NEUROSCIENCE RESEARCH NOTES

OPEN ACCESS | MINI-REVIEW ISSN: 2576-828X

Optimizing functional recovery after sciatic nerve injury: A multidisciplinary approach

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Received: 5 June 2024; **Accepted**: 27 May 2025; **Published**: 29 September 2025
Edited by: Lin Kooi Ong (University of Southern Queensland, Australia)
Reviewed by: Antonio Eblen-Zajjur (Universidad Diego Portales, Chile); Nurul Aqmar Mohd Nor Hazalin (Universiti Teknologi MARA, Malaysia).
https://doi.org/10.31117/neuroscirn.v8i3.371

Abstract: Sciatic nerve injuries present a significant challenge due to their inherent complexity and the limitations of current treatment methods. While microsurgical techniques have advanced, achieving optimal functional recovery necessitates a deeper understanding of the underlying neurobiology following peripheral nerve injury. This article explores the limitations of current treatment modalities, including autologous nerve grafting and mecobalamin administration. It emphasizes the importance of a multidisciplinary approach that incorporates physical therapy, occupational therapy, and potentially telehealth and VR interventions to optimize functional recovery and patient well-being. The article highlights the critical role of collaboration between various healthcare professionals. It emphasizes the need for ongoing research and development of novel therapeutic strategies to address the challenges associated with individual variability in the healing process and limited treatment options for severe nerve injuries.

Keywords: Sciatic nerve injury; Functional recovery; Multidisciplinary

1.0 INTRODUCTION

1.1 Factors leading to sciatic nerve injury

Sciatic nerve injuries make up around 2% of all peripheral nerve injuries, and peripheral nerve injuries account for about 1.8% of all traumatic injuries (Ferdinand & Raduma, 2019). Although sciatic nerve injuries are uncommon, they are a significant part of peripheral nerve damage. The main cause of sciatic nerve injuries is trauma, especially from car accidents, which are responsible for a large number of cases. One study found that car accidents caused 71.4% of sciatic nerve injuries, which is similar to previous results (Arbash et al., 2024). Other contributing factors include complications from surgery, particularly hip replacement surgery, which carries a risk of sciatic nerve injury ranging from 0.09% to 3.7% (Prakash et al., 2023).

Acetabular fractures, which occur when the hip joint socket is broken, can sometimes lead to damage to the sciatic nerve. This is the largest nerve in the body and runs through the hip area. When damaged, it can cause significant pain, weakness, and numbness in the leg. Studies have shown that approximately 3.3% of patients with acetabular fractures experience sciatic nerve injuries. This means that while it is not a common occurrence, it is a significant complication that can significantly impact a patient's recovery and quality of life. Certain types of acetabular fractures are more likely to result in sciatic nerve damage. One such fracture is the transverse posterior wall fracture. This type of fracture involves a break in the back wall of the acetabulum, which can put pressure on the sciatic nerve. When the sciatic nerve is damaged, it can cause various symptoms. These include severe pain in the leg, often described as a shooting or stabbing sensation. Additionally, individuals may experience weakness in the leg or foot, making it difficult to move. Loss of sensation in the leg and foot is another common symptom. Over time, the lack of use can lead to muscle wasting, where the leg muscles shrink due to disuse (Ali et al., 2023).

In this context, Iatrogenic injuries, particularly those resulting from intramuscular injections, are also a common cause of sciatic nerve damage. Reports indicate that intramuscular injections are the second most common cause of sciatic nerve injury after hip arthroplasty (Gunduz et al., 2012). Zhuo et al. (2019a) found that accidental injections into the sciatic nerve or nearby tissues are joint, particularly in children.

Recovery from sciatic nerve injuries can differ significantly. In cases linked to acetabular fractures, only about 22% of patients fully recover, and half experience partial recovery. Another study found that nearly 75% of patients with undamaged sciatic nerves after injury partially recover, but more than 25% have no nerve recovery at all (Shermetaro et al., 2023). These varying outcomes highlight the complexity of nerve injuries and the factors that affect recovery (Shermetaro et al., 2023).

Demographic factors, such as age and gender, can impact the likelihood and outcomes of sciatic nerve injuries. For example, proximal hamstring tendon avulsion injuries, which can damage the sciatic nerve, primarily affect middle-aged individuals and have distinct gender differences (Irger et al., 2019). This suggests these factors may influence a person's vulnerability to such injuries. The same reference stated that middle-aged individuals may be more susceptible to these injuries due to age-related muscle degeneration or changes in physical activity. Gender differences in proximal hamstring tendon avulsion injuries, which can damage the sciatic nerve, may be linked to hormonal factors, anatomical variations, or differences in sports participation. Other demographic factors such as ethnicity, occupation, and lifestyle may also play a role in the likelihood and severity of sciatic nerve injuries.

The etiology of sciatic nerve injuries is diverse and can arise from various traumatic, surgical, and postoperative causes. These include proximal hamstring avulsion and repair, acetabular fractures, total knee arthroplasty, postoperative hematoma in primary total hip replacement, vascular graft occlusion, developmental dysplasia of the hip, and traumatic injuries. These injuries can result from excessive tension, inappropriate placement of retractors, implant-related complications, heterotopic ossification, hematoma, scarring, and stretching exercises, among other causes (Butt et al., 2005; Issack & Helfet, 2009; Liu et al., 2015; Tanikawa et al., 2017; Willis-Owen et al., 2011; Wilson et al., 2017). Additionally, postoperative complications such as hematoma and vascular graft occlusion have been identified as potential causes of sciatic nerve injury (Butt et al., 2005; Willis-Owen et al., 2011). According to Kouyoumdjian (2006), vehicle accidents affecting the brachial plexus or radial, sciatic, facial, and peroneal nerves were also identified as common causes of injury. Based on a study by Shim et al. (2013), various mechanisms of injury, including laceration, contusion, compression, ischemia, hyper stretching, and direct or indirect mechanical trauma. Moreover, iatrogenic factors such as intramuscular injection, intraneural injection of local anesthetic, and iatrogenic injury during surgical repair have been reported as causes of sciatic nerve injury (Knorr, 2021; Zhuo et al., 2019).

1.2 Categories of sciatic nerve injury

In the realm of Peripheral Nerve Injury (PNI), Seddon was the pioneer in attempting to categorize nerve damage (Seddon, 1943). Considering the relationship between pathological findings and prognostic outcomes, Seddon's classification underscored the observation that nerve regeneration occurred primarily in class I and II injuries, corresponding to neuropraxia and axonotmesis, respectively. Consequently, surgical intervention was deemed warranted during the initial phase for class III injuries (neurotmesis), where the integrity of the nerve's surrounding connective tissue was compromised. Building upon Seddon's framework, Sunderland devised a comprehensive five-point grading system for PNI severity, offering a nuanced depiction of the extent of connective tissue impairment (Sunderland, 1951). Grade II injuries typically spare the connective tissue. In contrast, a worsening injury, necessitating surgical intervention, is characterized by increased involvement of the connective layers surrounding the nerve fibers, namely the endoneurium, perineurium, and epineurium. After that, (Bain et al., 1989) Sunderland's classification was extended to include a grade VI, accommodating PNIs presenting with a mixed pattern, thus aligning more closely with clinical realities.

1.3 Impact of sciatic nerve injury on function

Nerve damage induces a range of sensorimotor impairments delineated by the anatomical site of injury. Sensory manifestations encompass numbness, paraesthesia, hyperesthesia, and allodynia affecting the lower limbs (Austin et al., 2012; Fried et al., 2023). Motor symptoms encompass muscle weakness and paralysis corresponding to the affected muscles (Immerman et al., 2014). Other than that, weakness of knee flexion (bending), weakness of foot movements, difficulty bending the foot inward (inversion), or bending the foot down (plantar flexion). Reflexes may also be abnormal, with weak or absent ankle-jerk reflex (Hoveizi, 2023). It also reduces muscle function, resulting in leg and foot weakness. Sensory problems in the leg, typically present as numbness, tingling or burning pain (Jagannathan, 2020). The same report also mentioned Impairment of a wide range of motor functions, including inversion and eversion of the foot, dorsiflexion and plantarflexion of the foot, flexion and extension of the toes, knee flexion, and hip adduction. General motor impairment signs include difficulty or inability to walk, bend the leg, or stand on tiptoe or heel. Therefore, sciatic nerve injury can lead to a cascade of functional impairments, impacting self-care activities, work capacity, household chores, and leisure pursuits. This can significantly decrease quality of life by inducing chronic pain, depression, anxiety, social isolation, and a diminished sense of independence. The extent of nerve damage, individual coping mechanisms, and access to appropriate rehabilitation and support systems directly influences the severity of these consequences.

1.4 Importance of a multidisciplinary approach

While various treatment options exist for sciatic nerve injuries, relying solely on a single approach can lead to suboptimal outcomes. Consider the following examples. Jarragh's study (2023) found that only 22% of patients with sciatic nerve injuries caused by acetabular fractures fully recovered after surgery alone. This suggests that surgical repair alone may not be sufficient for optimal functional recovery and that combining it with rehabilitation and pain management is essential. Johnston et al.'s case report (2022) showed that conservative treatment alone for a complete sciatic nerve transection caused by a femoral fracture led to poor results, with no functional recovery. This highlights the limitations of a solely conservative approach in severe cases, where surgery may be necessary but often requires additional rehabilitation for optimal outcomes. Zhuo et al.'s study (2019) revealed that patients with sciatic nerve injuries caused by gluteal intramuscular injections who received only physical therapy had limited symptom improvement. This suggests that physical therapy alone may not be sufficient without addressing the underlying nerve damage through medical or surgical interventions.

Beyond single-approach limitations, the successes of a multidisciplinary approach demonstrate the benefits of combining different treatment modalities. For instance, integrating a multidisciplinary approach, encompassing collaboration among diverse healthcare professionals, presents manifold advantages in addressing various health conditions. Coordinated teamwork among practitioners from various disciplines, including physicians, nurses, physical therapists, psychologists, and social workers, can enhance patient outcomes and overall quality of care.

A study by Winters et al. (2021) found that a multidisciplinary approach can bolster adherence to optimal clinical practices, streamline diagnostic and treatment timelines, and result in superior patient outcomes, including heightened survival rates (Liu et al., 2022). This collaborative strategy guarantees patients benefit from thorough, integrated care that meets their physical, emotional, and social requirements.

A multidisciplinary approach can lead to more accurate diagnoses, particularly for complex conditions like nerve injuries. Advanced imaging techniques, such as magnetic resonance neurography (MRN), have significantly improved our ability to detect and characterize these injuries. Pham et al. (2011) show that MRN is especially useful for diagnosing injection-related sciatic nerve injuries. By leveraging these advanced tools, healthcare teams can provide timely and effective treatment, improving patient outcomes.

Beyond improved diagnostics, a multidisciplinary approach enables the development of personalized treatment plans tailored to each patient's unique needs. As highlighted by Shermetaro et al. (2023), the severity and location of the sciatic nerve injury significantly impact the required management strategy. By collaborating with specialists from diverse fields, healthcare providers can create comprehensive treatment plans that may involve surgery, medication, and rehabilitation, ensuring optimal patient outcomes.

In summary, the adoption of a multidisciplinary approach, fostering collaboration among healthcare professionals from diverse backgrounds, presents a holistic and patient-centric strategy for managing a spectrum of health conditions. Through harnessing the collective expertise of various professionals, patients can access comprehensive care that attends to their physical, emotional, and social welfare, ultimately resulting in enhanced outcomes and quality of life.

1.5 Roles of different disciplines in the multidisciplinary team

In the rehabilitation of sciatic nerve injuries, the integration of a multidisciplinary approach, facilitating collaboration among diverse healthcare professionals, is pivotal in maximizing patient outcomes. Each discipline brings forth distinct expertise and skill sets to comprehensively address different facets of the patient's care and recuperation process. Precise diagnosis is critical for optimal management of sciatic nerve injuries. Patients typically experience pain, sensory deficits, and muscle weakness in the affected leg. Initial evaluation involves a thorough history and physical examination, followed by imaging studies such as MRI or ultrasound to assess the extent of nerve damage (Fried et al., 2023). MRN is effective in diagnosing injection-related sciatic nerve injuries, a common clinical occurrence (Pham et al., 2011). Electrophysiological studies, including nerve conduction studies and electromyography, are also essential for assessing nerve function and informing treatment strategies.

Surgical intervention is often required for patients with severe nerve damage, especially in cases of complete nerve laceration or severe compression. Current guidelines advocate for early surgical exploration when there is evidence of complete nerve injury or persistent symptoms despite conservative treatment (Shermetaro et al., 2023). Shermetaro emphasizes that timely intervention can significantly improve functional outcomes, with nearly 75% of patients achieving partial recovery when the nerve remains intact. Surgical techniques may include direct nerve repair, nerve grafting, or decompression, depending on the specific injury (John, 2021).

Rehabilitation is a crucial component of recovery from sciatic nerve injury. A multidisciplinary team, including physical and occupational therapists, should develop a personalized rehabilitation program to address each patient's specific needs. Exercise therapy has been shown to improve functional recovery and quality of life. Additionally, electrotherapy may provide symptom relief and enhance recovery, as highlighted by Goulios et al. in their review of evidence-based physiotherapy practices (Goulios et al., 2021). Continuous monitoring and adjustment of rehabilitation strategies are essential to optimize recovery outcomes.

Besides, long-term follow-up is essential for patients recovering from sciatic nerve injuries. Regular assessments should be conducted to monitor for potential complications, such as chronic pain or functional deficits. Liu et al. report that traumatic sciatic nerve injuries occur in approximately 3.3% of patients with acetabular fractures, emphasizing the importance of vigilant follow-up in this population (Liu et al., 2022). Incorporating patient-reported outcomes and functional assessments can provide valuable insights into the effectiveness of treatment strategies and guide future interventions.

The existing study identifies various therapeutic strategies to enhance nerve regeneration and functional recovery. Zhang et al. (2022) demonstrated that delivering Wnt inhibitors through engineered polymeric microspheres promotes nerve regeneration after sciatic nerve crush injuries. Additionally, Tanshinone IIA has shown promise in mitigating nerve damage and promoting regeneration following crush injuries (Wang et al., 2013). Continued research into innovative treatment modalities is essential for advancing the management of sciatic nerve injuries.

On the other hand, neurologists are instrumental in the initial diagnosis and management of sciatic nerve injury. Through a detailed history and physical examination, they can pinpoint the presence and location of nerve damage. Neurologists employ specialized tests like electromyography (EMG) and nerve conduction studies (NCS) to confirm the diagnosis further and assess its severity. EMG evaluates the electrical activity of muscles and nerves, while NCS measures the speed and strength of nerve signals. This combined approach allows for a precise understanding of the injury, informing the treatment plan. In terms of medication management, neurologists focus on alleviating symptoms like pain, inflammation, and muscle spasms. Nonsteroidal anti-inflammatory drugs (NSAIDs) are often used to reduce inflammation and pain in the acute phase. (NSAIDs) are commonly used to manage pain and inflammation associated with sciatic nerve injuries, and commonly prescribed NSAIDs, including Diclofenac, are typically given at 50 mg orally two to three times a day, with a maximum of 150 mg per day (Abbaszadeh et al., 2024).

Anticonvulsant medications can be particularly effective in managing neuropathic pain, a chronic and often debilitating symptom of sciatic nerve injury. For example, Gabapentin can be combined with NSAIDs or acetaminophen for increased pain relief with an initial dose of 300 mg orally on the first day, which can be increased to 600 mg on the second day (Heinzel et al., 2020). Additionally, muscle relaxants may be prescribed to address muscle spasms that can exacerbate pain and limit movement (Weyker et al., 2016). When medications fail to control pain associated with sciatic nerve injury adequately, neurologists may introduce interventional procedures like nerve blocks. These targeted injections deliver a localized dose of anesthetic and corticosteroid medication directly to the affected nerve or surrounding tissues. The anaesthetic component provides immediate pain relief by interrupting nerve signals, while corticosteroids offer longer-term benefits by reducing inflammation around the injured nerve. Nerve blocks can be a valuable tool for managing both acute and chronic pain associated with sciatic nerve injury (Buys et al., 2010).

Anesthesiologists are vital in managing pain and ensuring patient comfort during interventional procedures. Ultrasound-guided nerve blocks have become increasingly popular, allowing for precise localization of the sciatic nerve and reducing the risk of procedural injury (Eker et al., 2010). This approach offers significant benefits by improving pain management and reducing the risk of nerve injury. Accurate identification of the sciatic nerve during surgery is paramount. As Zhang et al. noted, identifying and exploring the nerve can prevent entrapment and allow for neurolysis if necessary. Besides, neurosurgeons manage surgical interventions for sciatic nerve injuries, particularly in cases of complete nerve tears or significant damage (Gollwitzer et al., 2017). The outlook for patients with complete sciatic nerve lacerations is often grim, and there is a lack of robust data on practical treatment approaches. Despite the challenges, surgical interventions like neurolysis and nerve grafting have shown potential, mainly when performed promptly (John et al., 2021).

While neurologists provide crucial expertise in diagnosing the neurological aspects of sciatic nerve injury, physiatrists offer a complementary perspective. Their focus lies in evaluating the injury's impact on a patient's physical function. Through a comprehensive physical examination, physiatrists assess muscle strength, sensation, reflexes, and range of motion in the affected leg and foot. This functional evaluation helps to determine the severity of the injury and identify any limitations caused by nerve damage. Additionally, physiatrists may utilize diagnostic imaging techniques like X-rays or MRIs to rule out other potential causes of pain, such as disc herniation or spinal stenosis. Spinal stenosis can cause a variety of symptoms, including low back pain, neurogenic claudication, and leg pain. These symptoms may worsen with activities like walking or standing (Silaban & Kadar, 2021). Furthermore, all symptoms can often lead to a misdiagnosis of chronic nonspecific low back pain, especially when imaging studies do not show significant structural issues. Xu and Hu pointed out that demyelination and fibrosis associated with severe stenosis can worsen low back and leg pain, making the clinical picture more complex (Xu & Hu, 2021). Additionally, the clinical features of lumbar spinal stenosis can vary significantly between patients. Kuramoto et al. highlighted that symptoms may improve with spinal flexion and worsen with extension, a characteristic that can aid in differentiating spinal stenosis from other causes of lumbar pain (Kuramoto et al., 2011). Managing CNL pain in cases of spinal stenosis and sciatic nerve injury requires a multidisciplinary approach. Treatment options may include conservative measures like physical therapy, pain management, and lifestyle changes, as well as surgical interventions when conservative treatments are ineffective. Zhang et al. emphasized the effectiveness of dynamic fixation and decompression techniques for treating degenerative lumbar spinal stenosis, which can alleviate symptoms and improve quality of life (Zhang et al., 2018).

In some cases, they may collaborate with neurologists by utilizing electrodiagnostic testing (EMG/NCS) to obtain a more comprehensive picture of nerve function. This collaborative approach between neurologists and physiatrists ensures a thorough diagnosis of sciatic nerve injury, encompassing both the neurological underpinnings and the functional limitations it imposes (Jones et al., 2018).

Besides, physical therapists play a crucial role in the rehabilitation of patients with sciatic nerve injuries by designing and implementing exercise programs aimed at improving strength, flexibility, and range of motion. These exercise programs are tailored to address the specific needs of individuals recovering from sciatic nerve damage and play a vital role in promoting nerve regeneration and functional recovery. Research studies have underscored the crucial role of exercise therapy in promoting sciatic nerve regeneration after traumatic injury. Specifically, studies have shown that endurance training significantly improves nerve regeneration, demonstrating the clear benefit of physical conditioning in facilitating nerve recovery (Ilha et al., 2008). Research has shown that both passive and active exercise modalities can significantly enhance muscle reinnervation following peripheral nerve injury. They strategically incorporate a combination of endurance, resistance, and task-oriented exercises. This comprehensive approach addresses various aspects of nerve regeneration and muscle recovery, promoting overall functional improvement. Physical therapists can identify and address individual needs and limitations. This personalized approach ensures that the exercise program effectively targets the specific deficits caused by the nerve injury, maximizing the potential for complete recovery (Bonetti et al., 2015). Ultrasound-guided interventions, such as perineural steroid injections, can serve as valuable complements to exercise therapy in managing sciatic nerve injuries. These injections offer targeted pain relief, which can significantly improve patient comfort and facilitate participation in rehabilitation exercises. By reducing pain and inflammation around the injured nerve, ultrasound-guided interventions can create a more conducive environment for nerve healing and functional recovery, ultimately enhancing the effectiveness of exercise therapy (Wang et al., 2013).

Other than that, occupational therapists conduct in-depth assessments of patients' functional abilities, identifying specific limitations and challenges faced in daily living activities. This comprehensive evaluation allows for a tailored treatment plan that addresses individual needs. Based on the assessment findings, occupational therapists develop personalized treatment plans that target specific functional deficits. This ensures that the rehabilitation program focuses on the most relevant skills and activities, maximizing the potential for regaining independence and improving quality of life. Occupational therapists work closely with patients to identify and address specific challenges encountered in daily activities such as self-care, dressing, work, and leisure pursuits. They provide targeted interventions and training to restore functional skills and promote independence in these areas (Galanakos et al., 2011). Occupational therapy plays a vital role in the recovery process for individuals with sciatic nerve injuries. Therapists assess patients' functional limitations in daily activities and design personalized treatment plans. They recommend adaptive equipment and train individuals in their use, empowering patients to perform tasks independently and safely. This not only improves functional independence but also boosts self-confidence and overall well-being (Price et al., 2011). Occupational therapists do not work in isolation. They collaborate closely with other healthcare professionals like physical therapists, physicians, and rehabilitation specialists. This multidisciplinary team approach ensures coordinated care that addresses all aspects of the patient's recovery, from physical function to daily activities and mental well-being. By sharing expertise in functional assessment, activity modification, and adaptive strategies, occupational therapists play a vital role in optimizing patient outcomes and supporting a successful recovery journey (Kim et al., 2024).

1.6 Emerging trends in sciatic nerve injury rehabilitation

The management of sciatic nerve injuries has witnessed a paradigm shift with the integration of various innovative technologies. This multidisciplinary approach leverages telehealth, virtual reality (VR), and biofeedback to enhance patient outcomes in pain management, functional recovery, and overall quality of life. Here, we explore the unique contributions of each technology, such as telehealth, virtual reality and biofeedback.

While the literature directly examining synchronous telehealth interventions for low back pain, a common co-morbidity with sciatic nerve injury, is limited, this technology holds promise for improving access to care and facilitating timely referrals to non-surgical specialists. Telehealth platforms can promote the adoption of underutilized non-pharmacological interventions such as exercise therapy and patient education (Bise et al., 2023; Rezaian et al., 2020). Telehealth offers a game-changer for sciatic nerve injury rehabilitation (Jones et al., 2018). Patients can receive specialized care remotely, connecting with therapists and physicians from home. Virtual consultations allow for personalized treatment plans, progress monitoring, and optimized rehabilitation. This accessibility empowers patients, promotes engagement, and ensures treatment continuity, even when in-person visits are difficult (Cramer et al., 2019).

Other than that, virtual reality (VR) technology is emerging as a promising adjunct therapy for managing pain associated with sciatic nerve injury. Studies have shown its efficacy in both acute and chronic pain scenarios. For example, Kim et al. (2023) reported significant pain relief and functional improvement in a patient with chronic neuropathic pain following surgery using VR gaming interventions. This case highlights the potential of VR as a complementary approach to traditional pain management strategies for sciatic nerve injury (Sørensen et al., 2023). Building upon the previous example, another study explored the effectiveness of VR for sciatica pain relief. The findings suggest VR may be highly effective in managing this pain through two potential mechanisms; activation of pain-relieving neurotransmitter systems which VR could stimulate the release of endogenous pain-relieving chemicals within the brain and distraction that reduces nociceptive processing when the immersive nature of VR may provide a distraction, reducing the processing of pain signals in the central nervous system (Austin et al., 2012). Expanding on the analgesic potential of VR, research has explored its use in managing neuropathic pain for individuals with spinal cord injury (SCI). These studies have yielded promising results, demonstrating VR's ability to reduce neuropathic pain intensity through both immersive and non-immersive applications. This suggests that VR may be a versatile tool for pain management across various neurological conditions (Pourmand et al., 2018).

The previously discussed advancements in telehealth and VR offer exciting possibilities for sciatic nerve injury rehabilitation. However, their potential can be further amplified through integration with biofeedback technology. Biofeedback provides real-time physiological data, such as muscle activity, which can be crucial for optimizing rehabilitation (Yang et al., 2023). This is how this synergy could benefit patients. Firstly, VR environments can be coupled with biofeedback mechanisms to create a dynamic training platform. Imagine a VR scenario where a patient visualizes themselves performing a specific exercise (Lier et al., 2023). Biofeedback data on muscle activity could then be displayed within the VR environment, providing real-time feedback on their form and effort. This can help patients learn to modulate their response to pain or improve motor control through visual and sensory cues (Kulkarni et al., 2018). Then, telehealth platforms can leverage biofeedback to enhance remote monitoring and patient engagement. For instance, biofeedback sensors could be incorporated into home exercise programs, allowing therapists to remotely monitor a patient's muscle activity and provide feedback during virtual consultations (Schoenecker, 2020).

In conclusion, a multidisciplinary approach involving telehealth, virtual reality, and biofeedback is essential for the successful treatment of sciatic nerve injury. This integrated approach addresses immediate concerns and promotes long-term recovery and functional restoration. As research continues to uncover new therapeutic targets and strategies, the outlook for patients with sciatic nerve injuries remains hopeful.

1.7 Challenges and future directions

Successful rehabilitation following sciatic nerve injury hinges on patient compliance with treatment protocols. However, pain, discomfort, and the time commitment required by rehabilitation exercises can be significant barriers to adherence (Corrêa et al., 2022; Dove et al., 2023). While conservative management offers benefits, treatment options for sciatic nerve injury can become limited, especially when conservative approaches fail, and surgery becomes a consideration (Trelle et al., 2007). Despite advancements in surgical techniques, achieving complete recovery, particularly for extensive nerve damage, remains a challenge. Additionally, the effectiveness of conservative therapies like physiotherapy in improving long-term outcomes for most patients is inconclusive. These limitations highlight the critical need for further research and development of novel treatment strategies for sciatic nerve injuries (Turkman et al., 2023). Optimizing recovery after sciatic nerve injury is complex due to significant individual variability. Factors like injury cause, severity, age, overall health, and even a patient's inflammatory response can significantly influence healing speed and extent. This variability makes predicting outcomes and tailoring treatments a challenge (Dupépé et al., 2019).

2.0 CONCLUSIONS

Sciatic nerve injuries present a complex challenge, and achieving optimal functional recovery necessitates a multidisciplinary approach that leverages the expertise of various healthcare professionals. This collaborative effort is crucial for maximizing patient outcomes. Different professionals bring their unique skill sets to the table. Physical therapists design exercise programs to promote nerve regeneration and muscle recovery. Occupational therapists assess functional limitations and recommend adaptive strategies to improve daily living activities. Physicians provide medication management and monitor overall health. This collaborative assessment ensures a holistic approach that addresses all aspects of recovery. With input from various specialists, a tailored treatment plan can be created that addresses the specific needs and goals of each patient. This personalized approach optimizes the likelihood of achieving the best possible functional recovery. Collaboration fosters clear communication between healthcare professionals, ensuring everyone involved is on the same page regarding the patient's progress and treatment goals. This continuity of care creates a seamless rehabilitation journey for the patient.

Acknowledgements: No grant available for this study.

Author Contributions: NA conceptualized the study outline and wrote the initial manuscript; MD, ZE and HM reviewed and edited the manuscript. All author approved and acknowledged the final version of the manuscript.

Conflicts of Interest: The authors declare no conflict of interest.

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