

Arnold-Chiari malformation, a counter indication to diving?

Abstract

The Arnold-Chiari malformation is the name of a number of congenital anomalies at the base of the brain, the most consistent of which are :

1. an extension of a tongue of cerebellar tissue, posterior to the medulla and spinal cord, into the cervical canal.
2. A displacement of the medulla into the cervical canal, along with the inferior part of the fourth ventricle.

These anomalies can be divided into two types :

- Type I : cerebellomedullary malformation without meningocele
Type II : the same malformation with meningocele

In type I neurological symptoms may not develop until adolescence or adult life. The symptoms may be those of increased intracranial pressure, progressive cerebellar ataxia or syringomyelia

The case report of a 17 year old female diver, in good health, who suffered from a neurological syndrome during a 15 metres dive, is presented. There was altered consciousness and a lack of balance. Her buddy helped her to the surface where she regained full consciousness with a retrograde amnesia. An Arnold-Chiari malformation grade I was found.

Subject and methods

A young female diver, 17 years old, makes a dive to 15 msw. As a test she has to rescue someone from 15 metres to the surface. Along the rope she descends without any problem. At 15 meters she can't find a stable position on the bottom and loses balance. She doesn't react on the OK sign of her buddy. He takes her to the surface where she regains full consciousness. She blamed the incident on stress and a lack of sleep.

Nevertheless a few weeks later she consulted an ENT specialist.

- micro-otoscopic examination : normal tympanometry with a left tympano-stapedopexie
- audiogram : normal
- spontaneous nystagmus beating to the right
- caloric test : normal
- atypical central characteristics

EEG and duplex of the carotid arteries showed no abnormalities

The diagnosis of stress and hyperventilation remained doubtful, so an MRI of the brain was carried out.

As a result of the MRI of the brain, a discrete Arnold-Chiari type I was diagnosed .

Discussion

The Arnold-Chiari malformation is the name of a number of congenital anomalies at the base of the brain, the most consistent of which are :

1. an extension of a tongue of cerebellar tissue, posterior to the medulla and spinal cord, into the cervical canal.
2. a displacement of the medulla into the cervical canal, along with the inferior part of the fourth ventricle.

Those anomalies can be divided into two types :

- Type I : cerebellomedullary malformation without meningo-myelocoele
- Type II : the same malformation with meningo-myelocoele

The Arnold-Chiari type I malformation can be asymptomatic during many years. If the cerebellar tonsils got trapped into the foramen magnum, the possible symptoms are headache, cerebellar ataxia and neuropraxia of the cranial nerves. In type II the anatomical malformation is combined with a meningo-myelocoele. Divers use the Valsalva maneuver to balance the pressure in the middle ear on descent, a common technique to « pass their ears ». During this maneuver the central nervous pressure increases. The altered consciousness and the loss of balance in this case can be explained by a temporary entrapment of the cerebellar tonsils in the foramen magnum, due to the increased central nervous pressure induced by the Valsalva maneuver. The young lady was advised not to dive again.

References

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3. Andere referenties door jou te geven (artikels uit boeken)