

# FROZEN SHOULDER AND LIPIDS

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**We prospectively studied 50 patients with the diagnosis of primary frozen shoulder. The serum lipid levels were measured in 43 of these patients and compared with those in 43 age-matched and sex-matched control subjects. The fasting serum triglyceride and cholesterol levels were significantly elevated in the frozen-shoulder group (cholesterol  $p < 0.01$ ; triglyceride  $p < 0.02$ ).**

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Lundberg (1969) reported that in 12 patients the histological findings in frozen shoulder were similar to those in Dupuytren's disease and we have confirmed this using routine histological and immunocytochemical methods (Bunker and Anthony 1995). Sanderson et al (1992) have shown an association between hyperlipidaemia and Dupuytren's disease. We studied a series of patients with primary frozen shoulder to assess whether there was a similar association with hyperlipidaemia.

## PATIENTS AND METHODS

Codman (1934) first used the term 'frozen shoulder', for a condition of slow onset giving pain near the insertion of the deltoid, inability to sleep on the affected side, painful and incomplete elevation and external rotation, and a normal radiological appearance. All our patients fulfilled these criteria, and also had reduction of both active and passive movement (Zuckerman, Cuomo and Rokito 1994). We excluded patients with frozen shoulder secondary to soft-tissue trauma, fracture, arthritis, hemiplegia or any other known cause (Lundberg 1969).

Of 935 new patients presenting with shoulder pain 50 fitted these strict criteria. Of these, 43 agreed to measurement of fasting lipid and glucose levels. The average age of

these 50 patients was 56.1 years with an average duration of symptoms of 15.5 months; there were 24 women and 26 men. The left and right shoulders were affected equally. The average range of combined elevation was  $83.2^\circ$  and of external rotation  $9.4^\circ$ .

Patients fasted for ten hours before venepuncture, and the blood samples were analysed on a Kodak Ektachem 700XR analyser (Kodak, Amersham, UK) using standard manufacturer's slides. We obtained age-matched and sex-matched control patients by informed consent from among orthopaedic patients admitted for arthroscopic surgery to the knee or for foot surgery. The average age of the 23 men was 57.3 years and of the 20 women 55.8 years.

Of the 43 patients with frozen shoulder, 11 were diabetic. Five of them also had other diseases: two had sustained myocardial infarctions, one had chronic obstructive airway disease, one prostatic carcinoma and one was an alcoholic.

## RESULTS

There were 23 men, average age 59 years, and 20 women, average age 56 years, in the frozen-shoulder group. The mean serum cholesterol concentration was 5.92 mmol/l (SD1.17) compared with 5.14 mmol/l (SD1.13) in the control patients ( $p < 0.01$ , Student's *t*-test) (Fig. 1). The mean serum triglyceride concentration in the frozen-shoulder group was 2.24 mmol/l (SD1.38) and in the control group 1.62 mmol/l (SD0.64) ( $p < 0.02$ ) (Fig. 2). The exclusion from the frozen-shoulder group of the 11 patients known to be diabetic did not alter the significance levels of the differences between the two groups.

## DISCUSSION

The cause of frozen shoulder has remained unknown since the term was first used by Codman (Bunker 1985). The work of Lundberg (1969) and of Kay and Slater (1981) suggests a close histological similarity between Dupuytren's disease and frozen shoulder and we have confirmed this (Bunker and Anthony 1995, p.677). Ozaki et al (1989) and Hannafin, DiCarlo and Wickiewicz (1994) have also reported the histological appearances of fibrosis and contracture in the joint capsule of patients with frozen shoulders.

Both frozen shoulder and Dupuytren's contracture are known to be more common in diabetic patients than in the general population. Lequesne et al (1977) found an abnor-

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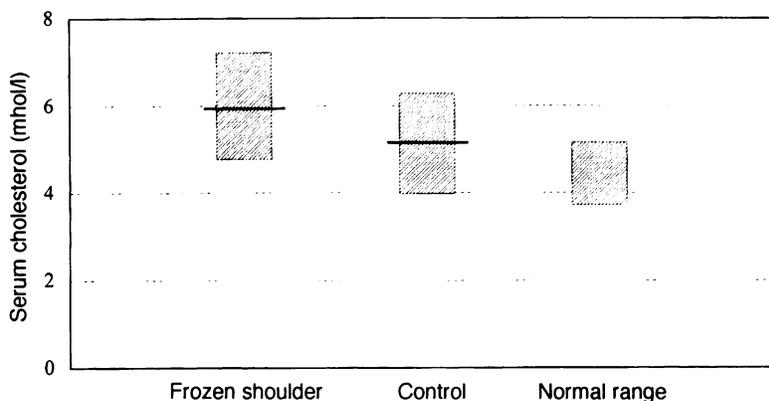


Fig. 1

Mean  $\pm$ 1SD for serum cholesterol concentrations in 43 frozen-shoulder patients and 43 age- and sex-matched control subjects. The accepted normal range for our laboratory is also shown.

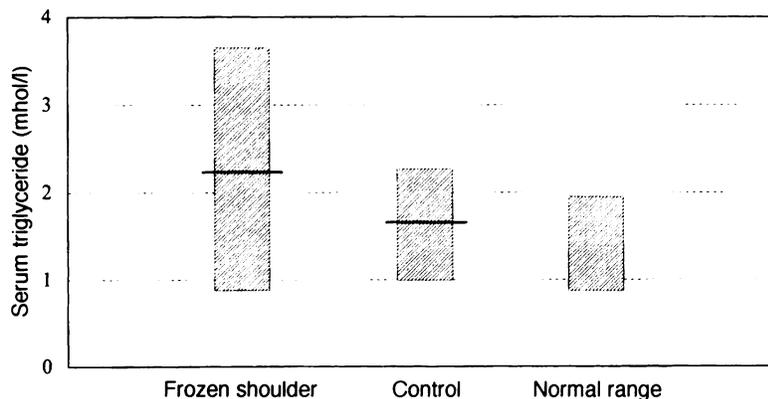


Fig. 2

Mean  $\pm$ 1SD for serum triglyceride concentrations in 43 frozen-shoulder patients and 43 age- and sex-matched control subjects. The accepted normal range for our laboratory is also shown.

mal glucose tolerance test in 28% of patients with primary frozen shoulder compared with 12% in control patients. Bridgman (1972) found frozen shoulder in 10.8% of a group of 800 diabetics compared with 2.3% in non-diabetic patients, and Pal et al (1986) reported incidences of 19% in diabetics and 5% in non-diabetics. Fisher, Kurtz and Shipley (1986) found shoulder problems in 7.1% of diabetic patients, but in a group of insulin-dependent diabetics with cheirarthropathy (flexion contractures of the fingers with no Dupuytren's disease) 44.8% had marked restriction of active and passive shoulder movement.

An association between Dupuytren's disease and diabetes was demonstrated by Noble, Heathcote and Cohen (1984), and patients with diabetes are known to have raised serum triglyceride levels (Havel 1979). Patients with Dupuytren's disease also show raised serum triglyceride levels (Sanderson et al 1992) and our results indicate that they are also increased in patients with frozen shoulder.

Dupuytren's disease is associated not only with diabetes, but also with alcoholism and with phenobarbitone when it is used to treat epilepsy. Alcoholism is associated with raised serum triglycerides (Havel 1979), and phenobarbitone is known to alter cholesterol metabolism (Harvey 1980).

Frozen shoulder is associated with diabetes and also with cardiac disease and with recovery from neurosurgery (Bruckner and Nye 1981). Cardiac disease is associated with hyperlipidaemia, and it is probable that many patients who are recovering from neurosurgery have been treated with phenobarbitone as prophylaxis against postoperative epilepsy.

It appears that hyperlipidaemia may be the common thread which links diabetes, Dupuytren's disease and frozen shoulder. This may help to explain the associations of Dupuytren's disease and frozen shoulder with alcoholism, neurosurgery, phenobarbitone and cardiac disease.

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