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SCIATIC NERVE INJURY: LEGAL CASES

Siyatik Sinir Yaralanması: Adli Olgular

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ABSTRACT

Objective: Sciatic nerve (SN) injuries may occur as a result of traumatic events or in result of medical interventions during the injections. This study was carried out to determine the causes of sciatic nerve injury which was subject to judicial scrutiny.

Method: 16,827 cases were analyzed between the years 2002 and 2011 which were sent to Department of Forensic Medicine of Atatürk University were evaluated retrospectively. A total of 21 SN injury cases were evaluated

Results: The reason of SN injury were in 10 cases (47.6%) intramusculer (IM) injection. In EMG of these 10 cases (47.6%) were identified as tibial-peroneal nerve injury. Physical examinations showed foot drop in 7 cases (33.3%) and dorsiflexion or plantar flexion weakness in 8 cases (38.1%).

Conclusion: More than half of the cases of SN injury were due to IM injection. For that reason, IM injection should be made by authorized medical staff and these staff should be well educated.

Key Words: Sciatic nerve injury; intramuscular injection; foot drop; legal case

ÖZET

Amaç: Siyatik sinir (SN) yaralanması travmatik olay sonucu olarak ya da enjeksiyon esnasında tıbbi müdahale sonucu olabilir. Bu çalışmada adli incelemeye konu olan siyatik sinir yaralanmaları ve nedenlerini belirlemek amacıyla yapıldı.

Yöntemler: 2002-2011 yılları arasında Atatürk Üniversitesi Adli Tıp Anabilim Dalında düzenlenen 16.827 olguya ait raporlar retrospektif olarak incelendi. Toplam 21 SN yaralanması belirlenerek olgular değerlendirildi.

Bulgular: SN yaralanması 10 (%47.6) olguda intramüsküler (IM) enjeksiyona bağlıydı. EMG'de 10 (%47.6) olguda tibial-peroneal sinir hasarı saptandı. Fiziksel muayenede 7 (%33.3) olguda düşük ayak, 8 (%38.1) olguda dorsifleksiyon veya plantar fleksiyon kaybı saptandı.

Sonuç: SN hasarı olan olguların yaklaşık yarısı IM enjeksiyona bağlı gelişmiştir. Bu sebeple SN yaralanması gelişmemesi için IM enjeksiyonlar yetkili sağlık personelince yapılmalı ve sağlık personeli bu konuda eğitilmelidir.

Anahtar Kelimeler: Siyatik sinir hasarı; intramuskuler enjeksiyon; düşük ayak; adli vaka.

Introduction

The Sciatic Nerve (SN) is the largest nerve in the body. It is composed of the peroneal and tibial branches. SN injury is a relatively uncommon injury caused by a variety of mechanisms (1). The most commonly described causes include inadvertent injections, iatrogenic injuries (usually related to hip surgery), hip fractures, contusions and penetrating trauma, predominantly in the military setting and often involving gunshot wounds (2-4)

Historically, complications from intramuscular (IM) injection were frequent and largely attributed to inadequate knowledge of the procedure and improper technique (5-7). Despite advances in knowledge about IM injection, preventable complications still occur (8). One of the most serious complications is injury to the SN (9).

Our study describes the epidemiologic features and outcome of 21 cases of SN injuries evaluated in our centre, mostly resulting from injection.

Methods

16,827 cases, reported at the Department of Forensic Medicine of Atatürk University, were analysed between the years 2002 and 2011, retrospectively. Sciatic nerve injury was investigated in 21 judicial cases (21/16,827; 1.25‰). Cases were examined for demographic data such as gender, age, type of event, physical examination findings and electromyography (EMG).

In all patients; the standard motor (peroneal, tibial) and orthodromic sensory nerve (sural) conductions were studied in the lower limbs using conventional techniques with EMG equipment (Keypoint, Dantec, Denmark). Two motors (peroneal and tibial nerves), one sensory (right and left sural nerve) nerve conduction studies in the lower extremities were performed on all patients. The sural SNAPs were recorded behind the lateral malleolus, with stimulation applied 14cm proximal to the recording electrode. Distal stimulations were made 10cm. proximal in the lower limbs. Proximal stimulation was made at the neck of the fibula for the common peroneal nerve, at the popliteal fossa for the tibial nerve. If a response was abnormal for any of the explored nerves, the nerve conduction study was repeated. Measurements were taken at temperatures of 32◦C for the lower limbs. Sciatic nerve injury was diagnosed when one nerve was affected. Findings were evaluated using IBM SPSS 20 statistical software.

Results

Of the cases, 19 (95%) were male and 2 (5%) were female. Median age was 34±16.4 years (min 12-max 66). The reasons for SN injury were as follows: injection in 10 cases (47.6%), stab wounds in 5 cases (23.8%), gunshot wounds in 4 cases (19%) and the event type was not recorded in 2 cases (9.5%) (Table 1). Among 10 (47.6%) cases of SN injury due to IM injection, injections were applied by nurses in 2 (9.5%) cases, medical staff responsible from the injection was not known for the remaining cases. All the gluteal injections were done in the dorsogluteal site. In EMG reports, 10 cases (47.6%) were identified as tibial-peroneal nerve injury, 4 cases (19%) were identified as tibial nerve injury, 5 cases (23.8%) were identified as peroneal nerve injury and 2 cases (9.5%) were found to be normal (Table 2). Physical examinations showed a foot drop in 7 cases (33.3%), dorsiflexion or plantar flexion weakness in 8 cases (38.1%), normal in 2 cases (9.5%) and physical examinations were not recorded in 4 patients (19%).

Discussion

Our study demonstrates that in approximately half of the cases (47.6%) with SN injury the cause was IM injection. Iatrogenic injury to the SN resulting from a misplaced gluteal IM injection is a persistent worldwide problem affecting patients in economically rich and poor countries alike, albeit with a different spectrum of affected individuals (10). In economically poorer countries, children make up the greatest number of reported cases (10). In our study, 28.6% were in the 21-30 year age group. In this group, the majority of sciatic nerve injuries (19.0%) were due to stab wounds. Studies have revealed that causative factors of SN injury may be mechanical or chemical, including the volume and characteristics of the medication, and location of the injection (8, 11). The anatomical proximity of the injection to the nerve is considered the single most crucial factor in determining the degree of damage, with injection directly into the nerve being the most destructive mechanism (12-14). Anatomical variations in the course and division of the SN may be a factor in some cases (15, 16).

Damage to the SN can produce a range of effects, from minor motor and sensory abnormalities to complete paralysis and causalgia (3, 14, 16, 17), which is excruciating and incapacitating pain that is resistant to analgesia (18). Typical manifestations are foot drop, loss of toe flexion and extension, troublesome dysesthesias, persistent leg and foot pain, and loss of protective foot sensitivity (5, 19). Affected children may be unable to walk or crawl; a significant proportion present with foot drop (20, 21). Affected patients typically experience immediate pain radiating down the limb, with weakness and numbness evolving more gradually exacerbated by secondary scarring (22). In our study, physical examination showed foot drop in 7 cases (33.3%), dorsiflexion or plantar flexion weakness in 8 cases (38.1%), normal in 2 cases (9.5%), and physical examination was not recorded in 4 patients (19%).

Table 1. Age distribution of cases by type of event

Age group	Injection	Stab-wound	Gunshot-wound	Undefined
	N (%)	N (%)	N (%)	N (%)
≤10	1 (4.8)			
11-20	2 (9.5)		1 (4.8)	
21-30		4 (19)	2 (9.5)	
31-40	1 (4.8)	1 (4.8)	1 (4.8)	1 (4.8)
51-60	4 (19)			
60≥	2 (9.5)			
Undefined				1 (4.8)
Total	10 (47.6)	5 (23.8)	4 (19.0)	2 (9.6)

The common fibular component of the sciatic nerve is more often affected because of its posterolateral position and smaller amount of supporting connective tissue (23). However, according to EMG reports in our study, 10 cases (47.6%) were identified as tibial-peroneal nerve injury, 4 cases (19%) were identified as tibial nerve injury, 5 cases (23.8%) were identified as peroneal nerve injury and 2 cases (9.5%) were found to be normal.

Depending on the mechanism and extent of injury, some spontaneous recovery may occur. However, residual deficit and discomfort remain in most cases, and severe effects cause devastating disability (18, 24). In our study, although 9.5% cases were detected normal EMG findings, the rest of the others had different EMG findings of the SN injury.

The potentially hazardous dorsogluteal site is still widely used for IM injection of drugs (8). Use of the dorsogluteal region not only risks damaging the sciatic nerve, although it also is not a good site for IM injection (10). In one study of 100 consecutive adults, the depth of adipose tissue in this region was beyond the 35mm limit of a 21 gauge (green) needle in 43% (25). In another study of 50 hospitalised patients receiving an IM injection in the 'upper outer quadrant' of the buttock with a 30mm long needle, injections were IM in only 32% of patients (8% in women); most were subcutaneous (26). In the gluteal region, the ventrogluteal area is safer, with only one reported significant complication (10, 27). This site has less subcutaneous fat (26), offers the combined thickness of gluteus medius and minimus muscles, has relatively minor nerves and blood vessels and can be accessed with the patient on his⁄her side or lying supine (8). Cook and Murtagh recommended this site for use in the paediatric age group 2–14

Table 2: The distribution of cases by type of event and nerve damage in EMG.

Type of Event	Tibial and peroneal	Tibial	Peroneal	Normal
	N (%)	N (%)	N (%)	N (%)
Undefined	1 (4.8)		1 (4.8)	
Injection	5 (23.8)	2 (9.5)	2 (9.5)	1 (4.8)
Stab-wound	2 (9.5)		2 (9.5)	1 (4.8)
Gunshot-wound	2 (9.5)	2 (9.5)		
Total	10 (47.6)	4 (19)	5 (23.8)	2 (9.6)

years (28). This new injection site may be taught to medical staff leading to less SN damage.

Limitations:

The extent of recovery depends on the severity of the initial injury. Many patients fail to make a full recovery, even with the benefit of microsurgical repair (15, 20). In our study, we were unable to uncover any data about microsurgical treatment of the cases.

In our study, more than half of the cases of sciatic nerve injury were due to IM injection. For that reason, IM injection should be made by authorised and well educated medical staff.

KAYNAKLAR

1. Weil YA, Pearle AD, Palladas L, Liebergall M, Mosheiff R. Long-term functional outcome of penetrating sciatic nerve injury. The Journal of Trauma. 2008;64:790-5.
2. Kim DH, Murovic JA, Tiel R, Kline DG. Management and outcomes in 353 surgically treated sciatic nerve lesions. Journal of Neurosurgery. 2004;101:8-17.
3. Kline DG, Kim D, Midha R, Harsh C, Tiel R. Management and results of sciatic nerve injuries: a 24-year experience. Journal of Neurosurgery. 1998;89:13-23.
4. Vayvada H, Demirdöver C, Menderes A, Yılmaz M, Karaca C. The functional results of acute nerve grafting in traumatic sciatic nerve injuries. Ulus Travma Acil Cerrahi Derg. 2013;19:109-14.
5. Hanson DJ. Acute and chronic lesions from intramuscular injections. Hospital Formulary Management. 1966;1:31-4.
6. Ling CM, Loong SC. Injection injury of the radial nerve. Injury: The British journal of Accident Surgery. 1976;8:60-2.
7. Muller-Vahl H. Adverse reactions after intramuscular injections. Lancet. 1983;321:1050.
8. Small SP. Preventing sciatic nerve injury from intramuscular injections: literature review. Journal of Advanced Nursing. 2004;47:287-96.
9. Roosen NK, Kline DG. Peripheral nerve injury. In Prognosis of Neurological Disorders. Evans RB, Baskin DS, Yatsu FM, editor. New York: Oxford University Press; pp. 394-426, 2000.
10. Mishra P, Stringer MD. Sciatic nerve injury from intramuscular injection: a persistent and global problem. International Journal of Clinical Practice. 2010;64:1573-9.
11. Bramhall RJ, Deveraj VS. Traumatic sciatic nerve palsy after gluteal injection. Eur J Plast Surg. 2011;34:137-8.
12. Gentili F, Hudson A, Kline DG, Hunter D. Peripheral nerve injection injury: an experimental study. Neurosurgery. 1979;4:244-53.
13. Gentili F, Hudson AR, Hunter D. Clinical and experimental aspects of injection injuries of peripheral nerves. The Canadian Journal of Neurological Sciences Le journal Canadien des Sciences Neurologiques. 1980;7:143-51.
14. Ong MJ, Lim GH, Kei PL. Clinics in diagnostic imaging (140). Iatrogenic sciatic nerve injury secondary to intramuscular injection. Singapore Med J. 2012;53:551-4.
15. Senes FM, Campus R, Becchetti F, Catena N. Sciatic nerve injection palsy in the child: early microsurgical treatment and long-term results. Microsurgery. 2009;29:443-8.
16. Bağış S, Adam M, Leblebici ÜB, Güven AZ, Çeliker AR. Sciatic nerve injury due to intramuscular injection: electrophysiological findings and one-year follow-up. Turk J Med Sci. 2012; 42: 913-7.
17. Preston D, Logigian E. Iatrogenic needle-induced peroneal neuropathy in the foot. Annals of Internal Medicine. 1988;109:921-2.
18. Horowitz SH. Iatrogenic causalgia. Classification, clinical findings, and legal ramifications. Archives of Neurology. 1984;41:821-4.
19. Pickett JB. Localizing peroneal nerve lesions. American Family Physician. 1985;31:189-96.
20. Pandian JD, Bose S, Daniel V, Singh Y, Abraham AP. Nerve injuries following intramuscular injections: a clinical and neurophysiological study from Northwest India. JPNS. 2006;11:165-71.
21. Tak SD, Dar GN. Halwai MA, Mir MR. Post-injection nerve injuries in Kashmir: a menace overlooked. Eur J Res Med Sci. 2008;13:244-7.
22. Streib EW, Sun SF. Injection injury of the sciatic nerve: unusual anatomic distribution of nerve damage. European Neurology. 1981;20:481-4.
23. Sunderland S. The relative susceptibility to injury of the medial and lateral popliteal divisions of the sciatic nerve. The British Journal of Surgery. 1953;41:300-2.
24. Clark K, Williams PE, Jr., Willis W, McGavran WL, 3rd. Injection injury of the sciatic nerve. Clinical Neurosurgery. 1970;17:111-25.
25. Nisbet AC. Intramuscular gluteal injections in the increasingly obese population: retrospective study. BMJ. 2006;332:637-8.
26. Chan VO, Colville J, Persaud T, Buckley O, Hamilton S, Torreggiani WC. Intramuscular injections into the buttocks: are they truly intramuscular? European Journal of Radiology. 2006;58:480-4.
27. Muller-Vahl H. Isolated complete paralysis of the tensor fasciae latae muscle. European Neurology. 1985;24:289-91.
28. Cook IF, Murtagh J. Ventrogluteal area – a suitable site for intramuscular vaccination of infants and toddlers. Vaccine. 2006; 24:2403-8.