March 23, 2023

Parsonage-Turner Syndrome After COVID-19 Vaccination: A Case Report-Importance of Diagnostic Criteria for Evaluating Parsonage-Turner Syndrome

Karthik Raman Krishnan
Diagnostic Radiology Resident
Department of Radiology, New York Presbytarian Weill Cornell

Other Contributors:

Carlo Milani
Assistant Attending Physiatrist
Center for Brachial Plexus and Traumatic Nerve Injury, Hospital for Special Surgery

Zsuzsanna Arányi
Associate Professor of Neurology and Clinical Neurophysiology
Department of Neurology, Semmelweis University

Ogonna Nwawka
Chief, Division of Ultrasound
Center for Brachial Plexus and Traumatic Nerve Injury, Hospital for Special Surgery

Joseph Feinberg
Attending Physiatrist
Center for Brachial Plexus and Traumatic Nerve Injury, Hospital for Special Surgery

Steve Lee
Chief, Hand and Upper Extremity Service
Center for Brachial Plexus and Traumatic Nerve Injury, Hospital for Special Surgery

Scott Wolfe
Attending Orthopedic Surgeon
Center for Brachial Plexus and Traumatic Nerve Injury, Hospital for Special Surgery

We extend our congratulations to Drs. Ghanta et al for their recognition in writing one of the top 10 case reports of the year in the Journal of Bone and Joint Surgery. It is an exciting time for research involving Parsonage Turner Syndrome (PTS) /neuralgic amyotrophy (NA) given increasing physician awareness of the condition and new insights into its diagnosis and treatment.

The onset of upper extremity pain and weakness following an immune trigger (vaccination, as described in this case report), is suggestive of PTS. However, we question the conclusive diagnosis of PTS in this patient, particularly as neither imaging confirmation nor electrodiagnostic testing was performed, and according to the authors, “Motor examination showed 4 of 5 strength.” Because unexplained upper extremity neurologic ailments are sometimes labeled “Parsonage Turner Syndrome” as a diagnosis of exclusion, we previously published stringent diagnostic

criteria for PTS [1]. Most importantly, electrodiagnostic testing is necessary to confirm a peripheral axonopathy with complete, or near complete, denervation of all muscles in the distribution of one or more peripheral nerves [1-2]. Imaging with high-resolution ultrasound or magnetic resonance (MR) neurography is also helpful to confirm a diagnosis, as affected peripheral nerves and/or nerve fascicles usually demonstrate hourglass-like constrictions, an early hallmark finding with possible prognostic implications [3-5]. Imaging can also demonstrate effects of muscle denervation (edema pattern, diminished bulk) in the distribution of the affected nerve(s) [3, 6]. Notably, the shoulder MRI performed in this patient 3 weeks after onset of weakness should have shown denervation abnormality in the affected muscles included in the field of view: (supraspinatus, infraspinatus, subscapularis, deltoid, and latissimus); in this case the MRI was reported as normal. Without cervical spine or brachial plexus imaging to evaluate for more proximal pathology, electromyographic testing, and a neurologic examination that confirms muscle palsy, a diagnosis of PTS cannot be conclusively made.

The authors described PTS as a “brachial plexopathy;” however, recent imaging studies that directly visualize the plexus and affected nerves have consistently shown PTS to affect side or terminal branch nerves of the plexus rather than the plexus proper (roots to cords) [1-2, 5-7]. While PTS can affect multiple peripheral nerves, it is less likely to affect such a disparate but non-inclusive distribution of muscles in five different nerves (suprascapular, axillary, thoracodorsal, upper/lower subscapular, and musculocutaneous). Further, the thoracodorsal nerve is rarely, if ever affected by neuralgic amyotrophy [8]. As motor involvement in this report followed a C5-6 myotome distribution, a more proximal abnormality of the upper trunk or involvement of the C5-6 cervical nerve roots would represent a more likely explanation of this patient’s presentation. In an active weightlifter, we propose a cervical radiculopathy or upper trunk neuropraxic injury secondary to resistance training as alternative diagnoses.

Other elements of the history and exam argue against PTS. If the patient did have PTS, complete recovery within 4 months would be significantly faster than the typical time course for this disease. In a prospective series by Feinberg et al of 9 patients with PTS, complete reinnervation and recovery took 12 months on average, with the fastest reaching this point by 8.2 months [9]. In a separate study of 42 patients by van Alfen, none reported full subjective recovery within the first 6 months [8].

PTS was an important diagnostic consideration in this case given the vaccination trigger and pain prodrome, especially as PTS has now been reported in the context of the COVID-19 pandemic [10-11]. New research and insights into this disease have transformed it from a diagnosis of exclusion into a condition with salient imaging and electrodiagnostic features so that rapid diagnosis can be rendered.

Disclaimer: e-Letters represent the opinions of the individual authors and are not copy-edited or verified by JBJS.

References

1. Krishnan KR, Sneag DB, Feinberg JH, Wolfe SW. Anterior Interosseous Nerve Syndrome Reconsidered: A Critical Analysis Review. JBJS Rev. 2020;8(9):e2000011.
2. Krishnan KR, Sneag DB, Feinberg JH, et al. Outcomes of Microneurolysis of Hourglass Constrictions in Chronic Neuralgic Amyotrophy. J Hand Surg Am. 2021;46(1):43-53.
3. Ripellino P, Arányi Z, van Alfen N, et al. Imaging of neuralgic amyotrophy in the acute phase. Muscle Nerve. 2022;66(6):709-14.
4. Arányi Z, Csillik A, DéVay K, et al. Ultrasonography in neuralgic amyotrophy: Sensitivity, spectrum of findings, and clinical correlations. Muscle Nerve. 2017;56(6):1054-62.
5. Sneag DB, Saltzman EB, Meister DW, Feinberg JH, Lee SK, Wolfe SW. MRI bullseye sign: An indicator of peripheral nerve constriction in parsonage-turner syndrome. Muscle Nerve. 2017;56(1):99-106.

6. Sneag DB, Rancy SK, Wolfe SW, et al. Brachial plexitis or neuritis? MRI features of lesion distribution in Parsonage-Turner syndrome. Muscle Nerve. 2018;58(3):359-66.
7. Pan YW, Wang S, Tian G, Li C, Tian W, Tian M. Typical brachial neuritis (Parsonage-Turner syndrome) with hourglass-like constrictions in the affected nerves. J Hand Surg Am. 2011;36(7):1197-203.
8. van Alfen N, van Engelen BG. The clinical spectrum of neuralgic amyotrophy in 246 cases. Brain. 2006;129(Pt 2):438-50.
9. Feinberg JH, Nguyen ET, Boachie-Adjei K, et al. The electrodiagnostic natural history of parsonage-turner syndrome. Muscle Nerve. 2017;56(4):737-43.
10. Michaelson NM, Malhotra A, Wang Z, et al. Peripheral neurological complications during COVID-19: A single center experience. J Neurol Sci. 2022;434:120118.
11. Queler SC, Towbin AJ, Milani C, Whang J, Sneag DB. Parsonage-Turner Syndrome Following COVID-19 Vaccination: MR Neurography. Radiology. 2022;302(1):84-7.

Conflict of Interest: None Declared