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ANALYTIC STUDY OF PATIENTS WITH ADHESIVE CAPSULITIS AND ITS ASSOCIATION

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ABSTRACT

To examine the association between adhesive capsulitis and other various disorders, an analytic study of (96) patients with adhesive capsulitis and (96) patients without adhesive capsulitis was conducted. The data were analyzed and showed the following results. Among adhesive capsulitis cases the female: male ratio was 2 : 1. The peak age of onset was (50-59) years in both sexes. All patients (cases and controls) were screened for a number of possibly associated disorders. Notable correlations have been shown between shoulder capsulitis and other disorders which can be ranked as follows: diabetes mellitus (27%) ischaemic heart disease (12.5%), cervical spondylosis (9.4%), hypertension (8.3%), cerebro vascular accident (6.2%), trauma (4.2%) and rheumatoid arthritis (2.1%). In comparison with control group, significant correlations were encountered between shoulder capsulitis and diabetes ($p < 0.0001$) and between adhesive capsulitis and other up mentioned disorders ($p < 0.0001$). Four patients among cases and two among control were discovered to be diabetic. Other four patients within cases and four within control were discovered to have hypercholesterolemia. Thus adhesive capsulitis may be the presenting complaint of these disorders. An apparent female predominance was marked in all age groups of adhesive capsulitis cases, a fact that can be explained by a higher percent of diabetes, ischaemic heart disease and hypertension among females in the studied sample.

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INTRODUCTION

The first description of the condition under the title Periarthrito capsulo-humerale was by the Parisian surgeon Duplay (1872). Since then, several terms have been used: frozen shoulder, periarthritis and adhesive capsulitis. The latter term is the most preferable as it; more precisely, describes the pathogenic changes in the joint capsule (Brucker and C.J.S.N., 1981). Adhesive capsulitis is a well defined disorder characterized by progressive pain and stiffness of the shoulder (Louis Solomon *et al.,* 2001) which result in both) active and passive limitation of shoulder motion in all planes (John J.P. Warner, 1997). This disorder tends to (resolve over one to two years, although patients often are left with some residual loss of motion (Roger G. Poolock *et al.,* 1999). The incidence of frozen shoulder in the general population is approximately (2%) in Western studies. People between ages of (40-70) are more commonly affected (Claiborn A. Christian *et al.,* 1998).

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The disorder is more common in women than men (MIV Jayson, 1981; Frankin Kofin, 1993). The cause remains unknown, but the condition is particularly associated with diabetes mellitus, Dupuytren's disease, hyperlipidaemia, hyperthyroidisim, cardiac diseases and hemiplegia (Brucker and C.J.S.N., 1981) and rheumatoid arthritis. Other factors that have been blamed include recurrent trauma to the shoulder, perhaps associated with manual work, cervical herpes zoster, repeated ingestion of phenobarbitone and Isoniazid (MIV Jayson, 1981). In addition to that, adhesive capsulitis may result from other problems such as chronic lung diseases, pulmonary tuberculosis and cervical spinal syndromes (Frankin Kofin, 1993). Furthermore, lesions of mid shaft of the humerus (Smith *et al.,* 1990), primary chest wall tumor (Demazaiere, 1991), may also present as shoulder capsulitis. Parkinson's disease also could be one of the causes of frozen shoulder and furthermore the latter may be the presenting symptom of Parkinson's disease (Riley *et al.,* 1989). Patients with even minor degree of frozen shoulder may develop reflex sympathetic dystrophy, the features of which are similar to those of those of a adhesive capsulitis and it has been suggested

that the latter is a form of reflex sympathetic dystrophy (Brucker and C.J.S.N., 1981).

Aim of the study: This study to examine the association between adhesive capsulitis and other pathological disorders, some of which could be etiologically associated and others could be contributing factors.

MATERIALS AND METHODS

During a period of nine months, from the first of February to the first of October 2001, (600) patients complaining of shoulder pain and/or stiffness were examined for evidence of shoulder capsulitis. These patients were attendants at Rheumatic—Diseases Outpatient Clinic at Alsalam General Hospital in Mosul. During the first meeting with the patients, a questionnaire was completed for each patient including age, sex, occupation handedness, athletic activity and complaint duration. Each patient was asked about any past history of trauma to the shoulder within the previous months and whether he has history of diabetes, ischemic heart disease, hypertension, stroke, thyrotoxicosis, hyperlipidaemia or cervical spine disease. The duration, type of treatment and state of control of any of these disorders was recorded. Enquiry was made about any drug, treatment with Isoniazed, barbiturates and phenytoin. A standard physical examination was conducted for all patients including assessment of neurovascular status in affected side, palpable tenderness, range of motion, instability and impingement (John J.P. Warner, 1997). Out of (600) patients, only (96) were found to have adhesive capsulitis.

Diagnosis was based on the following criteria:

1. Global restriction of shoulder movement with pain
2. Natural progression through pain and stiffness successively, which may be followed by thawing (John J.P. Warner, 1997). A controlled group consisting of (96) patients of similar age range complaining from a wide variety of medical conditions not including adhesive capsulitis, attending Rheumatic-Diseases Outpatient Clinic, were included in the study sample and the same questionnaire was completed for each patient about any associated disorder or risk factors. Blood sample was taken from all patients (cases and control groups) for estimation of blood glucose, erythrocyte sedimentation rate and serum cholesterol level. X-ray of affected shoulder and/or cervical spine was done for (54) patients with adhesive capsulitis. With regard to diabetes, patients were considered to be diabetic if they had a fasting blood glucose of >=126 mg/di on at least two occasions or a random glucose of >= 200 mg/dl + symptoms (Alvin C. Powers, 2001). In relation to ischemic heart disease, only established cases were considered in this study. Systolic and diastolic blood pressure were measured in the sitting position and patients were considered to be hypertensive if the systolic blood pressure is >=140 mmHg and/or a diastolic blood pressure >= 90 mmHg in >= 3 readings 15 or they were currently taking antihypertensive medications. Patients with serum cholesterol level of > 200 mg/di were considered to have a risk of hypercholesterolemia (Peter N. Herbert, 2001).

Statistical Analyses: The associations between adhesive capsulitis and various disorders on one hand and between control group and same disorders on the other hand were examined using the Z- test, chi- square and odd's ratio.

RESULTS

In this study data were analyzed from (96) cases of adhesive capsulitis and (96) patients who acted as controls. Among adhesive capsulitis cases there were (67) women and (29) men.

Table I. Age and Sex Distribution of Adhesive capsulitis Patients in the Study Sample

Age of Patients (years)	Male No. (%)	Female No. (%)	Total (100%)	p value
30-39	3 (42.8)	4 (57.1)	7 (7.3)	*N.S
40-49	8 (30.8)	18 (69.2)	26 (27.1)	< 0.05
50-59	8 (22.8)	(77.1) 27	35 (36.5)	< 0.001
60-69	8 (36.3)	14 (63.6)	22 (22.9)	N.S
70-79	2(33.3)	4(66.6)	6 (6.2)	N.S
Total	29 (3.2)	67 (69.8)	96 (100)	< 0.001

* Not significant

Table II. Age and Sex Distribution among control group

Age	Male No. (%)	Female No. (%)	Total
30 — 39	18 (41.0)	26 (59.0)	44 (45.83)
40 — 49	3 (18.8)	3(81.2)	16 (16.6)
50 — 59	8 (57.14)	(42.85)	14 (14.5)
60 — 69	7 (38.8)	11 (61.11)	18(18.8)
70 — 79	2 (50.0)	2(50.0)	4 (4.16)
Total	38(39.6)	58(60.4)	96(100)

Table III. Associated Disorders Among Adhesive capsulitis Cases

Associated Disorders	Male No. (%)	Female No. (%)	Total (100%)	p value
Diabetes mellitus	8 (30.7)	18 (69.3)	26 (27.1)	< 0.05
Ischemic heart disease	5 (41.7)	7 (58.3)	12 (12.5)	*N.S
Hypertension	1(12.5)	7(87.5)	8 (8.3) ,	< 0.05
Hemiplegia	2 (33.3)	4 (66.6)	6 (6.2)	N.S
Rheumatoid Arthritis	(0.0)	2 (100)	2 (2.0)	N.S
Cervical Spondylosis	(0.0)	9 (100)	9 (9.4)	< 0.001
Trauma	2 (40.0)	3 (60.0)	5 (5.2)	N.S
Hypercholester olemia	1 (25.0)	3 (75.0)	4 (4.2)	N.S
Others**	10 (41.7)	14 (58.3)	24 (25)	N.S
Total	29 (30.2)	67 (69.8)	96 (100)	< 0.001

Table IV. Shoulder Capsulitis according to Age and Sex in Total Diabetic Patients

Age of Patients (years)	Male No. (%)	Female No. (%)	Total (100%)	p value
40 — 49	1 (25.0)	3 (75.0)	4 (15.3)	*N.S
50 — 59	5 (33.3)	10 (66.6)	15 (57.7)	N.S
60 — 69	2 (28.6)	5 (71.4)	7 (27.0)	N.S
Total	8 (30.7)	18 (69.3)	26 (100)	< 0.05

(* Not significant)

Table V. The Percent of Occurrence of the Associated Disorders with Adhesive capsulitis Cases **and Control Group**

Associated Disorders	Adhesive capsulitis Cases No. (%)	Control Group No. (%)	p. value	Odd's Ratio
Diabetes	26 (27.1)	2 (2.0)	< 0.0001	17.46
Ischemic heart disease	12 (12.5)	5 (5.2)	*N.S	2.6
Hypertension	8 (8.3)	11 (11.4)	N.S	0.70
Hemiplegia	6 (6.2)	** (0.0)	< 0.013	
Hypercholes terolemia	4 (4.2)	4 (4.2)	N.S	1
Cervical spondylosis	9 (9.4)	3 (3.1)	N.S	3.21
Trauma	5 (5.2)	1 (0.0)	N.S	5.22
Rheumatoid Arthritis	2 (2.0)	** (0.0)	N.S	
Total of associated disorders	72 (75.0)	26 (27.1)	< 0.0001	8.08
Others***	24 (25.0)	70 (73.0)	< 0.0001	0.12
Total	96 (100.0)	96 (100.0)		

* Not significant
** None of the control group found to have hemiplegia or rheumatoid arthritis
* * * Others include those in whom no any associated disorder could be encountered.

The age of the male patients was in the range (37-71 years) with a mean of (53±3) while age distribution of females ranged between (33-75 years) with a mean of (51±9). The female: male ratio in adhesive capsulitis cases was approximately 2:1 which was statistically significant (p< 0.001). The peak age of onset was between (50) and (59) years in both sexes (see Table I). In relation to control group, the age of male patients ranged from (35-70) years with a mean of (49 ± 11.6), the women form (33) to (75) years with a mean of (48 ± 10) years. (see Table II) Among shoulder capsulitis patients, the non-dominant side was affected in (51 %) while the dominant one represented (41%) and only (8%) of cases were bilaterally affected. Six of them were already diabetic on oral hypoglycemic agents.

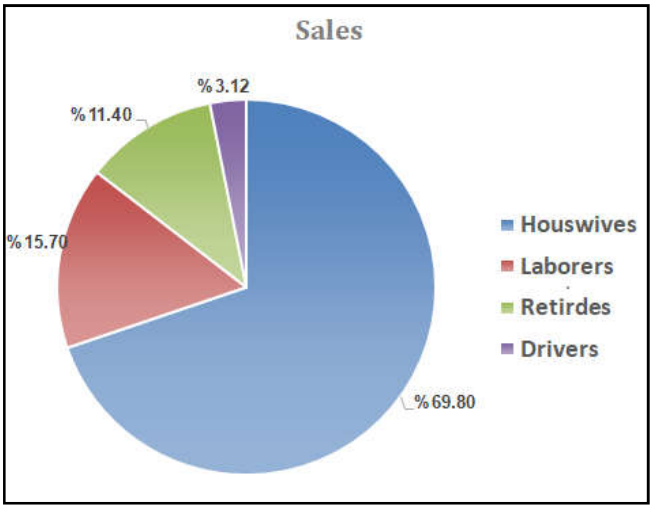

Figure 1. Distribution of occupation among adhesive Capsulitis Patients

The distribution of occupations among adhesive capsulitis cases is clarified in (Fig. 1). The various disorders with which adhesive capsulitis were associated are outlined in (Table III).

The female/male difference, as revealed in this table, did not reach statistical significance apart from the cases of diabetes (p< 0.05), hypertension (p<0.05) and cervical spondylosis (p< 0.001). Of the total 26 (27.1%) diabetic patients, (22) were known to be diabetic (18) females and (4) males, the other four patients were accidentally discovered by our study to be diabetics (3 females and one male). The peak age of onset of shoulder symptoms for diabetic patients was between (50-59) years, and the ratio of females to males was approximately 2:1 which attained statistical significance (p < 0.05) as shown in (Table IV). Out of 22 (23%) already diabetic patients, (18) were on oral hypoglycemic agents and (4) patients were on diet therapy.

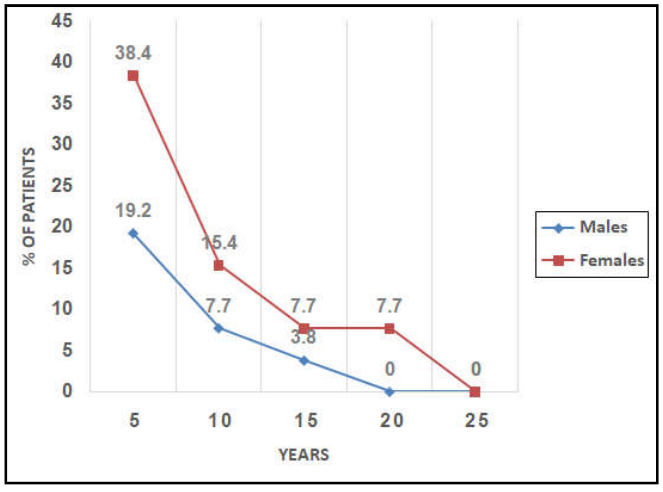

Figure 2. Duration of Diabetes among Diabetics (n = 26) with Adhesive Capsulitis

The majority of diabetic patients showed poor glycermic control. The occurrence of shoulder capsulitis in diabetic patients was more obviously seen during the first five years since they were first diagnosed as diabetics as shown in (Fig. 2). History of trauma was present in five patients (5.2%), two

of them had fracture in same upper limb in the past few months preceding their shoulder complaint. The first had fracture humerus and the other had Colle's fracture, while the remainder (n = 3) patients attributed their symptoms to trauma during work. Four patients (4.2%) were newly diagnosed to have hyper cholesterlomia with serum cholesterol level ranging between (230-340) mg/d1. The mean erythrocyte sedimentation rate was (14.5) m.m/hour in males and (13.3) m.m/hour in females with a range of (2-28) in male and (2-31) in females. Shoulders which were X-rayed showed no striking abnormalities and, out of 19 (19.7%) who had cervical spine X-ray only nine patients exhibited osteoarthritic changes. In regard to control group two female patients (2.1 %) were accidentally discovered to have diabetes and (4) male patients (4.2%) were also newly discovered to have hyper cholesterolemia. Other various disorders that were screened are recorded in (Table V).

DISCUSSION

The etiology of adhesive capsulitis is still not known and our understanding of pathogenesis is still limited (Baslund *et al.,* 1990). This study has shown that progression in age is important in the development of adhesive capsulitis, and the peak rate of onset was between the ages 50 and 59 years which is in agreement with other previous studies (Wrigh and A.M.M.M. Hag, 1976). Other authors have described a peak age of onset between 50 and 70 years (Duplay, 1872). As far as the sex ratio is concerned, the statistically significant ratio of women to men which was approximately 2:1 is higher than 3:2 mentioned by other authors (Duplay, 1872; Wrigh and A.M.M.M. Hag, 1976). Concerning the occupational status, since all female patients in the sample were housewives, and a reasonable percentage of male patients were labourers with moderate to heavy manual work, one could invoke repeated trivial injuries as a precipitating factor to trigger the condition. This is consistent with other study (Wrigh and A.M.M.M. Hag, 1976), though others denied the relationship between occupation and the development of adhesive capsulitis (Brucker, and C.J.S.N, 1981; Frankin Kofin, 1993). In relation to associated disorders, the study has shown a definite relationship between diabetes mellitus and adhesive capsulitis in comparison with the control group, and this marked correlation attained high statistically significant rate ($p < 0.0001$), (odd's ratio = 17.46). The percentage of diabetics among adhesive capsulitis cases (27%) is higher than the percentage (3.2%) reported by other study(18). However, another study found no association between shoulder capsulitis and diabetes (Brucker, and C.J.S.N, 1981) The (4.2%) of patients who were accidentally discovered to have diabetes is obviously near to other authors' finding (4%)(19). Hypercholesterolemia which was present in (4.2%) of patients has no statistical significance when compared to control group. This finding is incompatible with previous studies (Bunker *et al.,* 1995). Reviewing the overall associations between different pathological disorders and adhesive capsulitis cases in comparison with control group, it obviously seems that the overall associations are statistically significant ($p < 0.0001$) (odd's ratio = 8.08).

Conclusions

1. On our locality, adhesive capsulitis occurs more commonly among women. This can be interpreted by the higher percentage of diabetes, ischaemic heart disease, ... etc. (i.e. the accompanying disorders of adhesive capsulitis are commoner in females in this studied sample).
2. Adhesive capsulitis affect the non dominant side more than the dominant one suggesting that immobility of shoulder joint calls for a higher occurrence of adhesive capsulitis.
3. There is a marked association between adhesive capsulitis and some chronic disorder, but the special attention has been drawn to the highly significant correlation with diabetes mellitus.
4. Poor glycemic control hastens the development of adhesive capsulitis.

Recommendations

Since adhesive capsulitis may be the presenting complaint of various disorders like diabetes, or hyper cholesterolemia, it seems reasonable to screen for these disorders among adhesive capsulitis patients in order to have an earlier diagnosis and treatment.

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