12-31-2020

Coinstantaneous Brachial Plexus Injuries in a 55-year-old Man with Traumatic Spinal Cord Injury: A casereport and Literature reviewarticle

Hong-Yi Lin
Jia-Yin Guo
Su-Ju Tsai

Follow this and additional works at: https://rps.researchcommons.org/journal

Part of the Rehabilitation and Therapy Commons

Recommended Citation
DOI: 10.6315/TJPMR.202012_48(2).0011
Available at: https://rps.researchcommons.org/journal/vol48/iss2/11

This Case Report is brought to you for free and open access by Rehabilitation Practice and Science. It has been accepted for inclusion in Rehabilitation Practice and Science by an authorized editor of Rehabilitation Practice and Science. For more information, please contact twpmrscore@gmail.com.
Case Report

Cointaneous Brachial Plexus Injuries in a 55-year-old Man with Traumatic Spinal Cord Injury: A Case Report and Literature Review

Hong-Yi Lin1,2, Jia-Yin Guo3, Su-Ju Tsai1,2

1Department of Physical Medicine and Rehabilitation, Chung Shan Medical University Hospital, Taichung; 2Department of Physical Medicine and Rehabilitation, School of Medicine, Chung Shan Medical University, Taichung; 3Department of Metabolism & Endocrinology, China Medical University Hospital, Taichung.

Combined injuries of the spinal cord and brachial plexus are difficult to detect and treat. According to previous literature, the incidence of brachial plexus injuries (BPI) in patients with spinal cord injuries (SCI) is 0.6%–1.8%.[2] According to previous literature, the incidence of brachial plexus injuries (BPI) in patients with spinal cord injuries (SCI) is 0.6%–1.8%.[2] Moreover, when BPI occur with SCI, treatment of spinal cord injuries more severe and urgent are usually prioritized, as a result, the risk of overlooking and delaying treatment for BPI increases.[3]

INTRODUCTION

Combined injuries of the spinal cord and brachial plexus are difficult to detect and treat.[1] According to previous literature, the incidence of brachial plexus injuries (BPI) in patients with spinal cord injuries (SCI) is 0.6%–1.8%.[2] Moreover, when BPI occur with SCI, treatment of spinal cord injuries more severe and urgent are usually prioritized, as a result, the risk of overlooking and delaying treatment for BPI increases.[3]
Here we report a 55-year-old male patient who had suffered from traffic accident. The patient fell into a ditch and was stuck for approximately half an hour, unable to move his right limbs. At emergency department, physical examination showed right upper limb muscle power was manual muscle test (MMT) 1/5 while left upper limb was MMT 3/5, right lower limb was MMT 2/5, left lower limb was MMT 2/5. In the same time, the sensory physical examination showed bilateral hypoesthesia below C5 dermatome and the physical examination discovered weak anus sphincter voluntary contraction, impaired anus sensation and indwelled Foley catheter. Cervical spine magnetic resonance image showed C3–C6 intervertebral disc herniation with dural sac compression and high signal cord edema change of T2W1 sequence (Figure 1.), there was no strong evidence of spinal nerve root avulsion injury on magnetic resonance imaging. Diagnosis of C3–C6 intervertebral disc herniation was confirmed by medical image findings, clinical presentation, and physical examination. The patient underwent a surgery of C3–C6 spinal fusion and discectomy.

One month after the operation, he was admitted to rehabilitation ward where his American Spinal Injury Association (ASIA) impairment scale was ASIA-C with a neurological level of C4 on admission day. Physical examination revealed disproportional muscle atrophy in the right deltoid, supraspinatus, and infraspinatus muscles when compared to the left. The muscle power of his right shoulder abductor, elbow flexor, wrist extensor, and elbow extensor were MMT 1/5 while his left muscle group strength was MMT 3/5. Additionally, the muscle power of his bilateral finger flexors and finger abductors was MMT 1/5. There was also an absence of deep tendon reflex (DTR) in the right biceps, brachioradialis, and triceps muscles while it was DTR 3+ on the left. In addition, there was symmetrical lower limb muscle strength. Bilateral hip flexor and knee extensor were MMT 2/5 while ankle dorsiflexors and big toe extensor both were MMT 1/5. The sensory examinations were bilaterally symmetrical with impaired level from C5. The significant differences in muscle power and DTR of the right and left upper extremity are both indications of suspicious concurrent right upper limb lower motor injury. Thus, we arranged electrodiagnosis examination to confirm the diagnosis. Nerve conduction study and electromyography were performed, SNCV showed attenuated amplitude of right lateral antebrachial cutaneous nerve compared to the left while the amplitude of right medial antebrachial cutaneous almost as the same as left. MNCV revealed notable attenuation of compound motor action potential in the right musculocutaneous, suprascapular, and axillary nerves, while the left side was normal.

There were also active denervation signs (fibrillation and positive sharp waves) noted in the right deltoid, biceps, and triceps muscles with significantly decreased activation and recruitment patterns when compared to those on the left. All of the above confirmed a brachial plexus injury. After consulting a neurosurgeon, the patient underwent a revised cervical spine surgery (anterior discectomy and interbody fusion with Zero-P screw cage) to correct malalignment and achieve decompression. The surgery went well. After 4 months of rehabilitation, the muscle strength of his right shoulder abductor, elbow flexor and wrist extensor improved from MMT 1/5 to MMT 2/5, with DTR restoration in the right biceps and
DISCUSSION

Traumatic injuries are the most common cause of brachial plexopathies. Traumatic BPI in paralyzed patients are rare, with a reported incidence of 0.6%–1.8%. In patients with complete SCI, the ultimate goal is to restore their ability to perform daily activities. However, for patients with concomitant BPI, upper extremity dysfunction recovery is hindered. Brachial plexus reconstruction (BPR) is an optional treatment for BPI. However, if BPR is delayed for more than 9 to 12 months may lead to poor results. Since BPI are often overlooked for patients with both BPI and SCI, treatment of the former may be delayed.

Dual injuries as such may be caused by excessive traction force between the neck and shoulder due to lateral flexion, rotation, and hyperextension of the vertebra. For patients with SCI, especially those who have the following conditions, should be examined for BPI. First, DTR is decreased due to the superimposed LMN injuries on UMN injuries. Second, bilateral upper arm muscle power is asymmetric. Nerve conduction study and electromyography can be performed to confirm BPI. Theoretically, the peripheral nerve conduction study of a patient with SCI is normal while electromyogram shows UMN lesion pattern with decreasing activation below the spinal cord lesion level. However, in the case of this patient, his electromyogram showed plexopathy lesion pattern, typical of a brachial plexus injury.

The difficulty of BPR lies in selecting suitable graft nerves due to the lack of available intraplexal donor nerves. Other extraplexal donor nerves may have injured UMN due to SCI. Furthermore, UMN injuries result in the conversion of type 1 muscle fibers to type 2 muscle fibers after spinal cord transection. The retrospective literature reported poor BPR results due to delayed intervention, which is the most important prognostic factor for BPI.

CONCLUSION

Early detection and proper treatment are essential for upper extremity recovery in subjects with concurrent BPI and SCI. Investigations of patients’ clinical features, physical examinations, neurologic examinations and electrodiagnostic studies are helpful for detecting a combination of UMN and LMN lesions in SCI patients.

REFERENCES

一名創傷性脊髓損傷病人同時合併臂神經叢損傷：病例報告及文獻回顧

林紘毅1,2 郭佳茵3 蔡素如1,2

中山醫學大學附設醫院 復健部1 中山醫學大學 醫學系2
中國醫藥大學附設醫院 新陳代謝科3

脊髓損傷合併臂神經叢損傷臨床上少見且不易診斷與處置。過去研究的報告發生率約為0.6%到1.8%。在脊髓損傷的病人處置時，通常優先處理危及生命的傷害，且臂神經叢損傷的臨床表現也可能歸因於脊髓損傷而被忽略。

本文報告一名55歲因車禍意外導致第四節脊髓損傷的男性病人，根據病人的身體檢查、神經學檢查發現右上肢深肌腱反射無反應，以及明顯不對稱的右上肢與左上肢肌力，經過神經傳導檢查及肌電圖檢查，確定該名病人為脊髓損傷合併臂神經叢損傷。

同時罹患脊髓損傷及臂神經叢損傷的病人數量可能被低估，治療計畫及復健也更為複雜，早期診斷與適當治療是此類病人上肢功能恢復的重要關鍵。除了詳細探查脊髓損傷病人的臨床症狀、身體檢查、神經學檢查之外，電學診斷對於合併臂神經叢損傷的確診最有效益。（台灣復健醫誌2020；48(2)：163-166）

關鍵詞：脊髓損傷(spinal cord injury)，臂神經叢損傷(brachial plexus injury)，電學診斷(electrodiagnosis)