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Pfizer Vaccine-Associated Parsonage-Turner Syndrome

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ABSTRACT

Parsonage-Turner syndrome, a rare condition with a reported overall incidence of 1.64 cases per 100,000 people. PTS is also characterized by associated delayed upper extremity weakness, muscle atrophy, and painless paresthesias, which tend to diminish slowly and resolve gradually; Although most patients report 80% to 90% muscle strength recovery within 2-3 years, more than 70% of patients experience residual paresis and exercise intolerance. As described in the existing bibliography, the patients reported initial pain in the shoulder and weakness after vaccination that, as it worsened, led them to visit the emergency department. Vaccination is a known cause of this syndrome although there is difficulty in early identification, it is often overlooked or misdiagnosed, Possible immune-mediated mechanisms include molecular simulation and bystander activation, which can occur after any infection or vaccination.

KEY WORDS: Adverse Events; BNT162b2 Vaccine; Brachial Neuritis; Neuralgic Amyotrophy; Parsonage-Turner Syndrome; Pfizer; SARS-Cov-2.

ARTICLE DETAILS

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Introduction:

Parsonage-Turner syndrome (PTS), also known as idiopathic brachial plexopathy or neuralgic amyotrophy, is a rare condition with an overall reported incidence of 1.64 cases per 100,000 people. It most often affects young adults, although they have been reported from 3 months of age to 75 years. It is characterized by acute onset of severe shoulder pain, most commonly unilateral, that can spread to the arm and hand. The pain is often constant and is non-positional in nature. It is usually self-limiting and can last 1 to 2 weeks, although less frequently, persistent pain has been reported. PTS is also characterized by associated delayed upper extremity weakness, muscle atrophy, and painless paresthesias, which tend to diminish slowly and resolve gradually; Although most patients report 80% to 90% muscle strength recovery at 2-3 years, more than 70% of patients experience residual paresis and exercise intolerance (1).

The symptoms of this syndrome are usually preceded by a triggering event, such as infection, surgery, vaccination; being a recent viral disease and recent vaccination the most associated risk factors, with cases reported in 25% and 15% of patients who developed PTS, respectively. Given this strong correlation, it is believed that PTS may be the result of a viral disease that directly involves the brachial plexus or of an autoimmune response to a viral infection or antigen, various viruses, bacteria, and fungi. It has been reported that PTS can be caused by infections given by herpes simplex virus, Epstein-Barr virus, cytomegalovirus, varicella zoster virus, Parvo virus B19, human immunodeficiency virus (HIV), hepatitis B virus, virus of hepatitis E, vaccinia virus, Coxsackie B virus, and West Nile virus (2.4).

With the emergence of the covid-19 pandemic, vaccines were sought to help prevent contagion and improve the prognosis of patients infected with the coronavirus, multiple laboratories manufactured these biologicals that have shown good results in the control of covid- 19, as is the Pfizer vaccine; but these vaccines have been related to multiple adverse effects in patients, as in this case, there has been a

report of several cases in which after the administration of the Pfizer vaccine in the deltoid muscle, these patients have manifested the presence of of symptoms that may suggest the development of Parsonage-Turner syndrome (2).

MATERIALS AND METHODS

A literature search was performed in the MEDLINE (PubMed), UpToday, ScienceDirect and EMBASE (OVID) databases of original articles and case reports published from January 2020 to September 2021 in English using the MeSH terms: adverse events; BNT162b2 vaccine; brachial neuritis; neuralgic amyotrophy; Parsonage-Turner syndrome; Pfizer; SARS-CoV-2 to facilitate the search.

Articles reporting data on Pfizer vaccine-associated parsonage-turner syndrome were included, articles without access to incomplete text, editorials, letters to the editor, duplicates, however due to the few reports the results are scarce

The data obtained oscillate between 5 and 8 records after the use of the different keywords, 5 articles were used for the realization of this document.

Results:

In a case report in The Journal Of Bone And Joint Surgery, Incorporated presents a 66-year-old woman in the orthopedic surgery clinic with persistent right shoulder dysfunction 1 month after receiving the second dose of SARS-CoV-2 BNT162b2 on his right deltoid 3 fingers below the acromion at the institution's vaccination site. She reported initial shoulder pain and weakness after vaccination, which worsened and led her to visit the emergency department 2 weeks after the second dose. She noted pain all over her right arm down to her hand, particularly her little fingers, including slight numbness in her fourth and fifth fingers. Her physical examination in the emergency department consisted of right medial warping of the scapula and weakness and pain with forward elevation of the shoulder. X-ray of the shoulder showed no bone abnormalities. At her clinic visit 1 month after the second dose, her pain had resolved, but the scapular warping and decreased range of motion compared to contralateral persisted. In Figure 1 she shows the mid-scapular side of the right shoulder with forward elevation of the extremities and scapular protrusion. Physiotherapy was prescribed to focus on scapular stabilization exercises and parascapular muscle strengthening. The patient was seen again for follow-up 2 months after the second vaccination, during which she reported continued winging and dysfunction, but was back to her normal sporting activities**.**

His American Shoulder and Elbow Surgeons score, which was used to indicate his difficulty in performing tasks of daily living, only showed difficulty lifting heavy objects and reaching for objects overhead (1).

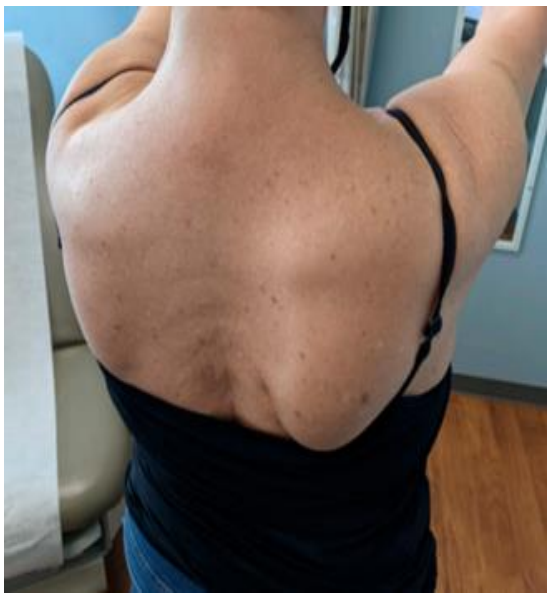

Fig 1. Forward elevation of bilateral shoulders and scapular protuberance showing right medial warping of the scapular.

On the other hand, a case reported by physician Shalini Mahajan at Cedars Sinai Medical Center, Beverly Hills, California mentions that a healthy 50-year-old man developed a sudden onset of severe left periscapular pain 1 week after receiving the first dose of COVID- 19 BNT162b2 vaccination in the left deltoid muscle. Although pain initially decreased with NSAID use, pain symptoms flared after receiving the second dose, spreading to the forearm and disturbing sleep. One week after the second dose, the patient developed weakness in the left grip and in the extension of the left wrist. There were no sensory disturbances or other symptoms. Physical examination showed weakness in left finger extension and left grip. Weak muscles include the left dorsal interosseous, extensor digitorum, extensor indicis, and flexor carpi ulnaris (Medical Research Council grade 3). Other muscles, including the deltoids and periscapularis, were at full strength. The muscle stretch reflexes were slightly rapid bilaterally, but symmetrical. No sensory deficits, bulbar weakness or pathological signs of the upper motor neurons were observed. Nerve conduction studies of the right and left, median and ulnar sensory and motor nerves performed 4 days after the onset of weakness were normal and symmetrical. Needle electromyography showed decreased motor unit recruitment in the first dorsal interosseous muscles, flexor carpi ulnaris, abductor digiti minimi, extensor digitorum, and extensor indicis. Treatment with oral prednisone 40 mg / d was started when pain spiked after the second dose of the vaccine. This resulted in a significant improvement in pain and a slight improvement in hand weakness. Subsequently, steroids were reduced to 5 mg / d for 5 weeks and occupational therapy began to maintain range of motion and facilitate ADLs (Activities of Daily Living) (2).

Two patients are referred for MRI neurography between February and March 2021 due to clinical suspicion of PTS

that developed 13 hours after the Pfizer-BioNTech (BNT162b2) COVID-19 vaccine and 18 days after the Moderna (mRNA-1273) vaccine COVID-19. Thus being the report of a patient 1 and 2.

Patient 1: A 49-year-old man is documented awakened by severe electrical shooting pain in his left forearm, 13 hours after receiving the first dose of the BNT162b2 (PfizerBioNTech) vaccine in his contralateral right shoulder. Due to persistent and severe pain, he went to the emergency room where he received intravenous non-steroidal anti-inflammatory drugs, but these provided only mild relief. Laboratory tests performed in the emergency room, including C-reactive protein, erythrocyte sedimentation rate, complete blood count, and exhaustive metabolic particles were normal. Eight weeks after onset of initial pain, physical examination by a neurologist revealed mild atrophy in the left forearm and mild weakness in forearm pronation and wrist flexion (British Medical Research Council Scale strength 4 + / 5). MRI neurography demonstrated a prominent denervation edema pattern of the pronator teres (PT) and flexor carpi radialis (FCR) muscles within the forearm (Figure 2A).

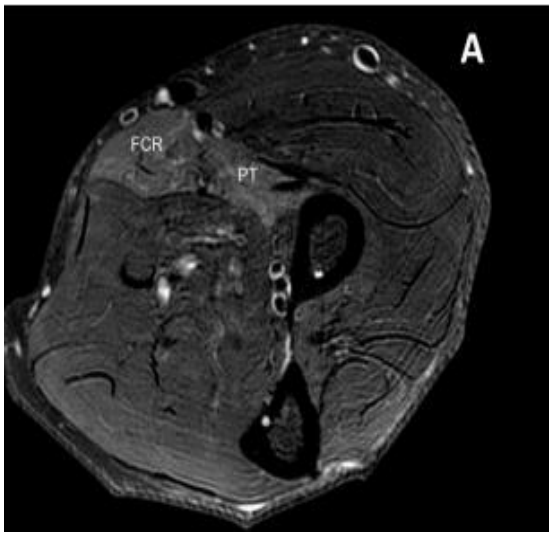

Figure 2A. It demonstrates the pattern of denervation edema of the pronator teres (PT) and flexor carpi radialis (FCR) muscles. T2-weighted gradient echo axial image

Within the arm, 4 severe hourglass-shaped constrictions and a T2-weighted signal hyperintensity of the anteromedially positioned fascicular bundle of the median nerve were detected; this bundle represents the PT / FCR bundle based on the known topography, fascicular arrangement of the median nerve (Figure 2B-C).

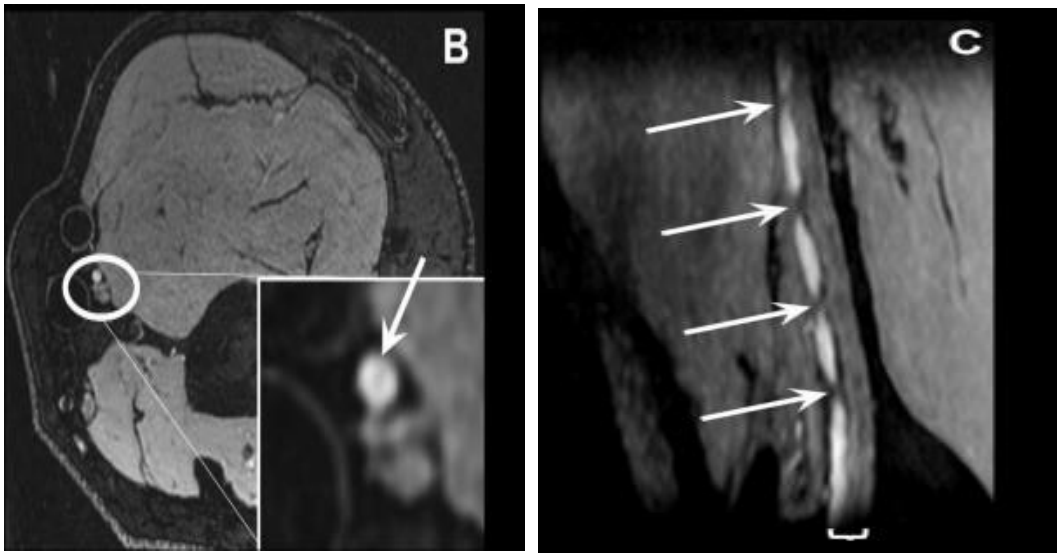

Figure 2B-C

(B) shows abnormal signal hyperintensity of the PT / FCR, antero-medially positioned, fascicular bundle (arrow, magnified insertion) of the median (oval) nerve within the distal arm. Sagittal oblique, reformatted curved multiplanar T2-weighted gradient echo image (C) demonstrates multiple severe intrinsic constrictions (arrows) of the PT / FCR bundle of the median nerve (bracket).

At 3-month follow-up after onset, the patient reported no residual pain but increased weakness. He had not yet received the second dose of his COVID-19 vaccine (3).

Patient 2: A healthy 44-year-old man developed sudden, severe, cramping pain in the left lateral deltoid region 18 days after receiving his second dose of 1273-mRNA in the same arm. Three weeks later, he noticed the inability to abduct his left shoulder beyond 20 degrees. Otherwise, he only experienced minor symptoms attributed to the vaccine, including erythema at the injection site, as well as headache and mild fatigue that lasted for 2 days.

Five weeks after the onset of symptoms, neurography of the left brachial plexus showed enlargement, T2-weighted signal hyperintensity, and multiple, focal, hourglass-shaped constrictions of the suprascapular nerve (Figure 3A) with the

edema pattern of denervation of the supraspinatus and infraspinatus muscles (Figure 3B).

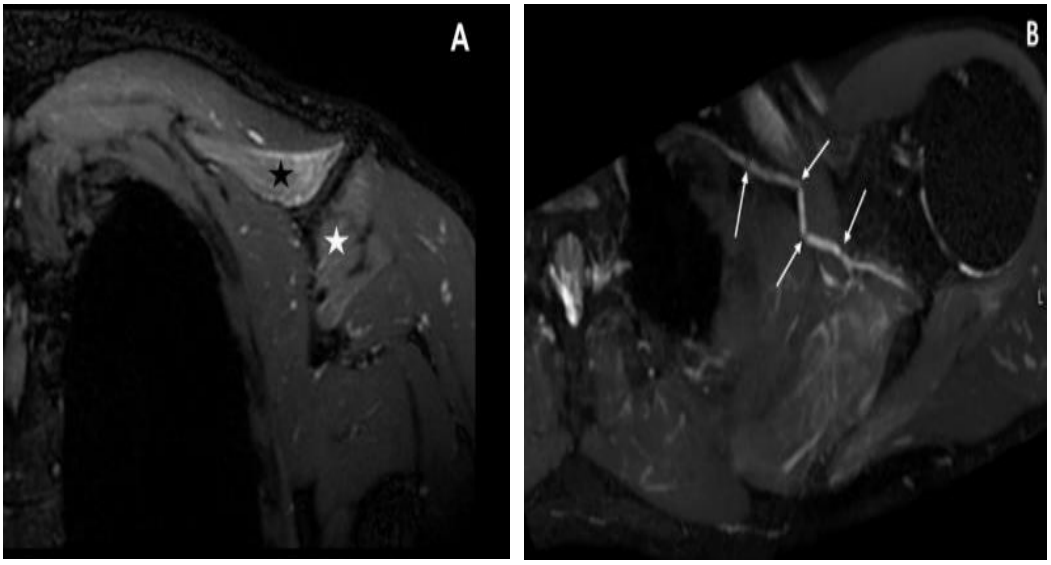

Figure 3A-B.

(A) demonstrates the denervation edema pattern of the supraspinatus (black star) and infraspinatus (white star) muscles. T2-weighted fat-flattened FSE (B) image (B) shows 4 severe intrinsic constrictions (arrows) of the suprascapular nerve

The patient was treated 3 weeks after initiation with 300 mg of gabapentin 3 times a day for pain and began physiotherapy 7 weeks after onset of symptoms. Three months after his onset, his range of motion and strength subjectively improved, but he did not return to baseline levels (3).

At Hospital-Weill Cornell, United States Department of Radiology, America, a case was reported of a 17-year-old female patient with no significant medical or surgical history who presented several weeks of shortness of breath and joint pain. She reported that her symptoms initially began 3 months prior to presentation, when she experienced fever, chills, and other symptoms of an upper respiratory infection for approximately 1 week, which resolved without intervention. A few weeks later the patient reported a new onset of multifocal joint pain, more prominent in the left shoulder and left hand. The pain was described as constant, but exacerbated by any movement. On physical examination, she appeared pale, she was able to speak in complete sentences in the air in the room, but seemed out of breath. She had the full range of motion of her left shoulder and left hand, but was somewhat limited by pain. Her examination was within normal limits. His serum inflammatory markers were markedly elevated, including c-reactive protein (CRP) of 92.6 mg / l (reference range 3.0 mg / l), erythrocyte sedimentation rate (ESR) of 98 mm / h (reference range 0-30 mm / h), dimer of 3479.5 ng / mL (reference range 30-230 ng / mL), and ferritin of 1216.1 ng / mL (reference range 8.0-252.0 ng / mL). She was anemic, with hemoglobin 6.8 g / dL (reference range 11.5-16.0 g / dL) and had mild leukocytosis, white blood cell count of 12.3 K / uL (reference range 4.0 -10.3 K / uL), with eosinophilia of 15% (reference range 1-5%) in manual differentiation. The respiratory pathogen and HIV PCR panel was negative. SARS-CoV2 real-time reverse transcription polymerase chain reaction (RT-PCR) test from nasopharyngeal swab was negative, however, serum IgG antibodies to SARS-CoV2 were positive, suggesting infection / previous exposure.
Imaging analysis included CT of the chest, abdomen, and pelvis that revealed cardiomegaly, left mediastinal and supraclavicular adenopathy, hepatomegaly, and ascites, possibly related to systemic infection / inflammation or malignant etiology.

MRI of the left shoulder showed a uniform increase in the T2 signal of the supraspinatus, infraspinatus, teres minor, teres major and trapezius muscles, consistent with PTS Figure 4A, B, C).

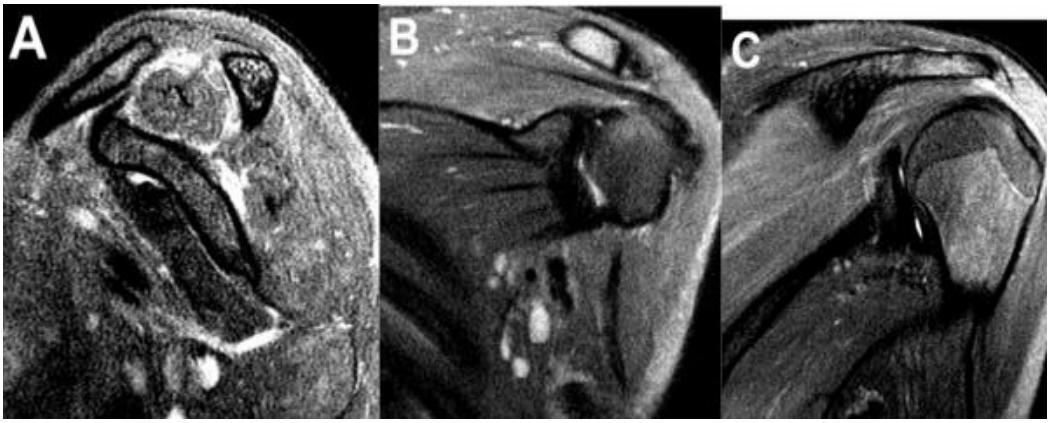

Figure 4A, B, C.

Sagittal (A) and coronal (B, C) views of a fat-saturated T2 sequence of the left shoulder show diffuse signal enhancement from the supraspinatus, infraspinatus, teres minor, teres major, and trapezius muscles.

The diagnosis of underlying malignancy or rheumatologic disorder was negative. Bone marrow biopsy and aspiration results also excluded hematologic malignancy and hypereosinophilic syndrome (HES) as alternative etiologies for the patient's symptoms. Given the temporal relationship of the onset of symptoms, markedly increased inflammatory markers, dilation of the left coronary artery and confirmation of infection / exposure to SARS-CoV2, a post-COVID-19 hyperinflammatory syndrome such as the multisystemic inflammatory syndrome in children (MIS- C) was the diagnosis favored over other etiologies such as the development of an autoimmune disorder (4).

DISCUSSION

Several studies related to PTS have related its appearance after the administration of the second dose of the vaccine against COVID 19 produced by Pfizer laboratories, with frequent and similar manifestations such as pain, weakness and limitation of movement and strength where The alternative to treat these is based on NSAID steroids, physical therapy and nerve stimulation, results similar to those of this study, where it was found that although it is true that PTS is related to previous pathologies with the recent administration of vaccines this same has been developed in healthy patients with no previous history (3.4)

Vaccination is a known cause of this syndrome but due to the difficulty of early diagnosis, it is often overlooked or misdiagnosed. Possible immune-mediated mechanisms include molecular simulation and bystander activation, which can occur after any infection. or vaccination. The mRNA vaccine elicits an effective type I interferon response, which induces inflammation and may be associated with an increased risk of autoimmune reactions. PTS is unlikely to be secondary to direct nerve damage caused by vaccination, as are PTS and other peripheral neuropathies after vaccination. The contralateral side of the injection side is often reported, however there are also other mechanisms such as nerve alterations and ideopathic alterations, however due to the appearance of the massive infection caused by SARS-CoV2 this syndrome has become more evident, with greater reports of cases where it is possible to describe the different forms of appearance, manifestations and treatment alternatives (3.5).

CONCLUSION

Different case reports have shown weakness in the extension of the left finger and the left grip. Weak muscles include the left dorsal interosseous, the extensor digitorum, the extensor indicis, and the flexor carpi ulnaris. The patients themselves reported pain and muscle weakness in the area of application and these patients after months of therapy and treatment recorded improvement in the range of motion, however the results are not conclusive.

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