TÍTULO:

Pediatric Asymptomatic Chiari I Malformation: Natural Evolution and a Proposed Development-Based Follow-Up Strategy

INTRODUCCIÓN/OBJETIVOS:

Chiari I malformation (CMI) is frequently detected incidentally in the pediatric population. The optimal management and imaging surveillance of asymptomatic children remain debated, with no uniform follow-up protocols across institutions. This study aims to characterize the natural course of asymptomatic pediatric CMI, evaluate radiological evolution, and identify factors associated with surgical intervention or spontaneous radiological normalization, proposing a follow-up strategy aligned with developmental stages.

MATERIAL Y MÉTODOS:

A retrospective analysis was conducted of pediatric patients diagnosed with asymptomatic CMI and managed conservatively at a single neurosurgical center between 2019 and 2023. Clinical data and MRI findings were reviewed at diagnosis and during follow-up. Imaging assessments were scheduled at predefined developmental milestones – late childhood (10–12 years) and late adolescence (16–20 years) – to assess growth-related anatomical changes. Radiological parameters included tonsillar descent below McRae line, presence and characteristics of syringomyelia, clivo-axial angle (CXA), and Grabb–Oakes measurement.

RESULTADOS:

Forty children with asymptomatic CMI were included, with a mean age at diagnosis of 9.5 years. Initial mean tonsillar herniation measured 11.8 mm, and syringomyelia was identified in 10% of patients. The mean CXA was 145°, and the mean Grabb–Oakes distance was 7 mm. Follow-up MRI was available for 24 patients. Upward migration of the cerebellar tonsils was observed in 96% of cases, with a mean ascent of 2.8 mm (0.89 mm/year), and 29% no longer fulfilled radiological criteria for CMI. Syringomyelia resolved in three of four patients. No patients developed Chiari-related symptoms during follow-up. Surgical intervention was required in one case (2.5%) after six years due to progression of syringomyelia. The presence of syringomyelia at diagnosis (p=0.002), particularly with dorsal extension (p=0.046), was associated with surgical conversion, while tonsillar descent <10 mm was predictive of spontaneous radiological resolution (p=0.012).

CONCLUSIONES:

Asymptomatic Chiari I malformation in children typically follows a benign course, with frequent spontaneous radiological improvement and low need for surgical treatment. Baseline syringomyelia represents the main risk factor for later intervention, whereas milder tonsillar descent favors resolution. These findings support a conservative, structured follow-up strategy with MRI surveillance at key stages of pediatric development.