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University of Zimbabwe

Injection-induced sciatic nerve injury in Nigerian children

OJ FATUNDE, JB FAMILUSI

Abstract

Objectives: A retrospective study of all children with a diagnosis of sciatic nerve injury managed at the University College Hospital, Ibadan, Nigeria over a 12 year period was carried out in order to determine predisposing factors to the nerve injury and highlighting practical preventive measures.

Design: The necessary data was collected from the case files of children seen at the hospital with a diagnosis of sciatic nerve injury, from 1988 to 1999.

Results: There were 27 children aged five months to 12 years with a diagnosis of sciatic nerve injury. Twenty (74%) of the children were aged five years or less. While seven patients (26%) presented within two weeks of development of foot drop consequent on intramuscular (IM) injection given on the buttock, 20 patients (74%) presented much later. Fever was the most common complaint for which the injection had been given. The identity of the drugs given was not known in 10 patients. In the remaining 17 patients drugs administered were specified and included Chloroquine, Novalgin, Paraldehyde, Procaine penicillin, and Sulfadoxine-Pyrimethamine. Most of the patients had received the injections in privately owned medical facilities where staff with minimal training are often allowed to administer IM injections.

Conclusion: It is suggested that the IM route for injection be strongly discouraged when a drug can be given by other routes. Only trained staff should be allowed to administer IM injections. Giving IM injections at sites other than the buttock maybe advantageous in children particularly those aged five years and below.

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Introduction

The sciatic nerve (roots L4,5,S1,2,3) enters the gluteal region through the lower part of the greater sciatic foramen and transverses the buttock under cover of the *gluteus maximus* in the interval between the greater trochanter of the femur and the tuberosity of the ischium. It ends half way down the back of the thigh by dividing into two branches — the common peroneal nerve which is lateral and the tibial nerve, which is medial.¹ It is recommended that intramuscular (IM) injections into the buttock be

placed in the upper outer quadrant, so as to avoid the sciatic nerve.² If the injection is given more medially than recommended or in the rare case of a sciatic nerve that is more laterally placed than usual, the sciatic nerve may be injured. Such injury mostly affects the more lateral fibres of the nerve, which are destined to form the common peroneal nerve in the thigh. The injury, therefore, produces a peroneal nerve palsy (foot drop)³ with or without sensory impairment.^{4,6} Injury to the sciatic nerve consequent on misplaced IM injection into the buttock should be rare when properly trained personnel administer such an

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injection. We have noted at our centre however, that such injury to the sciatic nerve is not uncommon and in most cases could have been avoided. We report here on 27 cases of sciatic nerve injury encountered in children admitted to paediatric wards or seen in the paediatric neurology clinic of the University College Hospital Ibadan, Nigeria, during an 11 year period. Our study objective was to determine the predisposing factors to the nerve injury, and highlight practical preventive measures.

Materials and Methods

The records of all patients with a diagnosis of sciatic nerve injury admitted to the paediatric wards or seen in the paediatric neurology clinic of the University College Hospital (UCH), Ibadan, Nigeria during the period 1988 to 1999 were reviewed. Note was taken of the age and sex of the patient at presentation, the presenting complaints, nature and site of the injection given, interval between injection administration and hospital presentation, findings on neurological examination, as well as the eventual outcome on follow up. Patients included in the study were mostly those that developed limb weakness and foot drop within hours (maximum 24 hours) of administration of an injection into the buttock. Two patients were neonates who were noted to have impaired dorsiflexion of the foot following discharge from the neonatal ward. Patients in whom there was a significant possibility of another diagnosis especially that of paralytic poliomyelitis were excluded from the study. All the patients were referred for physical therapy after the initial evaluation.

Results

There were a total of 27 children in the study; 16 males and 11 females, giving a male: female ratio of 1.5:1. The ages ranged from five months to 12 years with a mean of 4.1 years. Twenty of the patients (74%) were aged five years or less while seven were over five years old. The complaints for which IM injection had been given were stated as fever in 20 patients (74%), fever and seizures in two patients and other complaints such as bone pains, respiratory distress, neonatal sepsis and prematurity in the remaining patients. The medications injected into the buttock were not known in 10 patients. In the other 17 patients, chloroquine was implicated in seven cases (41%), Novalgin in seven cases (41%), Paraldehyde in two cases (12%) and other drugs such as procaine penicillin and Sulfadoxine-pyrimethamine. Some patients received more than one medication.

The IM injection had been given into the buttock on the same side as that of the foot drop in 15 cases (56%), in both buttocks in seven cases (26%), while the side was not specified in five cases (19%). As shown in Table II, 12 of the patients (44%) had received their injections at private clinics or hospitals, four patients at unspecified health facilities while three patients in each case had their injections at state government hospitals and university teaching hospitals. Two patients had injections at home given by

nurses living nearby and two others at local government maternity centres.

Table I: Intra-muscular medications implicated in 27 children with sciatic nerve injury.

Medication	No.	%*
Chloroquine	7	26
Novalgin	7	26
Paraldehyde	2	7
Procaine penicillin	1	4
Others	4	15
Unknown	10	37

*Some patients had more than one medication.

Table II: Health facility where injections were given that precipitated sciatic nerve injury in 27 children.

Institutions	No.	%
Home (Itinerary nurse)	2	7
Local Government Maternity Centre	2	7
Private Hospital	12	44
State Hospital	3	11
Mission Hospital	1	4
University Teaching Hospital	3	11
Not Stated	4	15
Total	27	100

The interval between development of foot drop and presentation in hospital ranged between five days and one year, with a mean of 60 days. Although only seven patients (26%) presented in the early stage within two weeks of development of foot drop, 22 patients were seen within two months. Table III shows that of those seven seen in the early stage, three presented with severe pain of the affected limb.

Table III: Presenting symptoms and signs in 27 children with sciatic nerve injury.

Signs and symptoms	Acute phase (n=7)		Late phase (n=20)	
	No.	(%)	No.	(%)
Foot drop	7	(100)	20	(100)
Pain	3	(43)	2	(10)
Hyperaesthesia	2	(29)	2	(10)
Sensory loss	2	(29)	3	(15)
Muscle wasting	2	(29)	10	(50)

The affected leg was usually held with the hip and knee joints flexed (Figure I). Two patients in each case had demonstrable sensory loss, hyperaesthesia and evidence of some muscle wasting. Among the 20 patients seen later in their illness, three had sensory loss (dorsum of the foot in two cases and lateral leg in the other) Figure II. Muscle wasting was documented in 10 of these 20 patients (50%). The areas of maximal muscle wasting were the thigh in two patients, the calf and lower leg in seven others, while the area was not specified in one case.

Figure I: Patient with right sided sciatic nerve injury in the acute phase, showing foot drop, evidence of pain and inability to stand on right leg.



Follow up was poor with only seven patients (26%) making further visits to the paediatric neurology clinic after the initial diagnosis. The period of follow up in the clinic ranged from two weeks to nine months. All the patients still had significant foot drop at follow up with a little improvement being recorded for one patient seen two months after the first visit.

Discussion

Most children in our environment are given IM injections at one time or another for fever (anti-malarials, antipyretics); seizures (anti-convulsants usually Paraldehyde) or infection (antibiotics usually penicillin or streptomycin). In addition, routine immunization with Diphtheria/Pertussis/Tetanus (DTP) vaccine is given via the IM route. While properly placed IM injections in the buttock should not normally cause sciatic nerve injury, damage occasionally results, especially in infants.^{7,8} This is why it is recommended that IM injections in little children should not be given into the buttock until the age of about three years when the child is

Figure II: Patient with right sciatic nerve injury of several months duration, showing mild muscle wasting of right leg, foot drop and loss of sensation over shaded area.



walking and the gluteal muscles are well developed.⁸ In the smaller child, alternative sites recommended for IM injections include the *vastus lateralis*, the *rectus femoris* and the deltoid muscles.⁹ There is very little risk of injury to major blood vessels or nerves using these sites. Some of the cases reviewed in this study involved children over the age of three years although most of them were aged five years or less. It would seem as if the danger to the sciatic nerve in the child older than three years is still considerable.

All the patients in this review presented with foot drop which is a consequence of the weakness of the dorsiflexors of the foot which are supplied by the common peroneal nerve.¹ In addition, some patients reported sensory impairment in the first few days following the injection, while direct observation of the same was made in two of the seven cases that presented within two weeks of the injection. Aberration of sensation in the form of hyperaesthesia, dysaesthesia, hyperalgesia mechanical and thermal allodynia following peripheral nerve injury have been reported both in human and animal models.^{4,6} In two of our cases, the pain was so severe as to require hospitalisation for several days. Suggestions for treating such pain have included intrathecal administration of ketamine.¹⁰ However, our patients improved eventually with the use of the common analgesia, paracetamol. Sensory loss was not systematically looked for in the patients under review but was recorded in five cases altogether. Areas affected were

the lateral aspect of the leg and/or parts of the dorsum of the foot. These are areas supplied by branches of the common peroneal nerve. Muscle wasting documented in 12 patients also occurred in muscles supplied by the common peroneal nerve. The main differential diagnosis of injection-associated sciatic nerve injury in our environment, is paralytic poliomyelitis. One of the main distinguishing factors, however, is that muscle weakness or paralysis in poliomyelitis is often very extensive in the early phase, often involving the loss of already acquired motor milestones. It is on recovery that paralysis may be localized to one or more limbs. In addition, although IM injections are known to facilitate paralysis in patients with acute poliomyelitis infection, such paralysis will not be immediate as is noted in that of sciatic nerve injury. Further, disorders of sensation already described in traumatic peripheral nerve injury, are not associated with paralytic poliomyelitis. Several other patients with a history and physical findings suggestive of sciatic nerve injury were encountered during this review but such cases were not included in the present analysis whenever there was even a remote possibility of paralytic poliomyelitis.

Prognosis of sciatic nerve injury depends on the magnitude of the trauma inflicted on the nerve.¹¹ In general, injection-induced trauma would be expected to carry a good prognosis since in most cases; the trauma is probably caused by the nearness of a hypertonic solution to the nerve rather than a direct trauma to the nerve. Sixteen of 21 neonatal cases reviewed by Ramos Fernandez *et al*⁷ obtained total recovery, with time of recovery ranging from four to 14 months. Follow up among our patients was poor, most of the cases seen in the clinic did not report back for subsequent scheduled visits. However, it is noteworthy that many patients had had their foot drop for several months before presenting in our hospital. This would indicate that total recovery (if it occurs) would probably take several months. In addition, the late presentation of many of our patients with foot drop suggests that there may be several more children with less pronounced muscle weakness going about the streets without reporting at all to a hospital. The problem of sciatic nerve injury is therefore probably much bigger than would be suggested by the number of patients reviewed in this study.

Most of the patients in this review had IM injections at privately owned health institutions. It is well known that many such institutions do not employ adequately trained nurses and often make use of auxiliary staff whose training is often deficient. The use of properly trained staff may be expected to reduce the incidence of wrongly placed IM injections. The most common condition for which IM injections were given to children in this review was fever. Where specified, the drug given was mostly chloroquine and the same drug was probably administered in the cases where specification was not given. Chloroquine is a drug that is known to be rapidly effective when given by the oral as well as the subcutaneous routes and IM administration was probably unnecessary in most of these cases. Also, antibiotics administered for presumed infections can usually

be given safely by the oral route. Most of the IM injections given to children in this review, therefore, were unnecessary and the undesirable side effect of sciatic nerve injury could have been avoided. Other workers have made the same observations about unnecessary IM injections.^{1,2}

It is suggested, in order to reduce the morbidity caused by IM injections given to children, that only properly trained staff should administer such injections. In addition, alternative sites such as the *vastus lateralis*, *rectus femoris* or the deltoid muscles should be used in children at least up to the age of five years. Whenever possible, routes other than IM (oral, subcutaneous) should be used for the administration of drugs in children.

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