Case Report

Direct Sodium Hypochlorite Injection in the Forearm Resulting in Radial Nerve Palsy

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INTRODUCTION

Accidental acute exposure to sodium hypochlorite solutions produces a wide spectrum of clinical manifestations [1–6]. However, peripheral mononeuropathy has not been reported. We describe the case of a 14-year-old girl who experienced radial nerve palsy as a result of direct injection of bleach in a suicide attempt. Magnetic resonance imaging (MRI) demonstrated two muscle lesions and disappearance of fat planes around the superficial and deep branches of the radial nerve. The patient’s clinical outcome was favourable, with recovery of radial nerve function. MRI was useful for determining the morphology and extent of the caustic injury.

CASE REPORT

A 14-year-old girl with depression and anorexic–bulimia disorder was brought to the emergency department of our institution because of left upper limb pain, inflammation and functional incapacity after bleach injection into the left forearm in a suicide attempt. Physical examination showed left forearm paresis, elbow in flexion, oedema and increased local heat in the dorsal forearm and hand. The remaining neurological examination was normal. Laboratory results revealed normal erythrocyte sedimentation rate, C-reactive protein levels, haematology and blood chemistry profile. MRI (Magnetom 1.0 T, Siemens; Erlangen, Germany) of the forearm was performed 1 day later and included spin-echo (SE) T1-weighted [600/15 repetition/echo time (TR/TE)] axial and coronal images without and with intravenous gadolinium-DTPA injection (Schering AG; Berlin, Germany), SE proton-density-weighted [2120/20 (TR/TE)] and SE T2-weighted [2120/70 (TR/TE)] axial images, and GE Flash two-dimensional T2-weighted [336/13/30 (TR/TE/angle)] coronal images. MRI demonstrated an anomalous signal with a maximum diameter of 40 mm located in the middle of the extensor carpi radialis muscle, and an 8-mm anomalous signal in the supinator muscle surrounding the radial head and neck. These foci were isointense to muscle parenchyma on SE T1 images (Fig. 1) and hyperintense on SE T2, with uptake of gadolinium at the perimeter of the lesion and absence of uptake in the central region on T1-weighted images (Fig. 2). On the basis of these findings, focal necrosis secondary to exposure to a caustic agent was suggested, despite the absence of histological confirmation. We also noted the disappearance of fat planes around the superficial (Fig. 3) and deep (Fig. 4) branches of the radial nerve, which run near the extensor carpi radialis and supinator (Frohse’s arcade) muscles, respectively. No bone abnormalities were observed. Nerve conduction studies showed alteration of the radial compound muscle action potential (CMAP) and sensory nerve action potential (SNAP). MRI findings demonstrated a mild degree of injury. Conservative therapy with antibiotics and anti-inflammatory drugs was decided. Clinical evolution was favourable, with marked functional improvement 2 weeks after the episode. The patient refused a second MRI and electromyography.

DISCUSSION

The reported toxic effects of sodium hypochlorite have resulted mainly from accidental ingestion at home, inhalation or contact with the skin or eyes [1]. In medicine, sodium hypochlorite solutions are frequently used in endodontic therapy for sterilization and debridement of root canals. The few reports of associated complications describe local pain, oedema, facial haematoma, ulceration and mucosal necrosis [2,3], rarely affecting the maxillary sinus [4]. The toxic effect of sodium hypochlorite solution can be included in the complications affecting intravenous drug abusers, as they use this agent to disinfect syringes [5]. The severity of the reaction, which may even result in death [6], depends on the concentration of the solution, its...
pH, the duration of administration and the anatomic area involved.

The toxic action of sodium hypochlorite in muscle tissue has not been specifically reported, but it is likely to be similar to that produced in the mucosa and other soft tissues, with oedema and haematoma that can progress to ulceration and necrosis [2,3]. In the case presented, MRI depicted some of these features and was also useful for determining the morphology and extent of the injury. MRI findings showed a central cavity devoid of contrast uptake that was probably necrotic, and a thick enhancing rim corresponding to peripheral inflammation, secondary to direct injection of sodium hypochlorite in the forearm. Similar MRI findings can be encountered in a variety of conditions. The short time interval between injection and MRI evaluation, the absence of sepsis, normal C-reactive protein levels and the inherent sterilization power of sodium hypochlorite were factors against the possibility of a pyogenic muscle abscess [7]. Other aetiologies such as tumours, focal myositis [8] or diabetic muscle infarction [9–11] were excluded on the basis of the traumatic background and clinical outcome. Biopsy was rejected for ethical reasons.

MRI was also particularly useful for indicating the course of both branches of the radial nerve and their relationship with the damaged zone. The second area of injury in the supinator muscle, which was smaller and deeper than the primary location, affected the deep (motor) branch of the radial nerve. This information was available because of the high contrast resolution of the MRI study. MRI has also been used to evaluate the distribution of non-toxic substances injected in soft tissues, such as anesthetic drug in nerve blocks in the inferior alveolar nerve [12] and in the obturator nerve [13,14]. With an appropriate choice of technique, the contrast between muscle, fat and bone are unambiguous [15]. All the MRI findings in the present case were perfectly consistent with the physical neurologic examination and electromyography findings. In a review of the international literature, we were unable to find a description of a case similar to ours, reporting MRI muscle

Fig. 1 – Coronal T1-weighted MR image does not show injured area because of its isointensity with normal muscle.

Fig. 2 – After administration of Gd-DTPA, MR image in the same T1-weighted coronal plane shows a thick rim of severe enhancement with a necrotic central zone in the extensor carpi radialis longus muscle (arrows).

Fig. 3 – Axial proton-density-weighted MR image shows an area of high signal intensity in the extensor carpi radialis longus muscle (asterisk) that extends to the course of the superficial branch of the radial nerve (arrows).

Fig. 4 – Axial proton-density-weighted MR image in another area displays high signal intensities in the supinator muscle, affecting the course of the deep branch of the radial nerve (arrows).
injury changes secondary to direct injection of sodium hypochlorite or any other caustic fluid.

REFERENCES


