

PERIARTHRITIS OF THE SHOULDER

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The clinical entity which has come to be known as 'peri-arthritis' of the shoulder is of particular interest to orthopaedic surgeons because it presents features which are unique. It is unique in that the same pathology does not appear to affect joints other than the shoulder. It is a constant source of amazement that a 'frozen shoulder,' presenting as a virtually complete ankylosis, can spontaneously 'thaw' and leave a completely normal joint. This is all the more astonishing because it is usually an isolated incident in the life of a patient who appears to be perfectly healthy and who continues to remain healthy; occasionally the opposite shoulder may be affected and occasionally other manifestations of connective tissue disorders such as 'tennis elbow' may be experienced, but none of these lead to permanent or progressive changes in the tissues.

Clinical Features

Peri-arthritis is not encountered before middle age; but after that period it is more or less evenly distributed over all age-groups up to the seventies. It affects the sexes with almost equal frequency though there may be a slight preponderance of females. The condition usually develops spontaneously as a painful shoulder without any definite relation to injury, but in 20 to 30 per cent. of the cases it may be associated with a very definite injury such as a fall on the shoulder or after a fracture of the wrist. Frequently patients will attribute the start of the pain to injuries which on closer examination will be found to be spontaneous as the result of active movements, such as lifting the arm to clean a window, which suggests that the state of the shoulder was not normal at the time of the incident which precipitated the symptoms.

At its onset the pain in the shoulder can sometimes be extremely severe and may keep the patient awake for many nights and even require the use of the strongest analgesics and narcotic drugs. After an initial violent onset the pain may subside to the level of severe discomfort and patients are not usually referred for the opinion of a consultant until it is evident that after eight or 12 weeks no progress is being made.

Diagnosis

The diagnosis of peri-arthritis can usually be made by a simple clinical examination. The conditions from which it has to be distinguished are (1) spontaneous rupture (or partial rupture) of the supraspinatus tendon; (2) supraspinatus tendinitis, with or without calcification; (3) brachial neuritis; (4) osteoarthritis of the acromioclavicular joint and (5) tuberculous arthritis of the shoulder-joint. The conditions in (1), (2) and (3) can be distinguished because in these the shoulder will have a good range of movement on passive examination whereas peri-arthritis is characterized by limitation of movement affecting all directions. Osteoarthritis of the acromioclavicular joint, (4), can be distinguished from peri-arthritis by the site of maximum tenderness and by the fact that limitation of movement will be found only in the direction of abduction while external and internal rotation of the shoulder will be full. The earliest, and most characteristic, direction which suffers limitation in peri-arthritis is external rotation.

Peri-arthritis can easily be differentiated from tuberculosis of the shoulder, (5), by the absence of destructive changes in the X-ray.

In a severe case of "frozen shoulder" the complete normality of the radiograph will strike the examiner very forcibly when he encounters his first example of this condition, because to judge from the degree of ankylosis and muscular wasting it is quite probable that he would be expecting to find advanced radiological changes. There seems to be no doubt that the 'caries sicca' of the old surgeons, supposedly a type of tuberculosis encountered particularly in the shoulder, was not a special form of tuberculosis but was what we now know as the 'frozen' shoulder of peri-arthritis.

Pathology

There have been few descriptions of the morbid anatomy of the tissues in peri-arthritis because the condition is not encountered at autopsies; this fact itself indicates that the condition is eventually self-curing because if it were to leave

permanent defects it ought to be fairly commonly seen in routine autopsies on elderly subjects.

The best descriptions of the appearance of the interior of the shoulder joint in periarthritis are those of Neviaser (1945), who explored ten patients, and Simmonds (1949), who explored four. The essential feature on naked-eye inspection is best conveyed in Neviaser's own words: 'there was a conspicuous absence of synovial fluid and the redundant capsule, instead of showing the normal separation from the humeral head, was adherent to it. By means of a suitable elevator the capsule could easily be separated from the cartilage. No bleeding could be detected during this procedure, thus indicating that the adhesion was not due to vascular bands. This adhesion was similar to that of adhesive plaster applied to the bare skin. The capsule could also be separated from the head by rotating the arm. During manipulations the head and the capsule, at first seemingly glued together, were separated after one or two rotational movements. Free rotation was then possible. . . . The capsule was thicker than normal, as observed in cadaver experiments and in operations for recurrent dislocation . . .'

These findings caused Neviaser to suggest the descriptive term 'adhesive capsulitis' in preference to the very unsatisfactory word 'periarthritis' and it is unfortunate that the better term has never achieved popularity.

Simmonds also chooses highly descriptive words to convey the same essential picture: 'The tendinous cuff also showed increased vascularity and it seemed abnormally thick and closely applied to the head. The cuff could be likened to a vascular, leathery hood . . . The joint itself was normal and there were no intra-articular adhesions.'

The feature common to these two descriptions is that there were no vascular intra-articular adhesions, in contrast to the picture so commonly conjured up when the subject of manipulation is discussed in the treatment of this condition.

Microscopy of the bursa and the tendon, as reported by Neviaser and by Simmonds, showed no specific pathology other than 'chronic inflammatory reaction with hyperaemia . . . and 'evidence of degeneration and focal necrosis with marked increase of vascularity.'

Simmonds concluded that these changes were the result of collagen degeneration in the tendinous material which is so intimately part of the capsule of the shoulder joint and that the thickening and hyperaemia of the capsule is part of the reactive process removing the degenerate collagen preparatory to repair.

Psycho-somatic Factors

It is a very noticeable clinical fact that, as a general rule, patients with 'frozen' shoulders are more than usually apprehensive and have a particular distaste for physical discomfort. Coventry (1953) has coined the phrase 'periarthritis personality' and believes that an underlying process of collagen degeneration, which is not an uncommon pathology in the highly stressed tendons of the middle-aged rotator cuff, passes into the clinical picture of periarthritis if it is associated with disuse. Phlegmatic patients who are able to persist in exercising their painful shoulders can avert with absolute certainty the full development of a 'frozen' shoulder, but patients who 'exercise' only within the comfortable arc, using mainly scapular movements, will eventually be overtaken by extreme stiffness.

In this concept of the development of periarthritis the actual nature of the process causing the initial pain is considered to be unimportant—provided that it lies in some part of the capsule. Thus a localized patch of degeneration in the supraspinatus tendon, with or without calcinosis, can develop into an adhesive capsulitis in patients who persistently evade attempts to use the shoulder through its maximum range of movement.

Whether the role of disuse in the production of periarthritis is as simple as it sounds or whether it acts through the medium of an obscure 'reflex sympathetic dystrophy' is impossible to decide. The fact stands out that periarthritis can develop in patients of an apprehensive disposition who are suffering from pain, of any kind, felt in the region of the shoulder but arising reflexly at a distance. Thus some cases of brachial neuritis, where initially there has been nothing to indicate a lesion of the shoulder joint, will develop imperceptibly into frozen shoulders as the months go by. In the same way, patients with pain arising in coronary heart disease will not infrequently develop frozen shoulders on the left side.

The association of adhesive capsulitis of the shoulder with a reflex sympathetic dystrophy is seen in its most exaggerated form in the 'shoulder-hand syndrome' in which a severe periarthritis is accompanied by vascular changes, stiffness of all the joints in the hand, and atrophic changes akin to Sudek's atrophy.

Treatment

Before discussing the treatment of fully established adhesive capsulitis we must not forget the importance of prophylaxis. Wherever a suspicion of shoulder stiffness arises after middle-age it should be a routine to encourage shoulder exercises. In traumatic surgery, shoulder exercise should not be reserved for injuries which

have fallen primarily and obviously on the shoulder when indirect contusions are overlooked, such as those which accompany a Colles' fracture of the wrist. Successful rehabilitation depends more on psychological factors than on any physical technique and apprehension is combated by the transference of optimism and encouragement from the physiotherapist. The application of heat is of value in rendering subsequent exercises more tolerable rather than from any special virtue in the heat itself.

In the treatment of the established condition there is considerable difference of opinion and therefore it is well to state the orthodox or majority attitude before discussing the points which are debatable. I am helped in this by a questionnaire sent to the Fellows of the British Orthopaedic Association in 1956, to which replies were obtained in 84 cases.

In general it is considered that the condition always yields to gentle physiotherapeutic treatment if pursued long enough, and it is held therefore that the greatest danger lies in the possibility of prolonging the duration of the condition by meddling treatment and in particular by too vigorous passive movements. In particular it is considered that there is a time during the evolution of the condition when passive stretching is specially harmful. The majority (70 per cent.) of the surgeons who replied to the questionnaire went to the extent of stating that manipulation of the shoulder under anaesthesia is *never* advisable, on the grounds that all cases will cure spontaneously if left long enough, but a few will be definitely worsened by manipulation. The minority (25 per cent.) of the surgeons questioned were prepared to contemplate manipulation under anaesthesia but had difficulty in defining scientifically the circumstances when manipulation would be permissible and there was a tendency to fall back on the forlorn phrase that 'every case must be considered on its merits' and that manipulation should not be used as a routine. Only the vaguest of indications were suggested for the time when manipulation could be contemplated: 'never before three months of physiotherapy has been tried'; 'never before six months from the onset'; 'never when there is still spontaneous pain at night'; 'not until the patient can lie on the shoulder at night without being wakened up by it.' Even in those who tolerate and practise manipulation there was no *positive* recommendation as to when it should be used. Only about 5 per cent. of the surgeons replying to the questionnaire appeared to have absolutely no apprehension about the possible ill-effects of manipulation and to be prepared to use it almost at any time in the course of the disease.

Discussion

The pathology of peri-arthritis of the shoulder is rendered especially intriguing by the widely held view that over-enthusiastic treatment can be harmful.

By analogy with the clinical signs of inflammation and joint 'irritation' it is easy to appreciate the reaction of surgeons who dislike early manipulation in the presence of pain, but it is difficult to understand why the same surgeons will approve of active movements as prophylactic treatment in the early stages. What sort of inflammation is it which can benefit from prophylactic exercise?

Against manipulation it is often said that the total duration of symptoms, before and after the start of treatment, is about 18 months and is only rarely reduced by treatment of any kind. It is possible that this dictum derives from the statement of Dickson and Crosby (1932), from a study of 200 cases, that 'whether the treatment stressed was eradication of foci, physical measures, manipulation or operation, the time required for recovery and the total duration of symptoms was remarkably constant throughout.' I find it difficult to understand how they arrive at this conclusion because they had almost as many cases with a total duration lasting two to four months as those lasting one to two years. If the time required for recovery is more or less constant (one to six months of treatment, as Dickson and Crosby state) the total duration of symptoms cannot be the same for cases treated early as for cases treated late.

It is probable that in attempting to decide whether or not to manipulate most surgeons hazard a guess at the state of the 'intra-articular adhesions' and decide to manipulate if they think the adhesions are sufficiently mature to have become avascular. The descriptions of intra-articular pathology already quoted show clearly that isolated intra-articular adhesions, as seen in other joints after inflammatory processes, do not exist in this condition of the shoulder. Neviaser states clearly that the stiff and thickened capsule could be separated from its close application to the articular cartilage of the humeral head *without any bleeding*. Simmonds states that there were *no intra-articular adhesions*.

With a view to testing the idea that the pathology of peri-arthritis of the shoulder was unique among common joint affections, over a period of six years I have kept careful personal records of the cases which I myself have manipulated. While initially I never manipulated unless the patient had been under physiotherapeutic treatment for three months, progressive experience later led me to manipulate much earlier because I felt that by so do-

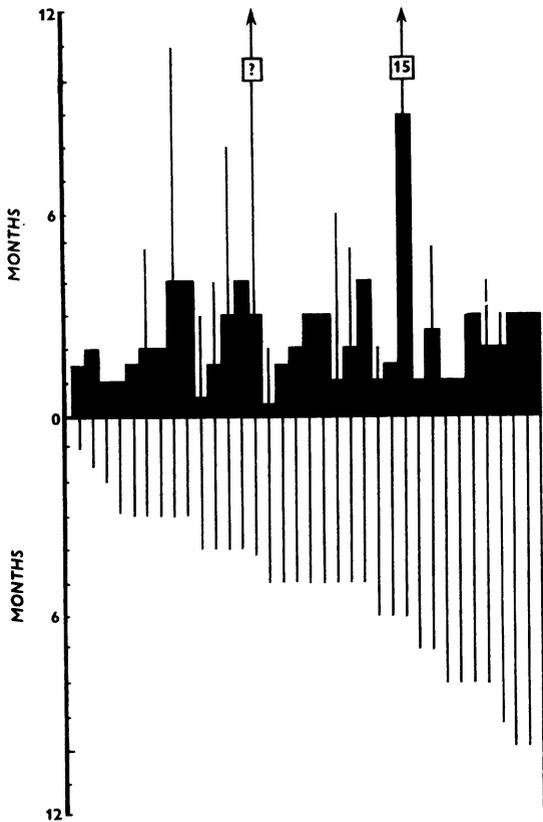


FIG. 1.—Thirty-five cases of periarthritis showing duration of pain and stiffness after manipulation in relation to duration of symptoms before manipulation. Below the line the cases have been arranged ascending in order of duration of symptoms before manipulation. Above the line solid black indicates duration of pain after manipulation; this coincides with duration of the greater part of the stiffness except in those cases continued upwards as a line in which stiffness persisted after relief of pain.

ing pain was relieved more consistently and earlier. While it is impossible to prove that manipulation has significantly shortened the total period of disability, the histogram of 35 cases (Fig. 1) establishes clearly that *early manipulation did not prolong treatment*. This histogram also shows that the duration of symptoms while under treatment was fairly constant and averaged about two and a half months for pain irrespective of the duration of symptoms prior to manipulation. Stiffness persisted considerably longer than pain.

The most noticeable improvement after manipulation was subjective, being evident in the patient's morale and happiness when seen two weeks after the manipulation. Four weeks after manipulation a certain amount of pain was often still present but it was always much less and the patient often

volunteered that the shoulder was much looser. This latter statement is most significant, because only in a very small minority was there any objective alteration in the stiffness of the shoulder at this early stage. Manipulation thus made the shoulder *feel* loose because it was less sensitive and the patient could push it further without arousing discomfort.

Because psycho-somatic factors play a strong part in the causation of periarthritis a dramatic incident to initiate cure, such as manipulation under anaesthesia, is not illogical. But the possibility of further harmful psycho-somatic factors must not be overlooked in the post-operative care after a manipulation. Thus the patient must be warned beforehand that the pain will be worse for two or three days after manipulation. The manipulation must be timed and coordinated with physiotherapy, as for instance on a Monday, so that the patient can receive treatment from a physiotherapist daily, or even twice daily, throughout the first week.

A point of extreme importance in the manipulation of a shoulder for periarthritis is that manipulation is to initiate the relief of pain and not to restore movement. Therefore, after the manipulation the patient should be allowed to have the arm by the side in the most comfortable position. These patients have abnormally low thresholds for pain and, because manipulation only rarely produces an immediate improvement in the true range of movement in the shoulder joint, it is foolish to tie the arm above the head so that the patient recovers from the anaesthetic to experience the tortures of the damned. I have no doubt that with the arm maintained in a painful position after manipulation for many hours some patients could be made decidedly worse.

As regards the actual technique of manipulation, the operator must be alive to the fact that the humerus can be fractured by straining too strongly if resistance is extreme. Therefore, if the head of the humerus does not slip inside its thick and contracted capsule when a reasonable amount of force has been used it is foolish to persist in an exercise which is not fundamentally essential. In this respect I suggest that, if the surgeon believes in the value of manipulation as a method of initiating rehabilitation, it is wiser to manipulate early, before the adhesions are too dense, than to manipulate too late. It is fascinating to reflect that, in this unique condition, adhesions can be so dense that they will resist forces sufficient to fracture the humerus, yet they will still vanish completely and leave a mobile joint two or three years later.

A technical detail of supreme importance during the manipulation of a shoulder for adhesive

capsulitis is that external rotation should be secured before any attempt is made to abduct the shoulder. If the shoulder is abducted before external rotation is obtained the shoulder will be dislocated, because in neutral rotation it is an anatomical impossibility to secure full abduction even of the normal shoulder.

An anecdote may help to emphasise points in the treatment of peri-arthritis by manipulation. I remember a zealous female house-surgeon unwittingly dislocating (because she did not first externally rotate) the shoulder of an Irish labourer (a species prone to psycho-somatic complications), and sending him home with his arm in full abduction, in the dislocated position, on an abduction splint. After a weekend of torture (manipulation on a Friday before physiotherapy department closed) the subluxated shoulder was reduced by removing the abduction splint. I have every reason to believe that the final result was perfect because the patient knew the consternation he had caused, yet never sued the female house-surgeon or the hospital!

In addition to physical treatment the possibility of shortening the duration of symptoms by using cortisone has been tried, on the supposition that a derangement of collagen metabolism is the underlying cause of the trouble. Good results for treatment by cortisone were claimed by Sigler and Ensign (1951), Solomon *et al.* (1951) and Coventry (1953). On the other hand, Blockey, Wright and Kellgren (1954), using oral cortisone compared with a dummy preparation administered to two groups by a method of random selection, did not find any statistical significance in the use of cortisone.

Hydrocortisone has been administered by local injection, often after manipulation, but no statistically significant results have so far been published.

Conclusions

Peri-arthritis, more aptly named adhesive capsulitis, is a unique condition of the shoulder whose clinical picture simulates that of an inflamed joint.

The majority of contemporary surgeons hold views on the 'frozen' shoulder which are still deeply coloured by the classical management of bacterial inflammation as taught by Hilton in the famous monograph 'Rest and Pain' published in 1863. It is probable that the pathological process responsible for adhesive capsulitis arises in the obscure condition of 'collagen degeneration' affecting one or more of the tendons which are intimately fused with the capsule of the shoulder joint. Normal active use of the shoulder, in the presence of discomfort, in patients of phlegmatic temperament prevents the development of adhesions and hastens removal of the products of collagen degeneration. In contrast to this a painful focus of collagen degeneration in the rotator cuff of a psychoneurotic patient can apparently result in gross organic changes in the capsule if permitted to remain in disuse. Treatment should thus be dominated by the attempt to overcome disuse. While I have not been able to prove my own belief that early manipulation of the shoulder speeds up the process of rehabilitation, I consider that I have established that the bad reputation of early manipulation is without foundation.

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