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HOW I DO IT

Single-port Endoscopic Removal of Forehead Osteoma: An Otolaryngologist's Procedure

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Key Words: dissection, endoscopic resection, forehead, forehead osteoma, osteoma.
***Laryngoscope*, 134:2194–2197, 2024**

INTRODUCTION

Forehead osteoma is a benign tumor lesion, although mostly asymptomatic, creating significant cosmetic concerns for the patient. Traditionally, either a direct open approach with a forehead incision along the relaxed free tension line or a large coronal incision in the hair-bearing skin is made to remove forehead osteoma. However, an inevitable scar is the main issue for a direct open approach.[1] Additionally, there is the risk of temporary or permanent scalp paresthesia from the supraorbital or supratrochlear nerve injury. Endoscope-assisted removal of forehead osteoma has been described, but it is not clear to many patients which surgical specialty has the appropriate training for this approach.[1–5] Referrals to plastic, neurosurgeons, and general surgeons are common, but otolaryngologists have the core skill set required for this procedure. The great visualization from the endoscope makes the success in complete removal and recontouring of the forehead without nerve injury. Moreover, the hidden incision in the frontal hairline gives excellent cosmetic outcomes. We describe our single-port endoscopic removal of forehead osteoma technique and the associated outcomes.

MATERIALS AND METHODS

A retrospective review of consecutive adult patients with forehead osteoma managed with single-port endoscopic removal of forehead osteoma was performed. This study was approved by St Vincent's Hospital Human Research Ethics Committee (2019/PID13822).

Outcomes

The primary outcomes were the complete removal of osteoma and restoration of contour. Success in the primary outcomes was measured by the complete removal of the osteoma, which could not be observed by either the patient or the surgeon, and the restoration of contour without irregularities in the forehead, which also could not be seen or palpated by the patient and the surgeon. Secondary outcomes were surgical morbidity, defined as early (<90 days) or late (>90 days). Early morbidity included periorbital swelling/bruising, infection, temporary scalp paresthesia, forehead hematoma, and pain (requiring additional analgesia). Late morbidity included permanent scalp paresthesia, irregularity of forehead contour, and visible surgical scar.

Preparation

The operation is performed under general anesthesia. The surgeon operates in the sitting position at the top of the operating bed. The endoscope monitor is placed above the patient in front of the surgeon. The patient's head was in a neutral anatomic position. The boundary of frontal osteoma is marked. The hair was divided by bush up and down above the frontal hairline without a haircut. The hair division line is perpendicular to the osteoma. The "deckled" hairline incision 1–2 cm is drawn in the hair division line (Fig. 1). The incision, tumor site, and endoscopic instruments' access path are infiltrated with 1% ropivacaine and 1:100,000 adrenaline.

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Editor's Note: This Manuscript was accepted for publication on September 28, 2023.

The authors have no funding, or financial relationships to disclose.

Richard J. Harvey is a consultant/advisory board with Medtronic, Novartis, Glaxo-Smith-Kline, and Meda Pharmaceuticals. He has been on the speakers' bureau for Glaxo-Smith-Kline, AstraZeneca, Meda Pharmaceuticals, and Seqirus. All other authors have no personal, financial, or institutional interest in any drugs, materials, or devices described in this article.

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DOI: 10.1002/lary.31111

Surgical Technique

The deckled hairline incision is made with the 15° Ophthalmic knife (Alcon, TX, USA). Needle-point diathermy coagulation occurs to the galeal layer, setting 12 (0016 AM Megadynne, NJ, USA). Under retraction, the surgeon blunt dissects, vertically through the galea, to the subperiosteal plane. Dissection is down to the subperiosteal layer. Then, a 4-mm 0° endoscope is inserted under the subperiosteal plane. The subperiosteal dissection is performed down to the osteoma's cephalic and lateral border, extending laterally to ensure full visualization. Dissection inferior and below the border of the osteoma is facilitated with an ethmoid curette (Fig. 2).

The forehead osteoma removal is performed with a 4-mm 15° diamond burr at 30,000 revolutions per minute, along with

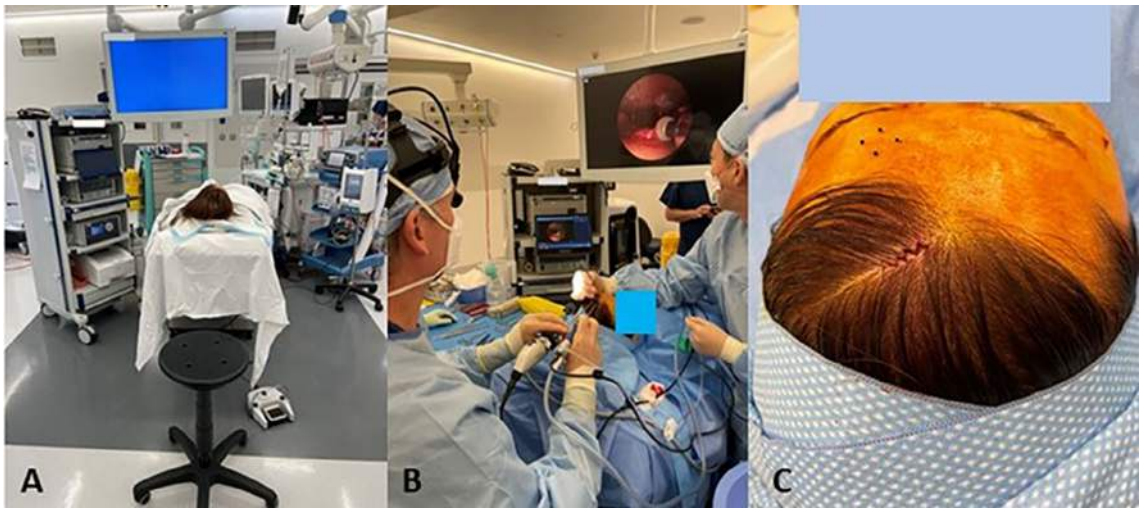

Fig. 1. Operating room setup and incision. (A, B) Operating room setup and patient positioning. (C) The "deckled" hairline incision 1–2 cm is drawn in the hair division line. Osteoma (circular dot).

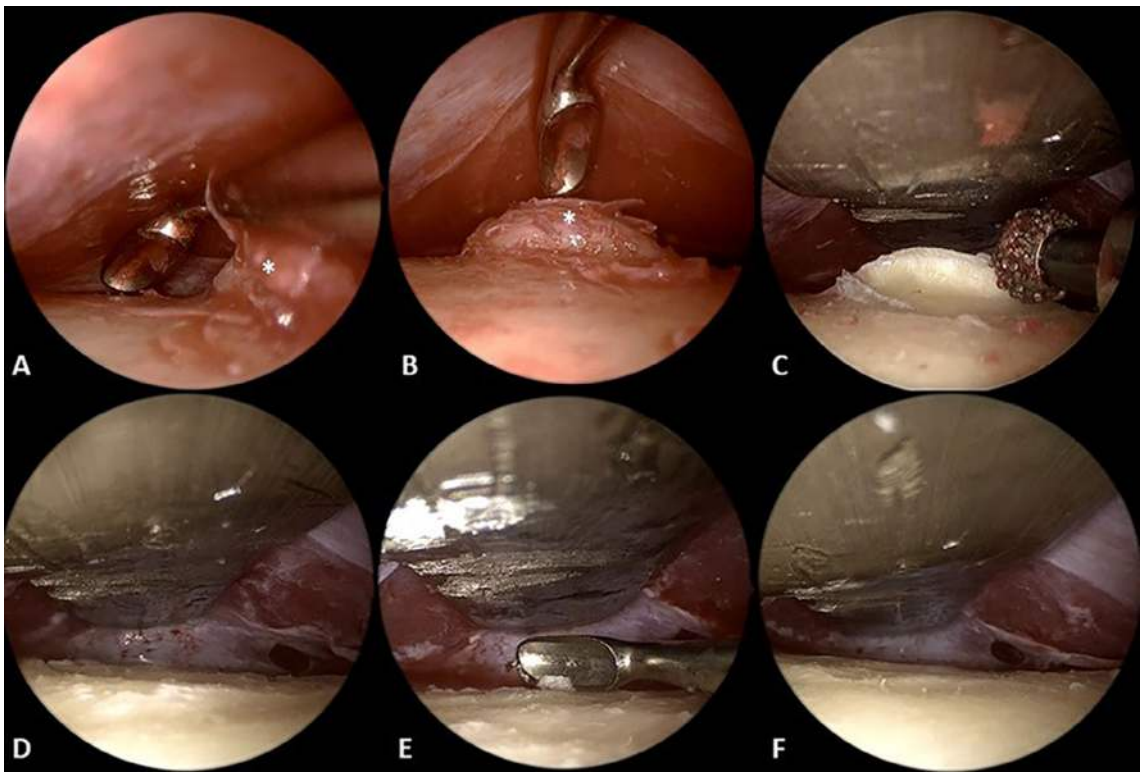

Fig. 2. Surgical techniques. (A, B) Subperiosteal dissection. (C) Drilling. (D) Uneven frontal bone surface after drilling. (E) Smoothen any minor irregularities. (F) The final smooth surface of the frontal bone. Osteoma (asterisk).

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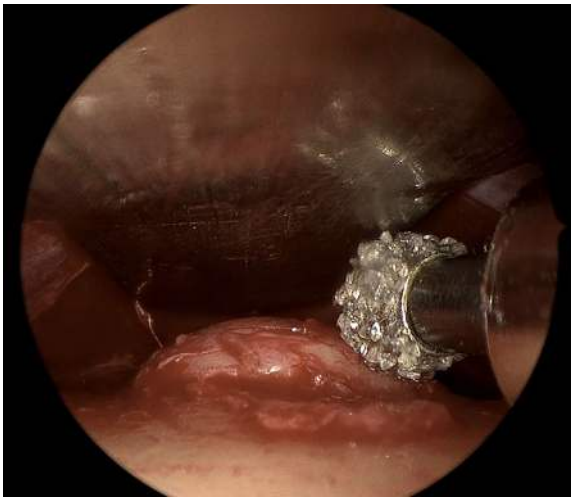
irrigation and suction system (Straightshot M5 Micordebrider, Medtronic, FL, USA) under 0° endoscope visualization. Irrigation and suction are critical for drilling to reduce heat and clean the surgical field. The surgeon holds the 0° endoscope above the drill, whereas the assistant holds the malleable retractor. The uneven frontal bone surface is recontoured with drilling. The ethmoid curette can be used to smooth any minor irregularities after drilling (Fig. 2). Finally, irrigation with normal saline was performed to clean the operative field and ensure that all bone debris are removed. The wound is closed using absorbable sutures (5-0 coated Vicryl and 5-0 Plain Gut, Ethicon, NJ, USA). The forehead is compressed with an elastic bandage for 3–5 days postoperative. The surgical steps are illustrated in Video 1.

Postoperative Care

Patients were managed via day surgery. Amoxicillin/clavulanic acid was given for 10 days, and prednisone was given at 25 mg daily for 7 days to reduce swelling.

RESULTS

Nine patients (48.9 ± 10.1 years, 100% female) were assessed. The osteoma diameter was 11.7 ± 3.5 mm.



Video 1. Endoscopic forehead osteoma removal was done in 49 years old female with an 11 mm left forehead osteoma.
Video content can be viewed at https://onlinelibrary.wiley.com/doi/10.1002/lary.31111

Multiple osteomas were present in 29%. All patients had complete removal of forehead osteoma (100% [95% CI: 66.4%–100%]) and success in restoration of contour (100% [95% CI: 66.4%–100%]). The follow-up was 24.8 ± 19.1 months. There were no early (0% [95% CI: 0%–33.6%]) or late (0% [95% CI: 0%–33.6%]) surgical morbidities.

DISCUSSION

Similar outcomes have been reported with complete removal and excellent cosmesis[1–5] (Table I). The technique described utilizes familiar drills and endoscopic equipment for the otolaryngologist. The subperiosteal dissection and osteoma removal steps were performed via endoscopic visualization. Although performing osteoma removal without endoscope visualization using osteotome and hammer instrumentation has been described,[3] the endoscope provides precise drilling and limits soft tissue dissection. Additionally, this skill set is very familiar to otolaryngologists.

The risk of supraorbital or supratrochlear nerve injury, and subsequent paresthesia, is minimized by subperiosteal approach, high incision, and small port access.[1–5] In our series, the entire dissection and tumor removal are performed via a single remote port. Multiple port approaches for endoscopic removal of forehead osteoma, attributed to the complexity arising from an excessively narrow inter-instrument angle that impedes manipulation, have been described but are not required.[1,2,5] Otolaryngologists are familiar with endoscopic visualization via a single port, similar to endoscopic sinus or ear surgery.

Additionally, the comprehensive dissection and tumor removal are done under 0°endoscope visualization, and although described with angled endoscopes,[1,2,5] otolaryngologists' comfort with the endoscope makes angled instruments redundant. The "deckled" incision allows hair follicles to grow through the wound and is closed by the absorbable sutures. The final location of a small visible scar resulting from this incision may become discernible in those at risk of male pattern hair loss. Placement as close to the vertex as possible will help to conceal this but will still be less conspicuous than a direct open approach or coronal incision.

The osteoma on the inferior forehead, located close to the eyebrow, and those patients with a very curved frontal eminence pose less of a challenge than would be

TABLE I.
Publications on Endoscopic Only Removal of Forehead Osteoma.

Author	Year	Number of Patients	Number of Ports	Complete Removal/Success	Complications
Seresirikachorn (Current)	2023	9	1	100%	0%
Bouguila[5]	2020	8	2	100%	0%
Hsiao[3]	2015	10	1	100%	0%
Lai[4]	2008	6	1	100%	0%
Mun[1]	2006	12	2	100%	0%
Onishi[2]	1995	5	2	100%	0%
Overall		48		97.3% [95% CI: 90.0%–99.8%]	2.7% [95% CI: 0.2%–11.0%]

Overall data is a meta-analysis of proportional data from the studies listed with a fixed effect model.

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anticipated. The mobilization of the forehead skin, both in the tunnel to the osteoma and around the incision, allows movement and release that affords near-straight instrument access for most. The release of the skin envelope has resulted in instruments with only a 15° angulation being required. While it is possible that further angled instruments may be required in some anatomical situations, this has not been encountered by the authors. Care needs to be taken with the extent of removal, especially when extending beyond the outer cortex. Drilling under visualization allows the surgeon to decide on whether to end the removal in line with the cortical margin or reconstruct with either bone cement or collagen matrix. Periorbital swelling and bruising are often recovery concerns for patients, but these are avoided due to subperiosteal and limited dissection. Patients seeking a low morbidity approach to their forehead osteoma should seek out an otolaryngologist to perform an endoscopic removal other than an open approach.

CONCLUSION

A single-port endoscopic removal of forehead osteoma draws upon an otolaryngology skill set, providing a minimally invasive approach for complete tumor removal, with excellent cosmetic outcomes and low surgical morbidity.

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