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Case Report

When a Massage Goes Wrong: Unveiling a Case of Post-Massage Brachial Plexopathy

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ABSTRACT

Brachial plexopathy associated with massage therapy is rarely reported. This case report describes an uncommon instance of brachial plexopathy that developed following a massage therapy session and reviews previous literature on peripheral nerve injuries linked to massage therapy. A 54-year-old Javanese woman presented with sudden onset of unilateral paralysis of the left shoulder girdle after a massage session, which was terminated due to severe pain. The patient experienced immediate loss of shoulder movement within 5 minutes of the massage, accompanied by hypoesthesia from the shoulder to the forearm and decreased muscle strength in the left deltoid muscle. She engaged in a twice-weekly rehabilitation program focusing on the left shoulder, which included neuromuscular electrical stimulation (NMES), low-level laser therapy (LLLT), passive range of motion (PROM) exercises, strengthening exercises, and a home exercise regimen. Based on her recent history and clinical examination findings, acute brachial plexopathy was diagnosed. Over time, the patient demonstrated gradual improvement in muscle strength, resolution of range of motion limitations, and recovery of sensory function in the shoulder. Rehabilitation interventions played a crucial role in restoring her functional abilities and improving her quality of life. This case underscores the need for vigilance among massage and physical therapists when performing neck and shoulder massages to prevent nerve injuries. It also highlights the importance of early diagnosis and comprehensive rehabilitation in managing such injuries. Further research is warranted to enhance the safety and efficacy of massage therapy techniques, and to establish guidelines for preventing similar cases in the future.

Keywords: *Brachial plexopathy, peripheral nerve, massage therapy, rehabilitation programs, physiotherapy*

INTRODUCTION

The brachial plexus is a complex network of nerves created by the ventral rami of the lower four cervical nerves (C5-C8) and the first thoracic nerve (T1), providing motor and sensory innervation to the upper limbs.[1] These nerves originate in the spinal cord and traverse the neck, axilla, and arm, passing between the anterior and middle scalene muscles, forming three trunks within the posterior cervical triangle. This intricate anatomical structure makes the brachial plexus prone to injuries, potentially leading to significant neurological deficits. When these nerves are damaged, a condition known as brachial plexopathy or brachial plexus injury (BPI) can occur, resulting in symptoms such as paralysis, sensory loss, and severe functional impairments.[2]

Globally, approximately 1.2% of the population suffers from brachial plexopathy, with common etiologies including high-energy trauma (e.g., motor vehicle accidents), humeral fractures, penetrating injuries, malignancies, radiation exposure, and athletic activities involving contact sports.[2] These injuries are often severe and can have a profound impact on neurological function, potentially resulting in long-term disabilities. The consequences of BPI can disrupt daily activities and significantly reduce the quality of life for affected individuals.[1] Therefore, understanding the diverse causes and mechanisms of BPI is crucial for accurate diagnosis and effective treatment planning.[3]

Diagnosis of BPI is particularly challenging when the injury mechanism is atypical. A thorough clinical examination is essential, supplemented by imaging studies and electrodiagnostic tests to assess the severity and precise location of the injury. Electrodiagnostic studies, including nerve conduction studies (NCS) and electromyography (EMG), are invaluable in evaluating the extent of nerve damage, predicting recovery outcomes, and guiding therapeutic interventions.[2] These diagnostic tools help differentiate between different types of nerve injuries, such as neuropraxia, axonotmesis, and neurotmesis, each of

which requires a different management approach.[3]

Treatment strategies for BPI vary based on the injury's etiology and severity, ranging from conservative approaches to surgical interventions.[3] Conservative management aims to alleviate symptoms, restore function, and prevent long-term complications such as joint contractures and muscle atrophy.[4] This may include physical therapy, pharmacological management, and the use of orthotic devices to support the affected limb.[4] Physical therapy plays a crucial role in maintaining joint mobility, improving muscle strength, and enhancing overall functional abilities. Techniques such as neuromuscular electrical stimulation (NMES) and low-level laser therapy (LLLT) have been shown to be effective in promoting nerve regeneration and reducing pain.[5]

Surgical options are considered when there is no significant recovery within a few months of injury or in cases of severe nerve disruption.[3] Surgical interventions may include nerve grafts, nerve transfers, or neurolysis to restore nerve continuity and function. The choice of surgical technique depends on the type and extent of the nerve injury, as well as the patient's overall health and functional goals.[6] Early surgical intervention is often recommended for severe injuries to maximize the chances of successful recovery.

This case report describes a rare instance of brachial plexopathy following a massage therapy session. While massage therapy is widely regarded as a beneficial complementary treatment for musculoskeletal pain and relaxation, it is not without risks.[7] The brachial plexus can be particularly vulnerable to injury during massage, especially if excessive pressure is applied or if the therapist lacks knowledge of the anatomical structures involved. There are few documented cases of peripheral nerve injuries associated with massage therapy, and this report aims to highlight the importance of awareness and caution among therapists to prevent such complications.

Massage therapists must be thoroughly trained in the anatomy and physiology of the

regions they are treating to avoid inadvertent nerve injuries. The use of appropriate techniques and pressure is critical in preventing damage to the delicate neural structures of the brachial plexus.[8] Moreover, therapists should be aware of the signs and symptoms of nerve injury and be prepared to refer patients to medical professionals if complications arise.

Additionally, this case underscores the critical role of rehabilitation in the recovery process. Rehabilitation programs tailored to the specific needs of the patient can facilitate nerve healing, restore function, and improve quality of life.[9] Such programs often include a combination of physical therapy, occupational therapy, and other modalities designed to address the multifaceted aspects of nerve injuries. Regular follow-ups and adjustments to the rehabilitation plan based on the patient's progress are essential for achieving optimal outcomes.[10]

Further research is warranted to establish safer and more effective massage therapy techniques and guidelines. Studies focusing on the biomechanics of massage, the thresholds for safe pressure application, and the identification of high-risk areas for nerve injuries can provide valuable insights for practitioners.[11] Developing evidence-based protocols and training programs can help mitigate the risks associated with massage therapy and enhance patient safety.

CASE REPORT

The patient, Mrs. S, a 54-year-old female from Batu who works as a farmer, was referred from the Neurology Outpatient Clinic with a diagnosis of suspected brachial plexus injury (BPI). The chief complaint was progressive weakness in the left upper limb over the past month. The patient reported a sudden onset of weakness and numbness in the left upper limb following a deep tissue massage session. The numbness was localized to the left arm and forearm, while her left hand felt heavy but she retained some movement; there was no associated pain or tingling sensation. Hand function was thoroughly examined, and it was found to be largely unaffected. Grip strength and fine

motor movements, including flexion and extension of the fingers, were intact. However, the patient reported a subjective sense of heaviness in the hand without any significant motor or sensory deficits in the distal extremities.

On examination, the patient exhibited hypoesthesia affecting the triceps (elbow extensor), biceps (elbow flexor), and deltoid (shoulder abduction) muscles, with a manual muscle test (MMT) score of 2 in the left upper arm. The wrist and fingers' flexion and extension remained essentially normal. Deep tendon reflexes were diminished in the left brachioradialis (mainly C6) and left biceps (mainly C5) tendons, though they were otherwise normal. Both passive range of motion (PROM) in the left shoulder joint and active range of motion (AROM) in the neck were within normal limits. Erb's point percussion elicited discomfort radiating from the left side of the neck to the shoulder, but the Spurling test for cervical root symptoms was negative. No other neurological deficits, such as cranial nerve dysfunction, dysarthria, or incontinence, were observed. The physical examination findings included reduced MMT in the upper extremity, sensory deficit, positive asymmetrical shoulder sulcus sign, positive left winging scapula, and reduced breathing function.

The diagnosis was massage-induced left brachial plexus injury, incomplete, suspected at the root level C5-T1 postganglionic. The rehabilitation program included neuromuscular electrical stimulation (NMES) at the left shoulder abductor and elbow flexor muscles, and low-level laser therapy (LLLT) at Erb’s point. The exercise program comprised PROM exercises for the left shoulder and wrist, AROM exercises for the left wrist and fingers, isotonic strengthening exercises, endurance exercises, and bimanual exercises. Occupational therapy focused on activities of daily living (ADL) exercises, including toileting, bathing, dressing, and sensory reeducation. A shoulder sling was provided to prevent further complications. The patient was educated about her condition, the purpose and benefits of

rehabilitation therapy, the importance of continuing the exercise program at home, and preventive measures to avoid complications by proper hand positioning. Routine follow-ups were scheduled to monitor the patient's subjective MMT, sensory function, breathing and chest expansion, ADL performance, and body mass index (BMI).

The patient consistently engaged in a twice-weekly rehabilitation program for the left shoulder. This regimen included supervised passive range of motion exercises, strengthening and stretching routines, as well as exercises to be done at home. Follow-up evaluations at three, six, and nine months demonstrated notable enhancements in the shoulder's range of motion and reductions in pain as measured by the visual analog scale (VAS). By the 9-month mark, the patient's muscle strength grade increased from 2 to 3, and the brachioradialis and biceps tendon reflexes nearly normalized. The patient showed a gradual reduction in symptoms, allowing her to return to daily activities independently.

DISCUSSION

The initial phase of our assessment focused on identifying the etiology of the patient's sudden onset of monoplegia and associated sensory loss. Given the absence of muscle atrophy and fasciculations, a myopathic cause was deemed unlikely. The presence of sensory loss suggested a neuropathic origin, prompting us to consider a range of potential diagnoses, including upper motor neuron lesions (such as cerebrovascular accidents and spinal cord injuries) and lower motor neuron disorders such as brachial plexus injury, cervical radiculopathy, and suprascapular neuropathy.[1]

Distinguishing between upper and lower motor neuron disorders was crucial. Clinical indicators of upper motor neuron involvement, such as increased deep tendon reflexes or the presence of Hoffmann's sign, were assessed. Conversely, signs of lower motor neuron involvement, such as reduced tendon reflexes and muscle weakness or atrophy, pointed towards peripheral nerve injuries. Early nerve conduction studies and electromyography (EMG) might not reveal

abnormalities immediately, as it takes approximately 1-2 weeks for denervation changes to become apparent.2 By waiting four weeks post-injury for these studies, we ensured accurate detection and localization of the brachial plexus injury.

Extensive evaluation of the patient's medical history and symptoms ruled out infections and tumors due to the absence of systemic symptoms such as migraines, fever, weight loss, seizures, facial paralysis, or dermatological manifestations.[5] This comprehensive approach confirmed that the patient's brachial plexopathy was indeed related to the recent massage therapy session.

The thoracic region was evaluated, revealing no significant abnormalities in muscle function or reflexes. However, sensory testing identified a mild hypoesthesia over the left lateral chest wall, which was consistent with the dermatomal distribution of the brachial plexus involvement. This finding further supports the diagnosis of brachial plexopathy, indicating that the sensory disruption extended beyond the upper limb into adjacent regions innervated by the affected nerve roots.[20]

Previous studies have documented cases of peripheral nerve injuries following manual therapies. For instance, Herskovitz et al. reported a case of median recurrent motor branch mononeuropathy due to manual pressure.[8] Giese and Hentz described posterior interosseous syndrome resulting from deep tissue forearm massage, with the patient nearly fully recovering after three weeks.[9] Aksoy et al. documented spinal accessory neuropathy after deep tissue massage, where the patient experienced incomplete muscle strength recovery but complete pain relief after two years.[11] Wu et al. reported posterior interosseous nerve palsy following friction massage, illustrating the susceptibility of nerves to compression injuries in areas where they cannot easily move or expand.[12]

Our case is likely mechanism of injury involved direct and intense pressure on Erb's point, leading to compressive damage to the brachial plexus.8 Additionally, the patient's previous rotator cuff tendon repair and

subsequent deconditioning of the shoulder muscles may have rendered the brachial plexus more susceptible to injury during the massage therapy session.[20]

Nerve conduction tests and electromyography (EMG) played pivotal roles in diagnosing brachial plexopathy. EMG results indicated notable fibrillation potentials and positive sharp waves in the biceps, deltoid, and supraspinatus muscles, confirming the presence of a brachial plexus injury. The absence of involvement of the cervical paraspinal muscles suggested that the injury was localized to the upper brachial plexus rather than the cervical nerve roots.[2] Spontaneous potentials in the triceps muscle on EMG pointed towards potential involvement of the middle trunk of the brachial plexus, although further evaluation of muscles innervated by the middle trunk, such as the flexor carpi radialis and pronator teres, was necessary for precise localization.[2]

Understanding the nature, location, and severity of the lesion is critical for effective management of BPI.[21] Initial conservative treatments are preferred for cases with intact nerve continuity, such as neuropraxia or axonotmesis, aiming to mitigate early and long-term impairments like range of motion limitations, joint contractures, and subsequent deformities. Rehabilitation modalities, including therapeutic ultrasound or transcutaneous electrical nerve stimulation, can be utilized to manage neuropathic pain. Surgical interventions, including nerve graft repairs or nerve transfer techniques, are recommended for patients showing no signs of reinnervation three months post-injury or those who do not benefit from conservative approaches.[22]

The outlook for brachial plexus injuries (BPI) is influenced by the injury's location, nature, and severity.[21] Neurapraxia, characterized by demyelination with preservation of the nerve's architecture, typically has a favorable recovery outcome, with 90% to 100% of functionality restored within 6 to 8 weeks.3 Axonotmesis, involving axonal disruption with intact endoneurium, shows a fair to good prognosis, with recovery rates depending on

the distance from the injury site and axonal regeneration occurring at 1-4 mm per day. Neurotmesis, marked by complete disruption of the axon and its connective tissue, generally results in a poor prognosis, necessitating surgical intervention.[24]

Massage therapy, a widely acknowledged complementary and alternative medicine modality, aims to alleviate musculoskeletal discomfort and promote relaxation. It has been utilized for centuries and is recognized for its benefits in reducing stress, improving circulation, and enhancing overall well-being.[26] Despite its widespread acceptance and general perception as a safe practice, there are, however, inherent risks associated with massage therapy, particularly when it is performed near sensitive anatomical structures such as nerves, blood vessels, and other critical tissues.[18]

This case report of brachial plexopathy following a massage therapy session highlights the potential for serious complications arising from this otherwise therapeutic intervention. The brachial plexus, a complex network of nerves that control the muscles of the shoulder, arm, and hand, is particularly vulnerable to injury if excessive pressure or improper techniques are applied.[22] Injuries to the brachial plexus can result in significant neurological deficits, including paralysis, sensory loss, and chronic pain, all of which can severely impact a patient's quality of life.[21]

Therapist awareness and training in muscular anatomy and neurological structures are crucial to minimizing these risks. Proper education on the biomechanics of massage, the appropriate application of pressure, and the identification of contraindications can help prevent nerve injuries.[15] For instance, techniques such as deep tissue massage, which involve applying sustained pressure to the musculoskeletal system, should be performed with caution, particularly in areas where nerves are superficial and unprotected by surrounding musculature.[9]

Further research is essential to establish safer and more effective massage therapy techniques. Studies investigating the optimal levels of pressure, the duration of massage,

and the specific techniques that minimize the risk of nerve injury can provide valuable guidelines for practitioners.[25] Additionally, randomized controlled trials comparing different massage modalities and their associated risks can offer insights into best practices for patient safety.[19]

In light of the increasing popularity of massage therapy, it is also important to develop standardized training and certification programs for therapists. These programs should include comprehensive modules on human anatomy, physiology, and pathology, as well as practical training in safe massage techniques.[19] By ensuring that therapists are well-educated and proficient in their practice, the incidence of massage-related complications can be significantly reduced.

Moreover, healthcare providers should be vigilant in monitoring patients who undergo massage therapy, particularly those with pre existing conditions that may predispose them to nerve injuries. Regular assessments and follow-up evaluations can help detect early signs of complications and facilitate timely intervention.[27]

While massage therapy offers numerous benefits, it is not without risks. This case underscores the importance of proper training for therapists, adherence to safe practices, and ongoing research to enhance the safety and efficacy of massage therapy. By addressing these factors, we can maximize the therapeutic potential of massage while minimizing the risk of adverse outcomes.

This incident highlights the need for massage and physical therapists to be cautious during neck massages. It also indicates the value of further research in developing safer and more effective massage therapy techniques for the future.

Table 1. Overview of Past and Recent Cases of Peripheral Nerve Injuries Caused by Massage Therapy

Research	Age/Gender	Kind of Massage	Complication	Therapy	Result
Herskovits et al., 1992	61/Male	Shiatsu	Median recurrent motor branch injury	Conservative	Good
Giese and Hentz, 1998	45/Male	Deep tissue	Posterior Interosseous syndrome	Conservative	Good
Aksoy et al., 2009	38/Female	Deep tissue	Spinal accessory neuropathy	Conservative	Pain relief was achieved, but shoulder function and strength recovery were not fully attained
Wu et al., 2010	40/Female	Friction	Posterior interosseous nerve palsy	Conservative	Good
Present case	54/Female	Deep tissue	Brachial plexus plexopathy	Exercises, Home Exercise Regimen, Laser Therapy, Electrical stimulation	Good; Able to do ADL without assistance

CONCLUSION

This case highlights the potential complications associated with massage therapy, particularly in the neck and shoulder regions, which can lead to significant nerve injuries such as brachial plexopathy. The patient in this report developed an acute brachial plexus injury following a deep tissue massage, presenting with sudden onset of unilateral shoulder paralysis and sensory deficits. This case underscores the necessity for massage therapists to exercise caution and be well-versed in musculoskeletal anatomy and the neurovascular structures at risk during therapy.

Early and accurate diagnosis of brachial plexopathy is crucial for effective management and optimal recovery. Electrodiagnostic studies, including nerve conduction studies (NCS) and electromyography (EMG), are invaluable tools for assessing the extent of nerve damage, determining the precise location of the injury, and guiding therapeutic interventions.[2] In this case, these diagnostic tools were pivotal in

confirming the diagnosis and formulating an appropriate rehabilitation strategy.

The rehabilitation program, which included neuromuscular electrical stimulation (NMES), low-level laser therapy (LLLT), passive and active range of motion exercises, and occupational therapy, played a significant role in the patient's recovery. Regular follow-up and adherence to the prescribed rehabilitation regimen resulted in substantial improvement in muscle strength, range of motion, and functional abilities, enabling the patient to resume daily activities independently.[21] This emphasizes the importance of a comprehensive and individualized rehabilitation plan in the management of brachial plexus injuries.

Massage therapy, while generally considered safe and beneficial for musculoskeletal pain and relaxation, carries inherent risks when not performed with adequate knowledge and caution. This case advocates for the implementation of standardized training and certification programs for massage therapists to minimize the risk of nerve injuries. Additionally, further research is warranted to develop safer massage techniques and establish evidence-based guidelines for clinical practice.[18]

In conclusion, the integration of careful clinical assessment, timely electrodiagnostic evaluation, and tailored rehabilitation interventions is essential for the successful management of brachial plexus injuries. Healthcare professionals, including massage therapists, must remain vigilant and prioritize patient safety to prevent such adverse events. This case serves as a reminder of the delicate balance between therapeutic benefit and potential harm in manual therapy practices.

DISCLOSURES

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Conflict of Interest

The authors state that they have no financial or personal connections with any organizations or entities that could improperly affect or bias the

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Author Contribution

All authors have significantly contributed to all stages of this research, encompassing the study's conception and design, data collection and analysis, and the drafting and critical review of the manuscript. Every author has examined and approved the final manuscript version for publication and collectively agree to take responsibility for all aspects of the work.

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