

Etiological factors and clinical profile of adhesive capsulitis in patients seen at the Rheumatology clinic of a tertiary care hospital in India

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ABSTRACT

Objective: This study was conducted to examine the clinical profile of patients with adhesive capsulitis (AC) and evaluate various possible etiological factors.

Methods: The study was conducted in the Department of Physical Medicine and Rehabilitation, Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Kashmir, India. One hundred patients fulfilling the criteria for the diagnosis of AC were studied for the severity of shoulder pain and the range of shoulder movements. The patients were also examined for the presence of various etiological factors for AC.

Results: Age of the subjects ranged from 25-70 years and duration of symptoms averaged 3.66 ± 2.36 months; left shoulder was more commonly involved (54%), 2%

had bilateral involvement and 63% of the subjects were sedentary workers. Disease was seen most commonly in patients with diabetes mellitus (27%). Other identifiable risk factors included previous myocardial infarction (5%), immobilization (5%), stroke and chronic bronchitis (4% each). Fifty-six percent of patients with AC had radiological evidence of cervical spondylosis.

Conclusion: We conclude that AC mostly affects people in the fifth to seventh decade. The majority of the affected individuals are sedentary at the time of the sickness and subjects with diabetes mellitus are at particular risk.

Saudi Med J 2004; Vol. 25 (3): 359-362

Adhesive capsulitis (AC) also termed as frozen shoulder and characterized by pain and restriction in shoulder movements is not an uncommon clinical disorder. The exact prevalence of AC is not known, but the cumulative risk of at least one episode has been estimated around 2%.¹ The syndrome is important due to its limiting effect on work capacity, its frequent resistance to treatment, and progression to severe capsulitis resulting in prolonged severe disability before resolution occurs. Total duration of the illness usually lasts 1-3 years.^{2,3} The disease may follow a variety of conditions including trauma, myocardial

infarction, pulmonary tuberculosis, thyrotoxicosis, and diabetes mellitus.⁴⁻⁸ However; a direct causal relationship with any of these associations is unclear. The present study examined the clinical characteristics of patients with AC. Various etiological risk factors associated with AC were also identified.

Methods. A total of 100 consecutive subjects with AC attending the Department of Physical Medicine and Rehabilitation of Sir-e-Kashmir Institute of Medical Sciences between July, 1993

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Received 24th June 2003. Accepted for publication in final form 15th November 2003.

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and December, 1995 were included in this study. Adhesive capsulitis was diagnosed by Reev's criteria consisting of: 1. Spontaneous shoulder pain persisting for more than 3 weeks, 2. Limitation of shoulder movements especially external rotation by at least 50%, and 3. No clinically or radiographically identifiable lesion of the shoulder.² All the 3 criterias were necessary for inclusion in the study. Severity of pain was categorized as mild (feeling of pain without restriction of daily activity or disturbance of sleep), moderate (pain severe enough to cause restriction of daily activity but no disturbance of sleep), or severe (pain severe enough to restrict daily activity as well as disturb sleep). Local examination of shoulder included recording of any drop, wasting, weakness, deformity, tenderness, and painful or restricted movements of abduction, external rotation, internal rotation, flexion, and external rotation. The range of individual movements was measured with respect to sagittal plane of the body. Abduction and external rotation were measured with a universal goniometer. The overhead abduction was taken as 180° and when the arm was by the side of the trunk, abduction was recorded as zero. External rotation was measured from central position such as arm by the side of the trunk with forearm in mid pronation and elbow flexed to 90°. Internal rotation was quantified by the ability of the patient to touch from behind with the dorsum of the hand: 1. Same side of the buttock (score 1); 2. Opposite buttock (score 2); 3. Space between opposite buttock and shoulder across the trunk (score 3); or 4. Opposite scapula across the trunk (score 4).⁹

The subjects were examined for presence or history of hypertension, ischemic heart disease, diabetes mellitus or its complications, chronic bronchitis, pulmonary tuberculosis, thyrotoxicosis, or any other significant co-morbid illness. A brief psychiatric assessment was also carried out. Investigations carried out included complete blood count, urine examination, fasting and post-prandial blood glucose, calcium, phosphorus, uric acid, and alkaline phosphatase. Oral glucose tolerance test was carried out on merits in 40 patients. Pain radiograms of chest, cervical spine shoulder and 12 lead surface electrocardiogram were taken in every patient. Immunological tests like rheumatoid factor, antinuclear antibody and immunoglobulins were estimated whenever indicated and subjects with suspected hypothyroidism were subjected to thyroid function tests. Patients with known or newly diagnosed or suspected major connective tissue disorder or frank arthritis of any joint were excluded.

Results. The mean age at the time of presentation was 49.62 ± 9.71 years with the

majority of subjects being in their sixth decade (**Table 1**). Mean duration of illness in the subjects was 3.66 ± 2.36 months. Fifty-seven of the hundred patients were females with a female to male ratio of 1.3:1. There was no significant difference between males and females with respect to the age at onset of symptoms of AC. Out of the 100 patients, 63 were sedentary workers, 32 were manual laborers, and 4 were supervisory. Fifty-four patients had left shoulder involvement, right shoulder was involved in 44 patients, and 2 patients had bilateral involvement. Mild, moderate, or severe shoulder pain at rest was present in 47, 27, and 26 patients at the time of initial presentation. Females, on the average, more often complained of severe pain than males (36.8% versus 22.7%; $p < 0.05$). Psychological assessment showed that 48% of the patients were worried regarding the sickness while one quarter each had insomnia or used night sedation. Internal rotation was affected in all the patients with 4, 58 and 38 patients, having mild (rotation score 3), moderate (score 2), or severe (score 1) limitation of internal rotation. The other joint movements involved more often were those of external rotation and abduction (**Table 2**).

Overall, 17% of the patients had history of a previous rheumatic disorder in the form of shoulder pain (10%), nuchal pain (2%), osteoarthritis of knee (3%), or non-specific rheumatism (2%). Half of the subjects had no other identifiable associated disease. Non-insulin dependant diabetes mellitus was the most common among the identifiable factors (**Table 3**). Of the 27 patients who were diabetic, 23 were females, all had well-controlled blood sugars (26 patients on oral hypoglycemic agents, one patient on diet therapy alone), and none had any major diabetic complication. The mean age at the time of onset of symptom of AC was 51.75 ± 2.36 years in diabetic males and 58.65 ± 6.73 in diabetic females (p NS). The corresponding age in non-diabetic subjects was slightly lower (48.59 ± 11.95 and 49.85 ± 9.15 years; p NS), but the difference between diabetic and non-diabetic subjects were not statistically significant. Overall, diabetic patients tended to have more frequent left sided (17 patients, 62.9%) or bilateral (2 patients, 7.4%) involvement compared to nondiabetics (37 patients, 50.7% and no patient); the difference was not statistically significant, however.

Discussion. The clinical profile of adhesive capsulitis in our study is, at large, consistent with the published literature regarding the problem. Slight female preponderance, brief duration of illness ($3.66 + 2.36$ months), and the more frequent involvement of the left shoulder observed in the present study have been reported previously as well.^{1-4,9} Although our patients had the onset of their

Table 1 - Age and sex distribution of patients with adhesive capsulitis.

Age group (years)	Male n=43 n (%)	Female n=57 n (%)	Total N=100 N (%)
20-29	1 (2.3)	1 (1.8)	2 (2)
30-39	7 (16.3)	2 (3.5)	9 (9)
40-49	12 (27.9)	17 (29.8)	29 (29)
50-59	12 (27.9)	26 (45.6)	38 (38)
60-69	7 (16.3)	10 (17.5)	17 (17)
≥70	4 (9.3)	1 (1.8)	5 (5)

Table 2 - Range of motion at shoulder joint in 100 patients with adhesive capsulitis.

Movement	Angle of movement (degrees)		Reference standard (angle degrees)
	Mean ± SD	Range	
Flexion	125.64 ± 20.26	80-150	up to 180
Extension	54.90 ± 07.66	30-50	up to 90
Abduction	91.44 ± 24.19	60-120	up to 180
External rotation	37.21 ± 7.12	20-45	up to 90
SD - standard deviation			

Table 3 - Associated conditions of adhesive capsulitis in 100 patients.

Associated disease	Males n=43 n (%)	Females n=57 n (%)	Total N=100 N (%)
Idiopathic	28 (65.1)	27 (47.3)	55 (55)
Diabetes mellitus	4 (9.3)	23 (40.3)	27 (27)
Myocardial infarction	2 (4.7)	3 (5.3)	5 (5)
Immobilization*	4 (9.3)	1 (1.8)	5 (5)
Stroke†	2 (4.7)	2 (3.5)	4 (4)
COPD	3 (6.9)	1 (1.8)	4 (4)
*direct shoulder immobilization due to above elbow cast for Colle's fracture (3 patients) or humeral fracture (1 patient) and prolonged (3 weeks) placement of central venous line through the ipsilateral upper limb veins (1 patient). † occlusive stroke with left hemiplegia (3 patients) or right hemiplegia (1 patient). COPD - chronic obstructive pulmonary disease (chronic bronchitis or emphysema)			

illness between third and seventh decade of life as is generally true of AC, the mean age of our patients at the time of onset of symptoms (49.62 + 9.71 years) is somewhat lower than noted in the Western literature. The predominance of sedentary workers as compared to manual laborers in our series of AC patients is, likewise, not in agreement with the published data.⁸⁻¹⁰ The small number of patients in our series may account for some of these discrepancies.

Adhesive capsulitis is a clinical description with pathogenic implications as suggested by the alternative designations like frozen shoulder, peri-arthritis, pericapsulitis, and obliterative bursitis. The disease is characterized by thickening and contraction of the joint capsule that becomes attached to the humeral head.¹¹ The pathology does not appear to affect joints other than shoulder. A triphasic natural history is characteristic; an initial phase of shoulder pain, a second phase of shoulder immobility, and the last phase of gradual improvement (thawing phase). After passing through the stages of pain, stiffness and recovery, it does not leave any disability after an average period of 30 months from the period of onset.^{2,3,12,15} Most of our patients had just completed the first phase. Although pain was mostly mild or moderate in intensity, the movements of shoulder were limited in all the planes. Internal rotation, external rotation, and abduction were the predominant areas of limitation with the degree of limitation not significantly correlating with the age or sex of the patient. Such observations regarding AC have been made previously as well though occasional notes of dissent cannot be ignored.^{2,13-15} Many patients of AC may have preceding non-specific rheumatic symptomatology.¹² However, only a small number of patients (17%) in our study admitted to having had previous joint pains, mostly in the same shoulder, before they actually developed pain and limitation of movements related to AC. Certain disease states are more often than others associated with the tendency to develop AC.⁴⁻⁸ We found diabetes mellitus of non-insulin dependant type to be the most common disease associated with AC especially in females. Most of such patients had well controlled diabetes of more than 5 years duration. Association of AC with diabetes mellitus is well known although the exact etiological link between the 2 is poorly understood. A tendency to increased fibrosis of shoulder capsule in diabetics may be related to the increased collagen synthesis by fibroblasts or to increased resistance of glycosylated collagen to degradation,⁸⁻¹² or both. Most of the other diseases that predispose to frozen shoulder probably do so by inducing prolonged shoulder immobilization. Cerebrovascular accidents, myocardial infarctions, and upper limb fractures can

all lead to prolonged shoulder immobilization during their acute and convalescent phases and thereby predispose to AC.^{12,15-17} One of our patients developed AC following prolonged arm immobilization due to placement of central venous line on that side for 3 weeks. Early physiotherapy and gradual mobilization of shoulder joint in such situations has been shown to prevent or greatly decrease the chances of development of AC. Association of chronic lung diseases like chronic bronchitis or emphysema with AC is poorly understood. Probably, immobilization or degenerative lesions of the rotator cuff may be playing some role in the pathogenesis.¹⁸ Despite these well documented disease associations, the causal relationship of any of these to the etiopathogenesis of AC is not entirely clear. This is substantiated by the fact that the majority of our patients had no identifiable risk factor for the development of the syndrome of frozen shoulder. Normal immune marker studies, and immunoglobulin profile of these patients dictate against any immune mechanism as the cause. Further, detailed studies are needed in this regard for complete understanding of this painful, disabling and protracted clinical syndrome. Until that time, early mobilization and careful physical therapy of the immobilized shoulders may be the only reliable method of prevention and rehabilitation.

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