Spontaneous Pneumoventricle Following Bariatric Surgery: Case Report and Review of Literature

Pneumoventrículo Espontâneo Após Cirurgia Bariátrica:
Relato de Caso e Revisão da Literatura

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RESUMO
O pneumoventrículo é um evento comum no pós-operatório de cirurgias de fossa posterior, ou acessos transventriculares, com evolução benigna e raramente letal. Já o pneumoventrículo espontâneo é uma condição rara, quase sempre associado com fístula líquórica, com possível pior prognóstico. Neste trabalho descrevemos uma paciente de 57 anos, previamente hígida, submetida 7 meses antes a uma cirurgia bariátrica, com perda de 50 Kg desde então, que há 1 mês apresentou cefaléia, hemiparesia e incontinência vesical, secundárias a um pneumoventrículo espontâneo.

Palavras-chave: pneumoventrículo espontâneo, meningocele esfenoidal, cirurgia bariátrica.

ABSTRACT
Pneumoventricle is a common postoperative event following posterior fossa approach, or any transventricular approach, with a benign evolution, rarely life-threatening. However, spontaneous pneumoventricle is a rare condition, almost always secondary to cerebrospinal fluid (CSF) leakage, with possible worse evolution. We report a 57 years-old woman, previously healthy, submitted 7 months previously to a bariatric surgery, with 110 pounds (50 Kg) weight loss since that, who developed 1 month later headache, hemiparesis and urinary incontinence, secondary to a spontaneous pneumoventricle.

Key words: spontaneous pneumoventricle, sphenoidal meningocele, bariatric surgery.
INTRODUCTION

Collection of air within the cranial cavity (pneumocephalus) is a common occurrence following skull fracture or any extended neurosurgical procedure. Small collections of air are absorbed uneventfully, but a large volume may act as a mass and cause clinical deterioration (tension pneumocephalus).

In its turn, pneumoventricle is a common postoperative event following posterior fossa approach, or any transventricular approach, especially when patients are operated on in the sitting position. Postoperative pneumoventricle is a self-limited disease, rarely life-threatening.

However, spontaneous pneumoventricle is a rare disease, almost always secondary to cerebrospinal fluid (CSF) leakage, with possible worse evolution. The term “tension pneumoventricle” may be used, and prompt surgical intervention is mandatory.

In this paper we report on a patient harboring an spontaneous tension pneumoventricle following remotely a bariatric surgery.

CASE REPORT

A 57 years-old woman, born in Belém – PA, Brazil, previously healthy, was submitted 7 months before to a bariatric surgery, with 110 pounds (50 Kg) weight loss; recently she developed a 1 month history of intense headache and dizziness. Concomitantly, she presented with progressive cognitive decline, with non-coherent repetitive discourse, bradypsychism and slow speech.

At her original city, she was submitted to a brain computed tomography (CT) showing an assymmetric lateral pneumoventricle, with a prominent right frontal horn, and sign of transependymal edema (Fig. 1). The established treatment was one session of hyperbaric oxygen chamber, and 24 hours later, she started with left nostril abundant CSF leakage. Forty-eight hours later, she evolved with left hemiparesis with brachial predominance and bladder incontinence.

On admission at Sírio-Libanès Hospital, she was confused, with bradylalia, repetitive non-coherent discourse, left hemiparesis with brachial predominance, visual blurring, and bladder incontinence.

She was promptly submitted to a new CT, evidencing a discrete increase in the pneumoventricle, and confirming a planum sphenoidal meningocele on skull base fine cuts (Fig. 2). On fine cuts axial 3 Tesla Magnetic Resonance Imaging (MRI), a small opening at lamina terminalis was documented, accompanied by pneumocephalus within its cistern (Fig. 3). Cisternal scintigraphy was negative, and CSF from lumbar puncture was normal.

We performed a neuronavigation-assisted ventricular catheterization, connecting an Ommaya reservoir (Fig. 4), with aspiration of 15 ml of CSF and air. A transphenoidal endonasal endoscopic approach with reconstruction of the sphenoidal breach was performed to correct the meningocele (Fig. 5), with mucoperichondral and septum cartilage graft, oxidized cellulose and biological glue (Fig. 6).

The postoperative period was uneventful. The patient evolved symptom-free in the 1st day postoperative with complete resolution of motor deficit, visual blurring and incontinence. Postoperative CT scan showed improvement of pneumoventricle and reduction of frontal mass effect (Fig. 7).
Figure 3. Sagittal 3 Tesla MRI FIESTA sequence showing an sphenoidal meningocele (white arrow) (A), and an opening at lamina terminalis, with a small air bubble ahead (white arrow) (B).

Figure 4. Neuronavigation device mapping ventricular catheterization (StealthStation Neuronavigation System, Medtronic Navigation, Inc., Louisville, CO).

Figure 5. Endoscopic view (30 degrees optical axis) : planum sphenoidale meningocele (black arrows) after opening of the rostrum of sphenoid bone.

Figure 6. Endoscopic view (30 degree optical axis) : reconstruction of sphenoidal breach.

Figure 7. First day postoperative axial CT scan.
Pneumocephalus is a very common neurosurgical condition, with a myriad of etiologies. Noteworthy are those traumatic (skull bone fracture, sinus fracture, CSF leakage), postoperative (hematoma evacuation, tumor resection, shunts or any intrathecal procedure) or postspinal anesthesia, postinfection (otogenic meningitis, anaerobic or fungal sinus infections), and neoplastic (sinus osteoma, cranial base meningiomas).

In its turn, pneumoventricle is not so common, excepting those postoperative, mainly after posterior fossa approaches in sitting position (pineal tumors, midbrain lesions), or transventricular approaches (intraventricular tumors, thalamic lesions, colloid cysts), or endoscopic surgeries (third ventriculostomy, septostomy, aqueductoplasty).

Spontaneous pneumoventricle is a rare condition, almost always related to CSF leakage, Valsalva’s maneuver, chronic cough, long airplane trips, or deep diving.

In our case, the etiology of pneumoventricle was CSF leakage secondary to a sphenoidal meningioma, following a bariatric surgery, but not certainly related to. More intriguing in this case is the lamina terminalis patency, with communication of air from the cistern to the ventricular system.

We could not demonstrate CSF leak by cistern scintigraphy, perhaps due to the patient 24 h rest, post-Technecium 99 injection. No Valsa’s maneuvers or efforts were done during this time. Only 3 Tesla fine cuts MRI could demonstrate the CSF leakage, showing cistern air from the lamina terminalis and an opening at the anterior wall of third ventricle. Moreover, the endonasal endoscopic procedure shown the CSF leakage through it after a Valsa’s maneuver.

Neurological complications following bariatric surgery

Nowadays, bariatric surgery is being performed more than ever, in order to alleviate the symptoms of morbid obesity. Along the last decade, bariatric surgery became a safe procedure, with an outstanding improvement in life quality for thousands of patients around the world. On the other hand, the amount of complications, mainly nutritional, metabolic, psychological and neurological related to this procedure is also increasing.

Koffman et al. found 1.3-4.6% of neurological complications after bariatric surgery, being peripheral neuropathy the most common presentation (62%) followed by encephalopathy (31%), rhombomolysis and Guillain-Barré syndrome (0.6%). Nutritional deficiencies secondary to the surgery are the most important factors in the majority of those complications.

However, CSF leakage or pneumoventricle following, whether related or not, bariatric surgery has never been reported, so with an obscure pathogenicity.

Spontaneous pneumoventricle is a rare neurosurgical condition, to which most neurosurgeons are not familiarized, sometimes lacking a benign evolution in postoperative patients. In these cases, neurological deterioration, urging rapid diagnosis and early intervention, is needed.

**REFERENCES**


**CONCLUSION**

Spontaneous pneumoventricle is a rare neurosurgical condition, to which most neurosurgeons are not familiarized, sometimes lacking a benign evolution in postoperative patients. In these cases, neurological deterioration, urging rapid diagnosis and early intervention, is needed.

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