Peripheral inflammatory neuropathy related to oral vaccine against polyomyeloitis: A case report

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ABSTRACT
At two years of age, 10 months after the 1st booster of the oral poliovirus vaccine, the pacient started with a subacute presentation of hypotrophy of the left lower limb, hyporeflexia and scarvating gait due to lack of function of the foot dorsiflexors. Cranioencephalic tomographic studies and lumbosacral spine MR were performed, ruling out anatomical alterations. In electroneuromyography examination, sciatic neuritis was observed. The patient's condition continued to evolve negatively, resulting in deformity of the foot structure and difficulty in walking less than one year after the onset of symptoms. It is not possible to state that the neuropathy was the exclusive result of an adverse reaction to the polio vaccine, however this is the most likely pathophysiological mechanism considering that other causes have been ruled out and the condition progresses with muscle paralysis typical of poliomyelitis. The present case report is important for epidemiological control and containment of virus damage.

Keywords: Poliomyelitis, Poliovirus vacines, Muscular atrophy, Epidemiological monitoring.

1 INTRODUCTION

Polio - infantile paralysis - is an acute viral infectious-contagious disease caused by RNA poliovirus of the family *Picornaviridae*.[1] It is recognized that vaccination is the only form of prevention for polio, so that all children between 2 months and 5 years should be vaccinated, according to the National Immunization Program (PNI). The vaccination schedule is carried out by two distinct forms, namely: injectable - VIP vaccine at 2 and 4 months, followed by an oral dose - PWV vaccine (attenuated) - at 6 months, with an interval of 60 days between doses and a minimum of 30 days. Booster doses with PWV are performed at 15 months and 4 years of age.[2] After a long journey and due to the success of the vaccination program, in 1994 Brazil received from the Pan American Health Organization the Certification of Eradication of the transmission of wild polyvirus.[3]

However, vaccination can cause adverse effects, the main one being acute polio associated with the vaccine virus (VAPP) – responsible for polio cases in Brazil after the eradication of the wild virus. The origin of the PWV vaccine of attenuated strains of the polio virus refers to the disadvantage of reversal to neurovirulence, which can cause acute flaccid paralysis, since it is a live attenuated virus.

It is estimated that after the first dose of PWV, the risk of acute polio associated with the vaccine virus is one for every 750,000 and, after subsequent doses, one for every five million. [4] Therefore, it is a very rare reaction characterized by flaccid motor deficit of variable intensity and usually asymmetric. There is no decrease in sensitivity and signs of radicular or meningeal involvement or spontaneous pain may be found. Around 60 days after the onset of the condition, the pain symptom disappears, there is improvement of the motor deficit and atrophies begin to set in. Hypotonia and decreased reflexes become evident. [5]

This study describes a rare case of peripheral neuropathy possibly associated with polio vaccine. Female patient, born at term (40 weeks), healthy, by cesarean section and without intercurrences. At two years of age, he started subacutely with hyporeflexia, paresis and, progressively, hypotrophy of the entire lower limb and unilateral bone deformity of the left foot. He had had the first booster of the oral poliovirus vaccine 10 months ago, there was no history of trauma or infection. Cranioencephalic tomographic studies and MRI of the lumbosacral spine were performed, ruling out anatomical alterations. In addition, blood tests and cerebrospinal fluid tests showed no changes.

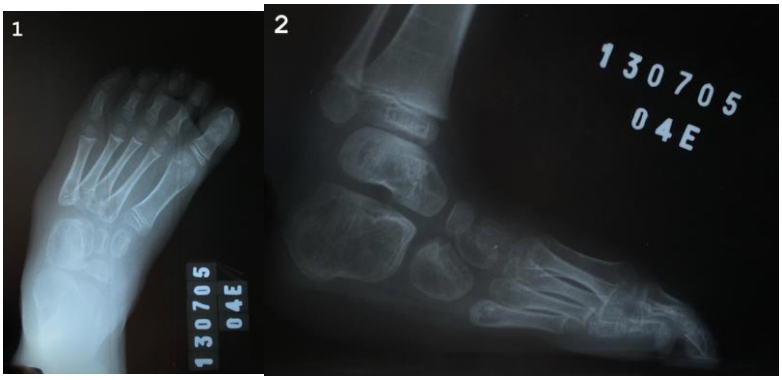
The investigation continued with an electroneuromyography (ENMG), through which dysfunctions of fibers from L5 and S1 were found, classifying the patient as neuritis of the sciatic nerve from its origin to the middle of the gluteal, with no sign of compression. Deepening the findings of this examination, the sensory conduction study demonstrated inexcitability of the superficial fibular and sural nerves, both on the left side. The study of motor conduction showed muscle action potential of the left tibial nerve of amplitude lower than 50%, when compared to the contralateral side (D) and the action potential of the deep fibular nerve presented 87% less amplitude than that of the right side. Electromyography showed no recruitment in the left tibialis anterior muscle and the gastrocnemius muscle had poor intermediate recruitment.

The patient also underwent magnetic resonance neurography (MRN) that found volumetric increase and post-contrast enhancement of the left sciatic nerve from its intrapelvic portion to the posterior pillar of the acetabulum, associated with thickening and hypersignal of the sacral roots S1 and S1, as well as signal alteration and post-contrast enhancement of the quadratus femoris muscle ipsilaterally (suggesting denervation).

She was submitted to prolonged corticosteroid therapy for at least four months, with the objective of stopping the evolution of a possible autoimmune plexopathy. The picture did not evolve favorably and culminated in the structuring of an equinovaro deformity of the left foot. At that moment, the need for a tendon transfer began to be discussed, a surgery that was performed six months later.

The surgical correction consisted of intramural stretching of the gastrocnemius and transfer of the posterior tibial transmembrane to the dorsum of the foot, in an attempt to correct the foot dropped due to lack of functioning of the dorsiflexion muscles. During surgery, tendon transfer from posterior

tibial to lateral cuneiform was chosen, because the patient was developing severe supine deformity. Although it was not documented in the medical record, the doctor later communicated to the parents about the occurrence of circulatory arrest during the procedure. Two months after surgery, a new MRI was performed that found a denervative pattern of the transferred muscle, which culminated in greater loss of movement and greater bone deformity of the left foot (Figures 1 and 2).



The patient started with administration of Immunoglobulin (Sandoglobulin) 2g/kg of the total dose, intravenous infusion, 1x per month, for six months. To prevent possible complications of the administration of Sanglobulin - such as hyperviscosity syndrome, renal failure - the patient received in-hospital care, dose 1g/kg/day for two days and remained with continuous IV hydration serum throughout the time. Although there was no clinical worsening of the condition, this treatment also did not provide significant improvement in any of the clinical aspects presented.

A patient aged three years and six months was referred to the Sarah Kubitschek hospital for further evaluation. Once again, a decrease in dorsiflexion strength was observed, with hyporeflexia of Aquileu on the left and inability to perform plantar flexion - after surgery. Hypotrophy of the entire left limb was also observed, especially gastrocnemius and tibial. Neurological examination normal, left scarvant gait. He repeated the ENMG, with no new findings. CBC and ESR, CRP, Beta-2-microglobulin and normal electrolytes, negative Lyme serology, negative herpes 6 PCR, HTLV negative test.

Despite all the investigations, it was not possible to define with certainty the etiology of the clinical picture. The professionals involved in the case, both from the SARAH network and from the Institute of Orthopedics and Traumatology of Passo Fundo (IOT), agreed on the most likely cause, which is acute vaccine-associated polio (VAPP).

At the age of seven, the patient began to be followed by a new medical team and at the age of eight years she underwent surgery for posterior medial lateral release to the left associated with anterior tibial transposition to the 3rd wedge. With the partial correction of the foot deformity, the patient can walk and perform everyday activities, despite not having dorsiflexion or plantar flexion movement.

The patient, now 21 years old, remains stable, with no new deformities in the bone structure and no greater nervous damage. However, the consequences of the possible poliomyelitis associated with the vaccine virus (VAPP) left some sequelae, such as a height difference of 2 cm between the lower limbs, muscle shortening, trochanteric bursitis, scoliosis, thigh valga and lateralized left patella. The current treatment is symptomatic and seeks to alleviate pain resulting from bone and muscle changes presented by the patient.

Vaccine-associated polio (VAPP), although a rare condition, is a risk assumed by the Global Polio Eradication Program itself [5] and, therefore, should be discussed and studied by governments that adopt polio strategies in order to establish a safer form of immunization. In one report, the incidence of VAPP in Russia during the period 1998-2014 was observed.[6] There were 127 cases recorded, 73.8% of which occurred during the period in which only the oral vaccine was administered and the remainder of the cases occurred during the sequential VIP and PWV regimen. Of the totality, five reported cases were of "obscure etiology", that is, they did not present in accordance with the definition of VAPP. In 114 of the patients, poliovirus isolation was performed, all of which had a proven vaccine origin. The study concluded that as the world approaches the global eradication of poliovirus, the incidence of new cases of VAPP becomes unacceptable, requiring the withdrawal of PWV from all vaccination schedules.

Polio can lead to partial or total muscle paralysis, so mandatory immunization in childhood is unquestionable. However, as demonstrated in the two studies already mentioned, it is important to remember that the risk of paralytic poliomyelitis associated with the vaccine virus (VAPP) will continue to exist as long as the oral form of immunization against poliovirus is part of the vaccination schedule. In 2020, a week after the WHO announced the eradication of wild polio in Africa, cases of polio derived from the oral vaccine emerged, which further strengthens the urgency of modifying the world's polio immunization standards.[7]

A randomized trial published in 2021, conducted in two centers in Panama and one in the Dominican Republic, provided important evidence for defining a vaccination schedule that contributes to current needs. [8] The study participants were healthy infants at 6 weeks of age, randomly selected and relocated into four main groups. Each group was immunized according to one of the following regimens: two doses of intradermal VIP, three doses of intradermal VIP, two doses of intramuscular VIP, or three doses of intramuscular VIP. The results showed that two intramuscular or intradermal doses at 14 and 36 weeks of life provide acceptable seroconversion rates against the three types of poliovirus, although the titers are lower than those of the traditional regimen (three intramuscular doses). The regimen of three intradermal doses can be considered ideal, as it is protective against the three serotypes of poliomyelitis and will also reduce costs. In addition, no serious vaccine-related adverse events or major medical events have been reported.

Replacing a vaccine may raise fears in the community, mainly because the total withdrawal of PWV may allow the resurgence of circulating poliovirus if eradication of the wild virus has not been complete.[9] It is necessary, therefore, that further studies be directed in order to discover the optimal moment for the transition from oral immunization to total intramuscular/intradermal immunization. Regarding the need for greater public investment, it seems to be increasingly feasible to create a VIP administration schedule that costs no more than the current PWV schedules, by reducing the number of doses, delivering one-fifth the amount of antigen per intradermal dose, introducing seed strains, among others.[10]

Adequate training of vaccinators, instructions on the disposal of vaccine vials and community participation in epidemiological surveillance will be required. This change, when possible, will mark a significant step toward the goal of polio eradication and thus end the suffering caused by polio and its severe vaccine reaction in so many children.

It is estimated that the rate of occurrence of VAPP after oral immunization against poliovirus is less than 0.01%. However, due to the importance of polio eradication and the severity of this adverse reaction, these numbers cannot be ignored. The reported case reinforces this, by presenting the morbidity related to the vaccine reaction and the lasting consequences on the quality of life of a child, until adulthood.

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