Association of Limited Joint Mobility with Dupuytren's Contracture in Diabetes Mellitus

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Abstract. **Limited joint mobility is a relatively recent addition to the list of other well known rheumatic disorders that may be associated with diabetes mellitus. In our study of 109 patients with diabetes, a higher prevalence of Dupuytren's contracture was found compared to nondiabetic subjects, but the difference was not statistically significant ($p<0.1$). An association between limited joint mobility and Dupuytren's contracture was shown. Patients with diabetes with Dupuytren's contracture showed no difference compared to those without Dupuytren's contracture with regard to sex, insulin dosage, metabolic control and presence of shoulder capsulitis. Limited joint mobility and Dupuytren's contracture may be associated with retinopathy.** (*J Rheumatol 1987;* **14:582–585**)

Key Indexing Terms:
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The association between diabetes mellitus and musculoskeletal disorders is not as well recognized as are the ophthalmic, cardiovascular, renal and neurological complications of the disease. An increased prevalence of shoulder capsulitis, Dupuytren's contracture, flexor tenosynovitis, ankylosing hyperostosis, carpal tunnel syndrome and chondrocalcinosis in patients with diabetes has been described[1,2]. More recently, limited joint mobility (cheiroarthropathy) and diabetic pseudoscleroderma have been reported in patients with diabetes mellitus[3,4]. The coexistence of musculoskeletal disorders in diabetes has not been studied in detail. The association of limited joint mobility with frozen shoulder has been described in a small number of insulin dependent diabetic patients[5]. In a larger number of both insulin and noninsulin dependent diabetic patients, however, we failed to show any significant association[6,7].

Dupuytren's contracture is recognized in 1 to 3% of middle aged or elderly normal individuals[1,2]. The prevalence of Dupuytren's contracture in diabetes mellitus has varied from 1.6 to 63% in different series, but most authors agree that patients with diabetes and Dupuytren's contracture tend to be older with longstanding disease[1,2]. We assessed patients with diabetes mellitus for the presence of Dupuytren's contracture and limited joint mobility. These features have been related to other clinical and demographic aspects of the disease.

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MATERIALS AND METHODS

One hundred and nine consecutive and unselected diabetic patients attending the diabetic clinic at the Royal Victoria Infirmary were examined. Of these, 49 patients were insulin dependent with median age of 47 years (range 18 to 82 years) and 60 patients were noninsulin dependent with median age of 58 (range of 34 to 85 years), sex distribution was male:female 27:22 and 33:27, respectively. Seventy-five nondiabetic subjects without musculoskeletal complaints or other illnesses of note, including past history of hand injury or infection (hospital staff, persons accompanying patients — who were not genetically related), were also assessed. Age range in this group was 18 to 76 years and median age was 44 years with sex distribution being male:female 35:40.

Joint mobility was assessed in both upper extremities by the method of Rosenbloom, *et al*[3]. All patients were assessed by one observer. The range of joint movement was recorded with a goniometer. The patients were asked to position their palms and fingers in the form of the "prayer sign," with their fingers splayed. If the patient failed to approximate the palmar surfaces completely, the examiner attempted to extend the fingers passively. Failure to extend the proximal interphalangeal (PIP) joint fully (a value < 0) was accepted as abnormal, provided there were not obvious degenerative changes present in that joint. Passive flexion of the wrist was performed if the PIP joint was not fully extendable to determine whether the limitation was correctable by this procedure. Only those PIP joints where passive flexion of the wrist did not correct the limitation were accepted as abnormal, thus excluding other possible causes of limitation such as flexor tenosynovitis. With the hand resting on a flat surface, the metacarpophalangeal (MCP) joint of each index finger was passively extended and an angle of less than 30° was taken as abnormal. Maximal extension of the wrist and elbow joints was also measured, and the shoulder joints were examined clinically. Joint limitation was classified according to the criteria of Rosenbloom, *et al*[3] as follows: (a) Slight — when there was limited extension of either the PIP joint or the MCP joint; (b) Moderate — when there was impaired extension of both these joints; and (c) Severe — when additionally there was limitation of the wrist or elbow joints.

Dupuytren's contracture was considered to be present if the following were present: Nodular or plaque-like thickening of palmar fascia primarily on the ulnar side of the hand, which may be associated with dimpling of the overlying skin with or without extension of the fibrous thickening to the base of the MCP joint, resulting in finger contracture[4]. One diabetic patient with severe Dupuytren's contracture who had difficulty in placing

the hand flat on the table was excluded from our study, as it was felt to be impossible to assess limited joint mobility in this patient.

Criteria for shoulder capsulitis were pain in the shoulder for at least one month, with inability to lie on the affected shoulder, and restricted active and passive shoulder joint movements in at least 3 planes. Note was taken of the presence or absence of Heberden's and Bouchard's nodes in diabetics and controls.

The following variables were also noted: duration of diabetes mellitus, current insulin dosage (where relevant), and diabetic control as assessed by estimation by glycosylated hemoglobin concentration. The presence of diabetic retinopathy was classified as: Grade 1 (normal), Grade 2 (background retinopathy only) and Grade 3 (proliferative retinopathy).

Statistical significances were determined by one way analysis of variance test (χ^2 method) and the Mann-Whitney test.

RESULTS

Rheumatological assessment revealed limited joint mobility (cheiroarthropathy) by the criteria of Rosenbloom, *et al*[3] in 55 of 109 diabetic patients. These patients could be categorized as: mild=39, moderate=15 and severe=1. Impaired joint mobility was found in 17 of 75 nondiabetic subjects; all had only mild impairment. The prevalence in the diabetic patients was significantly increased ($p<0.001$).

Patients with diabetes mellitus had a higher prevalence of Dupuytren's contracture compared to nondiabetic subjects, but this did not reach statistical significance (19 vs 9%, $p<0.1$). Of 39 patients with slight limitation in joint mobility, 11 had Dupuytren's contracture and of 16 patients with moderate or severe limitation, 4 had Dupuytren's contracture. There were no significant differences between diabetics with Dupuytren's contracture and those without with regard to sex, insulin dosage, glycosylated hemoglobin concentration and shoulder capsulitis. There were significant differences between the groups in the median age ($p=0.002$), median duration of diabetes ($p=0.01$), prevalence of limited joint mobility ($p<0.05$) and retinopathy ($p<0.01$). In 15 patients with Dupuytren's contracture, fundoscopy examination showed abnormalities in 9 patients. (Six patients had Grade 2 and 3 patients had Grade 3 changes). Eighty patients with no evidence of Dupuytren's contracture on fundoscopy showed presence of retinopathy in 18 patients (12 had Grade 2 changes and 6 patients had Grade 3 changes). The difference was statistically significant ($p<0.01$) (Table 1). Of the 7 nondiabetic subjects with Dupuytren's contracture, 4 had limited joint mobility, while of the 68 subjects without Dupuytren's contracture, 13 had limited joint mobility. This difference was significant ($0.1>p>0.05$).

Eighteen diabetic patients had unilateral Dupuytren's contracture and 3 had bilateral involvement, while all 7 nondiabetic subjects had only unilateral Dupuytren's contracture. The difference was not statistically significant.

Of the 21 patients with shoulder capsulitis, 12 (57%) also had limited joint mobility. This was not statistically different from the prevalence of limited joint mobility in diabetics without shoulder capsulitis (49%).

Dupuytren's contracture was present in 5 patients with shoulder capsulitis (23%). Again, this was not statistically different from the prevalence of Dupuytren's contracture in diabetics without shoulder capsulitis (18%).

Fifteen diabetics had Heberden's nodes and 3 had Bouchard's nodes, while these were noted in 8 and 2 nondiabetics, respectively (p=NS). Subjects with these nodes were

Table 1. *Characteristics of patients with diabetes mellitus according to presence or absence of Dupuytren's contracture.*

	Diabetic Patients with Dupuytren's Contracture	Diabetic Patients without Dupuytren's Contracture	p
Number	21	88	
Male/female	15/6	46/42	NS
Median age (years)	66	55	p=0.002
(range)	(34–80)	(18–85)	
Median duration of diabetes mellitus (years)	15	8	0.01
(range)	(1–42)	(1–40)	
Type of diabetes mellitus:			
IDDM*	6	43	<0.1
NIDDM**	15	45	
Insulin dose (units)	54 ± 16	49.7 ± 16.9	NS
Glycosylated Hb	9.9 ± 2.3	9.9 ± 2.6	NS
Number of patients with limited joint mobility	15	40	<0.05
Shoulder capsulitis	5	16	NS
Retinopathy	9 (n=15 tested)	18 (n=80 tested)	<.01

* IDDM — Insulin dependent diabetes mellitus

** NIDDM — Noninsulin dependent diabetes mellitus

considered to have limited joint mobility only if they had limited extension of the MCP joint or a larger joint.

DISCUSSION

A variety of rheumatic disorders have been described in patients with diabetes mellitus[1,2]. These conditions are more prevalent in diabetics than in the general population, but are not unique to patients with diabetes. We previously reported a high prevalence of limited joint mobility in this population of diabetics (49% in IDDM and 52% in NIDDM patients)[7]. Our somewhat surprising observation was that limited joint mobility also occurred in a substantial proportion of nondiabetic subjects (23%) and that the prevalence rose with age. The control, nondiabetic subjects, were not genetically related to the patients with diabetes. We performed oral glucose tolerance tests in a small number of the control subjects with limited joint mobility, and glucose homeostasis was normal in all of them. As we found no obvious cause of limited joint mobility in our nondiabetic subjects, we propose that limited joint mobility may, at least in part, be a phenomenon of aging and in diabetics it is accelerated perhaps because of microangiopathy. It is noteworthy that in all the nondiabetics, limited joint mobility was always only of a slight/mild degree according to the criteria of Rosenbloom, *et al*[3]. In this regard, this method of detection of limited joint mobility would appear to be quite sensitive. Since our report, similar observations have been made by other authors[8] substantiating our findings.

Our results in the present study show a tendency for higher prevalence of Dupuytren's contracture in diabetics compared to nondiabetic subjects. As in most previous studies, diabetics with this rheumatic manifestation tended to be older males with longer standing diabetes than those without. Diabetics tended to have bilateral Dupuytren's contracture more frequently than nondiabetics, but the difference was not statistically significant.

This study has revealed a significant association between Dupuytren's contracture and limited joint mobility of the hands in both the diabetic and the control nondiabetic subjects. Severity of limited joint mobility did not seem to influence Dupuytren's contracture. Although diabetic patients with limited joint mobility were believed to have an increased incidence of "additional rheumatic complaints"[4], a higher prevalence of Dupuytren's contracture in the presence of limited joint mobility has not been specifically described in the literature. This may be due to the difficulty in ascertaining limited joint mobility in the presence of Dupuytren's contracture. However, we demonstrated that with due precautions and exclusions, limited joint mobility can be assessed even in the presence of significant Dupuytren's contracture by measuring the MCP and PIP joint of the index finger. This is possible because Dupuytren's contracture is most prominent on the ulnar side of the hand and normally does not extend beyond the middle finger.

Unilateral limited joint mobility (all mild in degree) occurred in only 4 patients with diabetes — the remainder had bilateral and symmetrical limitation. In diabetics with concomitant Dupuytren's contracture, all had bilateral limited joint mobility and, therefore, it was not related to the side with concomitant Dupuytren's contracture, which was found bilaterally in only 3 diabetics. Similarly, there was no relationship between the side of Dupuytren's contracture and predilection/predominance of limited joint mobility in nondiabetic controls.

The prevalence of Dupuytren's contracture increases with age[1,2]. The higher prevalence (9%) of Dupuytren's contracture in the nondiabetic subjects in our series compared to reported figures (1–3%)[1,2] may be due to differences in age among control subjects in the different series. In our study there was a wide age range of the nondiabetic subjects (18–75 years) and Dupuytren's contracture was found only in subjects aged 55 or more. There was, therefore, no evidence to suggest that Dupuytren's contracture and limited joint mobility were spatially related in diabetic subjects.

The association between Dupuytren's contracture and limited joint mobility shown in our study may, in part, be a function of the greater age and duration of disease in those diabetics with Dupuytren's contracture compared to those without. Therefore, further studies in diabetics controlled for these factors are necessary.

We found no significant association between Dupuytren's contracture and shoulder capsulitis. In a previous paper, we reported the lack of association between limited joint mobility and shoulder capsulitis[6,7]. There is a dearth of information in the literature regarding the influence of the type of diabetes mellitus on the occurrence of Dupuytren's contracture. In our study, a higher proportion of noninsulin dependent diabetics had Dupuytren's contracture compared to insulin dependent diabetics, but the difference was not statistically significant. The genetic differences between the types of diabetes mellitus or merely the different ages of the 2 groups could be important in this respect. Genetic factors have been suggested as relevant because of racial and ethnic differences in the incidence of Dupuytren's contracture[9].

It is not known what effect diabetic control has on the development of Dupuytren's contracture. In our study no differences were found in the glycosylated hemoglobin concentration in the diabetic patients with or without Dupuytren's contracture. However, glycosylated hemoglobin concentration gives an indication of recent diabetic control rather than a measure of longterm glucose homeostatis, and as such, it would not be expected to reflect such diabetic complications as microangiopathy and Dupuytren's contracture, which take years to develop.

In our study retinopathy occurred significantly more frequently in those diabetics who had Dupuytren's contracture than in those without. A similar association between retinopathy and Dupuytren's contracture was recently reported by

Larkin and Frier[8]. This indicates that the presence of either limited joint mobility or Dupuytren's contracture may be associated with the presence of microangiopathy in diabetes. Although a majority of studies to date[3,4,7] revealed the association between limited joint mobility and microangiopathy, a few reports did not find a clear relationship[10,11] and, therefore, further prospective longitudinal studies are warranted.

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