PAINFUL SHOULDER

ARISING FROM LESIONS OF THE SUBACROMIAL BURSA AND SUPRASPINATUS TENDON

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IT IS not the purpose of this paper to discuss all the possible painful lesions of the shoulder region but rather to detail experiences in the treatment of the soft tissue lesions involving the subacromial or subdeltoid bursa and the supraspinatus tendon in 200 patients.

The lesions to be discussed are: (1) Acute traumatic bursitis; (2) acute bursitis with calcification; (3) subacute bursitis with calcification; (4) chronic bursitis; and (5) tendinitis or obliterative bursitis.

It is proposed to outline the significant points in the history and examination of each lesion, to describe as far as possible the pathologic change giving rise to the symptoms, to relate therapeutic measures which have been used, and finally to report the prognosis as observed in a series of cases (Table I).

ACUTE TRAUMATIC SUBDELTOID BURSITIS.—The patients included in this group are those who have pain in the shoulder region following either direct or indirect trauma to the shoulder. The direct trauma may be a blow or fall upon the shoulder, and this is always associated with contusion of the deltoid. Indirect trauma usually results from a fall upon the arm or elbow with the arm in partial abduction. The arm is driven up toward the shoulder by a force transmitted along the long axis of the humerus, or the arm may be forcibly pushed underneath the body by the fall while an effort is being made to produce an abduction movement. Naturally, in many such injuries, the exact mechanism of the trauma cannot be accurately learned, but generally a clear history stating that the shoulder itself did not receive direct trauma may be obtained.

Soon after the injury there is a rather acute tenderness over the greater tuberosity, which becomes less with the passage of time. The patient complains of pain on abduction of the arm. There is often only a portion of the abduction arc in which severe pain is experienced. Usually there is persisting soreness which may be present in decreasing intensity for several days after the injury. On examination, the patient's description of a painful point during abduction movement is confirmed and it may be demonstrated that abduction against resistance is markedly painful even in the lower portion of the abduction arc. Examination should be made for evidence of injury to the acromioclavicular joint as shown by tenderness on pressure over it. In cases with more severe trauma, abduction movements may be very markedly limited due to pain, and in such cases there may be considerable difficulty in making a differential diagnosis between simple acute traumatic bursitis and

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partial tear of the supraspinatus tendon. As a matter of fact, however, this differential diagnosis is not important in most cases because treatment of traumatic bursitis and minor tears of the supraspinatus is practically the same.

TABLE I

RÉSUMÉ OF LESIONS CAUSING SHOULDER PAIN

	Acute Traumatic Bursitis	Acute Bursitis with Calcification	Subacute Bursitis with Calcification	Chronic Bursitis	Tendinitis or Obliterative Bursitis
Symptoms	Direct trauma to shoulder. Indirect trauma through arm. Soreness in shoulder	Intense, constant pain in shoulder	Pain in shoulder worse on abduction. Nocturnal. Often history of trauma	History of trauma. Pain in certain degrees of abduction	History of slight trauma or overuse. Slowly increasing pain. Increasing disability in abduction and ext. rotation
Findings	Tenderness over greater tuberosity. Pain on motion, especially abduction	Acute tenderness over greater tuberosity. No shoulder motion because of pain	Tenderness over greater tuberosity. Pain on abduction but motion possible	Tenderness over greater tuberosity. Slight limitation of motion. Pain and click on abduction	Slight deep tenderness, greater tuberosity. Atrophy of shoulder muscles and spasm. Restriction of motion
Cause of symptoms	Traumatic inflammation of bursa due to (1) contusion between greater tuberosity and acromion, and (2) slight tears of supraspinatus tendon	Inflammatory tension in area of calcification	Traumatization of area of calcification in supraspinatus tendon. Reflex spasm of supraspinatus	Thickening of bursa, villi formation and bands	Adhesive bursitis. Loss of gliding function in bursa
X-ray findings	Negative	Large area of calcification over lateral edge of greater tuberosity	Small area of calcification on top of greater tuberosity	Changes in greater tuberosity. Excrescences	Negative
Treatment	Immobilization. Heat. Gradually increasing exercises within pain limits.	Incision and evacuation of calcified area under local anesthesia	Rest, heat, sedative. Local anes. injection into bursa. Exercises within pain limits	Rest, heat. Excision of villi, bands and excrescences	Injection with novocain. Manipulation. Heat, diathermy. Exercises
Prognosis	Good. Recovery in 2 to 3 wks.	Good. Immediate relief of pain. Normal function	Eventually good. Acute symptoms subside in 1 to 3 wks. Eventual recovery	Good. Recovery in 3 to 4 wks.	Eventual recovery. Progress slow

In major or complete tears of the supraspinatus tendon the symptoms are usually so definite that there can be no confusion.

The cause of these symptoms is an acute traumatic inflammation of the subdeltoid bursa. In cases caused by direct trauma, there is an associated

contusion of the deltoid. In those produced by indirect trauma, the inflammation is produced either by the greater tuberosity and the supraspinatus tendon being driven against the acromion or by partial tears at the insertion of the supraspinatus tendon on the greater tuberosity. The latter injury can hardly take place without some injury to the floor of the bursa which lies immediately over the tendon.

A roentgenologic examination should always be made in order to rule out the possibility of fracture.

The treatment of acute traumatic bursitis is immobilization of the shoulder with later applications of heat. A very effective method of immobilization is by means of adhesive strapping (Fig. 1). Moist heat or dry heat by means of an electric pad or diathermy is valuable after two or three days. Immobilization should be continued for a period of at least a week or ten days; then exercises, gradually increasing in range, will permit the patient to recover normal function of the shoulder within a period of three to four weeks after the injury. The difficulty in these cases is in maintaining immobilization and restricted motion long enough to permit the traumatic inflammation in the region of the bursa to subside. The prognosis in these cases is good but it should be remembered that the acute trauma, especially if repeated, may lead to one of the more disabling lesions.

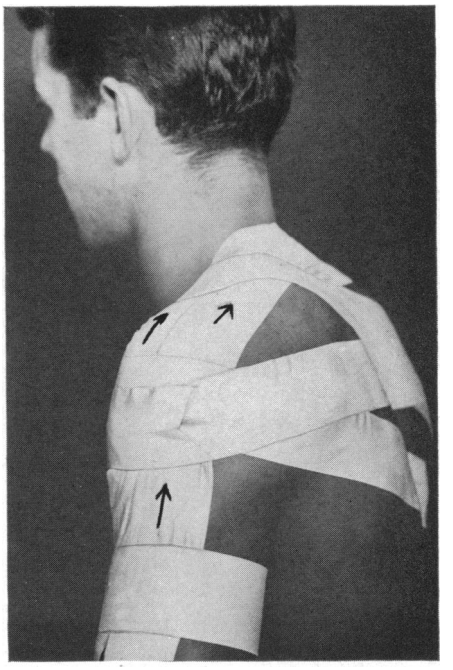

FIG. 1.—Adhesive tape strapping of shoulder. Longitudinal strips are fixed first to the arm, beginning about midway between the shoulder and elbow. They are then pulled firmly upward over the shoulder; those from the anterior surface of the arm across the point of the shoulder to lie over the scapula, and in the same manner, those from the posterior surface of the arm cross over the shoulder to become attached to the anterior upper chest. Transverse strips around the arm and across the shoulder fix the ends.

ACUTE SUBDELTOID BURSITIS WITH CALCIFICATION.—There is no mistaking the patient suffering from acute bursitis with calcification. He comes nursing the affected arm as tenderly as he would if he had a fractured clavicle (Fig. 2). He refuses to move the arm at the shoulder, and his haggard face confirms his story of sleepless nights because of a constant, intense pain in the shoulder often radiating down the arm. Acute tenderness is found on slight pressure over the greater tuberosity. Further examination can hardly be made because of pain experienced by the patient.

The cause of the acute symptoms in these cases is tension in a calcified area in the supraspinatus tendon in the floor of the subdeltoid bursa. This

area, which has probably been present for some time, seems suddenly to become the seat of an inflammatory process, and being confined in a dense tissue, the tension produced causes an intense pain. Any attempt to move the arm increases the tension in the calcified area with a consequent increase in the pain.

A roentgenologic examination is of value in confirming the diagnosis. In these acute cases there are two things that stand out in the roentgenogram: the calcified mass appears to be large, and it usually lies well down over the greater tuberosity (Figs. 3A and B).

The therapeutic indication is relief of the tension by incision of the area

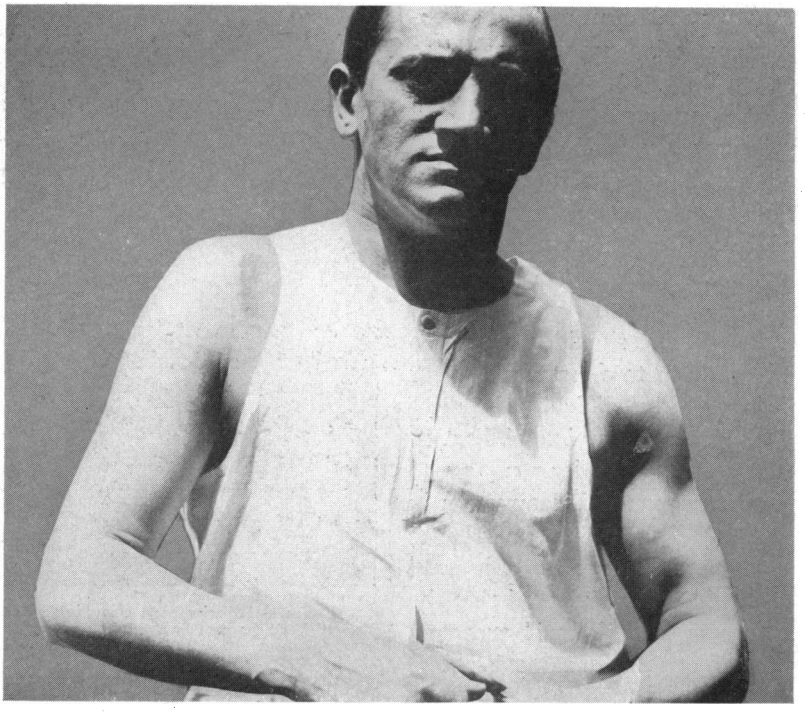

FIG. 2.—Typical position of patient with acute bursitis with calcification of right shoulder.

of calcification, which operation can be performed under local anesthesia, as described by Codman. The use of adrenalin in the novocain makes the operation practically bloodless. A small incision is made over the greater tuberosity, separating the fibers of the deltoid and the roof of the bursa. In typical cases, the lesion is found presenting over the greater tuberosity exactly as Codman describes it. There is a circular red zone of small injected vessels surrounding a pale area of calcification. This area has been found in most cases to lie to the lateral edge of the greater tuberosity. If the incision has been properly placed, the calcified area presents in the wound. If it is not immediately visualized, rotation of the greater tuberosity will bring it into view. Having localized the area of calcification, a small nick in its surface

readily demonstrates the tension which is causing the pain. White, soft material of a consistency and appearance of tooth paste pours out of the incision and curls up in the wound. With this relief of tension the patient experi-

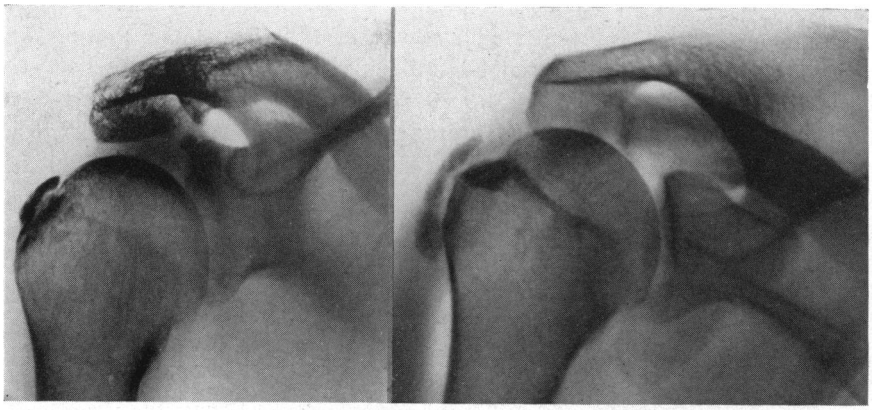

FIG. 3.—(A) Roentgenogram of patient in Fig. 2. (B) Roentgenogram of another similar case. Note typical position and relatively large area of calcium deposit in the acute bursitis with calcification.

ences immediate relief of the intense pain which has tormented him. Usually the incision is enlarged and as much as possible of the calcified material

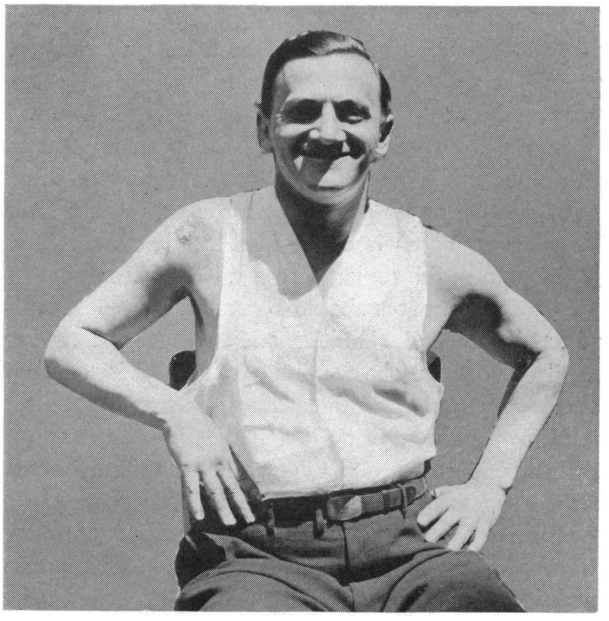

FIG. 4.—Same patient as Fig. 2, two weeks after incision and evacuation of calcified area.

is removed gently with a curette. No effort is made to excise any of the wall of the calcified area to which clings much of the pasty material. The wound in the bursa and deltoid is closed with a layer of catgut sutures and

the skin is closed with mattress sutures of silk. A simple pressure dressing is applied and a sling is adjusted.

This treatment gives such immediate relief from the excruciating pain that the discomfort caused by the wound is minimal in comparison. Five patients so treated have been ambulatory cases (Fig. 4). The prognosis is good in all cases. Immediate relief is followed by recovery without disability in one to two weeks.

SUBACUTE BURSITIS WITH CALCIFICATION.—The patients in this group complain of disabling pain in the shoulder, but it is not so constant or intense as in the former group. The pain does not prevent movement of the arm at the shoulder, but it is caused by abduction so that the movement of putting on a coat causes a sharp pain in the region of the shoulder. As a rule the pain appears if the patient lies on the affected shoulder and is for this reason often noted at night. There is not infrequently obtained a history of previous occasional pains in the shoulder and often of an injury or unusual use of the arm and shoulder.

Examination demonstrates pain on abduction of the arm. Usually it is most acute as the greater tuberosity passes under the acromion. There is tenderness on pressure over the greater tuberosity, but this is not nearly so marked as that noted in the acute type.

Roentgenologic examination shows an area or areas of calcification but these are not usually so dense or so large as noted in the acute variety and they are found located on top of the greater tuberosity rather than along its lateral edge (Figs. 5A and B).

The pathology consists of an area of calcification in the supraspinatus tendon beneath the floor of the bursa. There is no tension in the calcified area and no pain until the area is traumatized either by prolonged or unusual use of the supraspinatus, or by pressure of the area against the acromion in abduction. The supraspinatus is often found to be in a reflex spasm, probably caused by the pain in the region of the calcified area.

The treatment of these cases should be conservative. The indications are rest of the affected arm and shoulder and applications of heat during the painful stage. In about one-half of the cases baking and diathermy are effective in relieving the pain and in causing a rapid subsidence of the symptoms. Sedatives are necessary in the early phases of the treatment. In those cases in which heat and rest are not immediately effective, and especially in those with marked spasm of the supraspinatus, injections of 20 to 30 cc. of 1 per cent novocain into the region of the bursa are often effective. The injection apparently blocks the pain sensations and sets at rest the hyperirritable supraspinatus. After the more acute symptoms have subsided with either heat or injection, active exercises within pain limits are of most value. The prognosis for eventual recovery is good.

Operation in subacute bursitis with calcification is mentioned only to be condemned. An experience with a few such cases serves to forcefully teach this lesson. The operation itself is often embarrassing, for after opening the

bursa, there is no telltale circular zone of hyperemia to mark the area of calcification. A considerable search is often necessary, in spite of roentgenologic localization, before the dense chalk-like calcified area is found. It is deep in the substance of the supraspinatus tendon and does not present in the floor of the bursa. It seems that perhaps more harm than good is accomplished by making an opening through the tendon at the greater tuberosity in order to remove a relatively innocent appearing area of calcification. The results appear to bear this out, for usually the patient is not relieved of his symp-

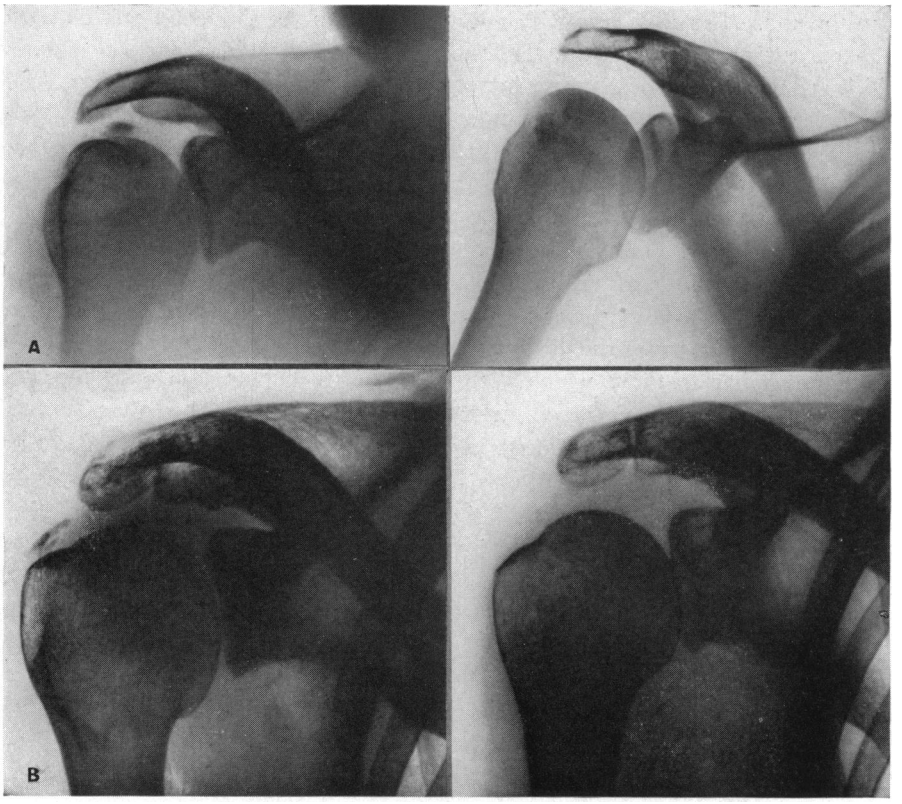

FIG. 5.—(A) Case of subacute bursitis with calcification before and after operation. (B) Another similar case. In both of these cases all of the calcification disappeared following operation, but the symptoms persisted.

toms, and his disability increases for a time and sometimes even goes on to a tendinitis.

CHRONIC BURSITIS.—The patients included under this heading are those who complain of pain in the shoulder in a certain range of abduction of the arm. They are usually in the fourth and fifth decades of life, and practically always a history is obtained of either direct or indirect trauma to the shoulder. The trauma is followed by a short-lived, but definite pain in the shoulder, and often there are several such incidents. Eventually, due either to overuse of the arm usually in abduction or to another injury, the pain reappears.

On examination, there is found little or no limitation of motion of the arm at the shoulder and there is no atrophy or marked spasm. However, when the arm is abducted to a point about where the greater tuberosity passes under the acromion, the patient notices a sharp pain in the shoulder, and he gives a downward jerk of the shoulder. This seems to be a help in passing the painful point because the arm may then be fully abducted without further discomfort. The same painful point seems to be present as the arm is brought to the side again from an overhead position. In addition to the above finding, a click or crepitation may be palpated over the tip of the shoulder in abduction movements. The click is usually felt at the time in the abduction motion when the patient experiences pain. The painful point noted in abduction and the click are not nearly so definite when the arm is raised in the extended position and in some patients this motion may be made without any pain at all.

The cause of these symptoms appears to be a chronic traumatic inflammation of the floor of the subdeltoid bursa, the traumata having resulted in repeated small defects at the insertion of the supraspinatus tendon on the greater tuberosity. These are described by Codman as straps and he believes they are separations of a lamina-like group of strands of tendinous tissue from the parent tendon, which push up in the floor of the bursa in abduction. Trauma may also cause the development of villi which extend across the bursa and are similar to those which are seen in other bursae following repeated injury. Some of these villi appear to be thicker and more fibrous and extend across the bursa in a cord-like string. These have been given the name of bands by Codman. In addition to these changes in the floor of the bursa over the point of the insertion of the supraspinatus tendon, there are often changes in the greater tuberosity itself, as a result of these injuries to the supraspinatus tendon. These changes are easily demonstrable roentgenologically as excrescences at the tip of the greater tuberosity, eburnation of bone and areas of reduced density in the greater tuberosity and adjacent shaft of the bone (Fig. 6).

The treatment of this type of chronic bursitis may be divided into the conservative and the operative treatment. Since the symptoms almost invariably arise from trauma it might be expected that rest of the shoulder and applications of heat might give good results in many cases. This reasoning has proved correct in the majority of our cases. However, in a few patients, where symptoms persist in spite of conservative therapy, incision of the bursa and excision of the offending villi, bands, straps, or excrescences seemed logical. This therapy has been successful in the four cases in which it has been used.

The prognosis in chronic bursitis is good. As a rule, under conservative therapy, relief of symptoms may be obtained in three to four weeks. When symptoms persist beyond this time, operative intervention is indicated, with the prospect of relieving the symptoms in another three to four weeks. In one patient there was complete relief of all symptoms 15 days after the re-

moval of hypertrophic villi and several small excrescences from the great tuberosity.

TENDINITIS OR OBLITERATIVE BURSITIS.—The cases included in this group are those which have commonly been described under the headings of bursitis, periarthritis or neuritis of the shoulder and arm. These patients are practically all 40 or more years and there is generally a history of direct or indirect trauma to the shoulder or of overuse of the arm. The pain in such cases appears to develop slowly and to increase gradually over a period of weeks. Characteristically, the pain appears somewhat lower down over

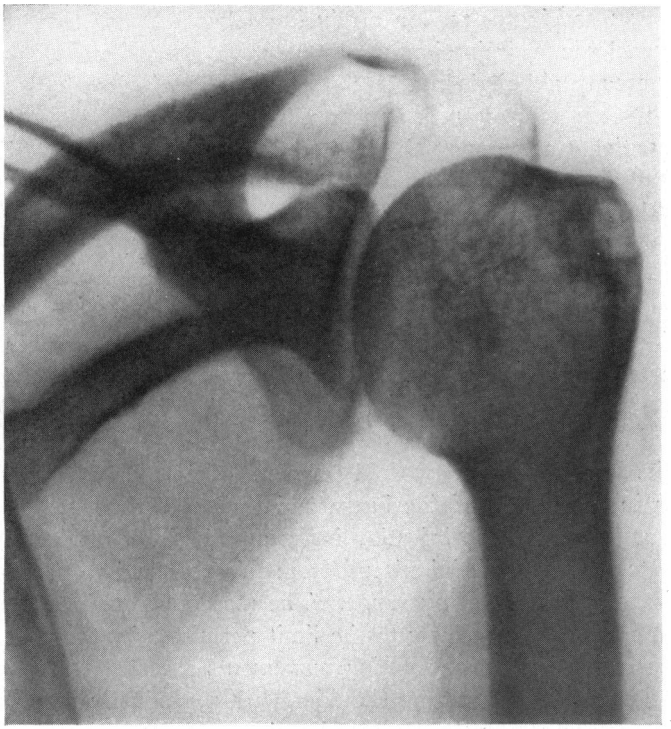

FIG. 6.—Rarefaction at the greater tuberosity.

the deltoid than in the other lesions previously described, although this is not invariable, and there is usually a radiation of the pain down the arm to the elbow and extending even as far as the hand. In addition, there is at times a radiation of the pain upward over the neck and scapula. The pain appears to be worse at night and the patient usually complains that he is unable to sleep on the affected side. Any attempt to move the arm away from the body either in abduction or in extension causes pain.

On examination, there is usually noted marked atrophy of the deltoid and other shoulder muscles. Tenderness on pressure over the greater tuberosity and well down along the humerus toward the deltoid tubercle is usual. Attempts to abduct the arm are restricted by an apparent fixation of the struc-

tures in the region of the shoulder; thus has arisen the term "frozen shoulder" as applied to this condition. Efforts to passively abduct the arm demonstrate the marked involuntary spasm of the shoulder muscles which is so characteristic of these cases. Not only is it impossible to abduct and extend the arm at the shoulder but in many instances rotation, especially external rotation, is impossible.

The pathologic process which appears to cause the symptoms is a chronic adhesive bursitis in which there is a functional loss of the gliding mechanism in the subdeltoid bursa. The adhesions are, as a rule, traumatic in origin and are probably the result of frequent minor traumata to the bursa and of tears in the supraspinatus tendon producing subacute symptoms.

Roentgenologic examination usually shows few or no changes in the greater tuberosity although in a few cases there may be a roughening at the edge and, in some, excrescences appear along the tip of the acromion.

These patients are among the most difficult of all to treat. Their arms are practically useless, especially if their occupation demands abduction. The treatment should consist in stretching or rupture of the adhesions so that the gliding function of the subdeltoid bursa may be resumed. Conservative treatment consists in applications of heat, usually in the form of diathermy, with exercises within pain limits. Under this therapy progress is slow and often discouraging to the patient although recovery will almost invariably take place after a period of months. A second method of treatment which has proved more successful, in a majority of our patients, has been the injection of 20 to 30 cc. of a 1 per cent novocain solution into the region of the subdeltoid bursa. The injection has a twofold purpose, one of stretching and dilating the tissues in the region of the bursa and thus providing for some gliding movement and, second, the injection being anesthetic, it produces a more or less complete relief of painful stimuli from this area and so permits manipulations of gradually increasing range. The manipulations should be carried out at first carefully and slowly to the limit permitted by the adhesions. As a rule, internal and external rotation movements are first tried, followed by circumduction movements at the shoulder with a gradually increasing range. During the manipulations there may often be a palpable and even an audible snap, after which practically full range of motion may be obtained. In some cases, when the pain is too marked to permit adequate manipulation, it has been found advisable to give a second injection of novocain.

For the first 24 hours after the injection and manipulation there may be an increase in the pain and soreness in the shoulder. This may persist for a day or two in decreasing intensity. Thereafter the discomfort usually subsides except on movement of the arm.

The best results, of course, are obtained when there has been a sensation of a snap or rupture of an adhesion during manipulation. These patients obtain almost complete range of motion of the shoulder without discomfort after a week or two. In the patients treated without injection, exercise is an important therapeutic measure. Codman's stooping exercises, in which the

patient leans forward and swings the arms forward and backward trying each time to bring the arm as far as possible towards the head, have been found to be a very useful procedure. In some patients the swinging of some heavy object, such as a dumbbell or an old fashioned flat-iron, has provided an increased inertia sufficient to stretch the adhesions and provide an increased range of motion. Another exercise which has proved valuable is so called wall climbing in which the patient creeps up the wall with his fingers (Fig. 7). It is useful in some cases to have the patient mark the upper limit which he can reach so that he may note his daily progress by the

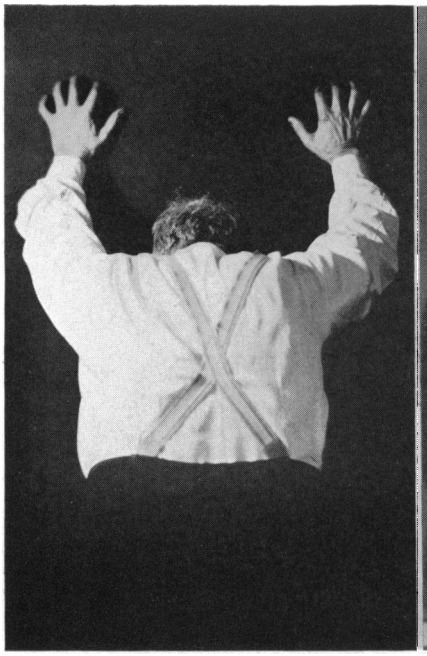

FIG. 7.—Wall climbing exercise. The patient creeps up a vertical wall with his fingers.

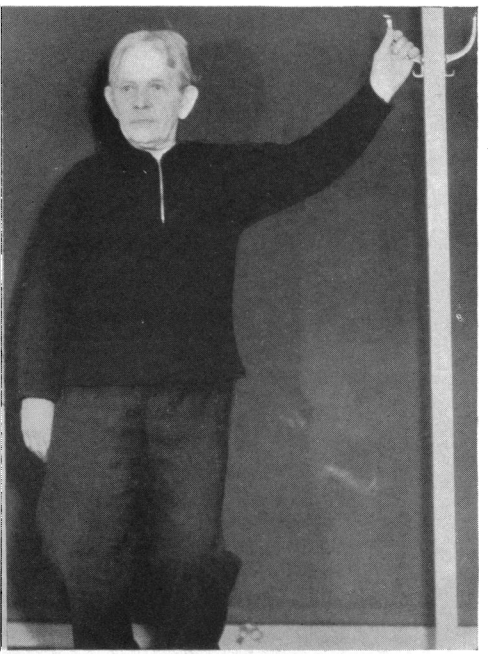

FIG. 8.—Abduction exercise to stretch adhesions in the shoulder bursa. The patient grasps an object at his side. Abduction motion is increased by bending the knees.

increasing height to which his fingers will obtain. Abduction exercises are provided by having the patient grasp some object at his side. Then by bending his knees abduction is obtained at the shoulder. Patients are often less timid about producing abduction by knee bending with the arm fixed than by moving the arm with the body fixed (Fig. 8). Another exercise which will utilize the same principle is one in which the patient grasps a banister, table or some other object about waist high. He then backs away from the object with his hands still in place; by bending the knees further stretching of the adhesions is produced (Fig. 9).

All of these exercises may be carried on in the home and the faithfulness and effort of the patient is a big factor in his progress. Some patients may improve in a period of three to four weeks, sufficient to obtain almost normal

function in the shoulder joint. In others the progress may be slow, but the prognosis for eventual recovery and normal shoulder function is good in practically all cases, although a degree of recovery approaching the normal may not take place for as many as 6 to 12 months.

COMMENT.—The above outline of the diagnosis and treatment of painful shoulder due to lesions of the shoulder bursa and the supraspinatus tendon presents the subject in much more simple fashion than is often encountered clinically in the patient. In spite of definite criteria upon which the diagnosis is made, a differential diagnosis is often difficult for the reason that many of

FIG. 9.—Adhesions in the shoulder bursa being stretched by grasping some waist-high object and backing away from it. When the patient has reached the pain limit, additional stretching is obtained by bending the knees.

these lesions may be combined or may follow one another, the one leading to the other so that the history is by no means clear and the findings may fit into several diagnoses. In other instances the diagnosis may be confused by other injuries in the shoulder region, such as dislocation of the shoulder, fracture of the greater tuberosity or of the upper humerus. In spite of these facts, however, an adequate history and a careful physical examination will as a rule give the examiner a fairly clear mental picture of the pathologic process with which he is dealing. This is important because the success of the treatment depends in large part upon an exact knowledge of the lesion being dealt with.

A statement should be added regarding the effect of toxic absorption and focal infection upon the production and course of these lesions. Since the

possibility of such an effect has been mentioned in many discussions of the etiology of chronic bursitis and tendinitis and even of those cases with calcification in the supraspinatus tendon, in many of the cases observed an investigation of possible foci of infection has been made, including the colon as a source from which toxic absorption may occur. In those cases in which foci of infection were found and eradicated no special benefit seemed to follow, and it has never been possible to definitely trace etiologic relationship between the painful lesions described and toxic absorption from foci of infection or from the colon. The constancy with which a story of trauma appears in the history of patients with painful lesions of the shoulder points to the relative importance of injury as the outstanding etiologic factor in these cases.

DISCUSSION.—DR. DONALD GORDON (New York). In regard to acute traumatic subdeltoid bursitis, I would add nothing except that in my experience I have found that a simple axillary pad, sling and swathe, make a more comfortable and efficient immobilization of the shoulder than adhesive plaster. This can be done with two bandages and a bundle of cotton and a few safety pins. It is easily removed for examination and therapy, which the adhesive does not permit. Doctor Ferguson does not mention an axillary pad; but where there is much space between the arm and the body at the elbow, close approximation of the arm to the body without a pad causes pressure on the bursa through the tense deltoid pressing on the swollen bursa by this arm adduction. I feel he does not sufficiently stress the danger of this type progressing to the "frozen shoulder," so called, by reason of inadequate treatment; though he feels as I do, that this is a common precursor of the shoulder with muscular contracture. In cases of this kind where severe pain has existed for a few days with much muscle spasm, I use immobilization and ambulatory traction, which I would like to suggest as an efficient therapeutic measure, when operation is not indicated or consented to.

The late Doctor Brickner of New York was one of the first to operate upon cases of calcified bursitis, the pathology of which Dr. Eli Moscowitz has described so well, but who had observed that these calcified areas frequently disappeared without operation. The largest conically shaped mass I have ever seen disappeared in ten days without operation. We are all familiar with the fact that these opacities are present in shoulders which are not painful, as well as in those which are painful, in the same patient. I have found it difficult to understand, if these areas of calcinosis are due to trauma alone, how further trauma by operation could cure them unless it was by aiding vascularization in an area of marked ischemia.

Curiously similar lesions are rarely seen, if at all, following fractures about the greater tuberosity, where the fracture lines have opened up a new vascularity, although there is an increase in the possibility for trauma due to the slightly elevated fragment. Also we do not get the bursal syndrome if muscular contracture has been avoided. The short period of recovery, however, in Doctor Ferguson's cases is the best criterion of the efficacy of the procedure in his hands whatever may be the academic view of the pathology.

I am unable to understand how, with the similarity of pathology and symptoms between subacute bursitis with calcification and the acute variety, operation is not of service if it releases tension only, unless the calcinosis being in the supraspinatus tendon, it is in a more avascular area than when it lies in the floor of the bursa.

I have never tried the injection of novocain, because I felt that it was a temporary sedative which would not correct the pathology. However, if such blocking of the protective mechanism will permit sufficient muscular activity without pain, to prevent atrophy of disuse and loss of coordination, its use should be of real value, and I feel that this is the basis for part of its success in Doctor Ferguson's hands. I feel also that the needling associated with such anesthesia must of necessity be of value in vascularization. Furthermore, if anesthesia permits increased function, and trauma has been an exciting factor, I am again at a loss as to why it cures, unless this type of lesion has the pain of contracture, which limited exercises correct if they can be done without pain.

Doctor Ferguson described the causative pathology of the symptom complex of tendinitis as due to "a chronic adhesive bursitis in which there is a functional loss of the gliding mechanism in the subdeltoid bursa." If it is a chronic adhesive bursitis, why call it tendinitis? The latter term seems to me to apply more aptly to his classification with calcinosis in the supraspinatus tendon insertion. Also there are many structures which move on each other in scapulohumeral movement. In fractures of the greater tuberosity, where there must be bursal adhesion and tendon injury, I have not seen this symptom complex.

The limitation of shoulder movement in these cases I believe is due to muscle contracture following prolonged muscle spasm caused by splinting the painful shoulder rather than spasm alone, which must be carefully differentiated for the purpose of treatment. The pain referred to the deltoid insertion, extending up the cervical plexus and down the arm to the hand, is present only when muscle contracture exists. Improvement in pain is directly proportionate to the improvement in muscle contracture. If novocain will permit the gentle stretching which is imperative in connection with other therapy, I think it is an excellent point.

Doctor Ferguson states that in his experience with cases studied "it has never been definitely possible to trace etiologic relationship between the painful lesions described and toxic absorption from foci of infection, or the colon." This is contrary to my experience. To cure patients of these lesions, I cannot overlook foci of infection as an etiologic factor however indirect the relationship. I am almost convinced from experience, that his last group is one of arthritis or periarthritis.