Use of small amounts of ultrasound guided air for injections

The existence and detection of air in various tissues is of great importance, whether the air has emanated by a disease mechanism (for example, intra-abdominal in gastric lesions, extrapulmonary in thoracic lesions) or been applied as a diagnostic tool. The detection of the air in a diagnostic test may be performed by such different methods as stethoscopy (epidurally in the whoosh test), or radiography (intra-articularly in arthrography).

In ultrasonography the injection of ultrasound contrast agents containing air may increase the diagnostic confidence in the intravascular domain.

Atmospheric air, which is much cheaper, may be safely injected in small quantities for diagnostic purposes in extravascular domains—for example, joints, and in our experience also in bursae and tendon sheaths, which all have cavities that can be visualised in this way.

In addition to the standard ultrasonic verification of correct needle placement, it is possible to monitor and verify the actual injection of the substance by adding a small amount (0.5–1 ml) of air. Figure 1 shows the inflamed tendon sheath of a patient with rheumatoid arthritis. Before injection of cortisone the correct position of the needle is verified as well as the correct placement of the substances injected through this needle. The air is readily discernible on the screen (fig 2A-D), and the flow of the air in both proximal and distal direction along the tendon can be visualised. The procedure can be performed in an outpatient clinic with the aid of an assistant.

We do not propose that all injections should be carried out under the guidance of ultrasound, however, during training of the therapists or in scientific studies the placement of the injection may be assured in this way.

H BLIDDAL
Professor of Rheumatology, Parker Institute, Frederiksberg Hospital, DK-2000 Denmark

S TORP-PEDERSEN
Chief of Laboratory of Ultrasonography, KAS Gentofte, DK-2900 Hellerup, Denmark

henning.bliddal@fh.hosp.dk

Figure 1 Thickened tendon sheath before injection. Longitudinal section of the palmar side of the fifth finger. In the top of the image the skin (S) is seen as an isoechoic band with varying thickness. The subcutaneous tissue (SC) is seen as a slightly more hypoechoic band below the skin. The thickened and irregular tendon sheath (TS) is seen both above and below the tendon (T). The proximal phalanx is indicated by long vertical arrows and the metacarpal bone is indicated by short vertical arrows. Local anaesthesia (LA) is applied and is seen as an expanding fluid collection indicated by the oblique arrow.

Figure 2 Ultrasound guided injection. (A) The needle has been inserted and is indicated by arrows. The leftmost arrow points at the needle tip. Small amounts of air are seen escaping the needle tip (short arrows), spreading out in the cleavage between the tendon and the thickened tendon sheath. TS = thickened tendon sheath; T = tendon; NT = needle tip; PP = proximal phalanx; MC = metacarpal bone. (B) and (C) An expanding fluid collection is seen in the cleavage between tendon and tendon sheath. (D) The bolus of the injection is seen as a hyperechogenic mass between the tendon and the tendon sheath.
Steroid psychosis after an intra-articular injection

Intra-articular steroid injections are a well recognised treatment for rheumatoid arthritis and osteoarthritis with an inflammatory component. It is also clear that the effects of intra-articular steroid treatment are not confined to the joint injected. Steroid is absorbed, inducing improvement in the indices of general inflammation and a clinical and thermographic improvement in other joints. Peak serum steroid levels occur from two to 12 hours after injection, and the drug is completely cleared within three to five days. Peak serum steroid levels are suppressed by 64–81% at 24 hours after injection, with most patients values returning to normal by one week. 

depo-medrone (methylprednisolone acetate) 40 mg is sufficient to induce maximum suppression. Many complications are known to arise after systemic steroid administration, but we are not aware of any reports of an acute psychosis after a single intra-articular steroid injection in a previously normal person with no past psychiatric history.

A 75 year old woman presented with osteoarthritis of her left hip. Past medical history showed mitral stenosis, atrial fibrillation and ischaemic heart disease. She had no history of psychiatric illness or dementia. Drug treatment included furosemide (frusemide), digoxin, nifedipine, and warfarin, which she omitted for four days before the injection. The hip was injected with 80 mg depot-medrone and 10 ml 0.5% marcur in x-ray control with local anaesthesia. Urographin contrast was used to ensure correct needle placement and corticosteroid levels were given. As the patient required further treatment with warfarin she was kept in hospital. Thirty six hours after the injection she developed para-axial delusions, visual and auditory hallucinations. There was no evidence of infection, with a normal chest x-ray and clear midstream urine.

Urea and electrolytes, glucose, a full blood count, and calcium were normal. The patient required sedating with stelazine owing to severe agitation, and the psychosis persisted for three days, then resolved, and the patient was discharged. At a week follow up a mini-mental state examination was performed, which showed no underlying abnor- mality.

A previous case has been reported of a 41 year old patient with rheumatoid arthritis who became elated, disoriented, and emotionally labile after intra-articular injections of 40 mg methylprednisolone into both shoulders, but this patient had already developed an acute undiagnosed confusional state after being treated with prednisolone 2.5 mg three times a day for 12 days only two weeks previously.

In a multicentre prospective study, psychiatric symptoms have been recorded in 1.3% of subjects receiving less than 40 mg/d prednisolone, in 4.6% of those receiving 41–80 mg/d, and in 14.8% of those receiving more than 80 mg/d. However, a lack of a past psychiatric history or pre-existing psychotropic complications as symptoms only occur in 11% with a known psychiatric history. Methylprednisolone (80 mg) injected into an osteoarthritic knee joint has been shown to lead to a mean peak plasma concentration of 169 ng/ml at eight hours after injection. After a 20 mg oral dose of prednisolone a peak plasma concentration at two hours of 220 ng/ml has been shown. As the equivalent dose of methylprednisolone is 40 mg, that of prednisolone (and prednisone) is 4 to 5 respectively these represent comparable levels.

It may be expected that a more rapid absorption of methylprednisolone would occur in patients with rheumatoid arthritis rather than osteoarthritis owing to the hyper- trophied and inflamed synovium. However, the rate or extent of absorption is not signifi- cantly different, and therefore patients with rheumatoid arthritis or osteoarthritis are equally likely to have systemic effects. If two joints are injected with 80 mg depot-medrone then the mean maximum serum concentra- tion is almost six times greater than if only one joint is injected.

Intra-articular injections are commonly given to outpatients and inpatients by all grades of medical staff. Many potential prob- lems may arise and it should be recognised that these may be induced by a single intra-articular dose.

D E ROBINSON
E HARRISON-HANSLEY
R F SPENCER
Department of Orthopaedic Surgery,
Wessex General Hospital, Stonehouse,
Wessex-super-Mare BS23 4TQ, UK

Correspondence to: Mr Derek Robinson, Department of Orthopaedics, Southmead Hospital, Westbury on Trym, Bristol BS10 5NB, UK


Familial macrophagic myofasciitis

Macrophagic myofascitis is an emerging entity that was first reported in the Lancet in August 1998. Between May 1993 and 1999 more than 50 cases have been described in France.1 We report the first familial case of macrophagic myofascitis.

A 45 year old woman was first admitted to hospital in July 1997 for pain and swelling of the right foot lasting for few months. Muscle biopsy of the calf was performed. In February 1999, diffuse myalgia appeared. Clinical examination was normal as were the laboratory and the second electromyography findings. However, a third muscle biopsy of the deltoid was performed showing diffuse infiltration of the subcutaneous tissue, epimysium, perimysium, and perifascicular endomyosium by sheets of non-epitheloid PAS-positive cells of macrophage lineage typical of macrophagic myofascitis (fig 1A).

In February 1999 her 11 year old son was referred to our institution for mild chronic myalgias and asthenia of two years’ duration. Clinical examination was normal as were laboratory findings (including CK, aldolase, and electromyography). Nevertheless, in view of the mother’s disease and despite the absence of objective signs, a left deltoid muscle biopsy was carried out. The findings were characteristic of macrophagic myofascitis (fig 1B).

Our two cases of macrophagic myofascitis underline the pitfalls of this diagnosis, especially the influence of the biopsy site for the demonstration of its typical pathological features. Owing to the rarity of macrophagic myofascitis, the occurrence of the disease in the mother and her son is unlikely to be coincidental, and therefore probably reflects either a common genetic predisposition or the presence of the causative agent in the environment, or both. Of note is the fact that onset of clinical
manifestations leading to the diagnosis of macrophagic myofasciitis occurred 24 and 18 months after immunisation against hepatitis B virus (HBV) (Genevac B, Pasteurs vaccins, Lyon, France and Engerix B, Smithkline Beecham, Nanterre, France) in mother and son, respectively. Additionally, both patients were vaccinated in the same side as the positive muscle biopsy (that is, the left deltoïd) and a prior biopsy of the right deltoïd of the mother was negative.

The putative role of the aluminic component of several vaccines—namely, those against HBV, has been recently suggested.1 If confirmed, this hypothesis should also consider the potential influence of the genetic background, as millions of French people have been recently immunised against HBV, whereas only a few dozen cases of macrophagic myofasciitis have been diagnosed. However, the possible role of currently unidentified environmental factors cannot be ruled out, given that macrophagic myofasciitis occurred concomitantly in our familial case report.

ZAHIR AMOURA
NATHALIE COSTEDOAT
THIERRY MAISONOBE
PIERRE GODEAU
JEAN-CHARLES PIETTE
Services de Médecine Interne et de Neuropathologie,
Hôpital Pitié-Salpêtrière,
47–83 Bd de l’hôpital,
75013 Paris, France

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H BLIDDAL and S TORP-PEDERSEN

Ann Rheum Dis 2000 59: 926
doi: 10.1136/ard.59.11.926

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