

RESULTS OF TREATMENT OF SUBACROMIAL BURSITIS IN THREE HUNDRED FORTY CASES*

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SUBACROMIAL OR SUBDELTOID BURSITIS, long recognized as a clinical entity, is manifested by acute, subacute and chronic symptoms referable to the shoulder and arm and caused by lesions in the muscular tendinous cuff over the head of the humerus and in the subacromial bursa. Patients afflicted with subacromial bursitis tend to recover spontaneously, the time required for recovery varying from a few weeks up to two or three years, depending upon the nature and stage of the lesion. However, in many the symptoms are so severe or so annoying that the majority of patients seek treatment for relief. Among the many therapeutic measures used from time to time are simple and complicated applications of heat, injections of the bursa and adjacent nerves, roentgen therapy and incisions for relief of tension and removal of calcified deposits from the supraspinatus tendon and subacromial bursa. The fact that such varied forms of treatment have been recommended for the same condition strongly suggests that none is specific.

Reports in the current literature on the results of various methods of treatment usually have been based on small groups of cases with short periods of follow-up observation. In an attempt to increase our knowledge of the treatment of subacromial bursitis, we reviewed the records of 485 patients treated in the Ochsner Clinic for this condition during the seven-year period ending July, 1949. Follow-up information was obtained by questionnaire on 340 patients and these data have been analyzed in an attempt to evaluate the various methods of treatment employed. The average time elapsed between our first examination and the follow-up report was three years.

PATHOGENESIS

The present concept of the pathogenesis of subacromial bursitis is based on the work of Codman¹ together with recent reports of Neviasser^{2, 3} on adhesive capsulitis or the "frozen shoulder." Codman described the underlying pathologic changes as consisting of degeneration in the collagen of the tendinous fibers unaccompanied by invasion of lymphocytes, leukocytes or other usual inflammatory signs. These changes occur near the insertion of the supraspinatus tendon where it lies beneath the floor of the subacromial bursa. As these degenerative changes progress, the tendon is weakened and

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complete rupture may occur with sudden, forcible abduction of the arm, giving rise to the classic symptoms and signs described by Codman.

However, in a large proportion of cases that begin as tendinitis, complete rupture does not occur (Fig. 1). Calcified deposits may appear in the tendon as its fibers degenerate and separate and, as these accumulate, minor strains or muscular efforts may suffice to aggravate the lesion. Fluid forms around the deposits and soon produces sufficient tension within the tendon to cause severe pain and spasm of the muscles about the shoulder. Although the inflammatory reaction spreads upward through the floor of the bursa and may involve the entire lining membrane, most of the pain is still caused by

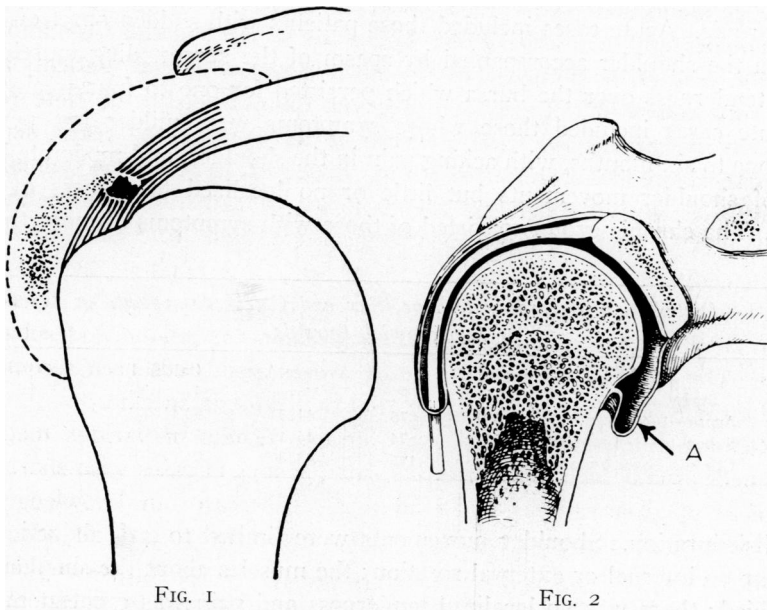


FIG. 1.—Schematic representation of tendinitis with a calcified deposit that has ruptured into the subacromial bursa (Courtesy of Codman¹).

FIG. 2.—Adhesions in the dependent part of the capsule which restrict movements of the shoulder (Courtesy of Neviasser³).

the excessive tension within the tendon. Release of this tension by spontaneous rupture, incision or puncture with a needle promptly relieves the severe pain. Although the fluid and calcified contents may then escape and lie free in the bursa itself for some time thereafter, there is only moderate pain and soreness in the shoulder and this usually subsides within seven to ten days. Occasionally this latter phase is prolonged, perhaps because the tension is not fully relieved. In such cases shoulder movements become increasingly restricted and the condition becomes chronic. This is known as the “frozen shoulder.”

The early stage of tendinitis may not proceed to rupture or calcification and subsequent acute subacromial bursitis but, instead, may persist as simple

tendinitis without calcification. Small rice-like bodies and some clear fluid appear within the tendon and gradually produce mild aching pain and "catches" in the shoulder, with progressive limitation of the movements of abduction and external rotation (Fig. 2). In such cases the course is likely to be chronic and to terminate in adhesive capsulitis, as described by Neviaser, or in the "frozen shoulder" portrayed by Codman.

CLASSIFICATION OF CASES

Although we realize that the foregoing classification by Codman is correct from the viewpoint of pathogenesis, we classified our cases clinically according to the severity and duration of symptoms into three groups: acute, subacute and chronic. Acute cases included those patients with sudden onset of severe pain in the shoulder accompanied by spasm of the surrounding muscles and acute tenderness over the bursa which persisted for one to four weeks. The subacute cases included those whose symptoms were milder but persisted from one to six months, with aching pain in the shoulder, and moderate limitation of shoulder movements but little or no localized tenderness over the bursa. The chronic group consisted of those with symptoms of more than six

TABLE I.—*Distribution According to Age, Sex and Calcified Deposits in 485 Cases of Subacromial Bursitis*

Stage	Sex		Average Age Years	Calcified Deposits	Total
	M.	F.			
Acute—1-4 weeks.....	60	75	44.5	64 (47%)	135
Subacute—1-6 months...	77	74	46.1	59 (39%)	151
Chronic—over 6 months..	84	115	48.4	91 (45%)	199

months' duration. Shoulder movements were limited to 45° abduction with little or no internal or external rotation; the muscles about the shoulder were atrophied; there was no localized tenderness and pain was greatest at night. As far as we have been able to diagnose them, cases with rupture of the supraspinatus tendon have been omitted. Each group in our series included cases with and without calcified deposits in the supraspinatus tendon or the subacromial bursa. However, the chronic group corresponds to the "frozen shoulder" described by Codman or the adhesive capsulitis of Neviaser.

Of the 485 patients examined, 135, or 28 per cent, had acute subacromial bursitis, 151, or 31 per cent, had subacute and 199, or 41 per cent, had chronic subacromial bursitis (Table I). It is probably fair to assume that most of these patients had some kind of treatment in the early stages, but such treatment was apparently not effective in 41 per cent of cases. As can be seen in Table I, there was no significant difference between the sex incidence in the acute and subacute groups but in the chronic group there were 31 more females (16 per cent) than males. The average age in the chronic group was 48.4 years, whereas it was 46.1 years in the subacute and 44.5 years in the acute group. Calcified deposits were present in the supraspinatus tendon or in

the subacromial bursa in 39 to 47 per cent of cases, there being no significant differences relating to the three stages.

TREATMENT

The various types of treatment in this series were administered or prescribed by seven different surgeons in the Orthopedic Department. Our general attitude has been that with conservative nonoperative measures most patients will become reasonably comfortable and gain fair use of the arm within a few weeks. The principal aim has been to relieve the acute pain as soon as possible and then to preserve motion or to overcome such adhesions as were already present by the use of heat, followed by stretching exercises.

Procaine Injections. Complete relief of some of the most acute symptoms was promptly obtained after injection of a 1 per cent solution of procaine hydrochloride into the skin, muscle and bursa, followed by multiple punctures of the tendon near its insertion into the tuberosity. Success in some of the acute cases led to use of the same procedure in some of the patients in the subacute and chronic groups.

Physical Therapy. As a rule most patients were also advised to have some form of heat applied to the shoulder, followed by gentle massage to relax the muscles, and then to practice circumduction movements and other stretching exercises to combat the formation of adhesions. Heat, massage and stretching exercises have been indicated in the accompanying tables as physical therapy, whether carried out at home or by a physical therapist. However, most patients who had physical therapy only, were treated by an experienced physical therapist, at least until the patient became reasonably comfortable and had mastered the technic of doing the exercises properly.

Roentgenotherapy combined with sedation has been used more and more by us to relieve severe pain when it occurs at any stage in the course of subacromial bursitis. However, it seems to be most effective in the initial attacks of the acute stage. The use of roentgenotherapy is empirical. It seems to us that the most rational explanation of the action of roentgen rays is that they produce *active* hyperemia about the periphery of the area of congestion or *passive* hyperemia. The increased vascularity thus induced around the lesion tends to relieve the congestion and reduce the tension within the tendon. Most lesions so treated seem to resolve without rupturing into the bursa because the relief of pain is not sudden, but is gradual. After the acute pain has been alleviated by two or three radiation treatments, we then prescribe the same physical therapy measures as in other cases.

Incision. Release of tension by opening the bursa and incising the supraspinatus tendon, followed by removal of calcified deposits, was reserved for the most acute cases, those in which relief was not obtained by more conservative measures and the chronic or recurrent cases. After incision of the tendon the shoulder was manipulated gently to establish a full range of motion, and suspension or traction was applied to the arm for one to two

weeks postoperatively. Stretching exercises were employed while the patient was in bed and continued after the patient was dismissed from the hospital.

Manipulation. Manipulation under anesthesia was carried out in a few of the chronic "frozen shoulders," which did not have calcified deposits. Manipulation was usually done at one sitting, and a complete range of motion was re-established. In most of the patients so treated the shoulder yielded readily with the separation of only one or two strong bands of adhesions. The immediate postoperative reaction was usually not severe, and great improvement in the range of motion continued for a few days. However, in spite of suspension and traction, and voluntary and assisted active exercises, most of the shoulder movements gradually became more limited and the net gain was small, although the associated pain was often considerably lessened.

RESULTS OF TREATMENT

The results were tabulated from questionnaires returned by 340 patients. The questions related to (1) the length of time before all pain disappeared, (2) recurrence, (3) treatment received elsewhere, (4) present range of shoulder movements as determined by (a) ability to reach equally high on the wall with both hands, (b) ability to reach back of the neck equally well with either hand, and (c) for women, ability to fasten brassieres. Whereas Table I presents the data obtained from the records of 485 patients examined at the Ochsner Clinic, the subsequent tables represent the results obtained in the 340 patients in whom follow-up data were obtained. Inasmuch as several patients had involvement of both shoulders, the figures indicate the results obtained in the shoulders treated; for this reason, the totals do not correspond to the total number of patients reported.

Grading of Results. The result was considered *good* if the patient had no pain, no recurrence and no limitation of the shoulder movements, *fair* if he had slight limitation of one or more of the shoulder movements, with intermittent pain or soreness but no recurrence of severe pain and muscular spasm, and *poor* if he had persistent pain and considerable limitation of all shoulder movements with or without recurrence of acute episodes of pain and muscular spasm. The results rated as *fair* were considered *satisfactory* by most patients, in that they were relieved of the constant severe pain and had recovered a useful range of shoulder motion which permitted them to carry on their daily routine with little annoyance. Therefore, in regard to the overall picture of results, those rated as good and fair might be combined in one group which might be termed *satisfactory*.

Results in Acute Stage. Four different kinds of treatment were used in the management of 136 shoulders with acute symptoms during the first week after onset (Table II). Only four of these shoulders were subjected to operation with good results in three and fair in one. Other methods employed were injections of a 1 per cent solution of procaine hydrochloride with or without physical therapy, roentgenotherapy with or without physical therapy,

or physical therapy alone. There was no significant difference in the results obtained by these different measures, although the percentage of poor results (8 per cent) from roentgenotherapy was appreciably less than from other methods. If the good and fair results are combined into one group as *satisfactory*, it will be seen that in 118 shoulders, or 87 per cent, the results were satisfactory, whereas in only 18, or 13 per cent, the results were poor.

Results in Subacute Stage. The same methods of treatment, with the exception of incision, were employed for this group as for the acute group.

TABLE II.—*Results of Therapy in Acute Stage of Subacromial Bursitis in 136 Shoulders*

Therapy	Good	Fair	Poor	Cases
Procaine ± physical.....	15	4	7	26
Roentgen ray ± physical.....	56	20	7	83
Physical only.....	13	6	4	23
Incision only.....	3	1	0	4
Total.....	87	31	18	136

It is noteworthy that treatment of 16 shoulders by procaine injections gave good results in only four, or 25 per cent, and poor results in seven, or 44 per cent. However, the results for roentgenotherapy and physical therapy alone were equally as good as in the acute group, and again, if the good and fair results are considered as satisfactory, it will be seen that results were satisfactory in 87, or 84 per cent, of 103 shoulders.

Results in Chronic Stage. In addition to the measures employed for treatment of the acute group, manipulation under anesthesia followed by suspension, traction and shoulder exercises was employed in seven patients

TABLE III.—*Results of Therapy in Subacute Stage of Subacromial Bursitis in 103 Shoulders*

Therapy	Good	Fair	Poor	Total
Procaine ± physical.....	4	5	7	16
Roentgen ray ± physical.....	35	14	6	55
Physical only.....	20	9	3	32
Total.....	59	28	16	103

(Table IV). Following manipulation there were no good results; four were graded fair and three poor. Therefore, this form of treatment, in our hands, leaves much to be desired. Surprisingly, of nine shoulders that were incised, good results were obtained in six and fair in three; these results are as good or better than those obtained in the acute group by the same procedure. There was no significant difference in the results obtained by the other three measures, but approximately 33 per cent of the results in the entire group were poor; this is a much higher percentage than in either of the preceding groups.

DISCUSSION

As the three tables showing results of the various treatments according to the stage of the disease indicate, the same three conservative measures (procaine injection, roentgenotherapy and physical therapy) were used to treat the majority of patients regardless of the stage of the disease. Table V shows an evaluation of the results of the various kinds of treatment employed without regard to the stage in which treatment was given. These statistics suggest that the combination of roentgen ray with physical therapy gives the best results, since in only 15 per cent were the results poor.

TABLE IV.—*Results of Therapy in Chronic Stage of Subacromial Bursitis in 138 Shoulders*

Therapy	Good	Fair	Poor	Total
Procaine = physical	7	3	6	16
Roentgen ray = physical	23	18	17	58
Physical only	13	18	17	48
Incision	6	3	0	9
Manipulation = traction	0	4	3	7
Total	49	46	43	138

It should be noted that the common denominator for all three treatments has been physical therapy, which is indicated to maintain or increase the range of shoulder movements. Roentgenotherapy cannot be expected to accomplish more than relief of pain and muscular spasm induced by pain. Therefore, if restricted shoulder movements persist after pain has subsided, one must assume that adhesions are the cause. If the limitations are less than 50 per cent of the normal range of movements and only two or three weeks

TABLE V.—*Results of Therapy in Subacromial Bursitis in 357 Shoulders Without Regard to Stage of Disease*

Therapy	Good	Fair	Poor		Total
			Cases	%	
Procaine = physical	26	12	20	34	58
Roentgen = physical	114	52	30	15	196
Physical only	46	33	24	23	103
Total	186	97	74	20	357

have elapsed since the acute phase, one may expect a well-supervised program of exercises to be effective. However, when the shoulder movements have been restricted more than 50 per cent for a month or more after the acute phase has subsided, it is unlikely that exercises alone will suffice. The results obtained from manipulation under anesthesia are discouraging, whereas incision with removal of calcified deposits and Neviaser's added procedure of cutting across the inferior portion of the capsules of the shoulder and freeing it from the head of the humerus, gives greater promise of relieving the cause of the trouble. This procedure should be followed by

systematic exercises for two to three months postoperatively if a full range of motion is to be regained.

Calcified Deposits. Calcified deposits were found in 155 or 44 per cent of 349 shoulders. There was no apparent relation to the stage of the disease. Recurrent, acute attacks may be expected in 22 per cent of the acute and subacute cases and in 33 per cent of the chronic cases.

Acute attacks recurred in 41, or 27 per cent, of the 155 shoulders, with calcified deposits and in 39, or 20 per cent, of the 194 shoulders without such deposits. These figures suggest that the presence or absence of calcified deposits probably has little or no bearing upon the recurrence of acute attacks. The calcium appears to be a bi-product of the degenerative lesion in the supraspinatus tendon, but is neither a cause of the lesion nor of the symptoms which accompany it.

SUMMARY

The records of 485 patients with subacromial bursitis treated in the Ochsner Clinic during the seven-year period ending July, 1949, were analyzed in an effort to evaluate the various methods of treatment employed. The treatments most used, regardless of the stage of the disease, were procaine injections and roentgenotherapy, each supplemented by physical therapy; some patients were treated with physical therapy alone. Follow-up reports of the results obtained on 340 patients after an average period of three years were analyzed with reference to stage of the disease at the time treatment was given. Analysis of these results indicates that:

1. Satisfactory relief of pain and restoration of a useful range of motion may be obtained by conservative measures in 70 to 85 per cent of cases.
2. Roentgen therapy is an effective measure for the relief of pain produced by tension within the supraspinatus tendon in 85 per cent of cases.
3. Physical therapy is a necessary adjunct to all other measures that may be employed. Physical therapy alone is adequate for many subacute or mild chronic cases.
4. Recurrent attacks are to be anticipated in 22 per cent of cases following acute or subacute symptoms and in 33 per cent of patients with chronic symptoms.
5. The presence or absence of calcified deposits seems to have no relation to the various stages nor to the incidence of recurrent attacks.
6. The longer the symptoms have persisted the poorer the outlook for relief by conservative measures. In the chronic group of cases 33 per cent had poor results.

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