Parsonage–Turner syndrome of the brachial plexus secondary to COVID-19 vaccine: A case report

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Abstract
Parsonage–Turner syndrome (PTS) is a peripheral inflammatory neuropathy of unknown etiology. We present a rare case of a 50-year-old male patient with PTS post-COVID-19 BNT162b2 mRNA vaccine. Symptoms occurred 15 days after the second dose. He was treated with corticosteroids, analgesics, and physical rehabilitation with a partial recovery.

KEYWORDS
COVID-19, Parsonage–Turner syndrome, vaccine

1 | BACKGROUND
Parsonage–Turner syndrome (PTS), also known as neuralgic amyotrophy or idiopathic brachial plexopathy, is a rare peripheral multifocal inflammatory neuropathy that usually affects the upper limbs.³ However, it is widely misdiagnosed because of its heterogeneous clinical appearance.² The classic presentation is a patient with subacute-onset of asymmetric shoulder pain, followed several days later by weakness and amiotrophy.³ Although its exact cause is still unknown, multiple factors have been identified such as immunological (infection, vaccination, surgery, pregnancy, physical, or mental stress), mechanical (trauma, sports, or heavy labor), and genetic factors.⁴ In the last years, PTS has been associated with severe COVID-19 infection as well as its vaccination.⁵ Therefore, we report a rare case of a subacute-onset of PTS as a result of COVID-19 vaccine.

2 | CASE DESCRIPTION
We represent the case of a 50-year-old right-handed male patient, admitted to the neurology department of the Military Hospital of Tunis-Tunisia. He has no medical history of chronic diseases or medication use. He had a mild COVID-19 infection confirmed by RT-PCR on April 2021. The COVID-19 infection did not require hospitalization, nor oxygen therapy, neither other medication. He had a complete immunization schedule with no history of vaccine
reaction. He received the first dose of COVID-19 BNT162b2 mRNA vaccine on August 8, 2021, followed by the second dose on December 4, 2021, both in his right deltoid muscle. He did not have a mild local pain immediately after the injection. There was no recent trauma, surgery, or infectious disease. Fifteen days after the second dose of the vaccine, he presented with pain on the injection site, resistant to pain relievers, radiating to the right shoulder and the neck. Two weeks later, he presented numbness, heaviness, and muscle weakness of the upper right limb. There were no sensory disturbances or other symptoms. General physical examination was normal. Neurological examination revealed hypoesthesia and monoparesis of the right upper limb with muscle weakness in shoulder abduction and extension and right deltoid myopathy. No motor deficits were found in other parts of the body. All deep tendon reflexes were normal and symmetrical. Superficial and deep sensation was normal. His laboratory results were all normal, as well as the lumbar puncture results. Electromyography (EMG) performed 30 days from symptoms’ onset showed signs of brachial plexus neuritis (neurogenic tracing of the right deltoid muscle). Computed tomography (CT)-scan imaging of the brain was normal. Magnetic resonance imaging (MRI) of the right shoulder, performed 2 weeks after symptoms’ onset, revealed no abnormal results.

Considering all these findings, the patient was diagnosed with subacute PTS post-COVID-19 BNT162b2 mRNA vaccine. He was treated with grade 2 analgesics and corticosteroids with initiation of physical rehabilitation. He received a 2-month treatment according to a standardized protocol: Methylprednisolone bolus 15 mg/kg for three consecutive days by IV infusion, followed by Prednisone per os (1 mg/kg/day for 4 weeks, 0.75 mg/kg/day for 4 more weeks). During the follow-up period, the patient’s medical condition improved; with a partial recovery in motor functions.

3 | DISCUSSION

Parsonage–Turner syndrome is the classic presentation of the brachial plexus inflammation, involving the long thoracic, subscapular, superficial radial, and anterior interosseous nerves, but can also involve other peripheral nerves, lower brachial plexus, and phrenic nerves.1,6

Parsonage–Turner syndrome is a not a rare neurological disorder as previously thought.1 A recent prospective study suggests that its actual incidence rate is 1 per 1000 per year.7 It is most likely underdiagnosed due to its misleading manifestations.1

In general, the idiopathic form of PTS occurs mainly in men with a sex ratio of 2 and a median age of 40 years. It is typically characterized by the onset of sudden severe shoulder pain, developing paresis and tingling within several hours to days later, as reported in our case.6

The diagnosis of PTS is primarily clinical, there is no specific diagnostic test.1 EMG may lack sensitivity and accuracy in confirming the diagnosis.6 In our case, the pattern brachial plexus neuritis comforted the diagnosis hypothesis. In fact, this sign is only found in 30%-45% of confirmed PTS cases.4 Shoulder MRI helps excluding differential diagnoses such as intrinsic shoulder disorder. Our patient showed no signal abnormalities.

The exact mechanism in PTS is still unknown but multiple factors are involved. The immunological hypothesis is plausible by the fact that 50% of PTS patients have a history of a trigger event such as infection, vaccination, surgery, pregnancy, physical, or mental stress.7 Concomitant hepatitis E viral infection was found in 10% of patients which pleads in favor of an infectious or post-infectious mechanism.4 In peripheral nerve biopsy, epineurial perivascular mononuclear T-cell infiltration was found6 which supports the immunological theory.

In this regard, our case is interesting as the symptoms’ onset occurred after a vaccination: COVID-19 BNT162b2 mRNA vaccine (manufactured by Pfizer).

Post-vaccination PTS is very rare.8 PTS onset occurs within 28 days after vaccination, in an estimated 4.3%-15.5% of cases.9 Our patient typically developed classic symptoms of PTS 15 days after receiving the second dose of BNT162b2 mRNA vaccine, as it was reported in the literature.

Concerning COVID-19 vaccines, and after at least one dose, 56 reports of PTS were detected by The Vaccine Adverse Event Reporting System (VAERS) in July 2021, among which 24 reports concerned BNT162b2 mRNA vaccine.9

To date, there is no specific treatment for PTS. Support therapy including corticosteroids, analgesics, immobilization, and physical therapy are the milestone of PTS treatment, as it was highlighted in our case.4 No recommendations have been established due to the lack of Randomized Controlled Trials. Intravenous corticosteroids and immunoglobulins can be used in severe extensive PTS with intense pain in order to minimize symptoms duration and recover functional abilities.4

Outcomes are heterogeneous and depend on the phase in which the patient is diagnosed, the intensity of pain, the extent of plexus involvement and whether the symptoms are bilateral or unilateral.10

4 | CONCLUSION

Parsonage–Turner syndrome is a disease that was previously considered rare, but it is rather misdiagnosed due to its variable symptoms. An immune system trigger is
usually found. The COVID-19 BNT162b2 mRNA vaccine, like other vaccines, can be associated to PTS with a typical presentation. As COVID-19 vaccination rates increase, it is quite possible that post-vaccination PTS will increase. Thus, early recognition is essential to initiate adequate treatment, leading to better recovery without sequelae. However, based on what we know so far, we cannot limit the access to vaccination based on a certain patient’s profile. In fact, we do not have a model of prediction and the current level of statistical evidence does not contraindicate the vaccination.

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All authors have contributed to this work. All authors have read and agreed to the final manuscript.

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The authors declare no competing interest.

**DATA AVAILABILITY STATEMENT**
None.

**CONSENT**
Written informed consent was obtained from the patient to publish this report in accordance with the journal’s patient consent policy.

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**REFERENCES**
1. IJspeert J, Janssen RMJ, van Alfen N. Neuralgic amyotrophy. *Curr Opin Neurol*. 2021;34(5):605-612.
2. Kim SI, Seok HY, Yi J, Cho JH. Leg paralysis after AstraZeneca COVID-19 vaccination diagnosed as neuralgic amyotrophy of the lumbosacral plexus: a case report. *J Int Med Res*. 2021;49(11):300065211056783.
3. Crespo Burillo JA, Loriente Martínez C, García Arguedas C, Mora Pueyo FJ. Amyotrophic neuralgia secondary to Vaxzevri (AstraZeneca) COVID-19 vaccine. *Neurol Barc Spain*. 2021;36(7):571-572.
4. Kim TU, Chang MC. Neuralgic amyotrophy: an underrecognized entity. *J Int Med Res*. 2021;49(4):300065211006542.
5. Vitturi BK, Grandis M, Beltramini S, et al. Parsonage-Turner syndrome following coronavirus disease 2019 immunization with ChAdOx1-S vaccine: a case report and review of the literature. *J Med Case Reports*. 2021;15(1):589.
6. Van Eijk JJJ, Groothuis JT, Van Alfen N. Neuralgic amyotrophy: an update on diagnosis, pathophysiology, and treatment. *Muscle Nerve*. 2016;53(3):337-350.
7. van Alfen N, van Eijk JJJ, Ennik T, et al. Incidence of neuralgic amyotrophy (Parsonage Turner syndrome) in a primary care setting – a prospective cohort study. *PLoS One*. 2015;10(5):e0128361.
8. Mahajan S, Zhang F, Mahajan A, Zimnowodzki S. Parsonage Turner syndrome after COVID-19 vaccination. *Muscle Nerve*. 2021;64(1):E3-E4.
9. Queler SC, Towbin AJ, Milani C, Whang J, Sneag DB. Parsonage-Turner syndrome following COVID-19 vaccination: MR neurography. *Radiology*. 2022;302(1):84-87.
10. Alvarado M, Lin-Miao Y, Carrillo-Arolas M. Parsonage-Turner syndrome post-infection by SARS-CoV-2: a case report. *Neurol Barc Spain*. 2021;36(7):568-571.

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