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Isolated Musculocutaneous Nerve Injury in a Professional Baseball Player: A Case Report

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Learning Point of the Article:

Since the neuroparalysis was incomplete and began to recover within a few days, the pathology of this isolated Musculocutaneous nerve Injury was considered incomplete axonotmesis, which was successfully treated conservatively.

Abstract

Introduction: Musculocutaneous nerve lesion in a throwing athlete is a rare condition. We report the case of a professional baseball pitcher with an isolated musculocutaneous nerve lesion that occurred during a pitching motion.

Case Presentation: The patient had radiating pain in the upper arm and weakness of elbow flexion. Physical examination revealed flaccid paralysis of the biceps brachii muscle and paresthesia in the right lateral forearm. Musculocutaneous nerve injury was suspected. Because some signs of recovery were observed within a few days, the patient received non-operative management. Nerve conduction studies at 2 weeks after the injury showed low-amplitude compound muscle action potential of the right biceps brachii muscle by stimulation of the musculocutaneous nerve. Needle electromyography showed markedly reduced motor unit potential recruitment in the biceps brachii muscle. He was diagnosed as having isolated musculocutaneous nerve injury. At 2 months after the injury, the muscle contraction and strength of the biceps brachii muscle improved. At 7 months after the injury, muscle weakness was fully recovered. His pitching ability returned to that of a competitive player.

Conclusion: Because the neuroparalysis was incomplete and began to recover within a few days, we considered the pathology of this injury to be incomplete axonotmesis, which was successfully treated conservatively.

Keywords: Isolated musculocutaneous nerve injury, baseball pitcher, axonotmesis.

Introduction

The musculocutaneous nerve branches from the lateral cord of the brachial plexus and then pierces the coracobrachialis muscle and runs between the brachialis and biceps brachii muscles [1]. The terminal branch of the musculocutaneous nerve is the lateral antebrachial cutaneous nerve (LACN), which innervates the sensation of the lateral forearm [2]. Isolated musculocutaneous nerve lesions are rare [3]. Typical complaints include painless weakness during elbow flexion and numbness or paresthesias in the distal lateral forearm [3]. We report the case of a 31-year-old professional baseball pitcher with an isolated musculocutaneous nerve injury that occurred during a pitching motion.

Case Presentation

A 31-year-old right-handed professional baseball pitcher felt a radiating pain from the upper arm to his fingertips while throwing at a preseason game. He could not continue throwing because of the pain and visited our hospital. He also felt weakness during elbow flexion. On physical examination, flaccid paralysis of the right biceps brachii muscle (Fig. 1) and paresthesia in the right lateral forearm were observed. Manual tests for a cervical spinal nerve root lesion, such as Jackson's and Spurling's tests, were negative. Deep tendon reflex tests showed no abnormality. Tinel's sign was elicited at the middle portion of the upper arm. Magnetic resonance imaging (MRI) showed no

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Author's Photo Gallery

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Figure 1: The appearance of the patient at the first visit. On physical examination, flaccid paralysis of the right biceps brachii muscle was observed.

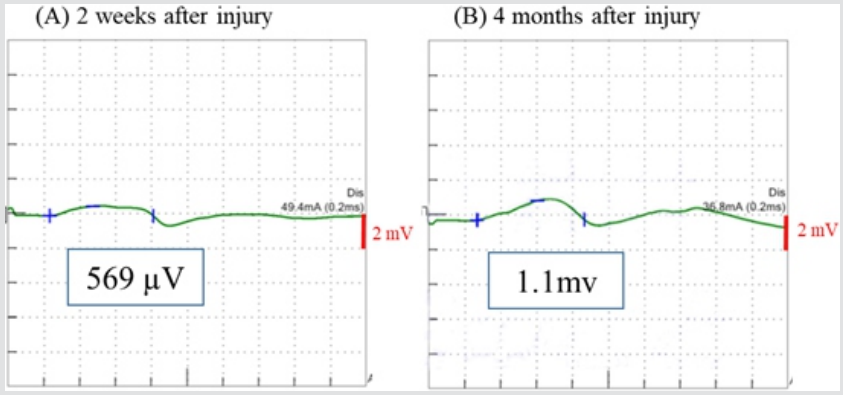

Figure 2: Nerve conduction studies at 2 weeks after the injury showed low-amplitude compound muscle action potential (CMAP) of the right biceps brachii muscle by stimulation of the musculocutaneous nerve (a). At 4 months after the injury, the CMAP amplitude of the right biceps brachii muscle improved (b).

nerve lesion in the cervical spine or brachial plexus. Because musculocutaneous nerve injury was suspected, electrophysiological examination was performed to confirm the diagnosis. Nerve conduction studies at 2 weeks after the injury showed low-amplitude compound muscle action potential (CMAP) of the right biceps brachii muscle by stimulation of the musculocutaneous nerve (amplitude: 569 µV) (Fig. 2a). Needle electromyography showed markedly reduced motor unit potential (MUP) recruitment in the biceps brachii muscle (Fig. 3a), and examinations of other muscles showed normal findings. The patient was diagnosed conclusively as having isolated musculocutaneous nerve injury and received non-operative management involving rest of his upper arm and oral prednisolone 10 mg/day for 2 weeks. A month after the injury, he resumed an exercise for range of motion and muscle strength of the elbow and shoulder and confirmed the motion of the pitch. Two months after the injury, paresthesia in the right lateral forearm was still observed but the muscle contraction and strength of the biceps brachii muscle improved, and the MUP of the biceps brachii muscle increased gradually in needle electromyography. He returned to participation in the throwing program. At 4 months after the injury, the CMAP amplitude of the right biceps brachii muscle improved (amplitude: 1.1 mV) (Fig. 2b) and the needle electromyographic MUP of the biceps brachii muscle further increased (Fig. 3b). At 7 months after the injury, his muscle weakness had fully recovered. His pitching ability had returned to that of a competitive player the next season, and he pitched about 50 games as a reliever.

Discussion

The musculocutaneous nerve originates from the upper and middle trunks of the brachial plexus (C5, C6, and sometimes C7), then pierces the coracobrachialis muscle, and runs between the brachialis and biceps brachii muscles. The motor branches supply the coracobrachialis, biceps brachii, and brachialis muscles. The terminal branch of the musculocutaneous nerve is the LACN, which innervates the lateral forearm [2]. Musculocutaneous nerve lesions are often accompanied by other nerve disorders, such as disorders of the axillary nerve, brachial plexus, and suprascapular nerve, after a shoulder dislocation or fracture of the clavicle [2].

On the other hand, a few cases of isolated musculocutaneous nerve injury have been reported in association with sports activities, such as softball [4] or baseball pitching [5, 6], kickboxing [7], weight lifting [8], and skydiving [9]. It has been reported that musculocutaneous nerve injury occurred distal to the innervations of the coracobrachialis at the level where the musculocutaneous nerve enters the biceps muscle [4]. Violent extension of the elbow and repeated biceps flexion can cause traction of the nerve. Furthermore, muscle hypertrophy and contraction may reportedly disturb blood supply and nerve function [4]. In the present case, we assumed that the shoulder was abducted and externally rotated, which caused a stretch injury of the musculocutaneous nerve at the point where it pierces the coracobrachialis muscle during the pitching motion. Several other disorders can be considered in the differential diagnosis. Radiculopathy at C5 and C6 could cause pain and denervation of the biceps but would typically involve other muscles, such as the serratus anterior, pectoralis major, and deltoid muscles. In addition, MRI of the cervical spine should be abnormal in radiculopathy. Brachial plexopathy will cause biceps weakness and paresthesia in the forearm, but it typically

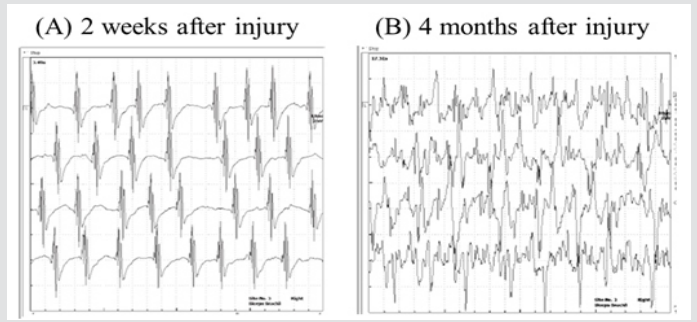

Figure 3: Needle electromyography showed markedly reduced motor unit potential (MUP) recruitment of the biceps brachii muscle at 2 weeks after the injury (a). At 4 months after the injury, the MUP of the biceps brachii muscle increased (b).

includes a more extensive sensory disturbance in the upper extremity and muscle weakness clinically and electrophysiologically compared with isolated musculocutaneous nerve injury [6]. Biceps tendon rupture causes acute pain and weakness during elbow flexion. However, paresthesia in the forearm will be absent, and denervation in the electrophysiological examination of the biceps should be normal.

Patients in previous reports were treated conservatively with rest, anti-inflammatory medications, and physical therapy. Those patients achieved full recovery of motor function and returned to their pre-injury level of activity without any problems within 1 year [4, 5, 6, 7, 8, 9]. A few cases have reportedly required surgical intervention. A case of musculocutaneous nerve injury that occurred after a vigorous push has been reported. In this case, conservative treatment including multiple corticosteroid injections for 3 months was not effective, and surgical release was finally required [10].

Nerve injuries were classified into neuropraxia, axonotmesis, and neurotmesis by Seddon [11]. Neuropraxia is caused by compression or stretching. Recovery of neuropraxia is expected within days or weeks. Neurotmesis is the most severe type of injury and results in complete disruption of the nerve. Neurotmesis requires nerve repair or nerve transfer. In axonotmesis, the axon is affected and Wallerian degeneration occurs distal to the injury site [12]. After an axonotmesis injury, there is an initial delay of a few days to several months for the regenerating axons to cross the lesion site. Axons traverse to the distal segment at a rate of 1 mm/day in the arm. Several months are typically required for clinical recovery after an axonotmesis injury, and full recovery is expected [13, 14]. The onset of the recovery of musculocutaneous nerve injuries reportedly ranges from 2 to 9 months [4, 5, 6, 7, 8, 9]. In these cases, the musculocutaneous nerve injury was expected to be axonotmesis. In our case, because the neuroparalysis was incomplete and some signs of recovery were observed within a few weeks, we considered the pathology of this injury to be incomplete axonotmesis, which was treated conservatively.

Conclusion

We reported the case of a 31-year-old professional baseball pitcher with an isolated musculocutaneous nerve injury that occurred during a pitching motion. Because the neuroparalysis was incomplete and began to recover within a few days, we considered the pathology of this injury to be incomplete axonotmesis, which was successfully treated conservatively.

Clinical Message

Musculocutaneous nerve lesion in a throwing athlete is a rare condition. In general, the musculocutaneous nerve injury is considered to be axonotmesis. Several months are typically required for clinical recovery after an axonotmesis injury, and full recovery is expected.

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