Case Report

Case report: Multiple sclerosis diagnosis after anterior lumbar interbody fusion and presumed COVID-19 infection

Todd H. Alter, Thomas Helbig, Gino Chiappetta

Department of Orthopaedic Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, New Jersey, United States.

E-mail: *Todd H. Alter - thaortho@gmail.com; Thomas Helbig - tph43@rwjms.rutgers.edu; Gino Chiappetta - chiappgi@yahoo.com

ABSTRACT

Background: Multiple sclerosis (MS) is an autoimmune demyelinating disease of the central nervous system that may present with a wide variety of clinical presentations. However, there can be substantial overlap between symptoms from MS and those caused by lumbar spondylosis and/or postviral plexopathies.

Case Description: A 33-year-old female with a history of an L5-S1 anterior lumbar interbody fusion and exposure to the SARS-CoV-2 virus developed postoperative worsening of her symptoms interpreted as “radiculopathy.” Despite a subsequent L5-S1 fusion, she continued to neurologically deteriorate and was ultimately diagnosed with MS.

Conclusion: The initial symptoms/signs of MS may mimic lumbar radiculopathy and or postviral plexopathy (i.e., due to recent COVID-19). This report should serve as a warning to future spinal surgeons to better differentiate between radicular and other “complaints,” sufficient to avoid unnecessary repeated spinal surgery.

Keywords: Anterior lumbar interbody fusion, COVID-19, Lumbar, Multiple sclerosis, Myelopathy, Spine, Radiculopathy

INTRODUCTION

Because multiple sclerosis (MS) can produce a wide array of neurological symptoms, it can mimic a variety of other conditions. These include myelopathy attributed to vertebral disc herniation, spinal stenosis, or spondylosis, and more recently COVID-19-related viral plexopathy.[9] Further, there is increasing evidence that viral infections such as COVID-19 (i.e., with neuroinvasive potential leading to a pro-inflammatory state) can trigger MS exacerbations.[1,6] Here, we report a 33-year-old female who underwent lumbar surgery (anterior lumbar interbody fusion [ALIF]) and subsequently had COVID-19. Her postoperative symptoms/signs led to a revision of her lumbar spinal surgery, but were ultimately attributed to MS.

CASE

History

A 33-year-old female with a medical history of hypothyroidism, polycystic ovarian syndrome, pseudotumor cerebri, pacemaker placement for bradycardia, a gastric sleeve, and a C6-7 cervical
disc replacement (1 year prior for myelopathy), presented with 2 years of low back pain/radiculopathy. On examination, she exhibited significant isolated weakness in her right lower extremity without sensory or reflex abnormalities [Table 1]. Lumbar X-rays and an MRI showed moderate degenerative disc disease at the L5-S1 level, a 3 mm minimal degenerative retrolisthesis, and a right paracentral L5-S1 disc protrusion causing moderate lateral recess narrowing [Figures 1 and 2]. She underwent an L5-S1 ALIF without complication [Figure 3].

**Postoperative course**

One week postoperatively, she had fevers, but a postoperative CT of the abdomen and laboratory studies were normal. Shortly thereafter, her husband tested positive for COVID-19; she was not tested at that time. Two weeks postoperatively, she complained of new left leg paresthesias (i.e., note her prior deficits were right-sided) with weakness and diffusely decreased sensation to light touch. She was given a steroid taper and sent for a lumbar CT scan that “suggested” encroachment on the left L5-S1 neural foramen by the L5-S1 ALIF [Figure 4]. Of interest, the MRI showed an intramedullary “lesion” at the L1-2 level in the area of the conus medullaris of unclear significance [Figure 5].

**Revision surgery followed by diagnosis of MS versus polysensory neuropathy**

She then underwent a revision ALIF for cage repositioning. Postoperatively, her symptoms continued to worsen. MRIs of the cervical, thoracic spine, and brain were all normal along with multiple lab tests. She was sent home, but was now wheelchair bound. Repeat X-rays showed good location of the

---

**Table 1: Summary of clinical data.**

| Time Point        | Symptoms          | Examination                      | Imaging                                                                 | Labs                                          | Treatment                         |
|-------------------|-------------------|----------------------------------|------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------|
| Presentation      | BLE radiculopathy | RLE quad, TA, EHL 3/5            | X-rays: moderate degenerative disc disease, 3 mm retrolisthesis L5-S1 MRI: right paracentral L5-S1 disc protrusion, moderate lateral recess narrowing | CT abdomen negative                        | L5-S1 ALIF                        |
| 1 Week Postoperative | Fever 102˚F        | Unchanged                        | CT: suggestive of encroachment of ALIF implant on left neural foramen MRI: T2 hyperintense lesion in conus medullaris L1-L2 | WBC 2.7/mm³ ESR 40 mm/h CRP 1.23 mg/dL      | Steroid taper Revision L5-S1 ALIF |
| 2 Weeks Postoperative | LLE paresthesias  | RLE unchanged LLE IP, quad, ham, EHL 4/5; TA, GS 3/5 LLE globally numb Normal reflexes | MRI: T2 hyperintense lesion in conus medullaris L1-L2 | TSH, T3/T4, vitamin B12, folate, ANA, syphilis, Lyme all normal | IV steroids AFO brace, wheelchair |
| 1 Week Post Revision | LLE weakness      | RLE unchanged LLE 1/5 throughout LLE globally numb | X-rays normal MRIs brain, cervical and thoracic spine normal | Lumbar puncture: | MS disease modifying medication |
| 1 Month Post Revision | Unchanged         | Unchanged                        | EMG: global loss amplitude, severe reduction recruitment LLE motor units L2-S1 CT-Myelo negative | Lens negative:                                    | Hotel modification |
| 4 Months Post Revision | BUE weakness Urinary urgency | BLE unchanged BUE extremities 4/5 globally Sensation intact Normal reflexes | Lumbar puncture: | • Protein 46 mg/dL • Glucose 47 mg/dL • WBC (8/mm³) • Culture negative • KFLC 0.371 mg/dL • 4 oligoclonal bands • MBP<2.0 mcg/L | Hotel modification |

RUE: Right upper extremity, LUE: Left upper extremity, BUE: Bilateral upper extremities, RLE: Right lower extremity, LLE: Left lower extremity, BLE: Bilateral lower extremities, IP: Iliopsoas, quad: Quadriceps, ham: Hamstrings, TA: Tibialis anterior, EHL: Extensor hallucis longus, GS: Gastrosoleus, KFLC: Kappa free light chains, MBP: Myelin basic protein.
L5-S1 ALIF cage [Figure 6]. A neurologist performed an EMG of the left lower extremity and determined that her deficit was likely consistent with transverse myelitis and/or a poly-sensory neuropathy (i.e., bilateral superficial peroneal and sural nerves).
Delayed diagnosis of MS

Four months later, now with additional bilateral upper and lower extremity weakness/sensory loss, and worsening urinary urgency with incomplete bladder emptying, she underwent a complete spinal Myelo-CT; it was negative. However, the cerebrospinal fluid obtained from the lumbar puncture showed findings consistent with MS (i.e., primary progressive subtype). She then began MS modifying therapy.

DISCUSSION

Diagnosis of MS versus spinal pathology and risks of spine surgery precipitating demyelinating events

The diagnosis of MS can easily be missed when patients present with myelopathic symptoms misinterpreted as “radiculopathy” secondary to spinal pathology/spondylotic disease. In these cases, patients’ failures to improve with surgery were ultimately attributed to the underlying diagnosis of MS and may result in unintended exacerbation of MS (i.e., precipitate demyelinating events). Further studies have shown that patients with known MS and significant spinal pathology may experience symptom improvement postoperatively, although the existing data are of low quality and conflicting [Table 2].

Increase in MS diagnoses related to COVID-19

Some have observed an increasing relationship between COVID-19 and the onset of MS (i.e., a spike in MS diagnoses). Further, MS patients taking anti-CD20 disease modifying therapies may be the most at risk for developing COVID-19 infections (i.e., they generate a less robust immune response to the virus). In this case, the patient’s lumbar surgeries and presumed infection with the SARS-CoV-2 virus may have directly triggered the onset/flare of MS.

CONCLUSION

The diagnosis of MS can easily be missed when patients present with myelopathic symptoms misinterpreted as “radiculopathy” secondary to spinal pathology. Further, recent COVID-19 infections may pose triggers that potentiate the development of MS.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflict of interest.

REFERENCES

1. Andersen O, Lygner PE, Bergström T, Andersson M, Vahlne A. Viral infections trigger multiple sclerosis relapses: A prospective seroepidemiological study. J Neurol 1993;240:417-22.
2. D’hooghe MB, Nagels G, Bissay V, De Keyser J. Modifiable factors influencing relapses and disability in multiple sclerosis. Mult Scler 2010;16:773-85.
3. Möhn N, Konen FF, Pul R, Kleinschnitz C, Prüss H, Witte T, et al. Experience in multiple sclerosis patients with COVID-19 and disease-modifying therapies: A review of 873 published cases. J Clin Med 2020;9:4067.
4. Moore L, Ghannam M, Manousakis G. A first presentation of multiple sclerosis with concurrent COVID-19 infection. eNeurologicalSci 2021;22:100299.

5. Palao M, Fernández-Díaz E, Gracia-Gil J, Romero-Sánchez CM, Díaz-Maroto I, Segura T. Multiple sclerosis following SARS-CoV-2 infection. Mult Scler Relat Disord 2020;45:102377.

6. Sadeghmousavi S, Rezaei N. COVID-19 and multiple sclerosis: Predisposition and precautions in treatment. SN ComprClin Med 2020;2:1802-7.

7. Satheesh NJ, Salloum-Asfar S, Abdulla SA. The potential role of COVID-19 in the pathogenesis of multiple sclerosis-a preliminary report. Viruses 2021;13:2091.

8. Yerneni K, Nichols N, Burke JF, Traynelis VC, Tan LA. Surgical management of patients with coexistent multiple sclerosis and cervical stenosis: A systematic review and meta-analysis. J ClinNeurosci 2019;65:77-82.

9. Young WF, Weaver M, Mishra B. Surgical outcome in patients with coexisting multiple sclerosis and spondylosis. ActaNeurolScand 1999;100:84-7.

10. Zabalza A, Cárdenas-Robledo S, Tagliani P, Arrambide G, Otero-Romero S, Carbonell-Mirabent P, et al. COVID-19 in multiple sclerosis patients: Susceptibility, severity risk factors and serological response. Eur J Neurol 2021;28:3384-95.

How to cite this article: Alter TH, Helbig T, Chiappetta G. Case report: Multiple sclerosis diagnosis after anterior lumbar interbody fusion and presumed COVID-19 infection. Surg Neurol Int 2022;13:125.