

An unexpected cause of palmar paraesthesia in a soldier: A case report

Matthew Psaila, Kirill Micallef Stafrace

Abstract

Introduction: Athletes presenting with neurological symptoms merit thorough assessments that in most cases will include investigations with one or more imaging modality. Imaging is especially useful in atypical presentations of neurological pathology (both acute and chronic) as was the instance in the presented case report.

Case presentation: The case of a 22-year-old male soldier is presented who presented with a two week history of paraesthesia involving his right hand. After being assessed by the military medical officer, a presumptive diagnosis of cervical radiculopathy was made and appropriate treatment was prescribed. Symptoms persisted despite treatment and following an inconclusive cervical X-Ray, a magnetic resonance scan was booked that confirmed the diagnosis of multiple sclerosis. The patient was admitted to hospital and started on intravenous methylprednisolone and beta-interferon therapy with resolution of his symptoms.

Conclusion: This case highlights the usefulness of imaging in confirming diagnosis, especially in atypical presentations of pathology afflicting the neurological system. Atypical symptoms, lack of response to standard therapy and inconclusive initial radiological investigations, should prompt the physician to carry out further detailed imaging modalities. The choice of the latter will need to reflect the working differential diagnoses. With reference to the presented case, imaging plays a role not only in diagnosis but also in assessing response to treatment and disease progression.

Keywords

Multiple sclerosis, palmar paraesthesia, magnetic resonance scan, neurological symptoms

Introduction

Neurological symptoms necessitate thorough assessments and investigations (where applicable) to identify underlying pathologies, to guide treatment and possibly halt further progression. In sports however, the simple act of participation in physical activity may be linked with the onset of neurological symptoms.¹ The latter could possibly be preempted by pre-participation screening.² Soldiers who undertake regular intensive military training are at a relatively high risk of injury including the involvement of the neurological system.³

To this effect, Schoenfeld and colleagues,³ audited cervical radiculopathy in the United States military and identified an incidence rate of approximately two per 1000 person-years, with female gender, higher military ranks, white race and service-type all reflecting risk. In the presented case, symptoms were atypical for a diagnosis of cervical radiculopathy, however, when all the medical and occupational factors were considered, the latter diagnosis featured most prominently in the differential diagnosis. Conservative management was employed with a multimodal approach involving biomechanical, pharmacological and imaging components.⁴ The negative initial imaging modalities led to the use of more detailed radiological tests which eventually confirmed the diagnosis.

Case Presentation

Background

The case of a 22-year old Maltese infantry soldier is presented, who had attended for review by a military medical officer. The soldier participated regularly in physical training that comprised strength and endurance training as well as military based training that included weighted route marching and combat training. The patient had a negative medical history and had not sustained significant debilitating physical injuries throughout his military career.

History of presenting complaint

The patient disclosed to the medical officer that over the past two weeks he had been complaining of tingling and numbness throughout his right hand. This

Matthew Psaila MD(Melit.), MSc Sports Med.(Cardiff)*
Armed Forces of Malta
mjpsaila@yahoo.co.uk

Kirill Micallef Stafrace MD(Melit.), MSc Sports Med.(Lond.)
Institute for Physical Education and Sport (IPES)
University of Malta,
Msida, Malta

*Corresponding Author

Case Report

sensation involved both palmar and dorsal surfaces of his hand and was not associated with hand muscle weakness. This was the first time he experienced such a sensation in his right hand, however, on further questioning, he did recall experiencing tingling in his right lower leg and foot in the previous year. The latter was milder in intensity and resolved spontaneously after five days and therefore he did not seek medical advice having presumed that it was training related and that it was nothing serious.

On further questioning, his symptoms were present throughout the day and were not preceded by trauma. He did not complain of any neck, elbow and wrist pain and there were no specific aggravating or relieving factors. The patient did not consume any medications for his symptoms and was still managing (although struggling) to continue with his work-related duties as well as some physical training. Systemic enquiry was negative and he had a negative family history.

Examination

The patient had a regular pulse, was normotensive at rest and had a normal cardiovascular, respiratory and gastrointestinal system examination. Neurological examination of his right hand revealed decreased (when compared to the left side) appreciation of pain and light touch sensation on the palmar and dorsal surfaces of his right hand in a distribution that did not conform to a specific dermatomal pattern. Joint position and vibration sense was normal. The rest of his neurological system,

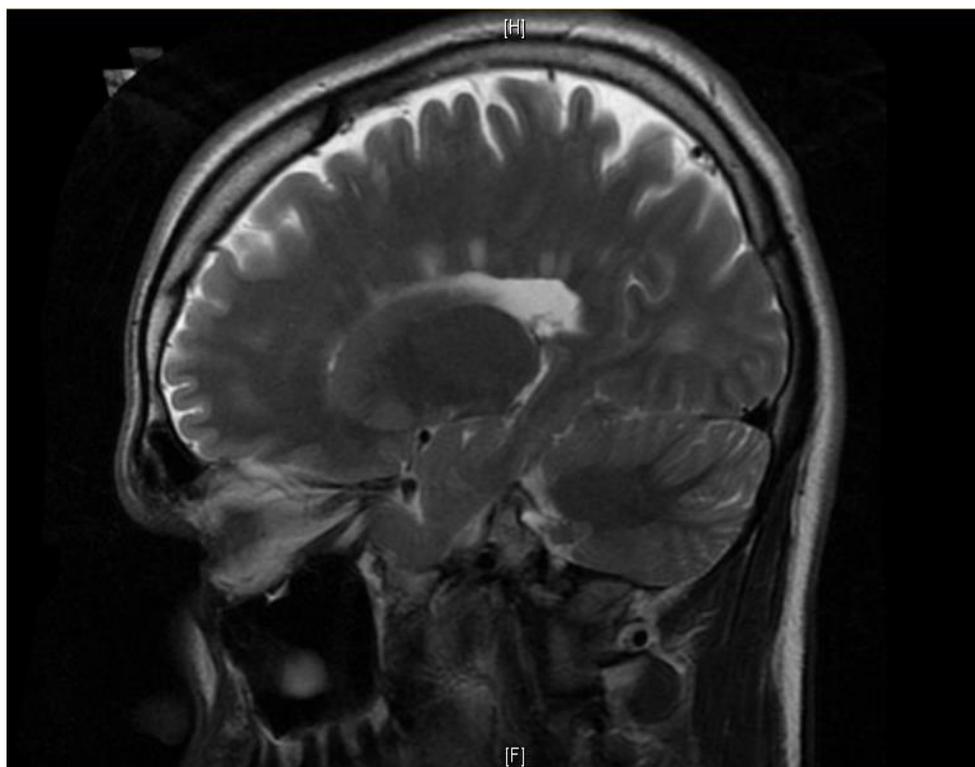
including cranial nerves and right lower limb, were completely normal.

Since his duties at work are mainly clerical, entailing long hours of working on a computer with possibly an incorrect neck posture, a presumptive diagnosis of cervical radiculopathy with involvement of the right cervical sixth and cervical seventh dermatomes was made by the reviewing medical officer. He was prescribed diclofenac sodium, vitamin-B complex and advised regarding his posture when using his computer. Elastic kinetic taping of his paraspinal muscles was suggested by the patient's physiotherapist to improve sensory biofeedback.

Follow-up

A cervical spine X-Ray was taken to assess cervical spine alignment as well as exclude bony pathology. When reviewed after one week, the patient was still complaining of a right sensory deficit in his right hand that had not worsened but did not improve with the advised treatment. The X-Ray was reported as normal. At this stage the patient was referred for a Magnetic Resonance Imaging (MRI) scan to visualize the cervical spine, spinal cord, nerve roots and surrounding connective tissue. This scan identified a small high intensity lesion within the spinal cord at the level of the sixth cervical nerve root. The rest of the spine, as well as disk spaces, were intact.

Figure 1: Magnetic resonance imaging scan of the head and brain



Case Report

An MRI of the head was also undertaken that identified multiple lesions of high signal intensity in both periventricular regions, corpus callosum, splenium and pons (Figure 1). When considering the patient's presentation and objective clinical assessment together with the history of a similar episode the year previously afflicting his right lower limb, a diagnosis of MS was made as per the revised 2010 McDonald criteria for diagnosis of MS.⁵ No additional data is recommended in the criteria for the diagnosis of MS to be made, however, the authors list that imaging, for the identification of lesions typical of MS, is desirable.⁵ With reference to the lesions identified on MRI, the McDonald criteria specify that there needs to involvement of at least two of the four regions of the central nervous system that are typically affected in MS, that is, the periventricular, juxtacortical, infratentorial and spinal cord. As per final MRI report, lesions were identified in only one of the regions listed in the criteria.

After being diagnosed with MS, the patient was reviewed by a neurologist and admitted to a neurological ward, where he was started on intravenous methylprednisolone and intramuscular beta-interferon therapy. His symptoms resolved gradually over a span of five days and he was discharged home with an out-patients follow up at the MS clinic.

Discussion

MS is a chronic neurological condition of presumed autoimmune etiology characterized by central nervous system demyelination.⁶ The MS international federation has recently updated the Atlas of MS, with the revised number of people with MS worldwide in 2013 measuring 2.3 million, increasing from the 2.1 million people estimated to be diagnosed with MS in 2008.⁷ According to epidemiology studies in the United Kingdom, the incidence of MS is 203 per 100,000 and peaks between the ages of 40 and 50, being almost twice as common in females.⁸ This incidence rate contrasts with earlier epidemiological data from Malta, where an incidence rate of two cases per 100,000 per year was identified.⁹ The last survey in Malta was conducted in 2005 by the MS society of Malta, with an estimated 100 people diagnosed with MS at the time.¹⁰

In the presented case, initial symptoms were incorrectly attributed to cervical radiculopathy, despite the lack of evidence from the clinical examination that revealed purely sensory neurological deficits that did not correlate to a dermatomal pattern. The presentation described in the above case, with atypical neurological signs and symptoms, is a common presentation of MS as opposed to MS presenting with signs and symptoms mimicking peripheral nervous system involvement, which is a very uncommon presentation.¹¹ In fact, only five cases of MS mimicking cervical radiculopathy were

ever presented in the literature, one with solely sensory deficits¹² and four with both sensory and motor deficits.¹³ No cases of MS presenting with signs and/or symptoms mimicking lower limb peripheral nervous system involvement have been described in the literature.

MRI is the imaging modality of choice in MS, having a sensitivity of between 35% and 100% and specificity of 36% to 92%.¹⁴ Unfortunately there is no single radiological gold standard test to diagnose MS in view of the inability of conventional MRI to clearly distinguish between inflammation, edema and demyelination.¹⁵ The McDonald 2010 criteria are aimed to target this weakness, incorporating novel MRI techniques in patients with a history of clinically relapsing disease, to diagnose MS in adults.¹⁶ This has improved the sensitivity to 84% and specificity to 80%. Novel MRI techniques include silent gadolinium-enhancing and non-enhancing lesions in baseline brain MRI.⁷ However, care needs to be employed as such enhancing lesions may reflect normal structures, including blood vessels.¹⁷ Bilello and colleagues¹⁸ have challenged the latter diagnostic difficulty through the use of a computer-assisted detection software to analyze magnetic resonance images over time, potentially improving diagnostic sensitivity.¹⁸ The latter will also aid in recognition of MS, monitoring of progression and treatment response. Earlier recognition of MS will in turn allow for earlier institution of treatment, which is being increasingly recognized as a being key in minimizing long-term disability.¹⁹

Conclusion

Management of athletes presenting with neurological symptoms will, in the majority of cases, necessitate thorough assessments and investigations to identify the underlying pathology. However, symptoms may accompany the simple act of participating in physical activity without an obvious underlying cause. Imaging in the presented case was employed to investigate neurological symptoms and was targeted to the identified differential diagnosis, starting with simple tests, such as an X-Ray, and progressing to MRI scans after the initial tests were inconclusive. In the above case, the MRI scan was instrumental to confirm the diagnosis. With reference to the discussed McDonald 2010 criteria, despite the advances in diagnosing MS, the practicality of employing these standards in daily clinical practice needs to be evaluated further. With specific reference to Malta, a repeat of the survey conducted in 1999 to update present local epidemiological data regarding number of persons diagnosed with MS, would be desirable, since available published data is outdated.

References

1. Alla S, Sullivan SJ, McCrory P, Schneiders AG, Handcock P. Does exercise evoke neurological symptoms in healthy subjects? *Journal of Science and Medicine in Sport* 2010; 13, 24-6.
2. Sosa I, Linic IS, Petaros A, Desnica A, Bosnar A. The potential value of early screening for neurological deficits in participants in certain sports. *Medical Hypotheses* 2010; 77, 633-7.
3. Schoenfeld AJ, George AA, Bader JO, Caram PM. Incidence and epidemiology of cervical radiculopathy in the United States military: 2000 to 2009. *Journal of Spinal Disorders and Techniques* 2012; 25, 17-22.
4. Eubanks JD. Cervical radiculopathy: nonoperative management of neck pain and radicular symptoms. *American Family Physician* 2010; 81, 33-40.
5. Chris HP, Stephen CR, Brenda B, Michel C, Jeffrey AC, Massimo F, et al. Diagnostic criteria for multiple sclerosis: 2010 Revisions to the McDonald criteria. *Ann Neurol* 2011; 69(2): 292-302.
6. Milo R, Miller A. Revised diagnostic criteria of multiple sclerosis. *Autoimmunity Reviews* 2014; 13, 518-24.
7. Multiple Sclerosis International Federation. *Atlas of MS*. <http://www.msif.org/about-us/advocacy/atlas/> (accessed 12 August 2015).
8. Mackenzie IS, Morant SV, Bloomfield GA, MacDonald TM, O'Riordan J. Incidence and prevalence of multiple sclerosis in the UK 1990-2010: a descriptive study in the General Practice Research Database. *Journal of Neurology, Neurosurgery and Psychiatry* 2014; 85, 76-84.
9. Dean G, Elian M, de Bono AG, Asciak RP, Vella N, Mifsud V, Aquilina J. Multiple sclerosis in Malta in 1999: an update. *J Neurol Neurosurg Psychiatry* 2002; 73(3):256-60.
10. Agius L. Multiple Sclerosis. *Journal of the Malta College of Pharmacy Practice* 2005;10:9.
11. Couratier P, Boukhris S, Magy L, Traore H, Vallat JM. Involvement of the peripheral nervous system in multiple sclerosis. *Revue neurologique* 2004; 160, 1159-63.
12. Tosi L, Righetti CA, Zanette G, Beltramello A. A single focus of multiple sclerosis in the cervical spinal cord mimicking a radiculopathy. *Journal of Neurology, Neurosurgery and Psychiatry* 1998; 64, 277.
13. Uldry PA, Regli F. Pseudoradicular syndrome in multiple sclerosis. 4 cases diagnosed by magnetic resonance imaging. *Revue neurologique* 1992; 148, 692-5.
14. Schaffler N, Kopke S, Winkler L, Schippling S, Inglese M, Fischer K, Heesen C. Accuracy of diagnostic tests in multiple sclerosis--a systematic review. *Acta Neurologica Scandinavica*, 2011; 124, 151-64.
15. Zivadinov R, Cox JL. Neuroimaging in multiple sclerosis. *International Review of Neurobiology*, 2007; 79, 449-74.
16. Patrucco L, Rojas JJ, Miguez JS, Cristiano E. Application of the McDonald 2010 criteria for the diagnosis of multiple sclerosis in an Argentinean cohort of patients with clinically isolated syndromes. *Multiple Sclerosis*, 2013; 19, 1297-301.
17. Karimghaloo Z, Shah M, Francis SJ, Arnold DL, Collins DL, Arbel T. Automatic detection of gadolinium-enhancing multiple sclerosis lesions in brain MRI using conditional random fields. *IEEE Transactions on Medical Imaging*, 2012; 31, 1181-94.
18. Bilello M, Arkuszewski M, Nucifora P, Nasrallah I, Melhem ER, Cirillo L, Krejza J. Multiple sclerosis: identification of temporal changes in brain lesions with computer-assisted detection software. *Neuroradiology Journal* 2013; 26, 143-50.
19. Broadley SA, Barnett MH, Boggild M, Brew BJ, Butzkueven H, Heard R, et al. A new era in the treatment of multiple sclerosis. *Med J Aust* 2015;203(3):139-41.