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Sciatic injection injuries in adults: Is dipyrone a foe to nerve?

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Abstract

Sciatic nerve injury is an iatrogenic and rare complication of intragluteal injections. There are a few reports on the subject in adults. Data were collected for eight years from patients referred to our electroneuromyography laboratory. Twenty-eight adult patients (20 males and 8 females) diagnosed with post-injection injuries were identified by history, clinical and electrophysiological findings. A complete history was available in 26, all reporting sudden pain and subsequent radiation of pain and numbness in the distribution of the sciatic nerve. In 17 of the 28 the common peroneal portion was affected more severely than the posterior tibial portion; in seven the opposite. Twenty-three patients were able to name the injected drug, and dipyrone (metamizole) specifically, as the responsible agent in 11 of them (47,8%). Injection neuropathy is not specific to children only alone and according to our data special attention is needed during intragluteal injections for thin men and/or usage of dipyrone.

Key words: injection neuropathy; sciatic injury; adults; dipyrone; metamizole.

Introduction

Sciatic nerve injury is an iatrogenic and rare complication of intragluteal injections. It can result in neurological sequelae varying from light paresthesia to more severe sensory disturbances, pain and muscular paralysis. Our current understanding suggests that intraneural injection is the main reason for injection injuries (Villajero and Pascual, 1993; Akyüz and Turhan, 2006). Children are more prone to sciatic injury than adults because of their thin fat pad and less muscle bulk of buttocks. Besides the thickness of fat pad and muscle bulk, the injection direction and the nature of the injected substance also have been implicated (Hudson, 1984). Many of the injectable substances has have been implicated in sciatic injection injury, but the most frequent offenders are antibiotics and analgesics, probably because they are used oftener more often and the buttock is usually the site chosen for injecting them (Brown, 1971). In contrast to several published studies about injection injuries in children, there is just one such report for adults, plus a few with including adults and children but, that lack many details (Villajero and Pascual, 1993; Akyüz and Turhan, 2006; Daniel *et al.*, 2006). Therefore we aimed our aim was to explore the clinical and electrophysiological characteristics of injection injuries in adults.

Methods and Materials

From January 1, 2000, to January 1, 2008 data were collected from outpatients and inpatients prospectively from outpatients and inpatients referred to our ENMG laboratory. Patients were required to have a history of gluteal injection, complaints, and abnormal ENMG findings attributable to sciatic injury to be included in the study. Twenty-eight patients who were diagnosed with 'isolated sciatic nerve injury due to intragluteal injection' were included. Patients were asked to find out the name of injected drug, if they did not already know it.

Patients were excluded if they were younger than 18, had negative ENMG findings, had polyneuropathy including in the lower extremities, had lumbosacral radiculopathy at L4, L5 and S1 levels or had severe lower extremity edema. A diagnosis of polyneuropathy, radiculopathy or lumbosacral plexopathy was made through the history, neurological findings and ENMG findings. These patients were then excluded even if they were thought to have coincident injection neuropathy.

As the a first step a history of injection was taken from every patient. The neurological examination consisted of motor, sensory and reflex examinations of the lower limbs. The sensory examination

consisted of routine testing of touch, pain and vibration sensation. Motor deficits were documented for each of the lower limbs.

A routine sciatic nerve injury ENMG protocol was administered to every patient including:

1) Sensory conduction studies of sural and superficial peroneal nerves on both sides
2) Motor conduction studies of posterior tibial and common peroneal nerves on both sides
3) Concentric needle ENMG examinations of the long short head of the biceps femoris, tibialis anterior, peroneus longus and extensor digitorum brevis; and the short long head of biceps femoris, gastrocnemius and abductor hallucis muscles on the effected affected side (In suspected cases the needle ENMG was widened to include relevant muscles for exclusion of L4, L5 and S1 radiculopathy, polyneuropathy, lumbosacral plexopathy and isolated posterior tibial or common peroneal neuropathy).

The Ethics Committee of Mersin Medical Faculty approved the study protocol and the study was conducted according to principles established in the Declaration of Helsinki.

Results

Twenty eight patients [20 male (71%) and 8 female (29%)] who met the criteria of 'isolated sciatic nerve injury due to intragluteal injection neuropathy' were identified.

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Eight patients found to have coincident polyneuropathy, radiculopathy or lumbosacral plexopathy with injection neuropathy were excluded according to the history, neurological findings and ENMG findings.

Characteristics of patients included in the study are summarized in the table.

The mean age of patients was 47.17 [range 18-85 years; SD (standard deviation):19,02] and mean body-mass index (BMI) was 20.24 (range 14,6-26,9; SD: 2,52).

Twenty-six patients reported sudden pain at the injection site and subsequent radiation of pain and numbness in the distribution of the nerve whereas 21 described weakness. We could not obtain a reliable history of symptoms appearing after the injection from two of our the patients. Twenty-five patients (89%) had an interval of three months or less between the injection time and electrophysiological examination.

We classified the severity of damage in sciatic nerve portions into four categories as severe, moderate, mild or normal according to ENMG and clinical findings with the consensus of the two authors who together have a total of 23 years' experience in the field of ENMG and peripheral neuropathies (see table). In 17 of the 28 the common peroneal portion was affected more severely than the posterior tibial portion; in seven the opposite. Three patients had an equal amount of damage in two of the main portions.

Twenty-three patients were able to name the injected agent that caused the injury, whereas five could not (%18). Of these 23 the reported responsible agent was dipyrone (metamizole) for 11 of them (47.8%) (in one in combination with cefazolin) followed by diclofenac for four of them (in one in combination with diazepam). The probable responsible agents of sciatic injury are listed in the table 1.

As dipyrone was found to be the responsible agent in about half of the patients we extended our study to gain more information about the frequency of dipyrone and other injectable drug use in our area. We collected data from documentations of one government health center (30 random days in 2007) and from one of the two state hospital's emergency service in our city (10 random days in 2007) retrospectively. A total of 2,028 injections were recorded with antibiotics the most commonly injected drug group (51,9%), followed by analgesic-antipyretics (29,7%), steroids (4,1%), myorelaxants (3.3%) and antiemetics (3.0%). The percentage of dipyrone use was 8.2% in all and in the analgesic-antipyretic subgroup 27,9%.

Twelve patients were followed up with at least one subsequent electrophysiological and clinical examination. (When a patient had more than two ENMG and clinical evaluations the first and the last ones were taken into account). The interval between the first and the last ENMG and clinical evaluations was 10 to 40 months. Two of the 12 patients were found to be normal for tibial division, and one was found to be normal for the common peroneal division. Of the remaining affected divisions seven did not show any recovery at all and five of these seven were severely affected. Of the remaining 12, eight had one level recovery (e.g. from severe to moderate, or from moderate to mild, or from mild to normal) and four had further regression (at least two levels regression).

Discussion

Sciatic nerve injury is not a very rare condition even in civilized countries. For example in a study exploring the mechanisms, locations, surgical treatment methods and outcomes of sciatic nerve

Table 1

Demographical and clinical characteristcs of patients (ordered according to the injected drug)

No	Age	Gender	Time interval to ENMG (days)	BMI	Drug	Amount of Degeneration Peroneal/Tibial
1	20	M	30	22.2	Dipyrone	Mild/-
2	42	M	2200	21.0	Dipyrone	Severe/-
3	25	M	15	18.4	Dipyrone	Severe/ Severe
4	43	M	210	21.5	Dipyrone	Severe/ Mild
5	49	M	40	19.9	Dipyrone	Severe/ Moderate
6	63	F	40	21.7	Dipyrone	Moderate/ Mild
7	68	M	80	22.8	Dipyrone	Severe/ Moderate
8	32	M	60	19.0	Dipyrone	Severe/ Mild
9	41	M	30	16.7	Dipyrone	Mild/-
10	27	F	30	25.9	Dipyrone	Moderate/Mild
11	70	M	70	19.9	Dipyrone + Cefazolin	Mild/Moderate
12	64	M	22	18.7	Diclofenac Na	Mild/Moderate
13	45	M	40	19.5	Diclofenac Na	-/Mild
14	67	F	30	18.7	Diclofenac K	Mild/ Severe
15	85	F	25	19.1	Ketoprofen	Severe/Severe
16	39	F	35	19.1	Diclofenac Na + Diazepam	-/Mild
17	82	F	20	14.6	Lornoksikam + Unknown	Mild/-
18	33	F	41	26.9	Piroxicam + Gentamicin	Moderate/ Mild
19	62	M	180	19.6	Piroxicam + Thiocolchcoside	Moderate/Severe
20	56	M	56	20.3	Ampicilin + Sublactam	Mild/Moderate
21	18	M	30	20.8	Cefazolin	Severe/ Mild
22	31	F	90	21.1	Diazepam	Severe/-
23	65	M	15	19.6	Ranitidine	Moderate/Moderate
24	27	M	60	17.5	Unknown	Moderate/ Mild
25	25	M	25	18.6	Unknown	-/Moderate
26	61	M	300	23.4	Unknown	Severe/ Mild
27	48	M	40	20.9	Unknown	Moderate/ Mild
28	33	M	30	19.4	Unknown	Moderate/ Mild

F: Female; M: Male; ENMG: Electroneuromyography; BMI: Body-mass index.

injuries, injections were reported to be reason in 64 patients out of 175 with buttock-level, and out of 363 of all levels sciatic nerve injuries (Kim *et al.*, 2004). Nevertheless we did Since we could not find any reports with the main topic of adult injection neuropathies except for a other than one study published in 2006, so our study is most probably the second (Akyüz and Turhan, 2006).

Male predominance was remarkable in our patients. Men are probably more susceptible to injection injuries than women due to the lesser extent of fat layer over their muscles. Only two of our patients were overweight, others were with in the normal range or less. Our findings were compatible with the aforementioned study in terms of gender predominance and body mass index of patients (Akyüz and Turhan, 2006).

In our study group all of the patients who were able to recall the history of their injury reported sudden pain and subsequent radiation of pain and/or numbness in the distribution of the nerve. Twenty of these 26 described muscle weakness as well. Although they did not clearly state the percentages, the authors of the aforementioned study reported motor complaints to be more frequent than sensory among their patients. which This was incompatible with our results. Nevertheless, in both studies patients reported very high percentages of sensory and motor complaints in their history. In suspicious cases the a typical history of injection neuropathy can be crucial in distinguishing it from other neuropathies.

In many reports the peroneal portion of the sciatic nerve shown to be solely or more severely affected than the tibial portion most likely due to its lateral and superficial course (Pandian *et al.*, 2006). Our results were compatible with these data. However, in one-fourth of our patients the tibial portion was more severely affected than the peroneal. Accordingly, one should not always expect peroneal dominance of injury in all injection neuropathies.

We found that when the main portions of the sciatic nerve are severely damaged the recovery is difficult, and if present, is insufficient. This finding is also consisted with most of the previous reports (Pandian *et al.*, 2006).

In animal studies it is stated that the degree of nerve injury due to intrafasicular injections significantly varies depending on the specific agent injected. Penicillin, diazepam and cephalotin were found to be the most toxic agents in many (Gentili *et al.*, 1980; Gentili *et al.*, 1979). Dipyrone (metamizole sodium) is a structurally aminopyrine like pyrazolone derivate which have has analgesic, antipyretic, spasmolitic and sedative effects (Arellano and Sacristan, 1990). Although still widely used in many countries, it is not available in the United States of America and the United Kingdom because of its association with potentially life-threatening blood dyscrasias such as agranulocytosis. It is alcohol-soluble and isoosmotic to the body fluids. For us One of the most striking findings of our study was the proportion of dipyrone as the responsible agent for sciatic injury. The percentage of intragluteal dipyrone injection in all found to be 8.2 according to data coming from two large health centers in our area whereas it was the cause of sciatic nerve damage in almost half of our patients. Therefore, we conclude that intraneural injections of dipyrone could possibly be very toxic.

The limitations of this study should be carefully considered when interpreting results. We obtained data from patients who were referred to us, which in turn potentially creates a selection bias. This problem exists about the data coming from two health centers in the area as well. Although these data can provide some idea about the frequency of certain drugs used in intragluteal injections in our area, it is not reasonable to claim that our data definitely reflect the facts in the area. Data coming from epidemiological studies are needed to obtain these facts (proportions of related drugs) with certainty. Moreover, it is not possible to make reliable statements on the prognosis of injection neuropathies by referring to our data as the number of patients falling into this category is very low. Nevertheless, to our knowledge ours is the first report implicating the role of dipyrone in injection neuropathies.

In summary, although rare post-injection sciatic neuropathy in adults is uncommon compared to that of children, but can and does occur and attention is needed to prevent this iatrogenic mishap.' It appears that thin men have higher risk than others. Additionally, as we found dipyrone to be the responsible agent in about half of our patients we conclude that special attention is needed in preventing this iatrogenic mishap while injecting dipyrone intramuscularly.

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