



Pneumocephalus secondary to transsphenoidal surgery

Neumoencéfalo secundario a cirugía transesfenoidal

Alexander Duran Flores ^{1*}<https://orcid.org/0000-0003-0550-7997>

Lisbon Rodriguez Lopez ²<https://orcid.org/0000-0002-1965-0500>

Oneidis Duran Flores ³<https://orcid.org/0000-0002-8098-8201>

¹“Tiverio Evoli” Hospital. Melito Porto Salvo. Reggio Calabria, Italy.

²“Martinez Tamayo Brothers” Polyclinic. Baracoa. Guantánamo, Cuba.

³“Octavio de la Concepcion and La Pedraja” Hospital. Baracoa. Guantánamo, Cuba.

*Corresponding author. Email:alexliduranflores@gmail.com

ABSTRACT

Introduction: Pneumocephalus is the accumulation of air in some intracranial structures. This condition can be asymptomatic or have mild symptoms, making it difficult to diagnose and causing death.

Objective: To present a rare case of pneumocephalus, its clinical manifestations, diagnosis and treatment.

Clinical case: 67-year-old female patient, with a history of surgery for pituitary macroadenoma five months before coming for consultation. He reported diffuse headache lasting several days (with progressive worsening), accompanied by drowsiness, without alteration in muscle strength or sensitivity. A skull tomography was performed where a pneumocephalus

<http://revcimeq.sld.cu/index.php/imq>

revinmedquir@infomed.sld.cu

Under Creative Commons license





ISSN: 1995-9427

RNPS: 2162

2024; 16: e861

Case report

was diagnosed. Conservative treatment was started without clinical improvement. Therefore, surgical treatment was performed

Conclusions: Pneumocephalus is a rare condition. A high index of clinical suspicion is required for its timely diagnosis, which can avoid complications and death.

after 24 hours, with satisfactory evolution without complications. He was discharged after 6 days.

Keywords: trepanation; intracranial hypertension; headache.

RESUMEN

Introducción: El neumoencéfalo es la acumulación de aire en algunas estructuras intracraneales. Esta afección puede cursar asintomática o con síntomas leves, lo que hace difícil su diagnóstico y causar la muerte.

Objetivo: Presentar un caso poco frecuente de neumoencéfalo, sus manifestaciones clínicas, diagnóstico y tratamiento.

Caso clínico: Paciente femenina de 67 años de edad, con antecedentes de intervención quirúrgica por macroadenoma hipofisario cinco meses antes de acudir a consulta. Refirió cefalea difusa de varios días de evolución (con empeoramiento progresivo),

acompañada de somnolencia, sin alteración de la fuerza muscular, ni de la sensibilidad. Se realizó tomografía de cráneo donde se diagnosticó un neumoencéfalo. Se inició tratamiento conservador sin mejoría clínica, por lo que se realizó tratamiento quirúrgico a las 24 horas, con evolución satisfactoria sin complicaciones. Egresó a los 6 días.

Conclusiones: El neumoencéfalo es una dolencia poco frecuente. Se requiere un alto índice de sospecha clínica para su diagnóstico oportuno, el cual puede evitar complicaciones y la muerte.

Palabras clave: trepanación; hipertensión intracraneal; cefalea.

<http://revcimeq.sld.cu/index.php/img>
revinmedquir@infomed.sld.cu

Under Creative Commons license





Received: 11/22/2023

Accepted: 08/27/2024

INTRODUCTION

Pneumocephalus is the accumulation of air in one of the intracranial compartments such as: the epidural, subdural, intraparenchymal, subarachnoid and intraventricular spaces. It usually follows cranial trauma, congenital abnormalities, infections, neoplastic diseases, an otorhinolaryngological or neurosurgical intervention. The first case of pneumocephalus was described by Lecat in 1866, although it was not until 1914 when Wolf first used the term pneumocephalus. ⁽¹⁾

The way in which pneumocephalus is generated is based on the existence of a deficiency in the meninges or in the skull and the difference in pressure that exists on both sides. It is usually diagnosed by imaging, has no clinical definition and can sometimes manifest with symptoms and signs of increased intracranial pressure. It is important to clarify that some clinical cases have been diagnosed years after the surgical intervention. ⁽²⁾

The aim of this article is to present a rare case of pneumocephalus, its clinical manifestations, diagnosis and treatment.

CLINICAL CASE

The patient was a 67-year-old white female, of urban origin, single, with a personal history of hypothyroidism, dyslipidemia, hyperuricemia, and surgery for pituitary macroadenoma five months before attending the consultation. She was receiving treatment for her underlying diseases

<http://revcimeq.sld.cu/index.php/img>

revinmedquir@infomed.sld.cu

Under Creative Commons license



ISSN: 1995-9427

RNPS: 2162

2024; 16: e861

Case report

with levothyroxine, pantoprazole, baclofen, rosuvastatin, and febuxostat.

He went to the emergency room of the “Tiberio Evoli” hospital. Melito Porto Salvo. Reggio Calabria. Italy. He reported a diffuse headache that had been developing for several days and had worsened in the last few hours and was not relieved by the administration of analgesics. It was accompanied by drowsiness, with no alteration of muscle strength or sensitivity.

Physical examination of the central nervous system describes the following: patient conscious, oriented, drowsy, with isochoric and reactive pupils. Glasgow scale 15 points.

A computed tomography (CT) scan of the head was performed, which reported the presence of air sacs in the pontocerebellar cistern, near the fourth ventricle, in the ventricular trigone and in the optic chiasma. The third ventricle and the frontal horns of the lateral ventricles were enlarged with air content corresponding to a picture of pneumocephalus (Fig. 1 and 2).



Fig. 1. Air sacs in the cerebellopontine cistern



Fig. 2. Air bubble sign

The patient was immediately admitted and transferred to the neurosurgery department. Conservative treatment was started, with bed rest in the Fowler position, maneuvers that increase intracranial pressure were avoided, high-flow oxygen was administered at 4 liters per minute by

<http://revcimeq.sld.cu/index.php/img>

revinmedquir@infomed.sld.cu

Under Creative Commons license





ISSN: 1995-9427

RNPS: 2162

2024; 16: e861

Case report

mask and intravenous analgesic therapy.

After 24 hours, the patient's clinical condition worsened, so it was decided to perform surgical treatment with the aim of achieving immediate intracranial decompression and definitive repair of the defect site. Combinations of trepanation holes were made at the sites of maximum pneumocephalus to allow air to escape. Definitive endoscopic repair of the dural defect was performed with multilayer sealing, and intraoperative fluorescein was used to verify its correction.

The patient had no postoperative complications and had a satisfactory evolution with absolute regression of the headache and drowsiness. A follow-up CT scan was scheduled, which confirmed the remission of the pneumocephalus. She was discharged after 6 days, in good general condition, asymptomatic and with follow-up in an outpatient clinic.

COMMENTS

The establishment of pneumocephalus is subject to the difference in pressure between the inside and outside of the skull and also to the deficiency of the dura mater. The main causes are: trauma, congenital alterations, infections, neoplastic diseases and surgical interventions. ^(3,4) In the case of the patient who presented, the pneumocephalus was a consequence of a small unidirectional fistula that allowed the entry of air into the cerebellopontine cistern, near the fourth ventricle, the ventricular trigone and the optic chiasma. The clinical manifestations were given by a progressive headache that did not respond to analgesics. However, the clinical picture can vary from the lack of symptoms to secondary symptoms such as: headache, nausea, vomiting, convulsions and neurological deterioration depending on the increase in the volume of gas, when high intracranial pressure or mass effect is generated. ⁽⁵⁾

<http://revcimeq.sld.cu/index.php/img>

revinmedquir@infomed.sld.cu

Under Creative Commons license





It is classified according to the level of intracranial pressure in simple or tension pneumocephalus and according to the time of presentation in acute (when it lasts less than 72 hours) and late (when it lasts longer than this time to appear) and according to the etiology in traumatic and non-traumatic. ⁽⁶⁾

The diagnosis of the case presented was the result of the combination of clinical and imaging findings. This diagnosis should always be considered in a patient who presents clinical deterioration after intracranial surgery. In the CT scan of the head, which is the most sensitive, there are two characteristic signs: the Mount Fuji sign (where the air exerts a compression between the frontal lobes with enlargement between the two hemispheres) and the air bubble sign. ⁽⁷⁾ The differential diagnosis should be made with diseases such as: Pneumorrhachi, Pneumocele, Pneumosinus and pneumoventricle.

In the patient, treatment for simple pneumocephalus was initially based on conservative management: bed rest in the Fowler position was prescribed, maneuvers that increase intracranial pressure were controlled (coughing, sneezing with an open mouth, Valsalva maneuver); in addition, pharmacological measures were indicated, such as the use of oxygen at 4 liters per minute and analgesics. Antibiotic therapy can be used if the etiology is infectious. Surgical treatment was justified in this case by the persistence of symptoms and may be the choice in cases of recurrent pneumocephalus or traumatic etiology that persists for more than a week. Decompression and repair of the dural defect was performed, corrected with a multilayer seal with the help of the use of intraoperative fluorescein to verify its adequate closure. The patient recovered satisfactorily thanks to the timely diagnosis and adequate intervention.

<http://revcimeq.sld.cu/index.php/img>

revinmedquir@infomed.sld.cu

Under Creative Commons license





ISSN: 1995-9427

RNPS: 2162

2024; 16: e861

Case report

Pneumocephalus is a medical emergency, the diagnosis of which is largely based on the patient's neurological condition. In most cases, treatment is medical, with clinical observation and imaging. A high level of suspicion is necessary to make the diagnosis.

BIBLIOGRAPHIC REFERENCES

1. Rodríguez García A, Fernández Cascón S, Pérez González R, Martín Sigüenza G, Ramírez Salas JE, Álvarez Álvarez I. Neumoencéfalo espontáneo. A propósito de un caso. Revista ORL [Internet]. 2023 [cited 2023 Agos 23]; 13 (2): 81-2. Available from: <https://revistas.usal.es/cinco/index.php/2444-7986/article/view/29061>
2. Quintana Pájaro L, Castilla Martínez A, Calderón Miranda WG, Ramos Villegas Y, Gómez Herazo D, Paez Nova M et al. Pneumoencéfalo y pneumorraquis traumático: reporte de caso y revisión de la literatura. Rev chil neurocir [Internet]. 2019 [cited 2023 Agos 23]; 45 (1): 80-6. Available from: <https://revistachilenadeneurocirugia.com/index.php/revchilneurocirugia/article/view/18>
3. Pereira Falcão A, Borges Venturi L, Gushiken-de-Campos W, Lemos Júnior CA, Barroso Marocco de Abreu TG. Hemi Le Fort III Fracture with Subdural and Subarachnoid Pneumocephalus with a Mild Mount Fuji Sign. Int. J. Odontostomat. [Internet]. 2022 [cited 2023 Agos 23]; 16 (2): 235-240. Available from: http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-381X2022000200235&lng=es
- 4-Villalgordo S, Escudero D, Viñas S, Leoz B, Balboa S. Muerte encefálica por neumocéfalo y fistula dural en el postoperatorio de hernia discal lumbar. Rev Neurol [Internet]. 2019 [cited 2023 Agos 23]; 68 (6): 264-265. Available from: <https://neurologia.com/articulo/2018316>
5. Callejas Gil I, Marco López C, Hernández Labrot B, Uldemolins Gómez I, Martín Pérez M, <http://revcimeq.sld.cu/index.php/img>
revinmedquir@infomed.sld.cu

Under Creative Commons license





ISSN: 1995-9427

RNPS: 2162

2024; 16: e861

Case report

Sánchez Prieto Y. Neumoencéfalo secundario a accidente de bicicleta. RSI [Internet]. 2023 [cited 2023 Agos 23]; 4(1): e2660-7085. Available from:

<https://revistasanitariadeinvestigacion.com/neumoencefalo-secundario-a-accidente-de-bicicleta/>

6. Wanpeng L, Quan L, Hanyu L, Huan W, Huankang Z, Li H et al. Tension Pneumocephalus from Endoscopic Endonasal Surgery: A Case Series and Literature Review. Therapeutics and Clinical Risk Management [Internet]. 2020 [cited 2023 Agos 23]; 16: 531-538. Available from:

<https://www.dovepress.com/tension-pneumocephalus-from-endoscopic-endonasal-surgery-a-case-series-peer-reviewed-fulltext-article-TCRM>

7. Gómez Matías G, David Rojas Z, Rómulo Melo M, Belén Rivera C, Francisca Contreras H. Neumoencéfalo, una revisión de literatura. Rev. Otorrinolaringol. Cir. Cabeza Cuello [Internet]. 2023 [cited 2023 Agos 23]; 83(1): 86-91. Available from:

<https://www.scielo.cl/pdf/orl/v83n1/0718-4816-orl-83-01-0086.pdf>

Conflicts of interest

The authors report no conflicts of interest.

<http://revcimeq.sld.cu/index.php/img>

revinmedquir@infomed.sld.cu

Under Creative Commons license

