Endonasal Endoscopic Pituitary Adenoma Resection in light of the COVID-19 Pandemic: A Technical Report

Cirurgia endoscópica endonasal para ressecção de macroadenoma hipofisário à luz da pandemia por COVID 19: Nota técnica

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Abstract

Introduction The endoscopic endonasal transsphenoidal approach (EETA) is routinely used to treat sellar and suprasellar tumors. It provides safe and direct access to tumors in these locations, with wide visualization of anatomical landmarks and great surgical results. With the COVID-19 pandemic, despite the high risk of transmission involved, various surgical procedures cannot be postponed due to their emergency.

Case Report A 62-year-old female presented in the previous two months with headaches, followed by bilateral severe visual loss. In 2016, she was submitted to subtotal resection of a non-secretory macroadenoma. Because of the progressive visual deficits, the EETA was used to the resect the pituitary adenoma.

Technical Note We developed a low-cost adaptation to the surgical fields, covering the patient's head and superior trunk with a regular surgical microscope bag with a tiny slit to enable the endoscope and surgical instruments to enter the nose, thus protecting the personnel in the operating room from the aerosolization of particles. This makes surgery safer for the surgical team and for the patient.

Conclusion In view of the lack of literature on this subject, except for some reports of experiences from some services around the world, we describe the way we have adjusted the EETA in the context of the COVID-19 pandemic.

Keywords
- endoscopic
- endonasal
- transsphenoidal
- skull base
- neurosurgery

Introduction

Currently, the COVID-19 pandemic is the most discussed topic worldwide. It has rapidly spread at an exponential rate, significantly affecting our practice as healthcare professionals and producing a huge global socioeconomic impact.[1–3]

The endoscopic endonasal transsphenoidal approach (EETA) is routinely used to treat sellar and suprasellar tumors. It provides safe and direct access to tumors in these locations, with wide visualization of anatomical landmarks and great surgical results. Besides, it obviates brain retraction and provides a quicker recovery of the

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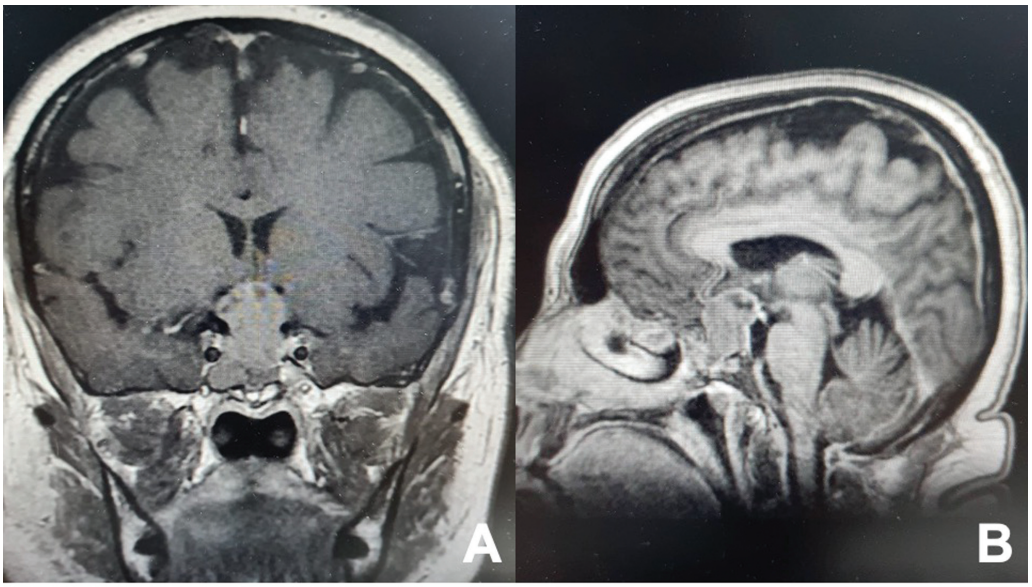

Fig. 1 Preoperative imaging studies. (**A**) Coronal preoperative magnetic resonance imaging (MRI) scan indicating a well-defined mass lesion in the sellar region with suprasellar extension, measuring 25 × 18 × 20 mm, and compressing the optic chiasm. (**B**) Sagittal reconstruction of a head MRI showing suprasellar extension and compression of the optic chiasm.

visual-field defects due to minimal manipulation of the optic apparatus.

Potential concerns during the EETA exist regarding the aerosolization of viral particles, which could theoretically spread throughout the operating room due to aggressive disruption of mucosa and the use of the drill and electrosurgical devices.[4]

We report the experience of performing an EETA in one case in our center during the COVID-19 pandemic.

Case Report

A 62-year-old female presented with headaches two months before hospital admission, followed by progressive bilateral severe visual loss. A campimetry examination detected blindness in the left eye and hemianopia in the right eye (►**Fig. 1**). The pituitary hormonal panel was normal. In 2016, the patient underwent subtotal resection of a nonsecretory macroadenoma through EETA.

A magnetic resonance imaging scan showed a well-delineated, dumbbell-shaped, sellar lesion with suprasellar extension and contrast enhancement, stretching the optic chiasm and optic nerve, measuring 25 mm craniocaudally, 18 mm anteroposteriorly and 20 mm transversely. (►**Fig. 2**)

Because of the progressive visual loss, the EETA with pituitary adenoma resection was performed.

Before the surgery, the patient was tested for COVID-19 following the protocol of our institution.

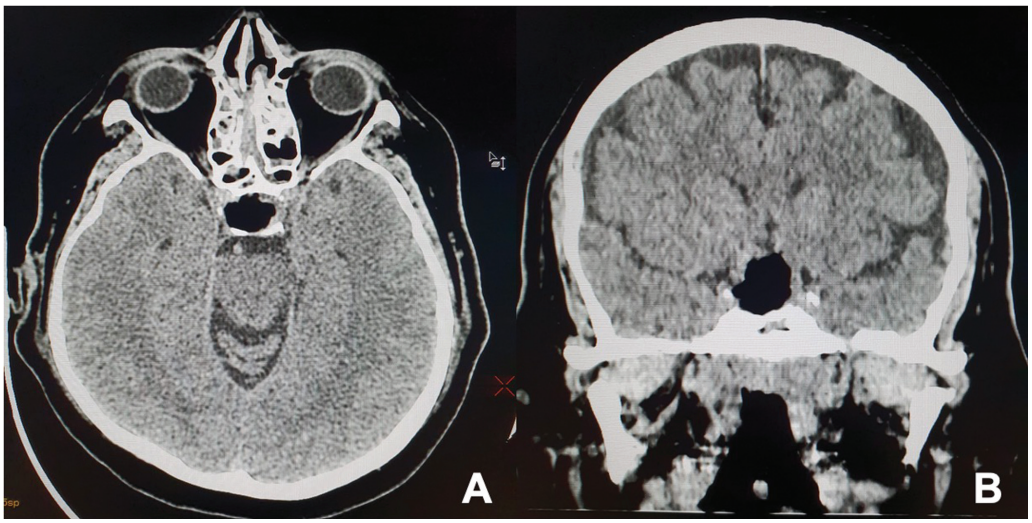

Fig. 2 Threshold plots of the Humphrey field analyser demonstrating (**A**) hemianopia in the right eye, and (**B**) loss of vision in the left eye.

Fig. 3 Patient positioning in the surgical table: (**A**) with the metal arch above the head; (**B**,**C**) with the surgical fields in place before and after insertion of the microscope bag. (**D**) Photograph showing the layout of the room during the surgical procedure, and the use of personal protective equipment (PPE) by the surgical team.

Technical Note

Only essential personnel entered the operating room (OR), including two neurosurgeons, two anesthesiologists, one scrub nurse and one running nurse. All surgical and anesthetic teams used personal protective equipment (PPE), which included: tight-fitting N95/PFF-2 mask, 1 surgical mask over it, face shield, and standard sterile surgical gloves and gown, as recommended by our local infectious disease control team. During the intubation and extubation procedures, only the anesthesiologists were present in the OR. The running nurse stayed outside the OR, but right by entrance, with emergency supplies that might be necessary readily available.

We developed a low-cost adaptation to the surgical fields, using a setup with a regular surgical microscope bag sealed with sterile adhesive drapes around the head and superior trunk of the patient, with only a tiny slit on it to enable the insertion of the endoscope and surgical instruments through the nose. To support the microscope bag like a tent, a metal arch, normally used around the head to collect blood, was positioned over the head. This arrangement was designed to protect the OR personnel from aerosolized particles (►**Fig. 3**).

Under general anesthesia, the patient was positioned in a supine position with the trunk elevated 30°. The head, fixed with the 3-pin Mayfield head holder, was tilted back 20° and rotated 25° toward the right shoulder. Neuronavigation was used, following institutional protocol. The neurosurgeon was positioned on the right side of the patient. Additionally, during maneuvers that could increase aerosolization, such as using the high speed drill, we performed generous irrigation with saline and blocked the entry site of the endoscope and suction tube on the microscope bag, avoiding aerosolized particles from spreading to the OR (►**Fig. 3**).

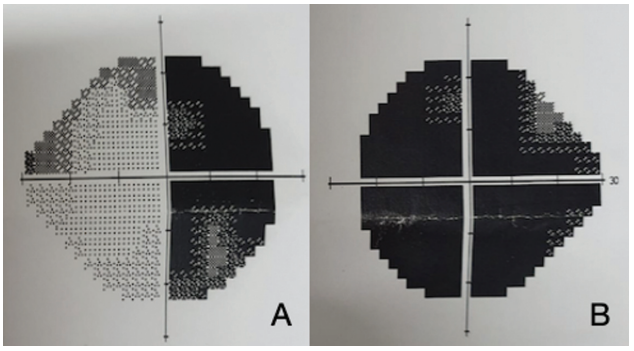

Fig. 4 (**A**) Axial and (**B**) coronal postoperative computed tomography (CT) scans showing total resection of the lesion.

A postoperative computed tomography scan showed complete resection of the tumor, with decompression of the optic nerve and chiasma (►**Fig. 4**). The patient was discharged four days postoperatively with subjective improvement of the visual field and acuity.

Discussion

Developing safety protocols for EETA during the COVID-19 pandemic is an evolving topic. Emerging data demonstrate that the EETA is currently a high-risk procedure, due to the high viral load and replication within the nasal cavities. As an aerosol-generating procedure, it can promote nosocomial viral transmission.[5] High rates of infection due to viral charge have been reported in upper-airway procedures, including an outbreak among fourteen medical staff that were

confirmed infected after an EETA.[6] There are few papers discussing this subject, and most of them are case reports.[4,6]

Currently, the care for neurosurgical patients presents numerous challenges regarding not only the safety of the patient and of the community, but also that of physicians and OR personnel. This means that, to save resources and to avoid unnecessary exposure, there is a need to postpone all elective interventions. When that is not possible, even deviations from the standard EETA to transcranial approaches can be justified, in light of the present extraordinary circumstances. These decisions, however, are likely to be highly patient-, surgeon- and institution-specific. Urgent procedures, like the one herein described, cannot be delayed, and surgeons must provide the best available care to their patients, even with the risk of exposure to COVID-19.[4,7]

It has become clear that physicians of all specialties need to change the way they work, mainly those who deal with the nasal cavities, nasopharynx and oropharynx. Even asymptomatic patients have exhibited high viral loads at these sites.[8,9] We believe that the strategy performed in the present case is a feasible and cheap way to keep EETA in the surgical repertoire for sellar and suprasellar surgery, since microscope bags are available in many neurosurgical departments around the world, even in developing countries like Brazil.

Conclusion

The concerns regarding the potential spread of COVID-19 during EETAs remain high, even in asymptomatic patients or in those with negative tests, because of the possibility of false-negative results. Because endonasal surgery creates clouds of droplets and aerosols which may permeate the OR,[10,11] we recommend that all patients be tested preoperatively for COVID-19, and the use of PPE for all personnel in the surgical theater. Local guidelines are warranted. The strategy herein described can be an important adjunct to these guidelines.

Ethics Committee for Research Protocols

The protocol was approved by the local institutional Review Board (Ethics Committee for Research Protocols – CEPI).

Conflict of Interest

The authors have no conflict of interests to declare.

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