A sudden weight gain in a child as clinical presentation of Chiari Type I Malformation: a case report

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Introduction

Chiari type I malformation (CM-I) is characterised by different symptoms involving cerebellar, cerebral and spinal cord areas. Herein authors report a very uncommon CM-I in an obese child, who suddenly showed a weight gain as clinical presentation of this neurologic disease.

Case presentation

Since the patient was one-year-old, she had presented a progressive weight gain, with a body weight that maintained between the 90th and 97th percentile for age, but at the age of 6 years she showed a sudden and deep weight gain, associated with recurrent episodes of headache. At admission her weight and height were: 36.2 Kg (>97° pc) and 110 cm (25-50° pc) respectively. (Body Mass Index = 29.9 kg/m2) with an increase of nearly 5 Kg, during the two months before the admission. Systolic blood pressure was elevated at 140 mmHg. For the recurrence of headache, cerebral magnetic resonance imaging was performed and it revealed a 10 mm herniation of the right cerebellar tonsil, and a 7 mm herniation of the left cerebellar tonsil, compatible with a diagnosis of CM-I.

Conclusions. To our knowledge this is the first case of sudden weight gain as first clinical presentation of CM-I.

Keywords: sudden weight gain, child, Chiari Malformation type I

Discussion

In this report, authors described the case of a six-years old Caucasian child, admitted for sudden weight gain and headache, in whom it was sporadically diagnosed a Chiari type I Malformation.

Headache is the most common presenting symptom of CM-I for most age groups, and it seems to be linked to an increased intracranial-pressure. Nevertheless, the disease can present with complaint of neck pain, balance problems, muscle weakness, numbness or other abnormal feelings in the arms or legs, dizziness, vision problems, ringing or buzzing in the ears, hearing loss, vomiting, insomnia.

Hand coordination and fine motor skills may be also affected. Infants may have symptoms such as difficult swallowing, irritability when being fed, excessive drooling, a weak cry, gagging or vomiting, breathing problems, developmental delays.

However, Chiari type I Malformation can be asymptomatic and to our knowledge, it has never been described in literature a sudden weight gain associated with headache as first clinical finding of the disease.

In literature, there are different hypothesis that correlate obesity with CM1.

The first line supports the hypothesis that obesity causes increased intra-abdominal pressure that pushes the diaphragm superiorly and raises pleural pressure. This event does not allow a normal venous return from the brain, leading to vascular engorgement and increased intracranial pressure in severely obese patients.

It is conceivable that altered cerebrospinal fluid flow and venous outflow abnormalities interact and add up to intracranial hypertension (6, 7).

Studies on MRI-based blood and cerebrospinal fluid flow measurements in patients with CM-I demonstrated a premature reduction in the cerebrospinal fluid outflow followed by a disturbed gradual decline of the intra-cranial volume, thus representing altered dynamics of the intra-cranial volume change (8).

In line with this hypothesis, Kurschel et al. (9) firstly described, the case of a chronic obese 13-year-old boy, affected by papillo-edema, intracranial hypertension and CM1.

In the case of Kurschel, the first neurological signs appeared four years before the occurrence of headache and intracranial hypertension. In fact, when he was 9 years old, epilepsy was diagnosed and MRI disclosed a Chiari I malformation with 5 mm of tonsillar herniation below the foramen magnum.

Thus, Kurschel’s description seems to support that obesity could be an additional aggravating factor in a critical high venous pressure. Other literature data support that obesity is not found to cause intracranial hypertension, but intracranial hypertension itself may be suggested to be the primary cause of weight increase.

Such a proposal is supported by the findings that rats become hypophagic and increase in weight after increase of the intracranial pressure (10) and by the study of randomly selected obese female patients who attained significant weight loss when cerebrospinal fluid pressure (PcSF) was decreased medically (11).

Such a proposal should increase PcSF and venous pressure vitally the hormonal systems regulating hunger in intracranial hypertension (IH) patients.

Moreover, in our case, differently from what Kurschel described, the child did not show any symptoms linked to CM1 until she was 6 years old, although her obesity dated since birth.

She did not have clear signs of intracranial hypertension, nevertheless, the case of Kurschel, underlying a correlation between obesity and CM1, justified our progress in the diagnostic process, suggesting the performance of a MRI exam.

Finally, another peculiarity of the case we described is the early onset of obesity and weight gain.

As a matter of fact, differently from the boy described by Kurschel et al., the child was only 6 years old when she started gaining suddenly weight.

To our knowledge, this is the first case of sudden weight gain associated with headache as first clinical presentation of CM1.

Moreover, this case suggests that a sudden variation of body weight, should be considered a sign of disease by pediatricians, so that growth curves in childhood are relevant.
indexes of good health.

**Figure 1:** Growth and body weight curve of auxologic parameter of our child

**Figure 2:** MRI images of cerebellar tonsils herniation in our CM1 child

**References**
