

treated at 200 K.V. or with radium), all classified as inoperable and many involving half the bladder.

The technical factors involved are as follows:—KV 525; MA 3.2; skin distance 50 centimeters; filter 1 mm. lead; HVL 6.4 mm. cu.; wave length 0.044 Angstroms. The dosage rate is 15 r per minute. Pelvic measurements of the patient are made and the number of portals planned accordingly. In the average case three fields, 10 x 10 cm. in size are used, over the bladder—one anterior, one posterior, and the other directly over the perineum.

Two portals are treated daily, the skin dosage being 175 r to each portal. Quite a well defined erythema usually occurs after 2100 r units have been delivered to each portal. The tumor dosage in the bladder from the first series averages in the order of 3500 to 4000 r. At times this routine is repeated after six weeks, and in a few instances a third series is given, usually with a slightly smaller tumor dosage, after an additional six weeks or more. Some cases receive electrocoagulation, cystoscopically, following preliminary supervoltage series; others are subjected later to suprapubic cystostomy with electrocoagulation. Apparently no operative difficulty has been encountered.

three cases of extensive carcinoma of the urinary bladder are reviewed.

A factor which the tabulated results fail to evaluate is the matter of palliation. A great majority of the patients were greatly benefited by external radiation, and showed partial symptomatic relief and some amount of regression of the bladder tumor. Hemorrhage ceased, at least temporarily, in practically all cases. The tumor in three instances was entirely radioresistant.

In elderly persons with extensive bladder cancer, palliative external radiation therapy is of definite value. It may be used without fear of mortality and with a minimum of morbidity.

It appears that supervoltage roentgen irradiation alone is not sufficient to control completely extensive bladder carcinoma, except in a small percentage of cases.

All patients with extensive bladder cancer, on whom electrocoagulation was done through open operation, following supervoltage irradiation, are dead.

Supervoltage x-irradiation, followed by cystoscopic electrocoagulation, gave the best results in this series. Thorough external irradiation may reduce an extensive bladder carcinoma sufficiently to render it amenable to complete removal by electrocoagulation cystoscopically.

In extensive bladder cancer the palliation secured by external irradiation alone is of distinct benefit.

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TABLE 1.—Treatment Results in Bladder Carcinoma

Method of Treatment	Number of Cases	Result	
		Dead	Alive
Supervoltage alone	13	11	2
Supervoltage and Transurethral Electrocoagulation	15	9	6
Supervoltage and Supra-pubic Electrocoagulation	5	5	0

RESULTS

Fourteen of our thirty-three extensive bladder carcinomas are of the papillary clinical group and nineteen of the infiltrating type. Thirteen were treated by supervoltage alone, with two regressions, fifteen by supervoltage plus electrocoagulation, cystoscopically showing six regressions, and five by supervoltage and electrocoagulation through a suprapubic cystostomy, with death resulting in all cases. When the eight cases showing complete regression are grouped clinically, it is found that one is infiltrating and the other seven are of the papillary type of carcinoma. The length of survival of the eight patients, apparently cancer free, is one over seven years; one, four years; four, three years; and two, two years.

SUMMARY

Therapeutic methods and end-results in thirty-

SUBACROMIAL BURSTITIS AND SUPRASPINATUS TENDINITIS: ITS ROENTGEN TREATMENT*

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IN January, 1938, the first case in this series of fifty-four painful shoulders was treated with high voltage x-rays. An article by Lattman,¹ which appeared in the *American Journal of Roentgenology and Radium Therapy*, July, 1936, was used as the basis of our technique, but the dosage was cut down slightly. The technique used by me was 220 KV, 2 mm. cu., 1 mm. al., 250 r in air, a series of four or five treatments, given

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twice a week, followed by a rest of two weeks, and a second series of two to four, only if indicated. It soon became apparent that striking results were often obtained, but, on the other hand, there were cases, apparently with just as favorable outlook, in which little or no relief was obtained. It was in search of an explanation for this great variation in results that the present series was closely studied, and the literature reviewed, not exhaustively but sufficiently, so that I believe no important method of treatment has been missed.

TREATMENT METHODS

It is apparent, from a study of the literature, that numerous methods of treatment have been used, some with indifferent success, and others which, in the hands of those who have used them, have been considered very satisfactory. The usual methods of physiotherapy, however, have almost everywhere, I believe, proven unsatisfactory; hence the institution of other methods, such as:

(1) Open operation and excision of the deposit. This is used by orthopedic surgeons generally over the country in selected cases.

(2) The injection of novacaine or procaine into the bursa. Watson-Jones.² Harrgart and Allen.³

(3) The simple needling of the bursa, and the withdrawal of fluid from it, practiced by many surgeons.

(4) The insertion of two hypodermic needles into the bursa, followed by thorough irrigation of it with saline solution. Patterson and Darrach.⁴

(5) The multiple needling of the bursa to relieve the tension in it. Weeks and Delprat.⁵

(6) The administration of relatively large doses of ammonium chloride, rest, physical therapy, and elimination of foci of infection. Dick, Hunt and Ferry.⁶

ROENTGEN THERAPY AN ADDITIONAL METHOD

The use of roentgen therapy for bursitis or tendinitis, therefore, is offered as an additional procedure, which is easy for the patient, relatively inexpensive, and in many instances very effective in producing prompt and usually fairly permanent relief. Reports in the literature of its effectiveness are becoming increasingly frequent, so that my report will by no means stand alone.

ETIOLOGY

The etiological factors which produce these painful shoulders are not agreed upon. The theory that they are a manifestation of focal infection, with the primary focus possibly in teeth, tonsils, or elsewhere, has been mentioned by most writers of recent reports, but most of them have rejected it on the ground that there is very little evidence to support it. Removal of primary foci of infection usually has not resulted in cessation of pain in shoulders. No one speaks of febrile reactions, increased pulse rates or leucocytosis, yet some of

these shoulders are as acutely painful as a carbuncle. The bursa is not far beneath the surface, yet in the most acute cases I have never seen reddening of the skin. The cases which Codman⁷ has operated upon without exception have been closed without drainage, and in none of them has there been any evidence of infection. Under effective treatment many of these shoulders get well, leaving the foci of infection in the teeth, tonsils, or elsewhere, untouched.

Trauma, either in the form of a single serious injury, or as multiple more or less trivial injuries, has been advanced as the etiological cause of bursitis or tendinitis, but it has not met full approval, for there are many cases where no history of any trauma can be obtained. In my series only seventeen out of fifty-four gave a history of trauma.

Dr. A. W. Meyer,⁸ now retired as professor of anatomy at Stanford University, wrote five articles during 1921 to 1926, describing what he aptly called "use-destruction" or "attrition" in tendons, joints and bursae. These articles, based upon studies of cadavers, showed in every line the meticulous care of the trained observer. The illustrations were clear and convincing. He showed conclusively that use-destruction in human tissues is a fairly common phenomenon, especially frequent in tendons around the shoulder. There were twenty cases of partial or total destruction of the superior portion of the humero-scapular articular capsule, most of which showed destruction of the subacromial bursa. Two of them showed defects in the tendon of the supraspinatus just above its insertion. He was convinced that infection played no part in the destructive process, because, in all cases, the lower half of the joint capsule was found to be entirely normal in thickness and appearance, and free from adhesions.

E. A. Codman of Boston, author of a book entitled "The Shoulder" and numerous short articles on the same subject, has done an enormous amount of work on shoulder conditions, and would be considered, I believe, the authority in this field. He does not think that infection is the etiologic cause of these shoulder conditions. Where calcium deposits have been found, he believes they are a manifestation of a degenerative process, but that repeated small traumas are a late factor. The deposits always start in the tendon of one of the short rotators, usually the supraspinatus. They increase in size, as fibres degenerate, and break, without producing any leucocytic infiltration around them, for these tissues are avascular, until there is a rupture through the tendon into the bursa. At this time he believes the symptoms usually begin, and if the bursa is examined just before the rupture takes place, a red mound-like swelling much like a boil will be found. After the rupture has occurred, the contents of the ruptured tendon diffuse through the bursa, and can readily be seen there in the radiographs. At this stage, then, an acute inflammatory reaction is present. The particles of calcareous material are fairly rapidly

eliminated, probably by the prompt action of the leucocytes. It is now generally known that the calcareous deposits often disappear spontaneously in a few weeks. Codman believes that this accounts for the encouraging results sometimes obtained by all kinds of treatment. However, the course of events is often not so favorable, the deposits may not all be extruded from the tendon nor absorbed from the bursa, and adhesions may develop to give trouble for months or even years.

CODMAN'S CLASSIFICATION

Codman also showed by diagrams and by radiographs that there are additional findings in the radiographs of nearly all of these sore shoulders, which indicate serious trouble, even though a calcium deposit does not appear. These he describes as:

- (1) Eburnation of bone at the insertion of the supraspinatus.
- (2) Excrescences or small depositions of new bone close to the insertion of the supraspinatus.
- (3) Trabecular atrophy in the bone.
- (4) Erosions at the margin of the articular cartilage near the tendon insertion.
- (5) Cavens, or small localized areas of osteoporosis.
- (6) Recession, or leveling off the sulcus and tuberosities.

Some of these have been found in a large percentage of my cases, and in the absence of a calcium deposit they are most valuable from a diagnostic standpoint, for together, or even separately, they indicate that one or another of the common types of lesion is present in the supraspinatus tendon, or in the overlying bursa. Many of these radiographs I would have passed as practically negative before I became acquainted with the work of Codman.

Details of diagnosis in these shoulder cases have been made so complicated, as described by Codman and also by other writers, that it has seemed impractical to attempt to follow them. Therefore, my diagnoses have been confined to tendinitis with or without calcification, bursitis with or without calcification, complete rupture of the tendon of the supraspinatus, and frozen shoulder. Even with this limitation, diagnosis often seems uncertain. I have seen only one case which I thought was a complete rupture of the tendon. This I did not treat. One case I thought was a frozen shoulder, that is, a bursitis with adhesions. This case I did treat, with very unsatisfactory results.

AUTHOR'S SERIES

In my series of fifty-four shoulder cases treated with high voltage x-ray therapy there were thirty females, and twenty-four males. Their average age was fifty years, the youngest being twenty-four, and the oldest eighty. A history of accident or severe trauma was obtained in seventeen. Only fifteen were in sufficient pain to keep them

awake at night, and only seven were taking an analgesic. Physiotherapy had been tried unsuccessfully in fourteen, manipulation in six, and other remedies in five.

Considering the group as a whole:

- Twelve, or 22 per cent, obtained no relief;
- Five, or 10 per cent, obtained slight relief;
- Twenty-five, or 46 per cent, obtained marked but incomplete relief.

Twelve, or 22 per cent, received complete relief. There was a great deal of variation in the time taken for relief to be obtained. In many it occurred by the time the last treatment was given, which was about two weeks, but in some relief was delayed for a month or more. When this was the case, some doubt might be entertained as to whether cure was due to the treatment, or to the passage of time, but the patients themselves were convinced that the treatments were responsible.

COMMENT

In a small series of cases such as this not much separation of cases into special classes can be made without reducing the classes to such small numbers that no conclusions can be drawn. Nevertheless, some separation into classes in this series is very instructive, and it has provided me with the only yardstick I have for giving any prediction before treatment as to whether success is to be expected or not, as the following table will show:

- All cases with calcification:
 - 31, 77 per cent markedly improved or cured.
- All cases without calcification:
 - 23, 58 per cent markedly improved or cured.
- All cases 1-30 days duration:
 - 17, 94 per cent markedly improved or cured.
- All cases 1-12 months duration:
 - 25, 77 per cent markedly improved or cured.
- All cases 1 year plus duration:
 - 12, 33 per cent markedly improved or cured.

It is readily perceived that the cases in which calcification can be seen in the radiographs do considerably better than those in which it does not appear. It is also apparent that the cases of 1-30 days' duration do much better than those with 1-12 months' duration, and that those whose symptoms have lasted over a year do rather poorly. This is exactly as one would expect.

A mere tabulation of results gives a very inadequate idea of the striking relief sometimes obtained after only one or two treatments. One has to talk to patients to be properly convinced of its effectiveness. That the relief is due to the treatments seems certain to me, for even those whose symptoms had been present only a few days were not getting any better until the treatments were given.

SUMMARY

A critical analysis of the results of treatment of fifty-four cases of subacromial bursitis and supraspinatus tendinitis by high voltage roentgen

therapy has been given, together with a short discussion of other methods of treatment in frequent use, and a consideration of the etiology and classification of such cases.

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TORSION OF THE TESTICLE*

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TORSION of the testicle should be more accurately called torsion of the spermatic cord. Most references are indexed under this title. The condition is also referred to as volvulus, strangulation, gangrene and infarction of the testicle.

Torsion is caused by a sudden axial rotation of the testicle or testes. This causes a constriction of the blood vessels of the spermatic cord, and results in an acute circulatory disturbance of the testes and adnexa.

The purpose of this paper is to call attention to, and emphasize, early diagnostic signs, thereby insuring an early and accurate diagnosis. It is only in those cases in which the condition is recognized within a few hours of the onset that treatment will be of any value in preserving the involved testicle. While pain is the earliest sign, the true condition is frequently unrecognized. It is often diagnosed strangulated hernia, epididymitis or orchitis, for which expectant treatment is erroneously administered. This is one of the few

urological emergencies. A careful history should help clear up this point, as well as early edema of the skin, which is sharply limited to the involved side. The edema of the scrotal skin, on the affected side, has been mentioned by Abehouse and his coworkers. However, Dr. James R. Dillon, our preceptor, has called our attention to the fact that there is an early edema of the scrotal skin extending up to the twist, and sharply limited to the side of the torsion, with fixation of the scrotal skin to the underlying structures. This sign, invariably present in, or within a very short time of the onset, in our experience has not been previously emphasized. The inability to palpate separately the testes and epididymis is another early finding.

INCIDENCE

The first authentic case was reported in 1840, by Delarsiarve¹ who found a torsion of an inguinal testis while operating for a supposedly strangulated hernia. Kreutzman and Strauss² found 450 cases reported in the literature up to 1938, but they and other recent authors agree that this is not a true representation of its incidence. The reluctance of the general surgeon to report an orchidectomy performed for strangulated hernia, or cases diagnosed "epididymitis" which were followed by atrophy of the testicle, account to some extent for the poor showing in the literature. In addition to these are the cases of recurrent torsion which undergo spontaneous detorsion. Kreutzman and Strauss found 40 such cases, or about 8 per cent of the reported cases to fall in this group.

Age Incidence.—Torsion has been reported in one case 4 hours after birth, (Taylor³) and in men up to the age of 68 (O'Connor⁴). However, Walker⁵ and Campbell⁶ found that from 70 to 75 per cent occurred in males below the age of 21. The average age in Abehouse's⁷ series of 350 cases was 17.7 years.

Side Affected.—Wallenstein⁸ found 144 cases on the right, and 142 cases on the left side. He also found 24 cases in which the condition had occurred bilaterally.

In Undescended Testicle.—Wallenstein and O'Connor found that torsion was twice as frequent in undescended testicle. Abehouse, however, found the ratio reversed. On combining his cases with those of Wallenstein and O'Connor, he found 150 cases in completely descended testicles, and 152 in incompletely descended testicles, or roughly, 50 per cent. But Abehouse points out this indicates that undescended testicles are more liable to torsion, since the incidence of cryptorchidism in the general population is only .1 to 1.2 per cent.

ETIOLOGY

While the exact etiology of torsion has not been clearly established, many theories have been advanced by as many authors. A critical study finds a general agreement that:

1. The normal testicle, with its normal attach-

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