Long-Term Outcome in Adhesive Capsulitis Associated with Type 2 Diabetes

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ABSTRACT

BACKGROUND

Adhesive capsulitis is characterised by progressive inflammation of the glenohumeral joint with subsequent stiffness of the shoulder. The diagnosis is mainly clinical. It has three phases with a prolonged course, but the recovery is near total in the majority. It is more common in women than men with a higher prevalence of diabetes mellitus. Kerala with a high diabetic prevalence has a high prevalence of adhesive capsulitis. Some patients have excess pseudo-neurological symptoms. There are reports that psychological factors predict outcome in neck and shoulder pain. We wanted to study the long-term outcome of secondary adhesive capsulitis in adults with diabetes mellitus and evaluate the pseudo-neurological symptoms associated with this condition, along with its influence on treatment.

METHODS

This is a clinic-based follow-up study done in Indian Institute of Diabetes, Trivandrum, Kerala. Consecutive type 2 diabetes patients were recruited from April 2016 to May 2018. There were 64 patients. Patients with upper extremity bone fractures or dislocations were excluded.

RESULTS

The M: F ratio was 1: 1.56. The median (IQR) duration of diabetic status was 48 (24, 81) months. There was no association of periartthritis with the severity of diabetic status. Forty-five patients (70.31 %) had pseudo-neurological symptoms, of which 28 (43.75 %) patients had sleep difficulties only and 17 had other symptoms also. There was a female preponderance in those who had pseudo-neurological symptoms. Most of the patients were symptom-free on follow up. Six (9.38 %) out of the seventeen patients who had multiple symptoms were refractory to treatment with persistent symptoms and functional loss at 36 months follow up. Favourable outcome was seen in 58 (90.62 %). The mean time for a favourable outcome was 26 months (range 11 - 38 months).

CONCLUSIONS

Between 10 and 20 percent of individuals with diabetes mellitus (DM) who develop adhesive capsulitis have good long-term outcome, but those with multiple pseudo-neurological symptoms have a poor outcome. Pseudo-neurological symptoms influence and predict the outcome in adhesive capsulitis

KEY WORDS

Periartthritis, Adhesive Capsulitis, Diabetes Mellitus, Type 2, Pseudo-Neurological Symptoms, Follow-Up Study

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BACKGROUND

Adhesive capsulitis, also known as periarthritis shoulder is a unique clinical condition. The consensus definition of a frozen shoulder by the American Shoulder and Elbow Surgeons is "a condition of uncertain aetiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder".¹ It can be primary (absence of intrinsic shoulder disease) or associated with bursitis or tendinitis of the shoulder or be associated with systemic disorders like cardiac, endocrine, and neurologic comorbid diseases.²⁻⁵ Between 10 and 20 percent of individuals with diabetes mellitus develop adhesive capsulitis.⁶ Diabetic patients, both type 1 and 2, have a high prevalence of this condition.^{7,8} The prevalence of periarthritis shoulder in Kerala is likely to be high with a high diabetic population prevalence of 16 to 20 % (double the national average of 8 %).⁹ Prolonged immobilization leads to adhesive capsulitis and reflex sympathetic dystrophy is a likely pathologic factor. The capsule is thickened with mild chronic inflammatory infiltrate and fibrosis.

Although pain and stiffness are gradual, some may have an accelerated course. Criteria for diagnosis are insidious shoulder stiffness, pain more at night, near-complete loss of active and passive external rotation. The arm is held in adduction with internal rotation. There is mild atrophy of deltoid and supraspinatus. We can elicit diffuse tenderness near the glenohumeral joint and extends to the trapezius and interscapular area due to attempted splinting of the painful shoulder. Complete loss of external rotation, both active and passive is pathognomonic. Some patients have pseudo-neurological complaints like tiredness, anxiety, sleep problems, sadness/depression, dizziness, hot flushes and/or extrasystoles, among others.¹⁰

NSAID (Non-Steroidal Anti-Inflammatory Drugs), systemic or local steroids and physiotherapy are tried with varying benefit.¹¹ Indications for surgery are relatively few. It takes 1 to 3 years for improvement, but some have permanent restriction of movement. It is refractory to treatment in some. There are reports that psychologic factors predict outcome in neck and shoulder pain. Also, pain-related beliefs contribute significantly to the disease condition.¹⁰ There are very few studies on the outcome of adhesive capsulitis in diabetic patients in South India. Hence, we aim to find the long-term outcome of secondary adhesive capsulitis in adults with diabetes treated with anti-inflammatory, antidepressants, and physiotherapy.

METHODS

We did a clinic-based follow-up study of consecutive patients with adhesive capsulitis associated with Type 2 DM recruited for two years (April 2016 to March 2018) attending Neurology clinic in Regional Diabetes Centre in Thiruvananthapuram, Kerala. We excluded patients with a diagnosis of carpal tunnel syndrome or cervical radiculopathy, generalised arthritis, upper extremity bone fractures, dislocations of the upper limb joints, or evidence of referred pain. The diagnosis of periarthritis was made based on a history of shoulder pain sufficient to wake the patient at night and present for at least

three months. There should be a progressive limitation of shoulder movement, particularly a reduction of at least half the normal range of external rotation. Physical examination revealed tenderness over the joint and upper fibres of trapezius, and atrophy of deltoid and supraspinatus. The phase of the illness is based on the classically described three phases-initial (2 – 9 months) with severe pain, intermediate (4 - 12 months) with less pain but restricted movements, recovery (5 – 24 months) gradual relief of pain and improved movements. The presence of Dupuytren's contracture was recorded. Blood investigations included complete blood count, erythrocyte sedimentation rate, HbA1c, serum uric acid, and the latex-fixation test for rheumatoid factor. Digital radiograph of the affected shoulders was taken. Patients were counselled regarding the nature of the disease.

All were followed-up monthly for three months and later every three months. They were followed up for 38 months. All patients were given NSAID (Etorocoxib 90 mg) for seven days with Amitriptyline 10 mg / Duloxetine 20 mg depending on the associated symptoms for eight weeks with add on ice therapy followed by shoulder exercise. Other associated comorbidities were also treated. Symptom-freedom at six months was defined as a favourable outcome.

Statistical Analysis

The details were entered on MS Excel for windows and analysed by IBM-SPSS version 25. Descriptive analysis of the patients like age, gender, percentage of comorbidities were assessed. The mean duration for favourable outcome was studied. The discrete variables were compared by chi-square and continuous variables by t-test.

RESULTS

There were 64 type 2 diabetes mellitus patients with a diagnosis of adhesive capsulitis. There were 39 (60.9 %) females and 25 (39.1 %) males. The M: F ratio was 1: 1.56. The mean age at onset was 52.13 years (7.97) with range 36 - 68 years. The mean age at onset of females was 53.51 years (7.33) and that of males was 49.96 years (8.58) (p-value 0.08). The mean duration of adhesive capsulitis at the time of inclusion in the study was three months, with a range of three weeks to six months. The median (IQR-Inter-Quartile Range) duration of diabetic status was 48 months (24, 81) with a range of 12 months to 21 years. The mean duration of DM in females was 62.64 months (52.8) and in males was 56.52 months (41.64) (p-value 0.5). All patients were right-handed. The left side was involved in 39 (60.9 %), right in 22 (34.4 %) and sequential involvement in 3 (4.7 %).

All patients had pain more at night lying on the affected side which disturbed sleep. Forty-five patients (70.31 %) had pseudo-neurological symptoms, of which 28 (43.75 %) patients had only sleep difficulties. The remaining 17 (26.56 %) patients who had other pseudo-neurological symptoms in addition to sleep problems were all females. External rotation was limited to a varying degree in all patients.

Trapezius tenderness of upper fibres was seen in 100 %. Glenohumeral (shoulder) joint tenderness was seen in 55

(85.94 %). Atrophy of deltoid muscle in 21 (33 %) patients and supraspinatus in 16 (25 %) patients were also seen.

Comorbidities	Number	%
Hypertension	14	21.9
Dyslipidemia	42	65.63
Hypothyroidism / Hyper	4	6.35
Parkinsonism	3	4.7
Stroke	4	6.35

Table 1. Comorbidities

Complications	Number	%
Neuropathy	21	32.81
Retinopathy	10	15.63
Nephropathy	6	9.38

Table 2. Complications of Diabetes

Dupuytren's contracture was seen in 5 (7.8 %) patients. Most of the patients were referred to the clinic for diabetic peripheral neuropathy in whom the mean duration of onset of periarthritis shoulder symptoms was 3 months with a range of 3 weeks - 6 months. Most patients were in stage 1, 44 (64 %) patients, followed by stage 2, 14 (21.88 %) patients.

Comorbidities like hypertension in 14 (21.9 %), hypothyroidism in 4 (6.35 %) and Parkinsonism in 3 (4.7 %) were seen in these patients. Four patients (6.35 %) had a history of stroke in the form of hemiplegia on the corresponding side. Mean HbA1c at the time of the first visit was 7.8 (6.7) with range 6.3 - 12.4. Among the patients, 44 (68.7 %) were controlled on oral hypoglycaemic drugs, 6 (9.37 %) on insulin and 14 (21.87 %) on both insulin and oral drugs.

All patients received seven days of NSAID. Add on tricyclic antidepressant (TCA) was given in 45 (70.31 %) with sleep problem and duloxetine was given in the remaining 19 (29.69 %) for eight weeks. All patients received shoulder exercises.

Symptom freedom at follow up was seen in 58 (90.62 %) patients. The mean duration to attain a favourable outcome was 26 months (range 11 to 38). Patients who did not have pseudo-neurologic symptoms and 28 patients who had only sleep difficulties, where symptom free on follow up. On the other hand, six (9.38 %) out of the seventeen patients who had sleep disturbance and other pseudo-neurological symptoms were refractory to treatment with severe symptoms, pain and functional loss at 36 months follow up. In the latter group, all of them were female.

DISCUSSION

We present the long-term outcome of patients with adhesive capsulitis associated with type 2 diabetes mellitus. In the long term, 90.62 % of patients had normal or near-normal shoulders. Earlier studies have shown good outcome in more than 87 % of patients.^{12,13} Sharma has shown that there is no difference in outcome between treatment with steroids and treatment as usual.¹⁴ Systematic review also has shown only short and intermediate term benefits for local steroid treatment.¹⁵ The mean time to attain favorable outcome was 26 months which is comparable to other studies which ranged between 18 to 24 months.^{12,13,16,17} We found 70.31 % had pseudo-neurological symptoms which are comparable to 65 % in the study population by Sharma et al.¹⁰ Our observation that those with multiple pseudo-neurological symptoms had poor

outcome in diabetic patients with periarthritis needs further studies.

The mean age at symptom onset of 53.4 years was similar to 52.13 years reported by Hand et al.¹⁸ The female preponderance in our study has been documented earlier.¹⁸ Twenty percent of patients reported bilateral symptoms, but there were no recurrent cases. Adhesive capsulitis affects both sides equally, and rarely presents bilaterally in a simultaneous fashion. Bilateral simultaneous presentation is rare, like our experience.^{7,8,19,20} Nevertheless, Hands et al. reported simultaneous bilateral symptoms in 20 %.¹⁸ However, the sequential bilateral occurrence may be found in up to 50 % of patients.^{7,8,19,20} Our low sequential occurrence of 4.7 % could be due to the short follow up period. Adhesive capsulitis affects both sides equally and frequently.^{18,21} But the study by Wolf JM. et al. showed that the non-dominant hand is more often affected.⁶ Our study also showed more involvement of left side (60.9 %).

According to Uppal HS. et al., one of the major complaints in the frozen shoulder in stage I and stage II is pain which in some cases, can be very severe.²² We also found that trapezius tenderness of upper fibres and glenohumeral joint tenderness in majority. The earliest and easy demonstrable sign was tenderness on upper fibres of trapezius, which was the pathognomonic sign even in patients with very mild restriction of external rotation. Complete loss of external rotation of the shoulder is pathognomonic and is confirmed by testing the active and, more importantly, the passive ranges of movement.^{13,20,23} Present study also showed external rotation was limited to a varying degree in all patients.

Limitation of the study was we had not measured the function and quality of life in patients with shoulder adhesive capsulitis using Shoulder Pain and Disability Index (SPADI) or SHC (Subjective Health Scale) total and subscale scores, and Neuroticism sum score.^{10,24,25}

Dupuytren's disease is more common than usual in the frozen shoulder.²⁶ We also found in 7.8 % of patients with adhesive capsulitis. The duration of shoulder pain correlated with the duration of the DM.⁸ Moron Hybbinette reported reduced ROM (Range of Motion) in 65 % of shoulders in people with diabetes at 29 months.⁷ The present study also showed a much longer duration of diabetes in patients with periarthritis shoulder, mean was 60.3 months (48.72) with a range 12 months to 21 years.

Comorbidities like hypertension (21.9 %), hypothyroidism (6.3 %), Parkinsonism (4.7 %) and stroke (6.35) were seen in a few patients. Though thyroid disorders, Parkinsonism and stroke are independent risk factors for adhesive capsulitis, number of cases with these risk factors in the current series were less probably due to the selection bias; the study setting was at a neurology clinic in a diabetic centre.

Study	Number	Follow-Up	Better Treatment	Favourable Outcome
Metzer	110	3.8 years	Physiotherapy	significant
Satya Pal Sharma	69	8 weeks	Intraarticular corticosteroid injections	Significant compared to control
Binder	40	44 months	Non-surgical	87.5 %
Reeves	41	30 months	Non-surgical	93.88 %
Present study	64	38 months	Non-surgical	90.62 %

Table 3. Comparison of Various Studies

CONCLUSIONS

Diabetic patients with periartthritis shoulder have good long-term outcome. Most patients had pseudo-neurological symptoms which responded well to TCA (Tri-Cyclic Antidepressants) and other antidepressants. Patients with multiple pseudo-neurological symptoms have poor outcome, pseudo-neurological symptoms influence and predict the treatment outcome in frozen shoulder.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

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