Case Report

Delayed CPAP-Induced Pneumocephalus and Meningitis Posttranssphenoidal Surgery

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Transsphenoidal surgery (TSS) is a frequently used technique to remove pituitary adenomas. Rare complications of TSS include development of postoperative pneumocephalus. Many patients undergoing TSS also suffer from obstructive sleep apnea (OSA) and thus require positive pressure ventilation. The exact timing of when to safely reintroduce the CPAP machine in this subset of patients is presently not exactly known but is most often cited as being two to four weeks postoperatively. In this case, we describe the story of a 69-year-old female who underwent TSS for a nonsecreting pituitary adenoma in April 2012 and went on to develop pneumocephalus five weeks postoperatively after reintroduction of her CPAP machine. This is the latest presentation of pneumocephalus after reintroduction of CPAP documented in present literature. The case reopens the debate as to how many weeks postoperatively positive pressure ventilation should be withheld to prevent the development of pneumocephalus in patients having undergone TSS with simultaneous OSA.

1. Introduction

Transsphenoidal surgery (TSS) is the main approach used for removal of pituitary tumours. Many patients undergoing transsphenoidal surgery have concurrent OSA (obstructive sleep apnea) in part due to the association between Cushing syndrome and acromegaly with OSA. OSA patients tend to complicate more postoperatively, particularly in terms of postoperative desaturation and airway complications. Although the use of CPAP has been demonstrated to decrease such postoperative risks, it is contraindicated in patients having undergone recent transsphenoidal surgery due to the increased incidence of tension pneumocephalus.

2. Case Presentation

We describe here the case of a 69-year-old female with a past medical history notable for a partially resected nonsecreting pituitary macroadenoma. She had presented 20 years prior with acute onset bitemporal hemianopsia and, upon CT scan, was shown to have a nonsecreting pituitary adenoma in contact with the optic chiasm. She underwent a partial transsphenoidal resection of the adenoma in 1993 as the sphenoidal sinus was described as very narrow, and thus, only 60% of the tumour was resected. However, there was no residual interaction with the optic chiasm. The patient was advised that another surgery may be necessary in the future and left the hospital with no residual symptoms. Her past medical history also includes morbid obesity (BMI 58), obstructive sleep apnea-hypopnea syndrome (OSAHS) treated with CPAP since 2004, insulin-dependent type 2 Diabetes, glaucoma, and asthma.

The patient was readmitted for a subsequent surgery after having developed a recurrence of visual symptoms. The patient underwent a transsphenoidal surgery without complication. No suspicion of CSF leak was described in the operative protocol. Her postoperative period was complicated...
by a left ophthalmic artery occlusion and an acute subarach- 
noind hemorrhage, which are both documented complica- 
tions after transsphenoidal surgery. [5] The patient left the 
hospital three weeks postoperatively for rehabilitation 
before returning home.

The patient demonstrated good progress during rehabil- 
itation. Nasal CPAP was reintroduced (autoset with a range 
of 5-12 cm H₂O) around five weeks postoperatively. Soon 
thereafter, she rapidly developed fever up to 39°C, decreased 
level of consciousness, and nuchal rigidity, and was subse-
quently transferred back to our institution. Brain CT scan 
demonstrated hydrocephalus and pneumocephalus as shown 
in Figures 1 and 2. Sphenoidoscopy demonstrated left CSF 
fistula. A lumbar puncture revealed a cerebrospinal fluid with 
elevated leukocytes, glucose level of 6.8, and lactic acid of 6.8. 
Cultures did not demonstrate any pathogen. A diagnosis of 
culture-negative meningitis secondary to reopening of the 
surgical site by CPAP was postulated. The patient was treated 
with broad spectrum antibiotics, an external ventricular 
drain was installed, and the patient was monitored until her 
discharge.

3. Discussion

Presently, positive pressure ventilation such as the use of a 
CPAP is contraindicated in the immediate postoperative 
period of TSS due to the increased risk of pneumocephalus. 
[4] One proposed mechanism for the development of tension 
pneumocephalus posttranssphenoidal surgery is the ball-
 valve effect, in which the application of positive pressure 
through a dural defect allows for the accumulation of air 
without a way out. [6] In the perioperative period, it is possi-
ble to manage hypercapnia and desaturation without use of 
noninvasive positive pressure ventilation in the majority of 
cases by using high-flow oxygen face mask in order to avoid 
such complications. [7] However, the appropriate timing for 
reintroduction of CPAP posttranssphenoidal surgery has yet 
to be established.

A recent retrospective study found that out of 64 post-TSS 
patients with OSA, eight required CPAP in the immediate 
postoperative period and yet did not develop pneumocepha-
lus. [8] In terms of the reintroduction of CPAP posthospital 
discharge, another recent retrospective study found that out 
of 324 patients having undergone transsphenoidal surgery to 
resect a sellar mass and a total of 349 procedures, the only 
two patients to develop pneumocephalus did not have OSA 
or use CPAP. In fact, 69 of their patients did have OSA and 
were advised that they could resume the use of their CPAP 
2-4 weeks postprocedure. None of these patients went on to 
develop pneumocephalus despite their CPAP use, which 
vouchers for the security of CPAP reintroduction a few weeks 
after the procedure. [2] Surprisingly, our patient went on to 
develop pneumocephalus after CPAP introduction 5 weeks 
postprocedure, which is the latest reported case to date to 
our knowledge. It is generally accepted that the recovery 
period after a transsphenoidal procedure can extend up to 
six weeks postoperatively, with a restriction on heavy weight 
lifting until twelve weeks postoperatively. [9] This case 
reopens the debate as to when it is safe to restart CPAP usage 
posttranssphenoidal procedure. While the installation of a 
tracheostomy could have been done, the attending physi-
cians at the time considered it a last resort option for such 
a patient. To impose a tracheostomy procedure for all 
OSAHS patients after a transsphenoidal surgery would be 
too invasive but could be considered in patients with a 
known CSF leak and a high risk of complication without 
positive pressure ventilation.

4. Conclusion

OSA is a frequent problem among patients undergoing trans-
sphenoidal surgery. The immediate use of CPAP posttrans-
sphenoidal surgery is presently contraindicated due to the 
increased risk of tension pneumocephalus. The appropriate 
moment to reintroduce CPAP post-TSS, which balances the 
risks of the development of pneumocephalus with the risks 
of untreated OSA, remains unknown as pneumocephalus 
can develop up to five weeks postsurgical intervention as seen 
in our present case study.
Data Availability

No data was used to support this study as it is a case report.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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