Acta Neurol. Belg., 2010, **110**, 97-99

Iatrogenic selective lesion of the median nerve at the elbow

Roberto Di Fabio[1], Carlo Casali[1] and Francesco Pierelli[1,2]

[1]Department of Neurology and ORL, "Sapienza" University of Rome – Polo Pontino Latina, Italy; [2]Neurological Unit, IRCCS-Neuromed, Pozzilli, Italy

Abstract

A lesion of the median nerve may occur as a consequence of a compression by a haematoma or for a direct damage of the axons caused by a needle insertion. To date, no investigation reported a very selective lesion of the median nerve at the elbow, with the suffering limited only to the fibres for the first digit.

A 53 year-old left-handed violinist underwent an arterial blood gas drawing. The patient complained immediately of an electrical shock impression going down the arm, followed by pin sensation into the first finger. A tingling sensation associated with numbness in the first fingertip and difficulty in the index-thumb pinch became progressively evident. The ENG-EMG findings showed an impairment mainly of the sensory fibres innervating the first digit and a drop of the motor action potential amplitude when the nerve was stimulated at the elbow.

We reported a very partial lesion of the left median nerve at the elbow in a violinist who had a selective involvement of the fibres for his first digit. Even minimal lesions of the median nerve may impair severely the quality of life of patients.

Key words : Axonal damage; elbow; first digit; iatrogenic partial lesion; median nerve.

Introduction

Vein or artery punctures are minimally invasive procedures commonly used for blood samples drawing.

Involuntary nerve punctures and nerve compression injuries may cause peripheral damages especially as a complication of a coronary arteriography (Kennedy *et al*., 1997; Kent *et al*., 1994; Luce *et al*., 1976; Macon *et al*., 1973; Stitik *et al*., 2001).

Nicking a nerve by a needle may provoke an immediate pain. An injury may also originate from an exogenous fluid injection or by a compression from a haematoma in the subcutaneous tissues, both conditions causing usually a delayed numbness in the affected area (Cartwright *et al*., 2005; Komiyama, 2007).

We described a case of a partial median nerve lesion at the elbow caused by unsuccessful attempts of an arterial puncture.

Despite the number of malpractice cases involving punctures in the arms is increasing, medical literature provide little information on needle-related nerve injuries.

Case report

A 53 year-old left-handed violinist underwent an arterial blood gas drawing. After several attempts at finding the radial artery, the doctor approached the left brachial artery, without any result. During a further attempt, the patient complained immediately of an electrical shock impression going down the arm, followed by a pin sensation into the first finger.

After two weeks, a tingling sensation associated with numbness in the first fingertip and difficulty in the index-thumb pinch became evident.

The MR of the elbow did not show any haematoma or pseudo-aneurism.

Approximately three weeks after the injury, the orthodromic conduction study of the left median nerve showed an evident reduction of the sensitive potential amplitude, stimulating the first finger with ring electrodes. The sensitive action potentials obtained from the second and the third finger stimulation were in the normal range (Fig. 1a). The compound motor action potential which originated from the stimulus of the median nerve at the elbow was smaller than the compound motor action potential obtained from the stimulation at the wrist (-33%) (Fig. 1b). The conduction studies of the left ulnar and radial nerves were normal.

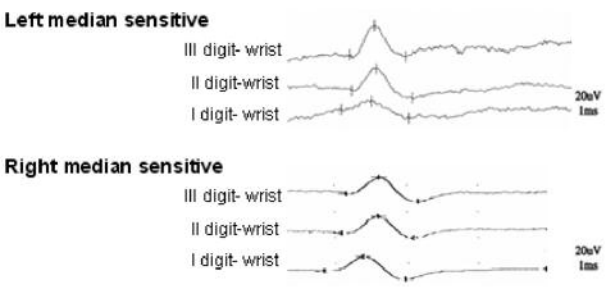

FIG. 1. — Sensitive orthodromic conductions of median nerve

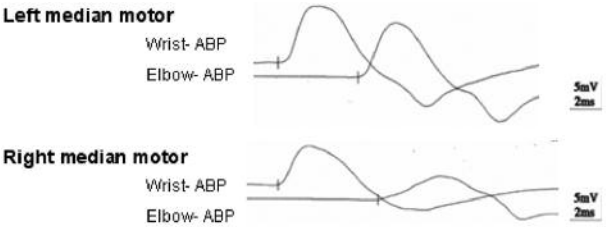

FIG. 2. — Motor conduction study of the median nerve

Table 1

Sensory and motor conduction parameters of the right and left median nerve

Sensory	Right				Left			
	Latency *msec* *range 1.8-3.7 (I digit: 1.6-3.1)* *mean 2.1 ± 0.5*	Amplitude *mV* *range 6.1-26.6* *mean 12.5 ± 3.9*	Conduction Velocity *m/sec* *range 52-60* *mean 53 ± 3*	*Amplitude reduction % *range 0-17* *mean 4 ± 2*	Latency *ms* *range 1.8-3.8 (I digit: 1.6-2.9)* *mean 2.1 ± 0.6*	Amplitude *mV* *range 5.7-27.6* *mean 12.8 ± 4.2*	Conduction Velocity *m/sec* *range 52-61* *mean 54 ± 3*	*Amplitude reduction % *range 0-19* *mean 4 ± 4*
III digit-wrist	1.92	16.0	54.7		1.93	15.1	55.3	
II digit-wrist	1.96	13.0	53.6		1.96	15.2	55.3	
I digit-wrist	1.73	6.5	46.2		1.71	14.4	52.1	
Motor								
Wrist-ABP	3.6	8.8			3.6	10.4		
Elbow ABP	9.0	5.9	44.4	-33	8.3	10.2	50.5	0

* Amplitude reduction of the compound motor potential in the distal-proximal stimulation.
ABP = abductor brevis pollicis.
In brackets = normative values according to a sample of 100 subjects.

On EMG of the left abductor pollicis brevis and opponens pollicis there was increased needle insertion activity and decreased recruitment of motor units. No spontaneous activity was noted. Flexor digitorum profundus, flexor pollicis longus, flexor carpi radialis and pronator teres were normal.

After four months, the patient was still complaining of the same needle sensation and numbness in the thumb, notwithstanding a therapy with pregabalin (150 mg per day) had been initiated (Table 1). A severe dexterity limitation in playing the violin was reported.

Discussion

Median nerve damage is a non-common complication of venous or arterial catheterisation.

The most documented cause is represented by a forearm haematoma, which may exert a nerve compression, by vasa nervorum focal ischemia (Patten, 1969).

The antecubital haematoma of right brachial artery is a typical consequence of coronary arteriography, especially in those patients who take anticoagulants (Luce *et al*., 1976; Macon *et al*., 1973).

Kennedy *et al*., 1997 reported an incidence of median nerve lesions caused mainly by a haematoma compression up to 1.4% in 350 procedures performed, even if a previous oral anticoagulant therapy had not been received.

In another old study involving 139 very low birth weight infants at 18 months post-term, 9% showed signs of unilateral persistent median nerve damage, and 4% revealed a bilateral median nerve injury (Pape *et al*., 1978).

Pseudo-aneurysm and fibrous scars may cause similar clinical pictures, by inducing a compression of the nerve (Cartwright *et al*., 2005; Kent *et al*., 1994; Marquardt *et al*., 2001; Wescott *et al*., 1972).

A damage may result from a direct axonal infiltration when an intravenous therapy is attempted. Furthermore, arterial thrombosis may provoke nerve ischemia (Kennedy *et al*., 1997).

The impairment due to median nerve lesions accounts for a wide rage of clinical pictures, depending on the degree of the nerve suffering. An impairment caused only by sensitive symptoms has been described (Kennedy *et al*., 1997; Kent *et al*., 1994). Numbness and pin-and needle sensation in the first three fingers and in the median side of the fourth digit, however, may be variably associated with weakness of the flexor pollicis longus, flexor digitorum profundus, abductor pollicis brevis and opponens pollicis. When the patient with a severe median nerve palsy tries to make a fist, the incapacity of pinching the thumb and the index produces the so-called "orator's hand posture".

On a clinical ground, an immediate pain is associated with direct lesions of the nerve, while delayed symptoms are more frequently caused by exogenous compressions. Since the symptoms duration and the functional outcome over time depend mainly on the degree of the axonal damage, the familiarity with the clinical pictures is crucial to prevent complications and to guide the following therapeutic interventions, such as blood or fluid evacuation, fasciotomy, compressive bandages, early physiotherapy.

In our case, we found a reduction of SAP amplitude of the left median nerve when the first finger was stimulated, a decreasing of CMAP amplitude in the proximal-distal stimulation and weak signs of axonal damage, consisting in increased activity at needle insertion, in the left abductor pollicis brevis and the opponens pollicis. As three weeks had passed from the injury, and no fibrillation was clearly evident in muscles, we speculated that a myelinic more than an axonal damage occurred and that very few axons have been involved in the puncture, as suggested by the increased activity at needle insertion in two muscles.

Partial lesions of the median nerve have been described previously (Kennedy *et al*., 1997; Kent *et al*., 1994), but no investigation had showed an involvement of the axons directed only to one finger, thus broadening the clinical spectrum of the iatrogenic injuries.

We showed that even a very selective lesion, caused by a direct damage of a few of fibres, may provoke a severe functional impairment of the hand dexterity.

The precise knowledge of the peripheral nerves anatomy, avoiding punctures in the dominant arm and the careful monitoring of symptoms may reduce the potential risk of functional injuries and prevent legal troubles.

REFERENCES

Cartwright MS, Donofrio PD, Ybema KD, Walker FO. Detection of a brachial artery pseudoaneurysm using ultrasonography and EMG. Neurology. 2005; 65:649.

Luce EA, Futrell JW, Wilgis EF, Hoopes JE. Compression neuropathy following brachial arterial puncture in anticoagulated patients. J Trauma. 1976;16:717.

Kennedy AM, Grocott M, Schwartz MS, Modarres H, Scott M. *et al.* Median nerve injury: an underrecognised complication of brachial artery cardiac catheterisation? J Neurol Neuros Psych. 1997;97: 542-546.

Kent KC, Moscucci M, Gallagher S, Dimattia ST, Skillman JJ. Neuropathy after cardiac catheterization: incidence, clinical patterns, long term outcome. J Vasc Surg. 1994;19:1008-1014.

Komiyama Y. Phlebotomy-related complications. Introduction. Rinsho Byori. 2007;55:237-40.

Macon WL, Futrell JW. Median nerve neuropathy after percutaneous puncture of the brachial artery in patients receiving anticoagulants. N. Engl. J. Med. 1973;288:1396.

Marquardt G, Angles SM, Leheta FD, Seifert V. Median nerve compression caused by a venous aneurysm. J. Neurosurg. 2001;94:624-626.

Pape KE, Armstrong DL, Fitzhardinge PM. Peripheral median nerve damage secondary to brachial arterial blood gas sampling. J. Pediatr. 1978;93:852-856.

Patten BM. Neuropathy induced by haemorrhage. Arch Neurol. 1969, 21:381-386.

Stitik TP, Foye PM, Nadler SF, Brachman GO. Phlebotomy-related lateral antebrachial cutaneous nerve injury. Am J Phys Med Rehabil. 2001;80:230-4.

Wescott J, Taylor P. Transaxillary, selective four vessel arteriography. Radiology. 1972;104:277-281.

Dr. Roberto Di Fabio,
Department of Neurology and ORL,
"Sapienza" University of Rome –
Polo Pontino- ICOT,
via Franco Faggiana 34,
04100 Latina (Italia).
E-mail: rob.dif@tiscali.it