Case 2 A 53 year old man with known coronary artery disease was admitted with unstable angina. This failed to respond to isosorbide dinitrate infusion and nifedipine, and a continuous heparin infusion (30,000 units per 24 hours) was started. Three days later he developed pain in the left groin and hip, difficulty in extending the left leg, and numbness over the anterior thigh. Examination showed a fixed flexion deformity of the left hip, with severe limitation of hip extension due to pain. The left knee jerk was absent, and diminished sensation over the left anterior thigh was confirmed. A computed tomography scan of the abdomen showed a large fluid collection, presumably a haematoma, in the left psoas and iliacus muscle measuring 10 × 6 cm (Figure 1). This was compressing the left femoral nerve, producing a femoral neuropathy. The heparin infusion was stopped, and the neurological deficit resolved after 3 weeks' intensive physiotherapy. A repeat computed tomography scan showed complete resolution of the haematoma.

Figure 1 CT scan of abdomen (Case 2).

Occult haemorrhage into the iliopsoas or gluteal muscle has been reported previously following heparin therapy.^{2,3} In both situations, acute compartment syndrome complications such as tissue necrosis, nerve damage and vascular ischaemia may occur, and may often be the presenting feature of the haematoma. Ultrasound or computed tomography scanning is invaluable in diagnosis, and, as in Case 2, serial scans may show complete resolution.

In neither case reported above was there an intramuscular injection, or other local trauma, to precipitate the bleeding. Perhaps the concurrent use of vasodilator therapy produces local vascular changes which predispose to prolonged intramuscular bleeding. The potential benefit from heparin therapy in unstable angina has to be balanced against the increased risk of this and other bleeding complications.

Stephen R.D. Johnston
Hugh M. Mather
Ealing General Hospital,
Uxbridge Road, Southall,
Middlesex UB1 3HW, UK.

References

1. Gillanders, I.A., Nakielnny, R. & Channer, K.S. Spontaneous iliopsoas haemorrhage – an unusual complication of streptokinase therapy. *Postgrad Med J* 1990, **66**: 862–863.
2. Al-Zamil, A. & Christenson, J.T. Psoas muscle haematoma – an acute compartment syndrome. *Vasa* 1988, **17**: 141–143.
3. Evanski, P.M. & Waugh, T.R. Gluteal compartment syndrome: case report. *J Trauma* 1977, **17**: 323.

Venepuncture for calcium assays: should we still avoid tourniquet?

Sir,

Dr McMullan and colleagues¹ have demonstrated convincingly that the application of a standard tourniquet for up to 10 minutes caused an increase in serum proteins and total calcium, but that calcium adjusted for albumin² did not change.

We should, however, like to sound a note of caution. Individuals may show significant differences between the slopes of their regression lines of serum calcium on albumin if the venous occlusion is accompanied by forearm exercise,^{3,4} when adjustment of calcium for albumin may be inaccurate. The probable reason is that there is a variable production of lactic acid and lowering of pH within as short a period as one minute of occlusion with fist-clenching^{5,6} and this causes variable dissociation of protein-bound calcium which is lost with plasma water through the capillary wall by ultrafiltration.⁴

Thus, although a tourniquet can be used if the total calcium is adjusted for albumin, it is imperative to avoid forearm exercise.

B.E. Walker

R.B. Payne

Departments of Medicine and
Chemical Pathology,
St. James's University Hospital,
Leeds LS9 7TF, UK

References

1. McMullan, A.D., Burns, J. & Paterson, C.R. Venepuncture for calcium assays: should we still avoid tourniquet? *Postgrad Med J* 1990, **66**: 547–548.
2. Butler, S.J., Payne, R.B., Gunn, I.R., Burns, J. & Paterson, C.R. Correlation between serum ionised calcium and serum albumin concentrations in two hospital populations. *Br Med J* 1984, **289**: 948–950.
3. Pain, R.W., Rowland, K.M., Phillips, P.J. & Duncan, B.McL. Current 'corrected' calcium concept challenged. *Br Med J* 1975, **4**: 617–619.
4. Walker, B.E. & Payne, R.B. Adjusted calcium concept resolved? Differing effects on plasma total calcium of changes in plasma albumin after venous stasis or myocardial infarction. *J Clin Pathol* 1979, **32**: 488–491.
5. van Leeuwen, A.M., Thomasse, C.M. & Kapteyn, P.C. The determination of protein-bound calcium and magnesium by ultrafiltration-in-vivo. *Clin Chim Acta* 1961, **6**: 550–565.
6. Braybrooke, J., Lloyd, B., Natrass, M. & Alberti, K.G.M.M. Blood sampling techniques for lactate and pyruvate estimation: a reappraisal. *Ann Clin Biochem* 1975, **12**: 252–254.