Supraorbital Burr Hole Via a Glabellar Incision:

A Simple Approach to Anterior Skull Base

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Abstract

A left subfrontopolar lesion with marked edema was totally resected utilizing a minimally invasive approach. It was possible to expose and resect the lesion, which turned out to be a tuberculoma, through a burr hole placed supraorbitally through a glabellar incision. The development and significance of minimalization techniques for surgery in the skull base region are discussed.
Key Words: Minimally invasive surgery, burr hole, skull base, tuberculoma.

PREVIOUS TECHNIQUES for removing skull base lesions necessitated excessive brain retraction, causing edema and neural damage. In the last two decades, surgical approaches to the skull base have undergone a dramatic modification, with the adoption of more extensive bony resection. These approaches, which are state of the art at present, have decreased cerebral damage by minimizing brain retraction. However, they are complicated and too extensive in opening and closure, time consuming, and associated with increasing morbidity. Although recent experience has led to simplified opening and closure, it is understood that a minimal opening with sufficient exposure would serve the same purpose, with shorter operative time and lower morbidity.

Case Report

A 57-year-old woman who emigrated to Israel from India was in generally good health. When first seen, she suffered from a subcutaneous neck abscess, which was drained in an outpatient clinic, with no further consequences.

One month later, the patient was admitted to the hospital following loss of consciousness, generalized seizures and right-sided weakness.

Neurologically she was comatose, and had a right-sided weakness and a right-sided central facial palsy; no papilledema was demonstrable on funduscopic examination. The general physical examination was unremarkable.

Biochemical and hematological blood tests, including blood count and blood cultures, were normal. An urgent brain CT, with and without contrast enhancement, demonstrated a space-occupying lesion at the left anterior skull base lateral to the crista gali. Contrast media enhanced the lesion, which was surrounded by a large edematous area (Fig. 1A). The patient was thought to have a cerebral pyogenic abscess; she was started on anticonvulsants, steroids and antibiotics. CT performed one and four days following admission did not show any change in the lesion.

Several days after admission, due to the lack of clinical and radiological improvement, the patient was taken to the operating room. Under general anesthesia, a left glabellar incision was performed, extending from 2 cm medial and 1 cm lateral to the supraorbital notch (Fig. 2A). The supraorbital nerve was preserved. A burr hole

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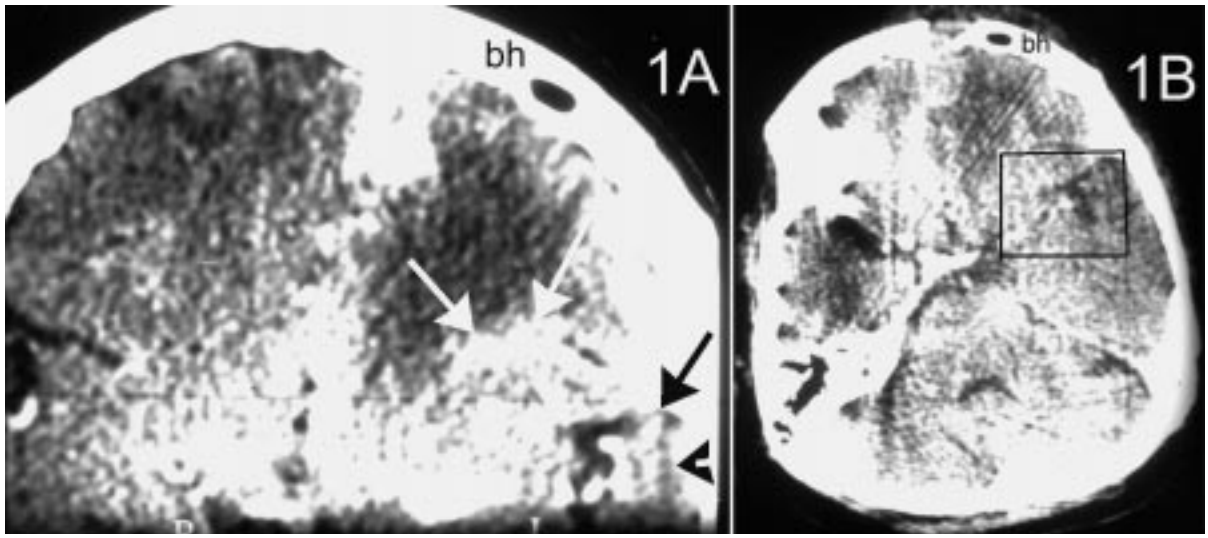

Fig. 1. (A) CT of the brain with intravenous contrast, revealing an enhancing left subfrontopolar lesion adjacent to the crista gali (black arrow and arrowhead) and surrounded by edema (white arrows). Burr hole is indicated by bh. **(B)** Repeat CT one day following the operation. A complete resection of the lesion is evident. The indicated rectangle is the area in which the resection was performed.

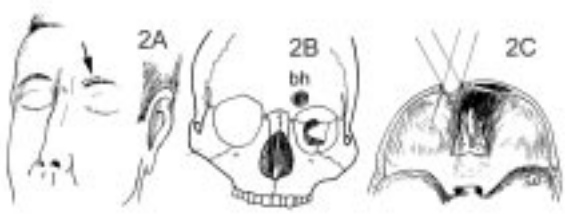

Fig. 2. (A) Schematic diagram of the placement of the glabellar incision (arrow). **(B)** Schematic drawing of the burr hole (bh) placement. **(C)** Schematic drawing of the angles accessible for surgical exposure.

was drilled under the operative microscope, 1 cm lateral to the midline and medial to the supraorbital notch and 1 cm above the orbital rim (Figs. 2B and 2C). Following dural opening, the lesion, which was located at the pole of the frontal lobe, was identified and excised. Marked post-excisional bleeding was easily controlled. The wound was closed with gel-foam and the skin was sutured in two layers. The operative time was 40 minutes.

One day following the operation, a CT scan with and without contrast media disclosed complete removal of the lesion (Fig. 1B).

Postoperatively, there was an immediate improvement: the patient was alert, seizures had ceased and the hemiparesis had disappeared. Histopathological examination disclosed a necrotizing, granulomatous reaction with extensive caseous necrosis in which numerous giant cells of Langhans were seen suggestive of a tuberculous abscess (Fig. 3). The patient was started on antituberculous medication.

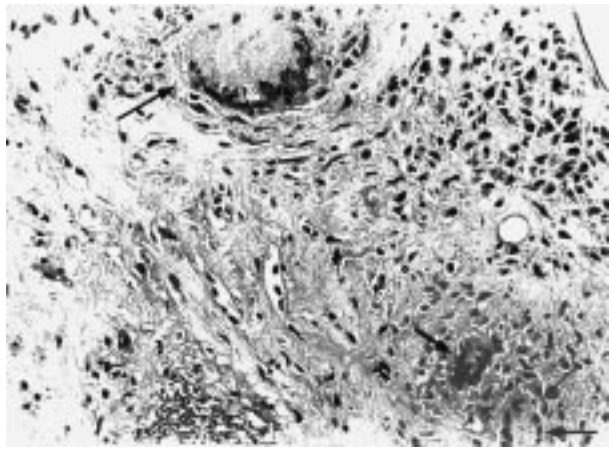

Fig. 3. Microscopic section of the resected tumor (H&E, 40x), showing granulomatous reaction with mononuclear cell infiltrate and three Langhans' giant cells (arrows) with typical nuclear horseshoe pattern.

Discussion

Our reported case clearly demonstrates the advantage of using a simplified approach rather than performing "classical" craniotomy. Previously, this patient would have undergone a relatively large frontal craniotomy and frontal lobe retraction in order to expose the lesion at the base of the skull. Brain retraction would have induced further brain damage and edema, thus increasing morbidity.

In order to prevent retraction-induced brain injury for lesions located at the base of the skull, various approaches have been developed. Improvements in technique have led to smaller surgical field exposures.

Derome (1), Dolence (2), Sekhar et al. (3), and Hakuba et al. (4) advocated the innovative extensive exposure to lesions at the base of the skull, starting with extensive skin incisions, bone resection and brain exposure. All of these solved the problem of brain retraction. However, the operative field itself remained small.

The trend now is to get to the same working operative field with less-extensive openings. This has resulted in the development of approaches which permit decreasing the extent of the surgical exposure. Recently, Perneczky (5, 6) described a minimally invasive approach known as the keyhole craniotomy. With this approach, the size of the surgical exposure is 2 cm in diameter. Thus, the opening must allow for sufficient intracranial space and an overlapping exposure and operative field, so that the lesion can be excised with minimal trauma to the surrounding brain.

Jho (7) described the excision of subfrontal and suprasellar lesions through an orbital craniotomy via an eyebrow incision. This method is a further minimalization of the supraorbital approach described by Jane (8). This procedure, however, can be utilized only in a select number of cases, where the lesion is close to the surface, small in size and subfrontally located.

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