

CMEARTICLE

Clinics in diagnostic imaging (140)

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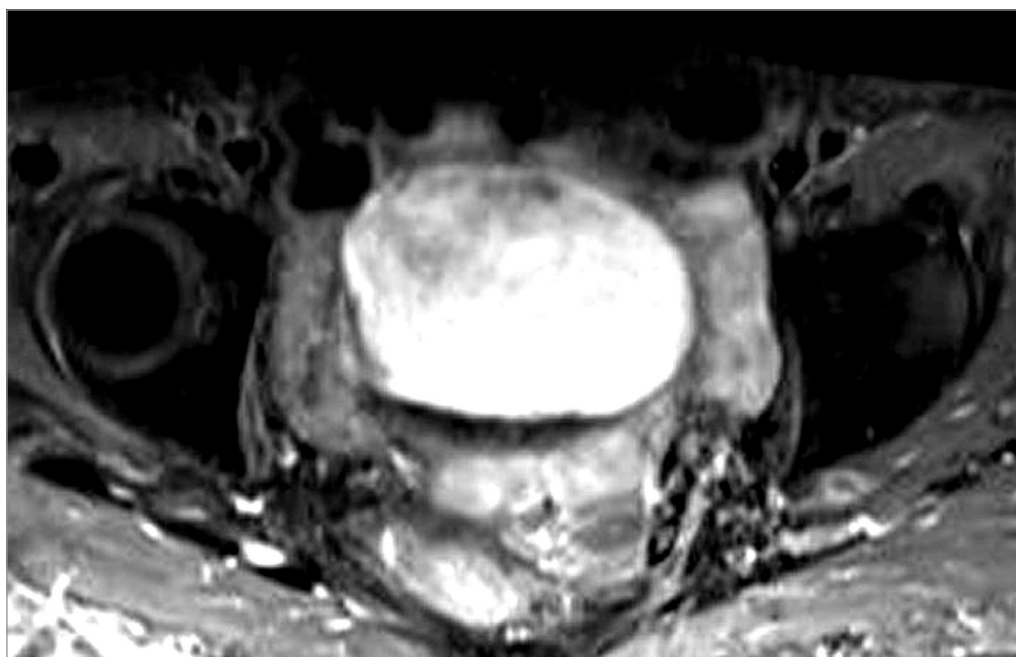


Fig. 1 Axial post-contrast TSE T1-W with fat saturation MR image of the gluteal region.

CASE PRESENTATION

A 77-year-old Chinese woman presented with acute onset of left lower limb paraesthesia and weakness of two days' duration. She denied any recent trauma. There was no loss of urinary or bowel continence, and she did not have fever, chills or rigors. She had a known history of lumbar spondylosis and had sought treatment at her family clinic two days prior to her presentation. During consultation, a clinic assistant had given her an intramuscular

analgesic injection for pain relief. She experienced pain during and after the procedure but initially attributed it to her worsening back problem. She sought a second opinion after two days due to persistent pain and was referred for specialist orthopaedic opinion. In view of new and worsening neurological symptoms, magnetic resonance (MR) imaging of her lumbosacral spine and sacral plexus was performed. What are the imaging findings? What is the diagnosis?

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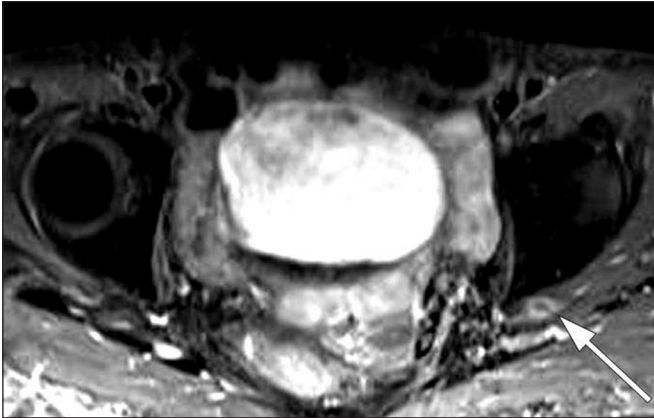


Fig. 2 Axial post-contrast TSE T1-W with fat saturation MR image of the gluteal region shows rim enhancement of the left sciatic nerve (arrow).



Fig. 3 Coronal-post contrast TSE T1-W with fat saturation MR image of the gluteal region shows perilesional oedema of the left sciatic nerve (arrow).

IMAGE INTERPRETATION

T1-weighted with fat suppression MR image of the gluteal region on the transverse and coronal sections shows enhancements, seen as perilesional oedema of the left sciatic nerve (Figs. 2 & 3).

DIAGNOSIS

Iatrogenic sciatic nerve injury secondary to intramuscular injection.

DISCUSSION

Iatrogenic traumatic sciatic nerve injuries have multiple aetiological factors and occur quite commonly. Although most commonly due to intra-operative injury to the sciatic nerve during surgery, injection-related injury is also a possible cause. Intramuscular injection is a very common route of drug administration, both in the community as well as in the hospital setting. About

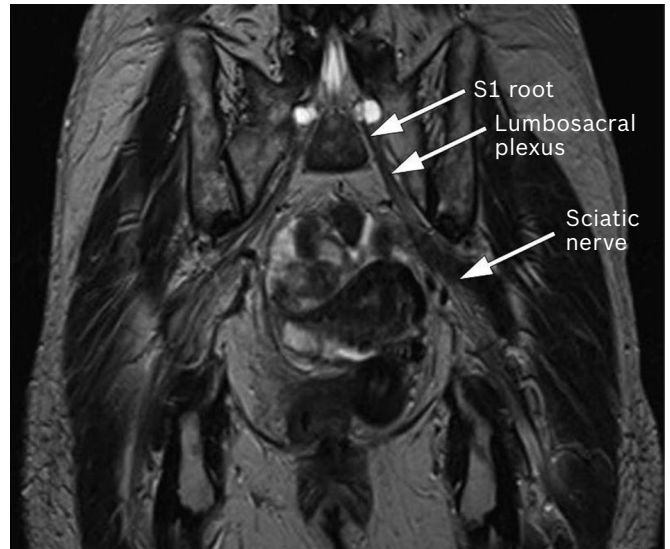


Fig. 4 Coronal TSE T2-W MR image of the lumbosacral spine shows the course of the left sciatic nerve.

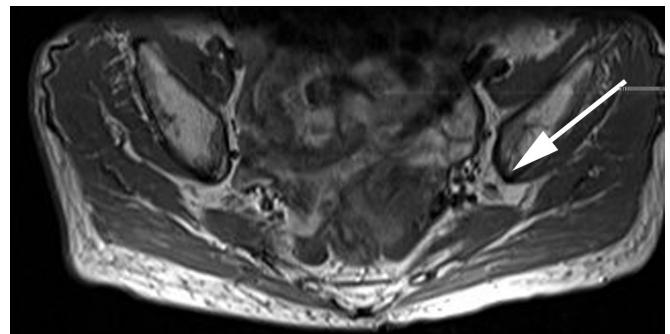


Fig. 5 Axial TSE T2-W MR image of the lumbosacral spine shows the left sciatic nerve (arrow).

20% of injection-related peripheral nerve injuries happen in the gluteal region.⁽¹⁾ A retrospective study, based on 24 years of records, found 1,025 patients with lower extremity lesions, of which 136 (13%) were injection-related injuries.⁽²⁾

Mishra et al reviewed 17 published reports of sciatic nerve injury from 1989 to 2009, comprising a total of 1,506 patients, of which 80% were in the paediatric age group. They found that the most common drugs injected were analgesia or antibiotics, although many other drugs were also administered via the intramuscular route.⁽³⁾ Symptoms range from pain in the gluteal region or distribution of the sciatic nerve to neurological manifestations such as paraesthesia, numbness or weakness. Injection-related sciatic nerve injuries occur commonly due to inadequate knowledge of the anatomy in the gluteal region.⁽²⁾

The sciatic nerve is the largest nerve in the body and a branch of the sacral plexus (L4–S3). It descends through the greater sciatic foramen below the piriformis muscle, midway between the posterosuperior iliac spine and ischial tuberosity. It courses caudally and laterally midway between the tip of the greater trochanter and ischial tuberosity, and then lies in the midline of the posterior thigh.⁽⁴⁾ On MR imaging (Figs. 4 & 5), the sciatic nerve can be traced from the S1 nerve root as it descends inferiorly and laterally in coronal images. It becomes the sciatic nerve as it exits the bony sciatic notch.^(5,6)



Fig. 6 Axial T1-W MR image of the right sciatic nerve schwannoma shows enlarged encapsulated lesions (arrow). [Reproduced from: Huang J, Mobbs R, Teo C. Multiple schwannomas of the sciatic nerve. *J Clin Neurosci* 2003; 10:391-3. With permission from Elsevier]

Abnormal enhancement, or sometimes increased T2-weighted signal indicates localised inflammation or oedema on MR imaging. In our patient, minimal perilesional oedema was seen in the axial post-gadolinium contrast images obtained with fat saturation. In this instance, however, the T2-weighted coronal images were less useful, as they were performed without fat saturation. Sciatic nerve tumours (Fig. 6) may be a differential diagnosis. Sciatic nerve schwannomas, for example, may present with multiple enlarged lesions of the sciatic nerve, but the lesions are usually encapsulated.

The severity of injury depends on the level of injury, proximity to the nerve and duration before treatment. Intrafascicular injections were noted to cause more severe nerve injury, and the mechanism of injury may include neurotoxic effects of the injected drug and disruption of the blood-nerve barrier, in addition to mechanical damage. Extensive axonal and myelin degeneration have been noted in intramuscular injections of hydrocortisone and triamcinolone.^(7,8) Management of sciatic nerve injuries can be divided into conservative and surgical. Management is directed by the severity of injury, which is based on the location of the lesion (tibial or peroneal branch), and the severity and duration of the neurological deficits. Conservative management includes early mobilisation and physiotherapy, with adequate analgesia. Surgical intervention is considered when the deficits are more complete or the symptoms are persistent and not amendable to conservative management. Intra-operative nerve action potential (NAP) studies are done on individual branches. Neurolysis or nerve grafting can be considered based on the NAP distal to the lesion. The patient continued her follow-up at the orthopaedics department. She was treated conservatively with analgesics and physiotherapy, and subsequently attained full recovery after two months of treatment.

Intramuscular injections are generally acceptable in five sites:⁽⁹⁾ the deltoids, vastus lateralis, rectus femoris, dorsogluteal and ventrogluteal. The deltoid is mainly used for small-volume injection,⁽¹⁰⁾ and is the recommended site for intramuscular injection of vaccines.⁽¹¹⁾ Used in ages of three years and above, it can be identified as the area 2–3 cm below the acromion in the

midline of the lateral arm.⁽⁹⁾ The dorsogluteal site, best described as the ‘upper outer quadrant’, is landmarked by imaginary lines bisecting the buttock equally, horizontally and vertically, and injection is made into the upper outer quadrant. Although Covington et al had advocated against the use of the the dorso-gluteal site in view of the high risk of sciatic nerve injury,⁽¹²⁾ it is still one of the favoured sites for intramuscular injections.⁽¹³⁾

The ventrogluteal region, first described by Hochstetter in 1954,⁽⁹⁾ utilises the large muscle mass of the gluteus medius and minimus muscles, and is almost free of major vessels and nerves. This site is best identified by placing the heel of the hand on the greater trochanter, the index finger on the anterior superior iliac spine, and the middle finger posteriorly below the iliac crest. The injection site is formed by the triangle between the index and middle fingers, and the iliac crest.⁽⁹⁾ Cook and Murtagh recommended this site for use in the paediatric age group 2–14 years.⁽¹⁴⁾ The vastus lateralis is the preferred site for administration of intramuscular injections in paediatric patients (especially children below one year of age), particularly if the deltoid muscle is not of adequate mass.⁽¹¹⁾ It is identified along the middle one-third of the way between the greater trochanter and lateral femoral condyle.⁽⁹⁾ The rectus femoris site is located at the anterior aspect of the thigh and is marked midway between the patella and the superior iliac spine. This site is usually utilised when other sites are contraindicated, or for self-administration of intramuscular injections by patients.⁽⁹⁾

In conclusion, iatrogenic sciatic nerve injuries are not uncommon in clinical practice. Adequate knowledge of the ‘safe areas’ for intramuscular injection is important. This injury can be detected on MR imaging.

ACKNOWLEDGEMENT

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ABSTRACT A 77-year-old Chinese female patient presented with acute onset of left lower limb paraesthesia and weakness after she received an intramuscular injection for pain relief in the gluteal region. Magnetic resonance (MR) imaging of her lumbosacral spine and sacral plexus was performed. The MR imaging findings are reviewed and discussed.

Keywords: iatrogenic sciatic nerve injury, intramuscular injection, magnetic resonance imaging, sciatic nerve
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SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

(Code SMJ 201208B)

Question 1. The following statements are true of the sciatic nerve:

- (a) The sciatic nerve is the largest nerve in the body.
- (b) It originates from the sacral plexus (S1–S3).
- (c) It cannot be compressed by the piriformis muscle.
- (d) Pain from the sciatica is usually in the posterior leg.

Question 2. The following are routes of intramuscular injections:

- (a) Deltoids.
- (b) Dorsogluteal.
- (c) Ventrogluteal.
- (d) Abdominal.

Question 3. The following are treatment modalities for sciatic nerve injuries:

- (a) Physiotherapy.
- (b) Neurolysis.
- (c) Nerve grafting.
- (d) Corticosteroid injections.

Question 4. The following are true of peripheral nerve injuries:

- (a) The commonest cause is intra-operative.
- (b) Up to 20% involve nerves in the gluteal region.
- (c) It commonly occurs in the paediatric age group.
- (d) Gunshot is not a possible cause.

Question 5. The following are signs or symptoms of sciatic nerve injury:

- (a) Numbness in the posterior leg.
- (b) Loss of bowel and urinary continence.
- (c) Weakness of the lower limb.
- (d) Prolapsed intervertebral disc is not a differential diagnosis.

| True | False |
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