

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

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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 describe a 57-year-old woman, previously healthy, submitted 7 months ago to a bariatric surgery, losing 110 pounds (50 Kg) since that, who developed 1 month ago headache, hemiparesis and incontinence, secondary to a spontaneous pneumoventricle.

Key-word: spontaneous pneumoventricle, sphenoidal meningocele, bariatric surgery.

Resumo

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

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

Case Report

We describe a 57-year-old woman, born in Belém-PA, Brazil, previously healthy, submitted 7 months ago to a bariatric surgery, losing 110 pounds (50 Kg) since that, who developed 1 month ago intense headache and dizziness. Concomitantly she presented progressive cognitive decline, with non coherent repetitive discourse, bradypsychism and slow speech.

On first evaluation (Figure 1), at her origin 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. After what she was submitted there to one session of hyperbaric oxygen chamber. 24-hour post chamber she started with abundant CSF leakage by the left nostril. 48-hour post chamber she evolved with left hemiparesis with brachial predominance and bladder incontinence.

By that time she was referred to Dr Pedro A. Arlant, coming by airplane to a consultation at São Paulo, Brazil. At admission at Sírio Libanês Hospital, São Paulo-Brazil, on neurological examination, she was

confused, with bradylalia, repetitive non coherent discourse, left hemiparesis with brachial predominance, visual blurring, and bladder incontinence.

She was promptly submitted to further evaluation, evidencing a discrete increase in the pneumoventricle on brain CT, and confirming a planum sphenoidal meningocele on skull base fine cuts CT (Figure 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 (Figure 3).



Figure 1: Axial CT scan showing bilateral frontal horn pneumoventricle.

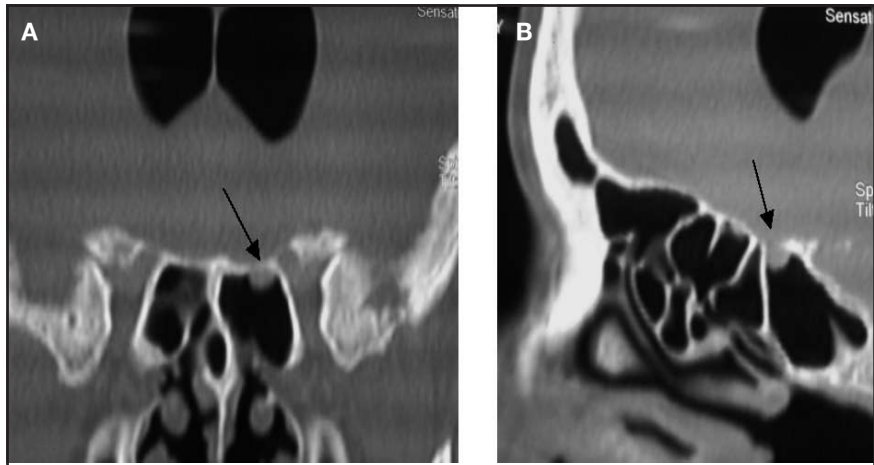


Figure 2: (A) Axial CT, bone window scan, presenting a meningocele at planum sphenoidal (black arrow); (B) Sagittal bone CT with fine cuts, sphenoidal breach (black arrow).

Cistern scintillography was accomplished, but negative to leakage, and the CSF from lumbar puncture was innocent.

To intent treating this unusual case, we performed a ventricular catheterization, connecting an Ommaya reservoir, assisted by neuronavigation (Figure 4), with aspiration of 15 ml of CSF and air. To correct the meningocele (Figure 5) we performed a transphenoidal endonasal endoscopic approach and reconstruction of the sphenoidal breach, with mucoperichondral and septum cartilage graft, oxidized cellulose and biological glue (Figure 6).

The postoperative period was unevenful. The patient evolved symptom-free at 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 (Figure 7).

Discussion

Pneumocephalus is a very common neurosurgical condition, with a myriad of etiologies. Noteworthy are those traumatic (skull bone fracture, sinus fracture, CSF leakage) 11, postoperative (haematoma evacuation 1, tumor resection, shunts 3 or any intrathecal procedure) or post spinal anesthesia 8, post infection (otogenic meningitis 2, anaerobic or fungic sinus infections 9), and neoplastic

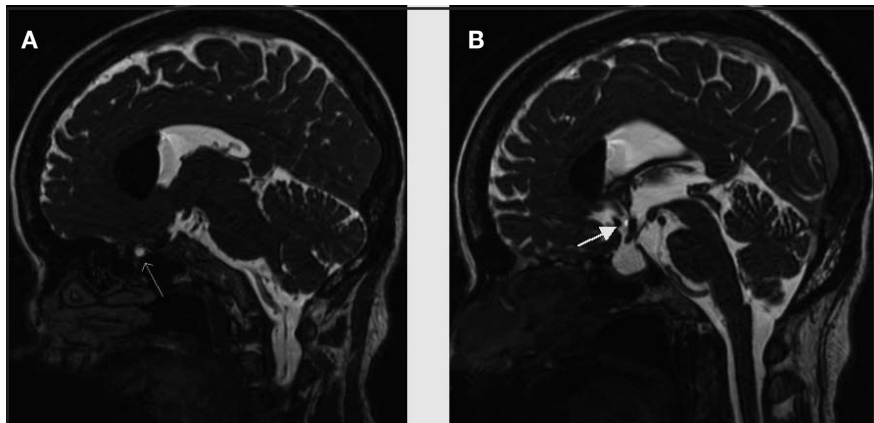


Figure 3: Sagittal 3 Tesla MRI FIESTA sequence showing an sphenoidal meningocele (white arrow) (A), and an opening at lamina terminalis, with a small air bubble ahead (white arrow) (B).

(sinus osteoma 6, cranium 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 12), or transventricular approaches (intraventricular tumors, thalamic lesions, colloid cysts), or endoscopic surgeries 4 (third ventriculotomy, septostomy, aqueductoplasty).

Spontaneous pneumoventricle is a rare condition, almost always related to CSF leakage, Valsalva's maneuver 5, chronic cough, long airplane trips 10, or deep diving. In our study, the etiology of pneumoventricle was CSF leakage secondary to a sphenoidal meningocele, following,

related or not, a bariatric surgery. More intriguing in this case is the patency of the lamina terminalis, through an opening, which conducted the air from cistern to the ventricular system.

In this case, CSF leakage could not be demonstrated by cistern scintillography, perhaps why the patient spent 24 h, post Tc-99m injection, resting. No Valsalva's maneuver or efforts were done during this time. Only 3 Tesla fine cuts MRI could demonstrate the CSF leakage, seeing air inside the cistern from lamina terminalis and an opening at the anterior wall of third ventricle. Moreover at endonasal endoscopic view, concluded the exposure of the meningocele, we could see the CSF leakage through it after a Valsalva's maneuver.

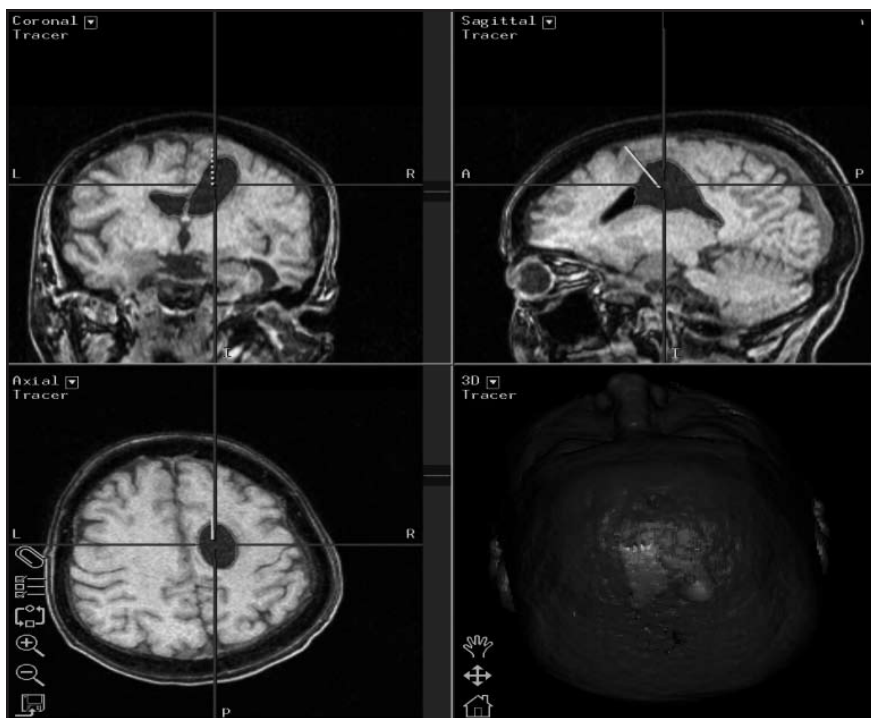


Figure 4: Neuronavigation device mapping ventricular catheterization (StealthStation Neuronavigation System, Medtronic Navigation, Inc., Louisville, CO).



Figure 7: First day postoperative axial CT scan.

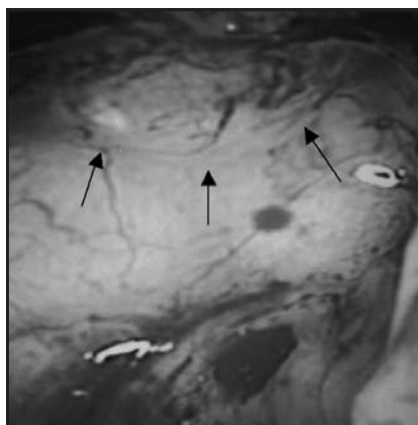


Figure 5: Endoscopic view (30 degrees optical axis) of planum sphenoidal meningocele (black arrows) after opening of sphenoid bone rostrum.

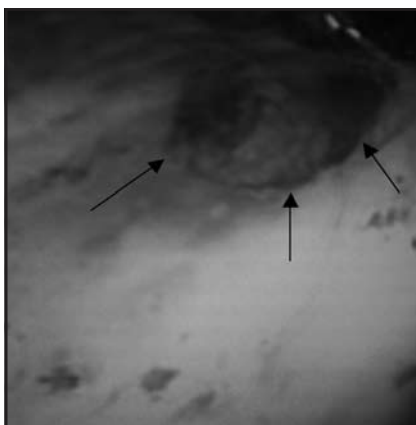


Figure 6: Endoscopic view (30 degree optical axis) of reconstruction of sphenoidal breach.

Neurological complications following bariatric surgery

Nowadays, bariatric surgery is being performed more than ever, in order to alleviate the symptoms of morbid obesity. Through the last decade, bariatric surgery has become a safety procedure, with an outstanding improvement

in life quality from millions of patients around the world. By the other side, the amount of complications related to this procedure is also increasing. The main complications reported are nutritional, metabolic, psychological and neurological. Koffman et al.⁷ found 1.3-4.6% of neurological complications after bariatric surgery, being peripheral neuro-

pathy the most common presentation (62%) followed by encephalopathy (31%), rhabdomyolysis 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. Since, its pathology is also obscure.

Conclusion

Spontaneous pneumoventricle is a rare neurosurgical condition, to which most neurosurgeons are not familiarized.

Sometimes it lacks the benign evolution of postoperative pneumoventricles. In these cases, it may cause neurological deterioration, urging rapid diagnosis and early intervention.

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