condition it is well to follow with saline infusion into the vein or under the skin—not too much, not too fast; but in the second condition saline infusion is not well given, because it does not seem reasonable to take blood to relieve the heart and then to add the same quantity of another fluid to embarrass the heart as much as before. There is a qualification to this, however, and that is in cases in which the blood is very thick and runs sluggishly from the open vein. Saline infusion will dilute it, and the respective quantities may be adjusted with skill. Temperature in itself, unless excessive or very low, offers no indication for treatment. I have learned to look on cases having temperatures of 103, 104 or even 105 degrees F. as being—other things equal—more favorable than those cases having a temperature of 100 to 101 degrees. The vital reaction is better and the temperature seems to be an indication of this vital reaction. Fenwick's statistics point in this direction, too, and I was recently reminded on looking over my student notes of DaCosta's lectures that he had taught the same thing. The matter is important, because many patients are killed by the by-effects of an'ipyretic drugs, needless under any circumstances. As to *veratrum viride*, it should be remembered that many drugs are used, concerning which it may be said that their physiologic action as laid down in the text-books seems to have little bearing on their effect as observed at the bedside. I have seen some cases benefited by *veratrum viride*, given early and stopped soon, and I know not why. Certainly the benefit has not been due to depression of the heart. Dr. Babcock has well said that this would be a counter-indication. Perhaps there may be something in the complex chemistry of infections and drugs and body cells and fluids, of toxins and antitoxins, amboceptors and complements, which may hereafter explain its action. For the present it has distinct empirical value used judiciously—that is, before consolidation and for prompt effect; using the pulse as an index, diminishing the dose as the pulse falls, and withdrawing the drug as soon as the pulse reaches 60 or 70 beats in the minute, or otherwise shows that the physiologic effect of *veratrum* has been attained. This, I repeat, is an index only.

DR. EDWARD F. WELLS—In a twenty minutes' paper on pneumonia one can barely indicate a few of the general principles and can not go into a discussion of any of these features systematically. In answer to Dr. Cabot, I stated explicitly that the very first effect of pneumonia on the system was a reduction of the arterial tension; there is no doubt about this. Within a few minutes of the onset of the pneumonic chill this reduction appears. If this is an effort of nature to protect the system from the initial shock of a pneumococcus poison, the question arises whether we should or should not assist nature, and I believe that, early, we should do so. In view of this I have taught that *veratrum viride*, given early in these cases, seems to offer a further protection from the violence of the initial shock. Empirically we know that *veratrum viride* will reduce the frequency of the pulse and this without raising the arterial tension. On the contrary, the capillaries are still further dilated. I most emphatically disagree with Dr. Cohen as to the advantage of high temperature in this disease. One hundred and sixty years ago it was stated by Cleg-horn, who practiced scientific medicine in the island of Minorica, that in pneumonia, in ordinary cases, the temperature in the afternoon reached 102 degrees F. with a favorable prognosis, but in severe cases and with a bad prognosis it reached 104 degrees. This statement applies to pneumonia to-day as it did in the days of this great clinician. I wish to set myself right regarding the use of opium. I do not think any one appreciates more than I the disadvantages and dangers of the improper use of opium in pneumonia; but because it may be improperly used is no reason why it should not be used intelligently, properly and beneficently. I stated that in the beginning of the attack, during the course of the chill, that 1/16 or 1/8 of a grain of morphin, given hyperdermatically, will quiet and soothe the patient and be very beneficial. Also late in the disease, similar small doses of morphin, especially in those dangerous conditions accompanied by profuse perspiration and pulmonary edema, small doses of morphin will stimulate the

heart as nothing else can, and sometimes snatch victory from apparently certain disaster. With regard to blood-letting, from first to last, my only reason is to remove more or less of the toxins and I am quite satisfied that this is the keynote to the situation. Occasionally one may bleed for the relief of an over-distended right heart, but I always desire to anticipate that event if by the exercise of foresight and discretion it is possible to do so.

DR. JOSEPH SAILER—In pneumonia I have invariably found the blood pressure to be low. If very low I regard the prognosis as unfavorable. In another series of cases I hope to employ the anti-pneumococcal serum intravenously, chiefly because certain other serums, particularly the anti-plague serum, seem to be more effective when introduced into the circulation than when introduced beneath the skin.

OLD UNREDUCED DISLOCATIONS.*

DE FOREST WILLARD.

Professor Orthopedic Surgery, University of Pennsylvania; Surgeon Presbyterian Hospital.

PHILADELPHIA.

The term, old unreduced dislocations, is here used to cover cases where the joint surfaces remain luxated for a month or more after the accident. The delay in effecting reduction may have been due either to non-recognition of the condition or to the failure of the original manipulative replacement efforts. The designation "irreducible" is a misnomer, since a joint incapable of reduction by one method may be reducible by another procedure.

DIAGNOSIS.

The chief element in the prevention of this condition lies in immediate diagnosis at a time when reduction is easy; old dislocations exist because of faulty diagnosis. With ordinary anatomic and surgical knowledge, with anesthesia and the Röntgen ray, primary diagnosis is usually a simple matter. Whenever uncertainty exists in regard to an injury near a joint, anesthesia should be the rule, since without its employment the pain and swelling often render accurate diagnosis impossible. Diagnosis once established, the treatment follows as a natural sequence. If manipulative efforts fail, operative measures should be at once instituted. The greatest difficulty will, of course, be encountered in dislocations associated with neighboring fractures, especially in the shoulder region, while the cases most likely to be overlooked are those complicated by severe injuries of other portions of the body.

In old dislocations of the shoulder, the body should be stripped to the waist and examined sitting and standing. In fracture of the head of the humerus, or of the neck of the scapula, or a separation of an epiphysis, the elbow can be brought easily to the side of the body, and mobility is the rule instead of fixation. In all old hip luxations the patient should be naked and examined in both the recumbent and standing posture. By this method many errors will be avoided. By comparison with its fellow, the loss of normal movements, difference in contour, altered relation of bones and restricted motion will be noted.

Pathologic dislocations from hip disease, congenital dislocations, coxa vara, and sliding up of the trochanter after fracture of the neck, should be carefully differentiated. Not infrequently I have been obliged in consultation to restrain attempts at reduction in cases both

* Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Surgery and Anatomy, and approved for publication by the Executive Committee: Drs. DeForest Willard, Charles A. Powers and J. E. Moore.

of hip disease and of neck fracture, which had been incorrectly diagnosed as luxations.

COMPLICATIONS.

Complications and obstacles preventing reduction are: inflammatory adhesions and deposits causing partial narrowing of the hole in the capsule; lacerations of muscles and tendons; filling up of the socket by torn muscle or fibrous deposit; fracture of the rim, with bony projections; fragments of fractured bone; a portion of capsule pushed back into the socket, and lastly, the anatomic and surgical ignorance of the surgeon. In dislocations of either shoulder or hip, fractures of the rim are not at all uncommon; the fragments may be found in the socket, or more frequently in the neighborhood, giving rise to osteophytes, which interfere most seriously with reduction, even after open incision. Such an osteophyte was the cause of a fatal result in the hands of Dr. Allis and myself, in which instance the external iliac vein was torn over a sharp cockspur bony point during manipulation of an old hip dislocation.

ACCIDENTS DURING MANIPULATIONS.

I shall never forget the suddenness with which a patient suddenly collapsed while I was assisting the late Professor Agnew, more than thirty years ago. In the midst of manipulations for reduction of a shoulder dislocation of six weeks' standing, a sudden ballooning of all the tissues about the axilla occurred, the patient became pulseless and apparently died; respiration ceased and the radial pulse disappeared. Instantaneous thumb pressure on the right subclavian artery arrested the current through an apparently ruptured axillary artery, and by the prompt application of restoratives the patient survived. The enormous hematoma that formed was afterward believed to have been produced by the tearing of the axillary vein. When the pulse returned at the wrist the tumor did not pulsate.

In Agnew's case only manipulations were employed, but in former days, when pulley traction was much more commonly used than at the present time, it was not remarkable that these accidents were common. Guérin tore off an entire arm. Bell tore the axillary structures to such an extent that immediate amputation was necessary. In other cases, gangrene has occurred, followed by either death or amputation. Gibson in 1823, in accordance with the practice of that day, after a week's depletion of blood letting, tartar emetic, etc., subjected the man to pulley extension and counter extension for half an hour, then manipulations were practiced for one and three-quarters of an hour more, one of the procedures being to hang the patient by the axilla over a door. As this was in preanesthetic days, and as the surgeon was obliged on the following morning to tie the subclavian for a pulsating tumor in the axilla, it is rather strange that the patient lived until the eighth day, with the arm in a state of incipient gangrene. The artery was found to have been firmly attached to the head of the bone and capsule.

Lister in 1873, in an old forward dislocation, ruptured the axillary artery with pulley traction by tearing a fibrous band attached to the coracoid and humerus. He tied the artery through an axillary incision and resected the head, but the patient died on the following day.

In twenty-four cases of injury to the axillary vessels during reduction manipulations collected by me,¹ fifteen terminated fatally; the result in two cases was uncertain; the axillary nerves were lacerated in one case: in

another the brachial plexus was torn from the spinal column. Michans tore off both the median nerve and the brachial artery in reducing a luxation of the elbow, but saved the case by amputation. In the reduction of a posterior dislocation of the head of the femur, the sciatic nerve has been hooked up and carried forward in front of the neck of the femur, with great resultant tension and pain, flexion of the hip and disability.

OPERATIVE METHODS.

1. Manipulation and traction. 2. Continuous extension and counter-extension. 3. Arthrotomy, with section of all tissues interfering with reduction. 4. Resection, with replacement, when possible. 5. Subcutaneous incision of capsule or of surrounding tissues, a procedure usually uncertain and dangerous.

Manipulation and Traction.—In former times the resistance of the muscles was considered to be the chief element in the prevention of reduction, consequently extreme force by pulleys was employed, even to the tearing away of the limb. At the present time, recognizing that the muscles are only one of many obstacles involved, intelligent manipulation is considered of the first importance. An extreme degree of force should be avoided lest serious injury result. Full anesthesia should be secured and moderate manipulative and traction efforts instituted. These will vary with each joint involved, in accordance with the usual methods pursued in primary cases, being varied to suit the position of the bone, the present condition as shown by palpation, the skiagraph, etc. Hand movements are, as a rule, much safer than instrumental.

Shoulder.—The manipulative efforts at the shoulder for the reduction of an old dislocation will vary but little from the ordinary ones employed in recent reductions save that great caution must be observed in the preliminary breaking up of adhesions. Serious accidents, as already enumerated, or fractures may readily be produced by undue force. The indications are: to fix the scapula, apply traction, adduction, external rotation, pressure on head, adduction, flexion, internal rotation.

The old method of upward traction was a most dangerous one, as it put great tension on the axillary tissues; outward traction is less risky, but should be employed with caution.

Reduction efforts rarely succeed four months after the luxation.

Hip.—An old hip-joint dislocation is a most formidable condition to encounter, and, next to the shoulder, this joint is the one most liable to be involved; it is also an injury most frequently undiagnosed, as the condition of fracture or of dislocation is often masked or overlooked when anesthesia has been carelessly omitted at the time of the original injury.

I recall a case that occurred twenty-five years ago, in which the man, three months after a heavy fall of earth compressing his body, was discovered to have a dorsal dislocation of the left hip. Under ether, I readily reduced this and placed it in the acetabulum with a distinct thud, and with the immediate resumption of the normal position of the leg. When comparison, however, was made with the right leg, it was discovered that the leg which had just been reduced was shorter than the one of the opposite side. This condition was very puzzling, until it was seen that the right leg was not only longer, but was also slightly everted, and that there was a fullness in the region of the thyroid foramen, thus showing that there had been a forward simultaneous dislocation of the opposite hip, both legs having evidently

1. Phila. Med. Times, Aug. 16, 1873.

been forced in the same direction. All efforts to reduce this failed, although, with the assistance of Dr. Allis, I applied all the then known methods of manipulation, leverage, traction, etc. The head could be carried to the position of dorsal dislocation, but could never be placed in the acetabulum. The fact that the left acetabulum had not been filled up through the three months, and that the rent in the capsule had not united, proved that other complications existed which prevented reduction of the right hip. What these complications were, of course, we could not determine, as at that time neither Allis nor myself was bold enough to cut down on the joint. Ten years later the man was doing hard laboring work.

Allis,² who has given most thorough experimental and practical work to hip dislocations, says that the greatest injury to the capsule is confined to the lower two-thirds, and that the upper thickened portion of the capsule, known as the Y ligament, is rarely lacerated, which accounts for its great service in restoration. The strong upper rim of the acetabulum, the surrounding muscles and the dense capsule, are all important elements in the prevention of a luxation.

A careful consideration, therefore, is necessary as to the probable character and direction of the force; whether a sudden blow or a slowly crushing power has been exerted. The x-ray is here most useful in determining the extent of the fractures and bony complications.

Allis' fundamental law is that a dislocated joint should be restored through steps in the reverse order of the displacement, consequently his manipulative reduction is based on the knowledge that the lower portion of the capsule is the one torn and that the head of the bone in dorsal dislocation, therefore, needs to be elevated into place. He first fastens the pelvis firmly to the floor by inserting into the wooden flooring three hooks—strong opened screw eyes—one near the perineum, and one on either side opposite the crest of the ilium. To these hooks the pelvis is firmly bandaged over towel pads. To avoid interference in the groins from the bandage, a flat metal cross, with its four ends curved on themselves sufficiently to hold the strips of the bandage, is placed above the pubis. To-and-fro turns of the bandage are then made from these hooks to the screw hooks in the floor. The femoral head is drawn downward by traction; then the flexed knee is lifted over the flexed arm of the surgeon until the head of the femur is brought opposite the acetabulum; if it catches on the rim, the surgeon steps across the opposite limb, carrying the knee with him into extreme adduction, while traction is still made toward the ceiling, and an assistant's hand is employed to lift the head into the socket. Reduction is usually accomplished with an audible snap. If it does not occur, the knee is then carried across the body to a state of abduction, while steady, simultaneous upward traction is employed. To increase the surgeon's tractive power, perforated iron bars are securely fixed with wet bandages to the sides of the lower half of the thigh. A rod connecting these bars makes an excellent handle for the surgeon in his traction and manipulation efforts. Fix pelvis, flex thigh, turn leg and heel out; lift, press on head, turn leg in, extend.

Second, or indirect method, employing the Y ligament of Bigelow as a fulcrum. When the head has been lifted as already described to a position just below the acetabulum, carry the knee with the leg flexed di-

rectly downward in extension; the Y ligament will thus be made tense and the head will be lifted into the socket. Bigelow's manipulations are flexion, abduction, eversion.

For a thyroid dislocation the reverse manipulations may be practiced, still following the law of reversed order, or the head may be thrown into the dorsal position and then reduced. In the forward dislocation first flex, abduct and make traction outward; then an assistant presses on the head during adduction and traction. Forward dislocation, second method, utilizing the Y ligament, flex, abduct, carrying the knee obliquely inward and downward; then rotate outward; not circumduction, lest the sciatic nerve be hooked up.

Bigelow's manipulations for thyroid dislocation are flexion, adduction, inversion, lifting, circumduction.

Continuous Extension and Counter-extension.—After failure of reduction by manipulation, a very useful adjuvant, especially for the lower extremities, is the application of continued weight and pulley extension in bed for a week or more, so as to relax and quiet muscular action. At the end of this time, under thorough relaxation by ether, manipulative efforts may be successful, although failure has occurred at the first attempt.

In the upper extremity it is much more difficult to apply continuous extension satisfactorily, even with air pads in the axilla and Stimson's couch with its perforation for the arm.

Arthrotomy and Excision.—When manipulations fail, the question of open operation becomes a serious matter, especially at the hips. The tissues surrounding the joint have not only been originally injured, but have also been subjected to repeated traumatism during the several efforts at reduction. Their resistive power to infection has consequently been greatly lowered, and septic influences easily prevail, as is well instanced in the following case:

A man, 28 years of age, with an eight-month-old dorsal dislocation of the hip that had resisted eight attempts at reduction by as many different surgeons, applied to me for relief. The hip was immovable and useless. A carefully planned and systematic effort at reduction was made by myself, assisted by Dr. Allis, but without avail. At the earnest solicitation of the man I consented to operate. An incision was made over the trochanter, head and neck in the line of the gluteal muscles, separating the fibers; the tissues were cut away and the capsule opened, but the acetabulum could not be reached. An anterior incision was then made in the triangle formed by the tensor vaginæ femoris and the sartorius. The head of the sartorius and the long head of the rectus were cut away; the psoas was also cut from the lesser trochanter, the capsule opened, strong traction applied; the acetabulum was found filled to the level with fibrous tissue almost as tough as tendon. This was cut away with gouge and spud, and a large quantity of thickened tissue was cleaned from the head, which was even then reduced with great difficulty. The cushion in the acetabulum still prevented the head from sinking more than one-half into the cavity; the bone was, therefore, redislocated and the acetabulum absolutely cleared; at last the head remained easily in its socket; thorough drainage with rubber and gauze was introduced and the limb fixed with plaster of paris, slightly abducted and everted, and nearly in line with the body. The hemorrhage was considerable, but no ligatures were required after clamp hemostasis. The man vomited persistently from the time of operation, and died a week later from septic endocarditis. The operation was long and severe; the chances for infection were numerous.

Dr. Thomson fractured the femur in an attempt to reduce an old dislocation of the hip. He very wisely opened the joint, reduced the dislocation and the frac-

2. Dislocations of the Hip. Gross Prize Essay. Phil., 1896. Octavo, p. 167.

ture, and retained the latter in position with a silver nail, thereby securing a good result.

Shoulder: The necessity for operative relief will depend largely on the amount of disability and the extent of the pain, the latter being caused by pressure on the nerves and vessels.

In a two-month-old subcoracoid dislocation of the shoulder, after failure of manipulative methods, and finding the head thoroughly fixed, I made an incision in the pectorodeltoid groove and resected a portion of the capsule and of the spinati muscles. As the luxation still refused to yield a second incision was made about the middle of the deltoid, separating the fibers, and after thoroughly dividing the tissues the head was at last successfully placed in the glenoid cavity. The capsule was so greatly injured that its remnants were stitched with catgut to the acromion; the arm was fastened across the chest with a plaster-of-paris bandage, and, after two weeks, gentle passive movements were instituted, with good recovery of motion but with slight loss of abduction and elevation.

In a shoulder joint that was dislocated fifteen years previously through a football injury, and where the head of the bone slid back and forth on the anterior ledge of the glenoid, with some eighteen subsequent luxations inflammatory swellings and great disability, I made one incision in front of the deltoid and another through the center of the muscle, separating its fibers. The outer portion of the capsule had evidently been torn away at the time of the original injury, and the inner portion had been subsequently elongated and stretched. After replacing the bone the external portion of the capsule was stitched to the acromion and the anterior capsule folded and fastened with a chromicized catgut. The arm was held for several weeks in front of the thorax until good union had been secured, after which forward movements were especially encouraged, and a firm joint secured.³

The best access may be obtained to this region and the least injury done by cutting just posterior to the cephalic vein, in the groove between the deltoid and the pectoral; this gives excellent access to the head. The axillary incision, while more dangerous, is sometimes necessary when the adhesions between the head of the bone, arteries, veins and nerves are dense, and is also an excellent incision for resection, although through it the glenoid is less easily reached. If incision is made over the middle of the deltoid the fibers should be separated as much as possible, not divided, so as to avoid loss of abduction and elevation. The posterior incision, which starts beneath the acromion, is most liable to injure the circumflex nerve (which runs just below the acromial ridge), thus cutting off a large portion of the innervation of the deltoid. It affords easy access to the glenoid, but not to the head. Even with the anterior incision there will be some atrophy of the internal fibers of the deltoid, but this loss is partially compensated by the pectoral. The old operation of cutting off the attachment of the deltoid is a bad one. If the biceps tendon is torn or cut, it should be restitched. In excisions it is better to take away too much rather than too little. Hemorrhage is greatly lessened by closely hugging the bone with bone gouge or chisel. It is sometimes necessary to divide the tendons of the infraspinatus and supraspinatus, the long head of the biceps, subscapularis and teres minor. After freeing the tissues about the head and neck of femur or

humerus, I have sometimes had the greatest difficulty in replacement and have been obliged to divide all the tissues most freely. In some cases traction on the head may be made through the incision by placing a curved bone elevator or strong wire about the head, by using a lever, or by drilling the bone and inserting strong steel hooks. When the glenoid cavity is filled with a tough cicatricial fibrous mass, the socket must be cleared with gouge and knife. In the young, great care should be taken not to injure the epiphysis, and resection should not be employed except under special circumstances. The natural accommodative mobility of the scapula must be taken into account, and the amount of adhesions. The subsequent fixation and pain depend largely on the original injury and the position of the head. In resections the keyhole saw or the heavy chain saw is advisable. Owing to the liability of breakage, I have had a chain saw made from an old *écraseur*. When old dislocation and fracture coexist, the question of manipulation or arthrotomy or excision is a serious one. The broken fragment may have united to the bone in bad position, or it may have become thoroughly adherent to surrounding tissues, or it may be entirely disconnected. Fragments may be nailed or wired in position. Resection of the head of humerus or femur, though often necessary in these cases, should not be undertaken as a positive rule, since a completely reduced upper joint fragment can sometimes be treated the same as an ordinary fracture and a fairly useful joint secured. In cases of doubt, an excision may be deferred in old persons until the amount of pain and disability is definitely ascertained, yet a resected shoulder joint, provided the muscles are not too seriously injured, often gives a more useful arm than the stiff ankylosed one so often secured by the forcible reduction of an old injury. Pressure of broken fragments on the axillary vessels and nerves usually gives great pain and demands resection. In one of my cases, however, where both dislocation and fracture existed, the aged man was so far advanced with locomotor ataxia that he was practically helpless, and lived several years without any serious inconvenience from the presence of the head in the axilla. In other cases, however, the pain is extreme; in others the inflammatory adhesions fasten the tissues in a mass which will not only resist attempts at manipulative reduction, but even persist in spite of open incision. Fractures of the shaft of the humerus and of the femur are not uncommon during efforts at reduction.

It is extremely important that every aseptic precaution be taken, as disturbance of tissues already below the normal resistive point is prone to give septic results. Drainage either by rubber tube or gauze is necessary on account of the severity and length of the operation.

Arthroplasty.—I have tried a number of methods to prevent the union of joint surfaces, but nature, while sometimes tolerating a foreign substance, usually rebels against its continued presence. Gold or silver foil is less irritating than rubber tissue. The best method is, when possible, to turn in a flap of fascia or connective tissue.

Results.—Souchon⁴ gives, in his admirable compilation, the histories of 133 operative cases of old shoulder dislocation, with their results, accompanied by a complete bibliography. He gives the deaths immediately following the operation as 13 per cent., with an additional 10 per cent subsequently; the chief causes being gangrene, hemorrhage, sepsis and pneumonia. Of the

3. Burrell's operation for this condition of habitual dislocation is an excellent one. *Trans. Amer. Surg. Asso.*, vol. xv, p. 293.

4. Operation of Irreducible Dislocation of the Shoulder Joint, *Trans. Amer. Surg. Asso.*, 1897; octavo, p. 138.

collected cases about 27 per cent. suppurated. Naturally, sepsis was much more frequent previous to 1885. A good result, however, has, according to statistics, been secured in over 50 per cent. of cases.

Reerink gives the fatality of shoulder excision: in 47 operative cases, 14 became infected and 8 died of sepsis and other causes.

Elbow: A dislocation of the elbow sometimes remains undiagnosed and becomes fixed in its malposition. In a case of four months' standing (Fig. 1) after the first failure at reduction I applied extension for a week. The woman was pregnant at the time, and the method gave so much pain and annoyance that after the second unsuccessful attempt at reduction I resected the condyles of the humerus through two lateral incisions (in preference to the posterior triceps cut), brought the ulna into position and secured a useful movable joint. A letter received last week states that the fetus was carried to full term, and that the elbow movements are nearly perfect, although strength is impaired.

Head of the Radius: An old dislocation of this joint is often difficult to replace, but extension, strong pressure and rotation will sometimes accomplish it. If un-

Fig. 1.—Lateral dislocation of elbow, four months' duration.

successful, the joint should be opened, replaced and stitched or resected.

Clavicle: In an old dislocation of the outer end of the clavicle, Hopkins was able to hold it firmly in place by carrying an X-shaped suture of silkworm through two drill holes in each bone; silver wire would answer the same purpose, or a firm nail could be used.

Jaw: In a three-month-old dislocation of the jaw Mixer applied lever extension with the fulcrum opposite the molars, and after forty-five minutes was able to reduce the dislocation.

Thumb: In old dislocations of the phalanges, where the head of the bone has passed between the tendons, these dense structures often resist all efforts at replacement and open incision is imperative.

AFTER-TREATMENT.

Passive movement should be instituted very early after reduction, and after operation in all old luxations. Electricity, massage, voluntary and involuntary muscular movements, gymnastics and other measures for the restoration of function must be continued for a long time.

CONCLUSIONS.

1. Early immediate diagnosis is the most important

element in preventing the existence of old unreduced dislocation. With ether, the x-ray and anatomic and surgical knowledge, a recent displacement ought always to be discovered by the surgeon. Immediate reduction by manipulation or open operation should follow.

2. An old, unrecognized dislocation should be carefully examined under the x-ray and ether to discover the extent of adhesions and the possibility of effecting reduction without extreme measures. The manipulations to be practiced are practically the same as those employed in recent luxations, but greater caution is necessary. Failing in these, continuous extension in bed should be practiced for a week; the second attempt, without the application of extreme force, should then be made, the permission of the patient having been previously obtained to permit of open operation, if deemed necessary.

3. Open section should include the division of all muscular, tendinous, capsular and bony obstacles to reduction. When the socket is filled up with dense fibrous tissue, such tissue should be excavated, and the head of the bone placed *in situ*.

4. Partial or complete excision of the head and of fragments in case of fracture will frequently be necessitated.

5. In cases that have existed more than a year, or where the original injury has been extreme, operation should be avoided unless pressure on nerves or blood vessels is seriously impairing the usefulness of the limb or giving pain, but resection should be practiced in bad late cases, with pain and serious nerve symptoms.

6. Sepsis is frequent on account of the severity and length of the operation, and especially by reason of the non-resistive ability of the tissues due to the original injury and to repeated traumatism from manipulative efforts.

7. Pain, disability, age and occupation are the most important conditions in arriving at a decision concerning operation. When a limb is useful in its new position, gives no pain or difficulty, it should be let alone.

8. In the after-treatment, muscular gymnastics, electricity, voluntary and involuntary muscular movements and massage are very important measures and should be persistently employed. These manipulations require both patience and pluck on the part of the patient.

DISCUSSION.

DR. A. F. JONAS, Omaha—My personal experience with old dislocation of the joint is limited almost entirely to the shoulder joint, of which two years ago I reported seven cases. Of these, six were operated on and one was not. One feature of the operative cases was common to all, and that was the contraction of the capsule. The first of the series had remained unreduced for three or four months. I began to use Kocher's manipulations, and it became reduced by this method. The remaining seven cases were reduced by manipulation. The structures which opposed reduction varied with each case. In one the coracoid process was broken off and had become adherent in its new locality. Before it could be replaced it was necessary to remove this broken off portion of the coracoid. In another case the long tendon of the biceps stood in the way of reduction, but the contracted capsules of the joints gave most trouble. Extirpation was necessary in one of the cases. Usually the head of the bone was replaced, but in most of the cases we injured the circumflex nerve, owing to the amount of manipulation. We could not always locate it, and in most of the cases we had atrophy of the deltoid muscle. Strangely, the mobility of the scapula is such that all of these cases were able to perform the duties to which they had been accustomed. There were no deaths, and the recoveries were all by primary union. So far as adhesions to other joints are concerned, I only recall one of

dislocation at the head of the radius which had existed for four or five months. I had to cut down on the head of the radius to replace it in its normal position.

DR. C. E. THOMSON, Scranton, Pa.—I will report one case of dislocation of the hip. My patient, a miner, was injured last June by being run over by a mine car. The leg was lacerated and was amputated five weeks later four inches below the knee. At that time the dislocation of the hip remained undiscovered. He came to me last February, when I attempted to reduce his old dislocation. I used the Allis method of fixation of the hip. While Dr. Allis recommended it so enthusiastically for experimental work on the cadaver, he was a little chary about recommending it on the living patient. We used it most energetically, without any injury to the patient further than slight excoriations. After the most energetic manipulations we failed to reduce the dislocation. Having failed by the Allis method, we tried the Kocher method, with disastrous results. Notwithstanding that we had but a stump to manipulate, we broke the bone between the trochanters—an oblique fracture—by the Kocher method. Ten days later we renewed the attack and succeeded in reducing the dislocation with long, blunt hooks similar to those used for handling meat. We used anterior and posterior incisions similar to Hoffa, and the patient made a good recovery. The fracture was held in place by a specially devised nail. Union has taken place in the fracture, and we hope he will have a useful stump.

DR. A. D. BEVAN, Chicago—Five years ago I reported a series of cases of old dislocations reduced by operative methods, and in practically all of them we had a complicating fracture. The dislocations of the shoulder had no complicating fracture. If reasonable efforts at reduction by mechanical means fail, then an x-ray should be taken to see if there is a complicating fracture. It is impossible to make an incision in such a direction as to expose the acetabulum before you expose the end of the femur. The capsule should be exposed and freed before the head is exposed. As to the importance in the work of operation on old dislocations of the elbow of sacrificing the triceps tendon, if you expose the joint you will almost invariably find a piece of bone preventing reduction. I have obtained better results since I have paid attention to this. I do not think I have injured the circumflex nerve and produced resulting paralysis, but I rather think we have had an ankylosis, with an atrophy of the deltoid from lack of use. I believe that where great force is necessary to reduce an old dislocation of the shoulder we are more apt to obtain a satisfactory result by resection of the head of the bone.

DR. J. A. BLAKE, New York City—I have had very little experience with old dislocations of the hip, but have treated several of the shoulder, and I am inclined to operate rather than make prolonged or forcible attempts to reduce by mechanical means. I split the fibers of the deltoid as near its anterior border as possible in order to avoid injuring its nerve supply. If this does not afford sufficient access, a supplementary transverse incision is made just below its attachment to the acromion, which also preserves the integrity of its nerve supply. Excision of the head of the bone may be done in some cases. After removal of the head the functional result is often excellent. I have recently seen a resection of four inches of the humerus for new growth, and the result has been almost perfect as regards function. As to the elbow, lateral incisions give the best access.

DR. G. T. VAUGHAN, Marine-Hospital Service, Washington, D. C.—We are all agreed that there should be no old dislocations of the shoulder; if one can not reduce them one should operate at once. Sometimes this is not done, and they come for treatment. I had one case of this kind in which the detached greater tuberosity of the humerus was located directly over the glenoid cavity. Several attempts had been made to reduce it, and it was thought with success, but the patient continued to suffer great pain for two months. I tried all the various methods of manipulation before cutting. I do not approve of the method of placing the foot or the hand in the axilla, having on two occasions fractured a rib by using the foot in the axilla as

a fulcrum. I made an incision and found the glenoid cavity filled with bone. On locating the head of the humerus, I found this bone was the detached greater tuberosity, which had to be dissected out from its attachments over the glenoid cavity. Extension and counter-extension is the best method by which to treat these cases, as it is least likely to do harm, and if it fail can be followed by Kocher's or some other method.

DR. J. P. LORD, Omaha, Neb.—We should take our cue from the recent experience of the orthopedists and adopt the suggestions voiced in last year's orthopedic association rather than resort to excessive force in order to reduce these dislocations. It has been my recent experience that this facilitates the reduction of the head of the femur, and it is my belief that injury of the nerves and blood vessels, nerves especially, is produced more by the effect of the lever action which we produce in our manipulation than by the traction. If we overcome this resistance by tenotomy and not exert this pressure on the nerves as we do with our forced manipulation evils, we will not produce these dire consequences. We should not operate immediately after severe traumatism has been produced by this bloodless reduction. Dr. Willard did not emphasize that sufficiently. Consent to open operation should be obtained if manipulative methods fail. I do not think we should undertake the operation until after severe manipulative measures have been resorted to.

DR. CHARLES A. POWERS, Denver—A number of years ago I saw many unreduced dislocations of the shoulder at the Chambers Street Hospital in New York, and so far as I can remember none which had been out more than ten or twelve weeks was replaced without operation. At that time I carefully studied the paper of Kocher, which many of you remember reading fifteen or twenty years ago and in which he stated that old dislocations could be reduced by his well-known manipulative methods. I was never quite able to understand Kocher's reasoning or his results in old dislocations. The adhesions must be thoroughly broken up before reduction by any method of manipulation. The breaking up of adhesions must be done, however, with utmost caution. I am heartily in accord with Dr. Willard in thinking that open operation should be resorted to more frequently. I would like to put on record a case of intracapsular dislocation of the shoulder of four months' standing which, to my surprise, was easily replaced after from eight or ten minutes of manipulation. This was in a woman of over 60 years, a patient of Dr. P. V. Carlin of Denver. Where an old luxation can be replaced by manipulation it is, of course, best to do so, but we are always to bear in mind the dangers attending too forcible manipulative effort.

DR. WILLARD—Ankylosis of the shoulder joint is an unfortunate condition, especially for a woman, and resection of the head of the humerus is often preferable. The breaking up of adhesions in an old dislocation is the most dangerous part of a reduction. Open arthrotomy with resection of the fragment is often the better operation.

Foam-Producing Power of Urine; Aphrometric Test.—A. Bignon of Lima, Peru, calls attention to a means of testing the urine by its power to produce a durable foam when shaken up with water and acetic acid. The *Boletín de la Academia Nacional de Medicina*, 1904, iv, No. 1, contains his communication on the subject with detailed accounts of his tests. He establishes as the standard the number of cubic centimeters of the urine for one hour, diluted with water to 200 c.c., which will produce a foam lasting for half an hour when shaken up for one minute with 100 c.c. of a solution of acetic acid (15 c.c. of acetic acid to the liter of water). In normal conditions about 1.5 c.c. to 3.5 c.c. of urine are required to produce this result, but in abnormal urine a much smaller amount is sufficient. When the foam can be induced with less than 1 c.c. of urine, it should be regarded as suspicious. He is now studying the application of the test to milk, wines, etc. He calls it the aphrometric test, from the Greek word *aphros*, foam. The term aphrodisiac is derived from the same root, from the legend that Venus (Aphrodite) was born from the foam of the sea.