



Posterior Interosseous Nerve Palsy Associated with Multiple Epiphyseal Dysplasia

Parálisis del interóseo posterior asociada a displasia epifisaria múltiple

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Abstract

Keywords

- multiple epiphyseal dysplasia
- posterior interosseous nerve compression
- radial head dislocation

Multiple epiphyseal dysplasia is a condition that courses with a retarded epiphyseal development and may cause joint dysmorphia. We report a case of posterior interosseous nerve palsy in a child with dysplasia. After a physical examination and complementary diagnostic tests that revealed posterior interosseous nerve compression neuropathy, surgical neurolysis of the posterior interosseous nerve was performed at level of the arcade of Frohse. The satisfactory evolution of the patient confirmed our diagnosis. Attention must be paid to the onset of signs or symptoms of nerve compression in these patients.

Resumen

Palabras clave

- displasia epifisaria múltiple
- compresión del nervio interóseo posterior
- subluxación de la cabeza radial

La displasia epifisaria múltiple es una condición que se caracteriza por el retraso en la aparición de las fisis, y que puede provocar dismorfias articulares. Presentamos un caso de paresia del nervio interóseo posterior en una niña con displasia. Tras la realización de un examen físico y pruebas diagnósticas complementarias que evidenciaron neuropatía compresiva del nervio interóseo posterior, se procedió a realizar la neurólisis del interóseo posterior a nivel de la arcada de Frohse. La evolución satisfactoria de la paciente apoyó nuestro diagnóstico. Ha de prestarse atención a la aparición de signos o síntomas de compresión nerviosa en estos pacientes.

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Introduction

Multiple epiphyseal dysplasia (MED) is characterized by the late appearance and irregular and asymmetric development of the physes (growth plates). Sometimes, the diagnosis is only established in adolescence, by the time patients report joint stiffness and pain. This condition causes early-onset osteoarthritis and primarily affects the hip and the proximal humerus.¹

The posterior interosseous nerve (PIN) is the terminal, primarily motor branch of the radial nerve. Its usual location is 5 cm distal from the external epicondyle.² Then, it descends and crosses the supinator arch. The proximity of this nerve to the radial head and its course through the supinator arch make it susceptible to injury and compression resulting from morphological alterations in this joint.^{2,3}

We present the case of a 14-year-old girl with MED who presented to our office due to the recent onset of weakness during finger extension.

Clinical case

A 14-year-old female patient was referred with a 6-month history of finger extension weakness.

The physical examination revealed an elbow with 20° of valgus and a varus forearm. The radial head was in anterior protrusion, with the forearm in pronation due to bone deformity. There was full joint balance. On the Medical Research Council (MRC) scale with the forearm in pronation, she presented weakness during extension of the fingers and thumb, with strength of 2/5. The function of the triceps and wrist radial extensor muscles was preserved. The patient did not present sensory involvement or elbow joint pain.

Radiography showed an alteration in elbow morphology and joint congruence (►Figure 1). An ultrasound scan revealed an abnormality in PIN echostructure and thickness at the level of the arcade of Frohse, probably resulting from a nerve entrapment by the radial head during pronation, measuring 0.01 cm² in area and 2.9 mm in perimeter (at the proximal level, the area was of 0.02 cm² with a 4.9-mm perimeter) (►Figure 2).

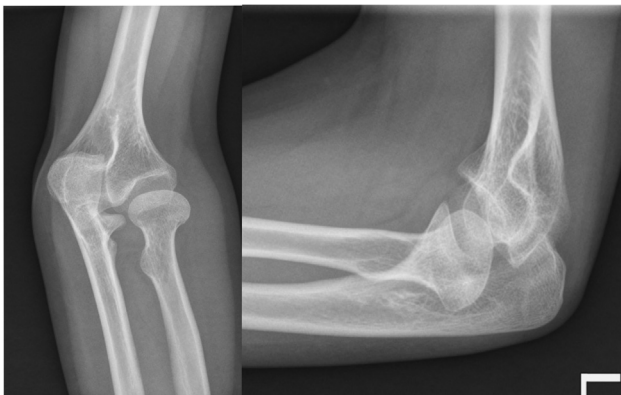


Fig. 1 Joint dysmorphia with potential compressive effect.

Electromyography revealed a neurogenic pattern at the extensor indicis and extensor digitorum in the left hand, and normal sensory conduction at the superficial radial nerve; these findings are consistent with mild, subacute/chronic PIN involvement.

Considering our findings, we proposed a PIN neurolysis at the level of the arcade of Frohse. Intraoperatively, through the Thompson approach, we observed how the nerve was compressed during forearm pronation at the level of the arcade due to the protrusion of the radial head and overlying muscles (►Figure 3, ►Video 1). Opening of the supinator enabled the proper visualization of the nerve, and neuroma was not evident.

Video 1



Intraoperative video after neurolysis showing the potential compressive effect exerted by the radial head during pronation against the supinator, the so called “sandwich” effect. Online content including video sequences viewable at: <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0042-1742691>.

Three and 8 months after surgery, the patient had an MRC score of 3/5 and 5/5 respectively.

Discussion

The annual incidence of PIN palsy is of 0.03%.⁴ The PIN can be compressed intrinsically in different sites: the border of the extensor carpi radialis brevis, the leash of Henry, the border of the supinator muscle (arcade of Frohse), the supinator muscle itself, or between the two supinator bellies at the lowest distal level. In addition, there are extrinsic causes of compression, most frequently tumors (often benign).⁵ However, joint distortion has also been described as a potential compressive cause. Demirel et al.³ reported an undiagnosed Monteggia fracture-dislocation in which the dislocation of the radial head caused PIN palsy; nonetheless, we have not found descriptions of cases occurring as a consequence of MED.

Considering the potential compressive causes, in addition to the clinical examination, imaging tests are recommended to optimize treatment. In our patient, radiographs showed a dysplastic joint with alterations at the level of the radial head. Ultrasound is useful to show the level of constriction: Raeburn et al.⁶ reported that the mean sectional areas of the PIN proximal and distal to the arcade of Frohse were of 0.022 cm² and 0.023 cm² respectively. In our case, an ultrasound revealed a constriction at the expense of supinator pronation (between its two heads), reducing the sectional area by 0.01 cm². Electromyography enhanced the diagnostic yield of ultrasound. There was no need for a separate elbow procedure due to the absence of joint pain and dysmorphia.

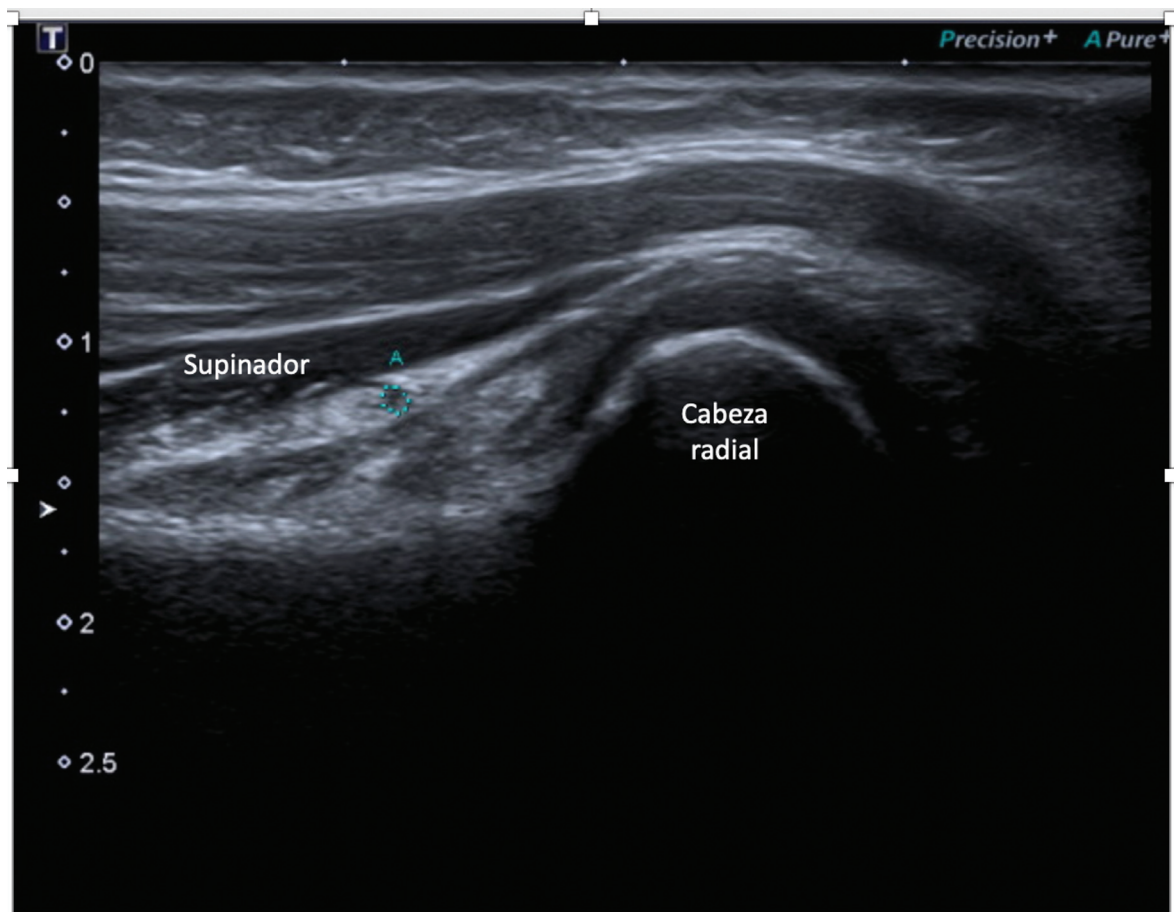


Fig. 2 Ultrasound image showing the decreased nerve diameter over the supinator arch.

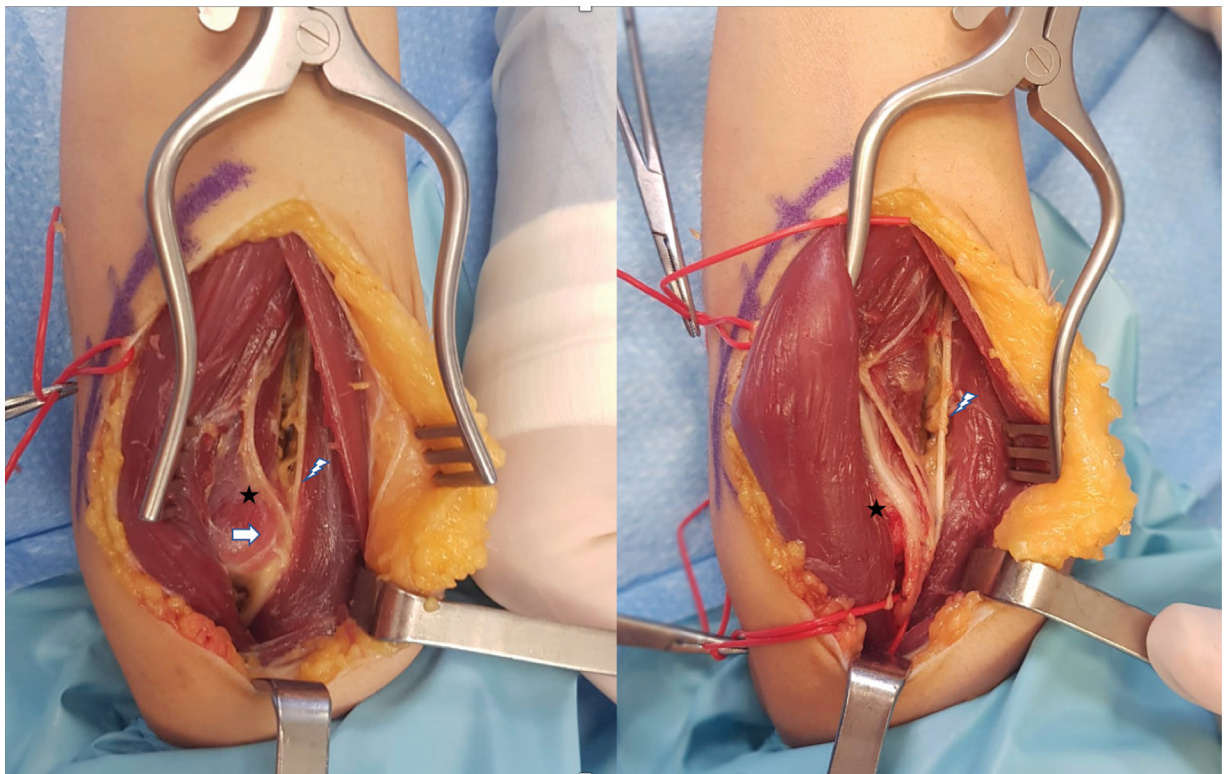


Fig. 3 Intraoperative image showing the posterior interosseous nerve before and after neurolysis.

Cases of PIN paresis are rare in children. Subluxation of the radial head has been reported as a potential compressive cause. Our case highlights the potential nerve compressive effect (in this case, in the PIN) in patients with MED due to joint dysmorphia. Based on our case, supinator decompression may be sufficient to recover normal function. Therefore, these patients require meticulous serial clinical examinations and complementary imaging tests in case of suspicion.

Conflict of interests

The authors have no conflict of interests to declare.

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