar nerve.

Watson Cheyne¹¹ showed a case upon which a simi-

lar operation had been performed in a dislocation of four months' standing. The result was less satisfactory than in the preceding case, but the man was enabled to do his work as a French polisher.

Sir Joseph Lister¹² had the rare good fortune of operating successfully on two cases of double irreducible dislocation of the shoulder. The propriety of any operative attempts at relief of such cases as these can hardly be questioned. In the second case the man was unable to put either hand to the gluteal region; the pitiable dependence resulting from which condition is obvious.

In Lister's first case, a robust laborer of forty-seven, with a double dislocation of four months' standing, bloody reposition was done upon each shoulder at a separate operation. The result was complete recovery of every motion of the shoulder except ability to lift the arm above a horizontal level, ability to perform hard manual labor, and recovery of the full size of the deltoid muscle. In the second case, that of an epileptic, both of whose shoulders had been dislocated for seven months, two operations were also done, with the result that the man was enabled to earn his living on a farm, and to perform very hard manual labor.

Polosson¹³ reports five cases of arthrotomy and reduction of old dislocation, in three of which good functional results were obtained. In one suppuration necessitated subsequent resection of the head of the humerus, and in one death resulted from the operation.

MacCormac¹⁴ reports a case in which arthrotomy had to be followed by resection on account of suppuration.

Owen¹⁵ reports a case of resection for old dislocation.

Monks¹⁶ reports a case of resection of the head of the humerus in a case of old dislocation attended by pain, atrophy of the muscles, and swelling of the arm from pressure on the nerves and vessels, in which the operation gave an excellent result.

Delbet¹⁷ reports a case of resection of the head of the humerus for an old dislocation in which attempts at reduction by arthrotomy by a posterior incision had been unsuccessful. The functional result of the operation was excellent. As a result of this experience he condemns the posterior incision, which he had been led to attempt by the results of experiment upon the cadaver. In his paper he gives a list of the reported cases of arthrotomy and resection, showing that there had been up to that time 28 arthrotomies reported, three of which died, a mortality of 10.72 per cent. Of 34 resections five had died, a mortality of 14.36 per cent. Although the mortality of resection is a little higher, the number of cases is too small and extends over too long a time to be of much value for purposes of comparison.

Arthrotomy would seem to be a more difficult operation than resection, and it is a little surprising that the latter should show a higher mortality. Of the 25 cases which recovered from the operation by arthrotomy, the results were good or fairly good in 12; five results were poor. In four secondary resection had to be done, and in three results were unknown. In one

¹² Loc. cit.

¹³ Assoc. Franc. de Chir. Proc. Verb., Paris, 1893, vii, pp. 384-388.

¹⁴ Loc. cit.

¹⁵ Clinical Journal, London, 1894, iii, pp. 273, 277.

¹⁶ Medical and Surgical Report, Boston City Hospital, 1895, and Boston Medical and Surgical Journal, April 30, 1896.

¹⁷ Arch. Coén. de Méd., Paris, 1893, 1, 19, 144.

⁹ Knapp: *Brunn Beiträge z. Chir.*, 1888, 4, 372.

¹⁰ British Medical Journal, February 27, 1892.

¹¹ Loc. cit.

the attempt resulted in fracture of the humerus and subsequent pseudarthrosis.

Polosson's results are not included in the statistics of Delbet. If these are added, we have 33 cases, with 15 good results, six poor results, five secondary resections, four deaths, and three cases not heard from; mortality 9.1 per cent.

Collecting the cases since 1890, we find arthrotomies as follows:

Gould, one case. Result good.
Cheyne, one case. Result good.
Lister, two cases. Result good.
Polosson, five cases. Three results good, one poor, one death.
MacCormac, one case. Result poor.

This gives 10 cases, with six good results, two poor results and one death. In the two cases in which the result was unsatisfactory, secondary resection was performed on account of suppuration.

Of 29 cases which survived the operation for resection in 13 the results were satisfactory (to these may be added the cases of Monks, McCormac and Owen, making 37 cases with 16 good results), in five the results were mediocre, in two bad, and in six they were unknown. The mortality is reduced to 13.5 per cent.

Schede has stated that the results of arthrotomy with reduction are far preferable to those of resection; but, as Delbet points out, the results are not comparable, and each case must be judged upon its merits. In the large majority of cases, the operation is begun with the attempt at reduction, and if this is unsuccessful, resection is performed. Resection can be performed secondarily if necrosis of the head of the humerus or long-continued suppuration should follow arthrotomy, and these accidents may be avoided by strict asepsis.

Arthrotomy with reduction should be our ideal, as it more nearly restores the normal conditions of the joint and surrounding structures. It is, however, a very difficult operation, more difficult than resection, and in cases where on opening the joint we find the head of the humerus enlarged by bony new growth, so that it cannot be forced into the glenoid cavity, it must be resected. When the glenoid cavity cannot be satisfactorily opened up so as to receive the head with a fair probability of its staying in place, resection should likewise be done.

It is a question whether, as Delbet says, cases in which reduction by arthrotomy is attended by great difficulty, so that extensive division of the muscles about the joint is required, and the head of the humerus will be held tightly by firm adhesions when healing has taken place, resection should not be preferred to arthrotomy as a primary measure. In Lister's and Gould's very successful cases, however, the muscles reunited after extensive section, and an excellent functional result was attained, so that they speak strongly in favor of arthrotomy. After resection the power of rotation, which was retained in these cases, will be necessarily lost, as the attachments of the rotations to the tuberosities are removed. If resection is necessary, only so much of the head of the bone should be removed as will enable the operator to slip the upper end into the socket. Too extensive removal gives a loose flail joint, too economical a cut exposes to danger of ankylosis.

I have collected from the records of the Boston City Hospital since 1882 the results of 24 cases which as will be seen have been treated by manipulation only, in all except two cases.

The results in these cases are of interest as show-

ing the prospect of success by manipulative methods at different times after the injury, and as showing that after a certain very limited period, the dislocation if reduced at all must be with rare exceptions reduced by open incision.

Dislocations of two weeks' and less duration are considered as fresh dislocations, and do not enter into our treatment of the subject. Cases in which the note reads, "reduction fairly successful," or "head of bone in fair position," have been classed as unsuccessful cases. I found records of four dislocations of from two to three weeks' standing, all of which were reduced successfully by manipulation. Three were reduced by traction downward and outward, with pressure upon the head of the humerus in the axilla. In one case in which the head of the humerus was said to lie under the clavicle which was reduced by extension at right angles to the body, we find it noted that pain in the arm, numbness of the fingers, paralysis of the deltoid with reaction of degeneration, and weakness of other muscles, persisted after reduction. This state of things indicated injury to the circumflex nerve which, as is well known, encircles the neck of the humerus close to the head and would, it seems probably, be liable to severe stretching in cases where the humeral moves far inward (subclavicular). The method of extension at or above a right angle to the body is attended with danger of injury to the brachial plexus and axillary artery.

At three weeks two successful cases are reported.

At four weeks two cases are reported, in which manipulative methods succeeded.

At five weeks four cases, all successful.

At six weeks two successful cases, and one unsuccessful, the later being a patient of seventy-two years. The patient came into the hospital with edema of the hand, great limitation of motion and much pain, and left in the same condition.

At nine weeks one case was not reduced by manipulative methods. The patient was sixty-four years of age and had fair use of his arm. Manipulation was desisted from owing to the difficulty and danger of further attempts.

At three months there are two cases, in both of which complete reduction was not attained, though the head of the bone was in better position than before operation.

At four months one case is reported. "Head of bone could not be replaced in the socket."

These cases in which, as shown by the fact that the head of the bone was freed from adhesions and brought to the edge of the glenoid, but could not be slipped in, illustrate well the effect of the filling up of the glenoid cavity and closure of the rent in the capsule which has been alluded to above.

At five and a half months we find a case reported of a sailor who fell from aloft on shipboard, and in whom several attempts at reduction made at various times had been unsuccessful. In attempt at reduction, rotation, very moderate in force, was attended by fracture of lower part of body of scapula, and fracture of surgical neck of humerus. The danger of rotation, using the forearm as a lever, has been commented upon above.

At six months two cases are found, in both of which attempts at reduction were unsuccessful, and in one of which, fracture of the surgical neck of the humerus resulted during the attempts.

At eight months one successful and one unsuccessful case are reported, the former being the case of Dr. Burrell alluded to above.

At ten months we find one case, in which Dr. Geo. H. Monks resected the head of the humerus for pain, paralysis and atrophy of the muscles about the shoulder and of all the muscles supplied by the median and ulnar nerves. The man had absolutely no use of his arm. The operation resulted in great improvement of his condition.

At one year there is one case, in which attempts at reduction by manipulation were desisted from on account of fear of fracture.

At one and a half years we have one case, in which Dr. Burrell resected the capsule for a recurrent dislocation on a man of twenty-seven with good result.

A tabular view of the cases, arranged according to time, follows:

Time.	Cases.	Successful.	Failures.	Remarks.
2 to 3 weeks.	4	4	0	
3 "	2	2	0	
4 "	2	2	0	
5 "	4	4	0	
6 "	2	1	1	
9 "	1	0	1	
3 months.	2	0	2	
4 "	1	0	1	
5½ "	1	0	1	Fracture of surgical neck.
6 "	2	0	2	One fracture of surgical neck.
8 "	1	1	0	
10 "	1	0	1	Resection of head of humerus.
1½ years.	1	0	1	Open incision and resection of capsule.
	24	14	10	

A glance at this table shows that all the cases reduced by manipulation were of six weeks' duration, with one exception—that reduced by Dr. Burrell at eight months.

There were 14 successful cases, 13 of them under six weeks. There was one failure at six weeks.

All the cases over six weeks in duration could not be reduced by manipulation, except in the case above noted. There were thus 10 cases in which manipulation failed, and of these 10 only one was of less than seven weeks' duration. In one of these resection of the head of the humerus was attended by a happy result, and in one, a recurrent case, excision of the capsule was successful.

In two of the unsuccessful cases, one at five and a half and one at six months, fracture of the surgical neck resulted from attempts at reduction by manipulation.

If these cases show anything, it is that after more than six weeks have elapsed, such changes have usually taken place as to render success with such manipulative methods as it is safe to employ without danger of fracture of the humerus or rupture of the axillary artery, improbable.

If reduction is to be effected at all, it must be ac-

complished by arthrotomy, with or without resection of the head of the humerus. Whether such operative interference should be adopted, must be decided upon the merits of each individual case. We must be guided by—

- (1) The extent of the present disability.
- (2) The amount of pain.
- (3) The pressure symptoms.

Where very great disability involving inability to earn a livelihood, pain, or paralysis from pressure are present, in dislocations of over six weeks' standing and in patients who are in good condition to bear operation, operative relief should be considered, although both operations are of such severity that the question of their performance should be carefully weighed in each case.

The results of arthrotomy and resection in the last six years give us somewhat greater hope of affording relief to our patients by their employment than those reported in Kocher's and Brun's papers.

The mortality of operative procedures will probably be low if cases in which senile or other constitutional defects render operation dangerous are rigidly excluded, and if in cases where arthrotomy is attempted, and the conditions found point to a difficult and tedious operation, prompt resection is performed.

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STERILITY IN THE MALE.¹

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THE rare mention in current medical literature of this subject is the chief reason for this paper. A short summary of the views of writers may not be out of place, and the report of two cases of a rare form of the affection may have some interest for gynecologists.

Sterility in the male is that condition in which, if there be any seminal fluid at all, it lacks all fecundating power. The absence of this power may be dependent upon one or two conditions, namely: the semen may be ejaculated in normal amount, but the spermatozoa are either entirely absent or dead when discharged. This constitutes the condition of azoöspemia. Or there may be a total absence of all seminal fluid, constituting what is known as aspermia. In both cases the act of copulation may be complete. As a corollary to the above two conditions, we might mention malemission, the condition in which the semen is discharged into the male urethra, but is not ejaculated into the vagina.

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