Hong Kong J Radiol. 2020;23:281-4 | https://doi.org/10.12809/hkjr2017102

CASE REPORT

Piriformis Syndrome is a Rare Cause of Insidious Unilateral Lower Limb Weakness and Buttock Pain: a Case Report

AWT Chin, KS Tse, PY Chu

Department of Radiology and Organ Imaging, United Christian Hospital, Kwun Tong, Hong Kong

INTRODUCTION

Piriformis syndrome is a neuromuscular disorder in which the sciatic nerve is compressed at the level of the piriformis muscle. Patients usually complain of buttock pain radiating down the thigh.[1] Primary causes are intrinsic abnormalities such as aberrant piriformis muscle fibres; secondary causes involve direct injury of the piriformis muscle resulting in hematoma or scar tissue formation.[1] Piriformis syndrome constitutes 0.3% to 6% of all cases of low back or buttock pain.[1,2] There are no uniform standardised diagnostic criteria because symptoms can be non-specific and electrodiagnostic tests are technically difficult to perform.[3] Magnetic resonance imaging (MRI) helps to depict the anatomical relationship of the sciatic nerve with the piriformis muscle and can exclude secondary compression of the sciatic nerve. We report a case of piriformis syndrome in a young adult patient successfully diagnosed with the aid of MRI and treated with surgery.

CASE REPORT

A 34-year-old man presented with right buttock pain, right lower limb clumsiness and weakness of gradual increasing severity for 3 years. His medical history was unremarkable except for allergic rhinitis and appendectomy. The patient denied any trauma history. Physical examination revealed tenderness and shooting pain along the right posterior thigh radiating to the

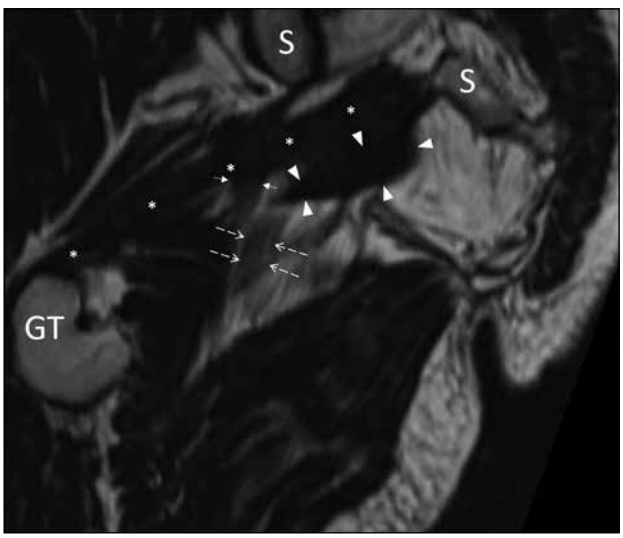

Figure 1. T2-weighted oblique coronal magnetic resonance imaging of pelvis (repetition time: 1500 ms, echo time: 126 ms): The main bulk of the piriformis muscle (asterisks) originates from the anterior sacrum (S) and attaches to the greater trochanter of femur (GT). Aberrant muscle fibres of the piriformis muscle (arrowheads) are noted anterior to the piriformis muscle. The common peroneal division of the sciatic nerve (short arrows) passes between the main bulk and aberrant muscle fibres of the piriformis muscle. The tibial division of the sciatic nerve (dotted arrows) courses deep to and below the main bulk and aberrant muscle fibres of the piriformis muscle.

Correspondence: *Dr AWT Chin, Department of Radiology and Organ Imaging, United Christian Hospital, Kwun Tong, Hong Kong*
Email: anthonywtchin@gmail.com

Submitted: 22 Mar 2019; Accepted: 24 Apr 2019

Contributors: All authors designed the study, acquired the data, analysed the data, drafted the manuscript, and critically revised the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of Interest: All authors have disclosed no conflicts of interest.

Funding/Support: This case report received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics Approval: The patient was treated in accordance with the tenets of the Declaration of Helsinki. The patient provided written informed consent for all treatments and procedures.

right calf on pressing the right gluteal region. Seated piriformis stretch test (a passive flexion, adduction with internal rotation test performed as the examiner palpates the deep gluteal region with the patient seated) and pace test (abduction and external rotation against resistance) reproduced the symptoms, but straight leg raise test did not. The patient had impaired dorsiflexion of the big toe with power of grade 4 out of 5. Motor and sensory examinations were otherwise unremarkable.

The preliminary working diagnosis was piriformis syndrome. Nerve conduction study failed to detect any abnormality. MRI of the lumbosacral spine did not reveal evidence of neurological compression. MRI of the pelvis (Figures 1 to 4) revealed the presence of aberrant fibres of the right piriformis muscle anterior to its main bulk. The common peroneal branch of the right sciatic nerve appeared to branch out proximally and travel between the aberrant and main muscle bulk of the piriformis

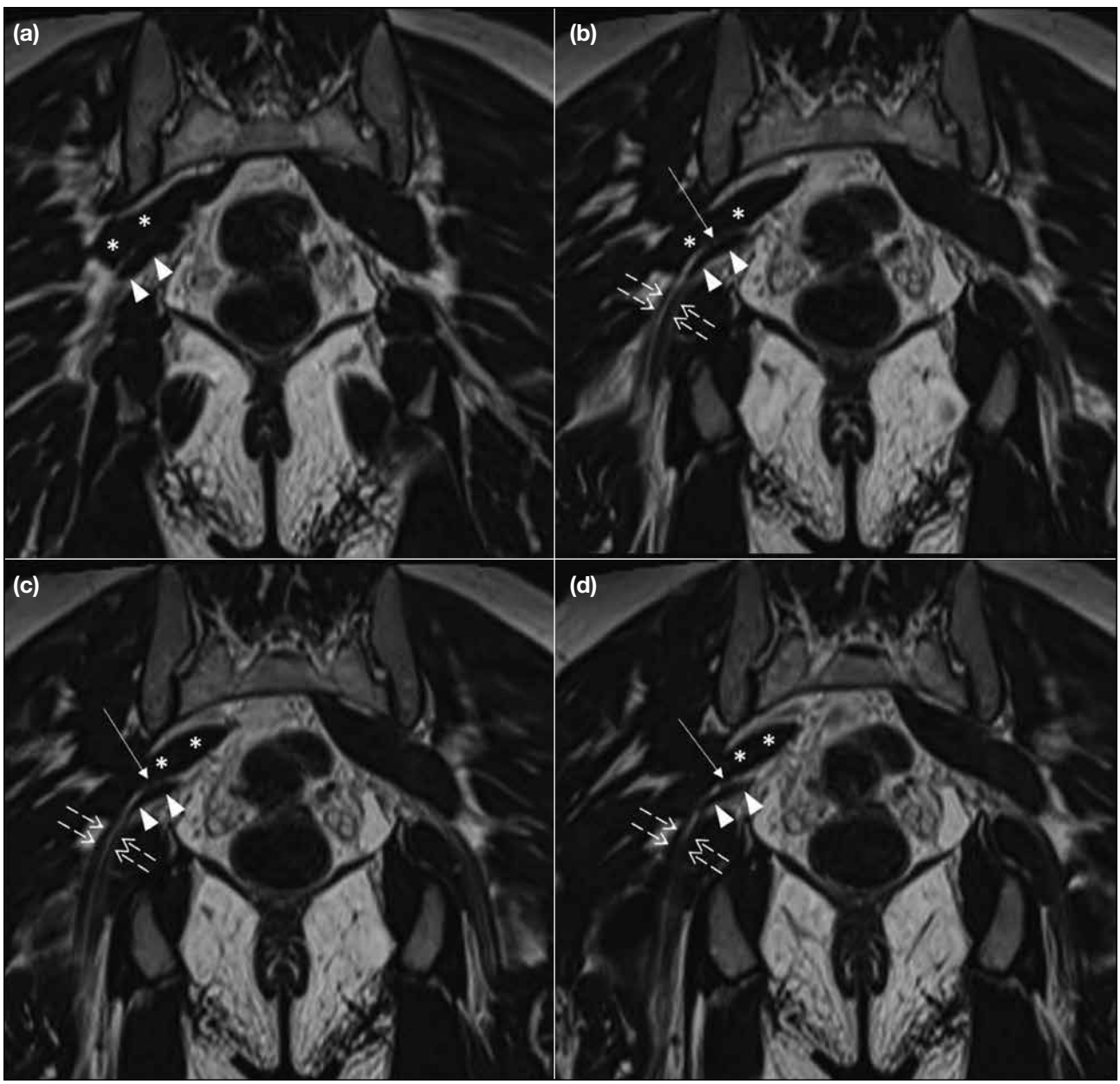

Figure 2. (a-d) T1-weighted coronal magnetic resonance images of the pelvis (repetition time: 400 ms, echo time: 10 ms): from posterior to anterior. Aberrant muscle fibres of the piriformis muscle (arrowheads) are noted anterior to the main bulk of the piriformis muscle (asterisks). The common peroneal division of the sciatic nerve (solid arrows) passes between the main bulk and aberrant muscle fibres of the piriformis muscle. The tibial division of the sciatic nerve (dotted arrows) courses deep to and below the main bulk and aberrant muscle fibres of the piriformis muscle.

muscle (Beaton and Anson's classification type B). The left sciatic nerve course was below the piriformis muscle with no aberrant muscle fibres detected (Beaton and Anson's classification type A).

The patient underwent surgery under general anaesthesia and MRI findings were confirmed. The common peroneal branch of the sciatic nerve was identified to penetrate between the main bulk and the aberrant muscle fibres of the piriformis with an indentation noted at the penetration site. The tendon insertion of the main bulk of the piriformis muscle was released from the greater trochanter. The aberrant piriformis muscle was released and excised.

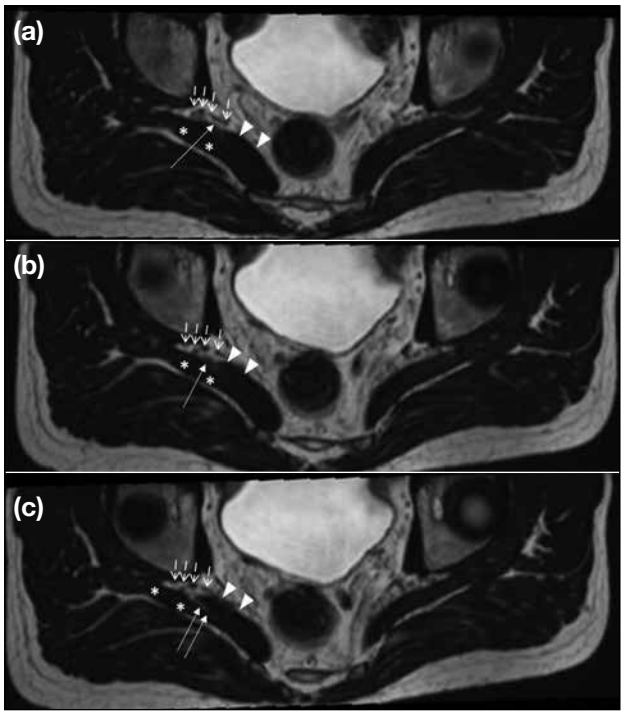

Figure 3. (a-c) Axial T2-weighted turbo spin echo magnetic resonance imaging (repetition time: 3120 ms, echo time: 77 ms), from superior to inferior. Aberrant muscle fibres of the piriformis muscle (arrowheads) are noted anterior to the main bulk of the piriformis muscle (asterisks). The common peroneal division of the sciatic nerve (long arrows) passes between the main bulk and aberrant muscle fibres of the piriformis muscle. Short arrows denote tibial division of the sciatic nerve.

The patient recovered dorsiflexion of his right big toe with full motor power. Neurological examination and sensation of the right lower limb was normal without any complications. The patient had subjective improvement of symptoms.

DISCUSSION

The piriformis muscle originates at the anterolateral S2-S4 level of the sacrum, travels through the greater sciatic foramen and attaches to the greater trochanter.[1,3] It acts as an external rotator of the hip as well as assisting hip flexion and hip abduction. Beaton and Anson first described variations in the sciatic nerve relationship with the piriformis muscle.[4] The undivided sciatic nerve passes completely below the piriformis muscle in most people (Beaton and Anson classification type A). A recent study of 102 limbs showed that 89% of subjects had conventional anatomy, while in 8.8% of subjects, the common peroneal branch of the sciatic nerve passed through the piriformis muscle, as in our patient (Beaton and Anson classification type B).[5] In the remaining 2.9%, the common peroneal branch passed over the piriformis muscle (Beaton and Anson classification type C).[5] All but one subject showed variant anatomy in one lower limb but normal in the other.[5] Multiple manoeuvres have been described that elicit sciatic pain due to piriformis stretching and contraction through hip movements.[6,7] Anatomical variations are thought to be related to development of piriformis syndrome, especially that of Beaton and Anson classification type B.[5] Knowledge of the anatomical course of the sciatic nerve is important to

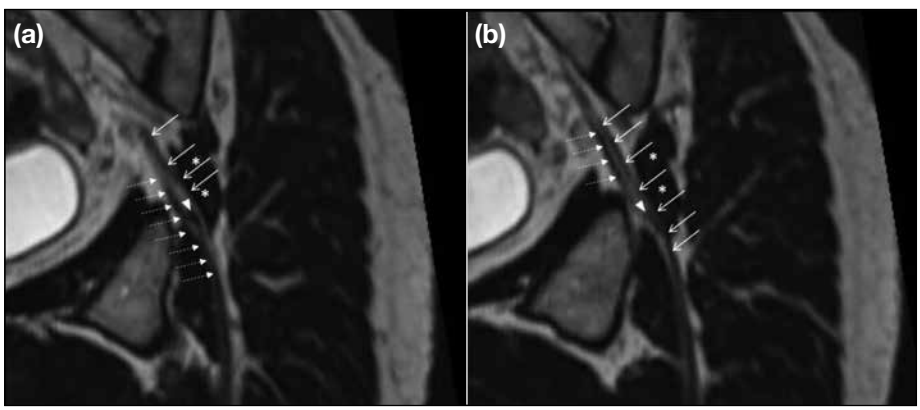

Figure 4. (a and b) T2-weighted oblique sagittal images (repetition time: 1500 ms, echo time: 126 ms), from medial to lateral. Aberrant muscle fibres of the piriformis muscle (arrowheads) are noted anterior to the main bulk of the piriformis muscle (asterisks). The common peroneal division of the sciatic nerve (solid arrows) passes between the main bulk and aberrant muscle fibres of the piriformis muscle. The tibial division of the sciatic nerve (dotted arrows) courses deep to and below the main bulk and aberrant muscle fibres of the piriformis muscle.

guide choice of physiotherapy exercises, image-guided analgesic injections and surgical approach.[5]

With the advancement of MRI, acquisitions of images of the pelvis in the axial and coronal planes as well as multiplanar reconstruction using isometric sequences enables a clear anatomical depiction of the sciatic nerve and pyriformis and facilitates subsequent management. Use of MRI in diagnosing piriformis syndrome has been previously confined to case reports with anatomy confirmed during surgery.[1,8-10] Our institution performs T1-weighted and T2-weighted spin echo sequences in axial and coronal planes with and without fat suppressed techniques, as well as T2-weighted isometric images acquired in the coronal plane. We find the images without fat suppression techniques allow better depiction of sciatic nerve and piriformis anatomy, while use of fat suppression techniques achieves better depiction of muscle oedema. Features to look for include sciatic nerve configuration, any thickening and signal change of the piriformis muscle and exclusion of other causes of sciatic nerve compression such as haematoma or soft tissue mass.[1,3] Sciatic nerve signal changes may not be present as in our case. This is due to the functional nature of the syndrome, as the sciatic nerve may not be compressed when the patient lies supine on the MRI examination table.[9] In addition, limitation of physical activity by the patient as well as chronicity of disease may explain the lack of sciatic nerve signal changes.[9] No single imaging feature is diagnostic of the condition. Piriformis asymmetry may not be diagnostic of piriformis syndrome, as shown in a study of 100 patients with no symptoms of piriformis syndrome but in whom 16% had piriformis asymmetry of 4 mm or more.[11] Clinical correlation is crucial to making the correct diagnosis. There is more recent evidence that use of MRI neurography allows even better delineation of anatomy and signal changes of the sciatic nerve.[12-14]

It has been argued that there is no gold standard to reliably diagnose piriformis syndrome. Previous studies based on treatment response assessed the usefulness of clinical and imaging features to diagnose the condition. However, Filler[14] suggested that the marked improvement in symptoms followed by an MRI diagnosis and image-guided injections strongly supports the importance of piriformis in causing a patient's symptoms.[1]

Treatment of piriformis syndrome is usually non-surgical and includes oral analgesics and image-guided analgesic injections. Surgery is reserved for cases not amenable to conservative management.[1]

CONCLUSION

We have described a young adult patient with piriformis syndrome that was successfully diagnosed with the assistance of MRI and who subsequently underwent surgery with improved clinical symptoms. This highlights the importance of multiplanar imaging to assist in the diagnosis of this clinical entity.

REFERENCES

1. Miller TA, White KP, Ross DC. The diagnosis and management of Piriformis Syndrome: myths and facts. Can J Neurol Sci. 2012;39:577-83.
2. Hicks BL, Lam JC, Varacallo M. Piriformis Syndrome. [Updated 2018 Nov 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2019 Jan. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448172/. Accessed 2 Jan 2019.
3. Petchprapa CN, Rosenberg ZS, Sconfienza LM, Cavalcanti CF, Vieira RL, Zember JS. MR imaging of entrapment neuropathies of the lower extremity. Part 1. The pelvis and hip. Radiographics. 2010;30:983-1000.
4. Beaton LE, Anson BJ. The relation of the sciatic nerve and of its subdivision to the piriformis muscle. Anat Rec. 1937;70:1-5.
5. Lewis S, Jurak J, Lee C, Lewis R, Gest T. Anatomical variations of the sciatic nerve, in relation to the piriformis muscle. Translational Res Anat. 2016;5:15-9.
6. Michel F, Decavel P, Toussirot E, Tatu L, Aleton E, Monnier G, et al. Piriformis muscle syndrome: diagnostic criteria and treatment of a monocentric series of 250 patients. Ann Phys. Rehabil Med. 2013;56:371-83.
7. Michel F, Decavel P, Toussirot E, Tatu L, Aleton E, Monnier G, et al. The piriformis muscle syndrome: an exploration of anatomical context, pathophysiological hypotheses and diagnostic criteria. Ann Phys Rehabil Med. 2013;56:300-11.
8. Jankiewicz JJ, Hennrikus WL, Houkom JA. The appearance of the piriformis muscle syndrome in computed tomography and magnetic resonance imaging. A case report and review of the literature. Clin Orthop Relat Res. 1991;(262):205-9.
9. Lee EY, Margherita AJ, Gierada DS, Narra VR. MRI of piriformis syndrome. AJR Am J Roentgenol. 2004;183:63-4.
10. Rossi P, Cardinali P, Serrao M, Parisi L, Bianco F, De Bac S. Magnetic resonance imaging findings in piriformis syndrome: a case report. Arch Phys Med Rehabil. 2001;82:519-21.
11. Russell JM, Kransdorf MJ, Bancroft LW, Peterson JJ, Berquist TH, Bridges MD. Magnetic resonance imaging of the sacral plexus and piriformis muscles. Skeletal Radiol. 2008;37:709-13.
12. Filler AG, Haynes J, Jordan SE, Prager J, Villablanca JP, Farahani K, et al. Sciatica of nondisc origin and piriformis syndrome: diagnosis by magnetic resonance neurography and interventional magnetic resonance imaging with outcome study of resulting treatment. J Neurosurg Spine. 2005;2:99-115.
13. Filler AG, Kliot M, Howe FA, Hayes CE, Saunders DE, Goodkin R, et al. Application of magnetic resonance neurography in the evaluation of patients with peripheral nerve pathology. J Neurosurg. 1996;85:299-309.
14. Filler AG. Piriformis and related entrapment syndromes: diagnosis & management. Neurosurg Clin N Am. 2008;19:609-22, vii.