Isolated musculocutaneous nerve injury in a kickboxer

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INTRODUCTION

The musculocutaneous nerve (MCN) derives from the brachial plexus lateral cord, then pierces the coracobrachialis (CB) muscle and courses between the brachialis and biceps brachii (BB) muscles supplying innervation to these three muscles. The terminal MCN is the lateral antebrachial cutaneous nerve (LABCN), which innervates the forearm lateral aspect. Isolated MCN damage has been reported very rarely and in association with vigorous exercise and sport activities, but the exact site of lesion has never been demonstrated.

CASE REPORT

A 37-year-old amateur kickboxer reported painless weakness of right elbow flexion after a match. He did not recall any punch or kick on the right axilla or arm. He did neither hear or feel a 'pop' nor notice a bulge or swelling in the arm. His previous clinical history was unremarkable. He was sent for evaluation two months after the onset of symptoms. Examination showed marked weakness of right BB, reduced BB reflex, smaller circumference of the right arm with no tenderness, and reduced sensation in the lateral forearm.

Nerve conduction study (NCS) documented reduced compound muscle action potential (cMAP) amplitude in the right MCN with an 80% conduction block between the axilla and the proximal arm and reduced sensory action potential of the right LABCN (Figure 1A). Needle electromyography (EMG) showed active denervation in the BB muscle. NCS and EMG were normal elsewhere, including other limbs. Ultrasound (US) documented enlarged right MCN for approx 3 cm after it pierced and exited the CB muscle and signs of denervation and atrophy in the BB and brachialis muscles (Figure 1B-D).
Normal lumbar puncture, cervical magnetic resonance imaging, antisulfatide/antiganglioside antibodies, NCS and needle EMG ruled out myelopathy, nerve root compression, Parsonage Turner's syndrome, or peripheral polyneuropathy. Four months later, BB strength improved, NCS documented partial recovery of cMAP \amplitude and needle EMG showed initial signs of BB reinnervation.

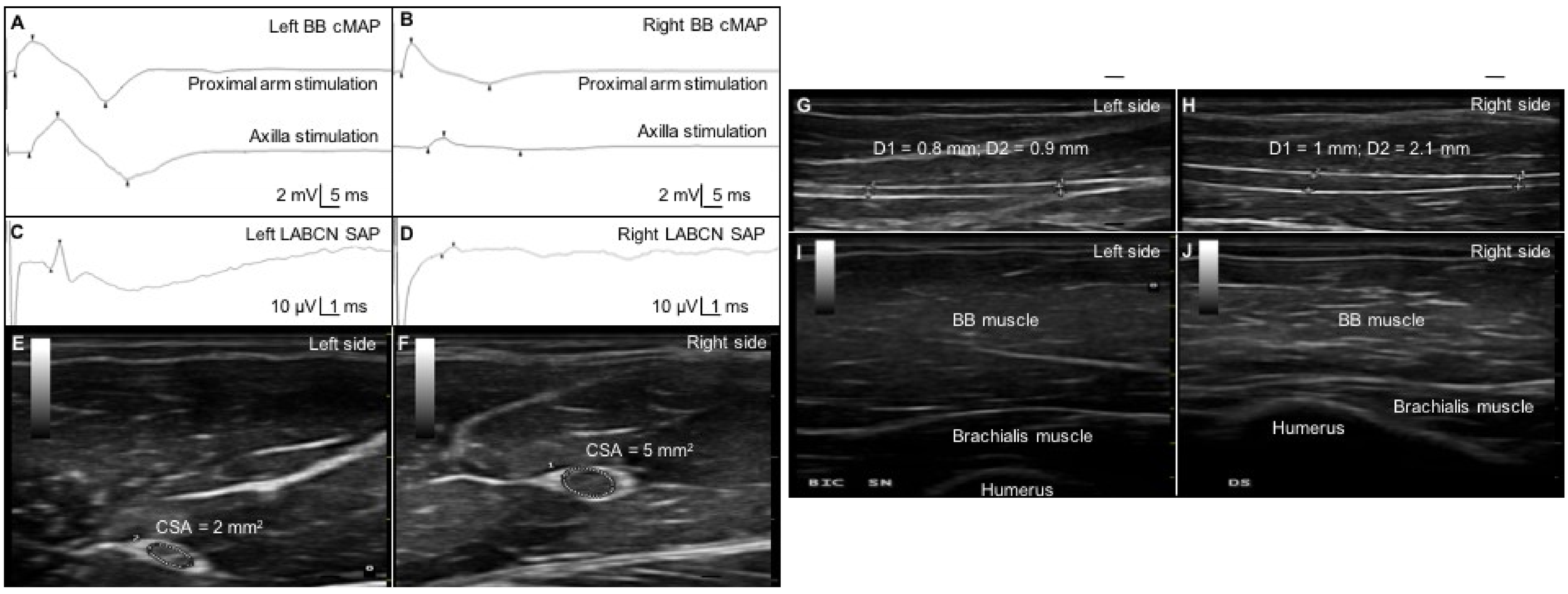

Figure 1. A, B. Compound muscle action potential (cMAP) in the biceps brachii (BB) muscle to stimulation of the musculocutaneous nerve (MCN) at the proximal arm and the axilla. Right BB cMAP was consistently reduced (6.2 mV) in comparison to the contralateral one (10.4 mV) and an 80% conduction block was found between the axilla and the proximal arm in the former. C, D. Sensory action potential (SAP) of the lateral antebrachial cutaneous nerve (LABCN). The right LABCN SAP was consistently smaller (8.4 µV) than the contralateral one (26.7 µV). E, F. Axial ultrasound (US) view of the MCN after it pierced the coracobrachialis (CB) muscle. The cross sectional area (CSA) of the right MCN was more than twice (5 mm²) that on the left side (2 mm²). G, H. Longitudinal US view of the MCN. After it pierced the CB muscle, the right MCN showed an approx 3 cm enlargement, where the nerve diameter was more than twice (2.1 mm, panel G) that on the contralateral side (0.9 mm, panel H). I, J. Signs of denervation and atrophy in the muscles innervated by the MCN. The size of the brachialis and BB muscles was reduced on the right side (2-2.5 cm) in comparison to the left side (3-3.5 cm) and their appearance was more hyperechoic as a result of denervation and atrophy changes secondary to MCN damage. Please note that the CB muscle was normal, because its motor branches leave the MCN at the axilla, before the site of nerve lesion.

DISCUSSION

The present case offer new information on isolated MCN injuries after exercise, because US demonstrated the site of nerve damage. The MCN is fixed and protected until it pierces the CB muscle, then courses loosely between the BB and the brachialis muscles. When the nerve passes through the deep fascia underlying the median cephalic vein to emerge on the lateral side of the biceps aponeurosis as the LABCN it is again fixed. In our patients, US showed MCN enlargement in the loose tract after it exited the CB muscle. We hypothesize that, in this site, MCN might be prone to traction injuries and/or disruption of blood supply because of BB vigorous contractions during the control of elbow extension, a motor activity that is shared by throwing, lifting, or punching, as in the present case. The maximal forces in kickboxers are smaller than those involved in ball throwing or baseball pitching, and we speculate that repeated punching, and weight-lifting during preparation for the match, might have contributed to nerve damage in our case. Anatomical variants were ruled out by US and polyneuropathy by the thorough diagnostic workup. MCN damage extends the range of traumatic lesions that kickboxers may undergo.

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