CASE REPORT

An unfortunate injection

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SUMMARY

Intramuscular injection has been used to administer medications for more than a hundred years. However, despite our profession's long experience with intramuscular administration, preventable complications such as injection nerve palsies are still prevalent in developing countries. Injections account for one-fifth of all traumatic nerve injuries. These injuries largely occur due to indiscriminate use of intramuscular injections for treating common illnesses, frequently by unlicensed or undertrained practitioners administering unnecessary treatment to impoverished patients. The sciatic nerve is the most commonly injured, and frequently the resulting muscle weakness and associated disability are irreversible. This case report includes a video of a patient with foot drop 6 weeks after gluteal intramuscular injection. Such injuries can be prevented by proper awareness and training, the implementation of safer injection techniques, and quality assurance methods.

CASE PRESENTATION

A 35-year-old man presented to a community hospital with an 18-month history of chronic abdominal pain. The pain was epigastric, mild, and associated with occasional diarrhoea. After being admitted to the hospital, the patient was diagnosed with insulin-dependent diabetes mellitus (IDDM) and was started on subcutaneous insulin injections. His condition improved and he was discharged. However, after a brief respite, he experienced severe abdominal pain and presented to the Primary Health Centre (PHC) nearest to his village. He was given an intramuscular injection of an unknown substance into the left gluteal region to relieve the pain.

After receiving the intramuscular injection, the patient was unable to rise from a supine position and could not move his left leg. The patient returned to the same PHC 2 days later, where nothing was done for his left leg weakness, but he was given another intramuscular injection in the contralateral gluteal region. The patient was later admitted to the PHC for 30 days, but no therapeutic steps were taken to resolve his loss of mobility. There was no improvement in his condition. Six weeks after the injury, the patient presented to a tertiary care hospital with foot drop, mild paraesthesia and tingling sensations in the left leg. He provided no history of polio infection and did not have any weakness in other limbs or any associated sensory disturbance.

On examination, the patient had sustained significant weakness and was unable to dorsiflex his left foot. This phenomenon is known as 'foot drop' and can be clearly seen in the video ([video 1](#)).

The patient's condition worsened and the progression resulted in 'steppage gait', where the patient lifts his left knee higher than would usually be required to prevent the left foot dragging on the ground. Inspection of his left lower leg revealed significant muscle wasting with fasciculation in the sciatic nerve distribution (L4-S1), that is, the glutei and the hamstrings, sparing other muscles of the left leg supplied by the obturator and femoral nerves. Strength in these muscles was reduced to I/V for extension at the hip joint, flexion at the knee joint, dorsiflexion, inversion, and eversion at the ankle joint, which suggests that in addition to the glutei and the hamstrings, the gastrocnemius and the toe flexors were also affected. The patient presented with a diminished Achilles deep tendon reflex and impaired ankle plantar flexion, but with minimal impairment regarding pain, temperature and proprioceptive sensations in the sciatic nerve distribution (L4-S1). His neurological examination was otherwise unremarkable.

The patient lives in a poor village in Madhya Pradesh and has worked as a manual labourer since a young age along with other members of his family. He is a husband and a father of three children. His wife lives with reduced mobility due to poliomyelitis and is considered disabled. This husband and father is the sole wage-earning member of his family.

Investigations

Blood tests revealed normal full blood count, urea and electrolytes, liver function, C-reactive protein and erythrocyte sedimentation rate. HIV ELISA was negative.

Assessment

In cases where a traumatic cause is readily identified, no specific diagnostic laboratory studies are required.¹ In such cases, investigations like MR neurography (MRN) and electromyography (EMG) are considered. EMG can establish the site of the lesion, estimate the extent of the injury, and provide a diagnosis.¹ Due to the patient's financial constraints and the regional unavailability of affordable advanced diagnostics, the authors were unable to procure an EMG for this patient.

Treatment

The outcome for injection nerve palsies is primarily determined by early diagnosis and treatment.² According to Huang *et al*,³ neurolysis should be performed as soon as possible in the cases of injection injury. In this patient, the potential for intervention was limited, as he had presented to the tertiary care hospital with the injection nerve injury

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Video 1 Video showing the typical steppage gait of a patient with foot drop due to intramuscular injection-induced sciatic nerve injury.

6 weeks after injury, and because surgical intervention was not a viable financial option for this patient. In this case, an ankle-foot orthosis (AFO) was used to provide foot dorsiflexion during the swing phase and lateral stability at the ankle during stance.

Since the patient also complained of paraesthesia, pregabalin was prescribed to manage this symptom.⁴ Unfortunately, because of the patient's poor socioeconomic condition, he was not able to afford this medicine. Hence, to alleviate his pain, less expensive medications, paracetamol and diclofenac, were prescribed. The patient was also put on regular insulin for his IDDM.

Outcome and follow-up

The patient was referred for regular follow-up and continued outpatient management of his paraesthesia, pain and foot drop. The patient is using a posterior AFO, but he finds it uncomfortable while walking. The fit of his AFO is less than ideal, and the authors are searching for alternative models that are affordable for the patient and will fit better.

Figure 1 Upper outer quadrant, the usual site of intramuscular injections in the dorsogluteal approach, and injury to the sciatic nerve caused by a wrongly given injection.

GLOBAL HEALTH PROBLEM LIST

1. Indiscriminate use of intramuscular injections
2. Limited training in proper injection techniques and early diagnosis of complications
3. Inequalities in access to quality healthcare.

GLOBAL HEALTH PROBLEM ANALYSIS

Indiscriminate use of injections

According to Reeler,⁵ the use of intramuscular injections has increased dramatically in the developing world. This trend seems to be driven both by a belief among patients that intramuscular administration is more effective and by practitioners who are willing to provide this unnecessary treatment. The quest for injections among the world's poor and the alarming rate at which unnecessary injections are provided is an unfortunate and poorly understood phenomenon.⁵

The WHO defines a safe injection as one that does not harm the recipient, the healthcare worker or the community.⁶ However, in developing countries, because of indiscriminate use of intramuscular injections and insufficient training in safe administration, injection nerve palsy is common.⁷ At least 50% of injections administered annually in developing countries may be considered unsafe and leave patients vulnerable to serious health risks.⁸

Limited training in proper injection technique and early diagnosis of complications

Even though intramuscular injections are regarded as a basic medical skill, the authors could find only limited data on the worldwide incidence of injection nerve palsies of the sciatic nerve. Anecdotally, the problem seems to be relatively common; in fact, the authors recorded two additional cases in the same month. The limited data on injection nerve palsy in the published literature is notable given its risk of long-term disability.

Intramuscular injection injuries are entirely avoidable with the use of proper injection techniques.^{9 10} Therefore, the authors recommend safer ways to provide intramuscular injections as well as avoidance of intramuscular injections when other administration routes can be used.

Figure 2 Recommended ventrogluteal intramuscular injection site, outlined by the 'gluteal triangle'.

As such injuries are easily preventable, proper training to develop an anatomical understanding of the sciatic nerve is essential. Hence, the authors took the nursing staff in their hospital to the dissection room and demonstrated the anatomy of the sciatic nerve along with the measures to prevent such injuries by demonstrating proper techniques and monitoring the staff as they practised on cadavers.

Traditionally, the dorsogluteal area between the iliac crest and the greater trochanter is the preferred site for intramuscular injections (figure 1).¹¹ Some authors have also explored administering gluteal intramuscular injections into the ventrogluteal region, commonly known as the 'gluteal triangle' (figure 2).^{9 10} The base of the gluteal triangle is formed by a virtual line joining the anterior superior iliac spine (ASIS) and the apex is formed by the greater trochanter of the femur. Proponents of the ventrogluteal injection site argue that it is more difficult to reach the sciatic nerve with a needle in this position than with the dorsogluteal approach, but there are no known outcomes data available comparing the two techniques. Given the morbidity of injection nerve palsies, the authors believe that further research is indicated on the relative risks and benefits of the ventrogluteal versus the dorsogluteal approach.

Inequality in access to quality healthcare

Inadequate access to appropriate healthcare is a major constraint for the health of poor and marginalised groups in low and middle-income countries (LMICs).¹² In India, only 1.04% of the GDP is invested in public health services.^{13 14} Even Thailand and Brazil spend 3.2% and 4.1%, respectively. India's 2015 National Health Policy as presented by the country's Ministry of Health and Family Welfare (MoHFW) has proposed increasing spending to 2.5% of GDP. At this time, the need for health reform exceeds the monies made available.¹⁴

The official physician-to-population ratio in India is 50–60 per 100 000 or one physician for about 2000 patients. However, the reality is that approximately 74% of physicians practice in urban areas that reach only 26% of patients.¹⁵ Rural India is served by about 250 000 medical officers (MOs), most of whom have only the MBBS (Bachelor of Medicine/Bachelor of Surgery) or equivalent of a Master's degree. There is one

medical officer only per PHC and four are assigned to each Community Health Centre (CHC). In total, 4000 specialists serve all of rural India, equating to four physicians per 25 000 people¹⁵ and many Indians can spend a lifetime without seeing an allopathic doctor. The vacuum for rural dwellers is filled by non-allopathic fee-for-service practitioners.¹⁶ As evident in the presented case, both distance from the home and the quality of services available influence healthcare-seeking behaviour.

Access to quality rural healthcare requires improvement in physical infrastructure, appropriate training for rural providers, and assistance for patients accessing care. In the presented case, the necessary physical infrastructure was present, as the patient received his care at a PHC, but the training was inadequate—the injection was performed incorrectly and the complication was not readily diagnosed and treated. The solution proposed by the authors is inexpensive, practical, could be used by non-allopathic health workers, and does not require high levels of literacy or expensive travel outside of rural India for implementation. We have the opportunity to provide medical information meeting the needs of and bringing safe healthcare to all people.

Patient's perspective

I have been a poor labourer all my life. I used to earn 150 rupees [~£1.5] daily and from that amount I used to feed my family. At the age of 32, I started having recurrent genitourinary tract infections, but I wasn't able to tell anyone about it. Then, some time back, I was diagnosed with diabetes for which I have to buy insulin injections daily. As if this wasn't enough for my ill fate, I got injured with an injection and that made my foot paralysed. Now, I realise how such a small mistake can lead to lifelong disability. I started feeling hopeless, but the doctors motivated me psychologically and I decided to complete my treatment. I can say that there has been some amount of improvement due to the rehabilitation physiotherapy. I just want my doctors to make me alright, so that I can go back to work and feed my family, just like the good old days.

Learning points

- ▶ Intramuscular injections in low and middle income countries are frequently administered incorrectly and for inappropriate indications.
- ▶ Injuries causing injection nerve palsy are easily preventable by proper training and understanding of the anatomy of the sciatic nerve.
- ▶ The ventrogluteal region may have a more favourable safety profile than the traditional dorsolateral region, but currently there is insufficient evidence to recommend a change in practice.
- ▶ Improving access to quality healthcare for the rural poor requires increased funding, improved physical infrastructure, improved training of medical staff, and increased incentives and rural training programmes for healthcare providers.

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