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ASSESSING THE SUCCESS OF ENDONASAL SURGICAL MANAGEMENT FOR SUPRAORBITAL CELLS MUCOCELE

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ABSTRACT

Background: Treating the mucoceles that originate from the supraorbital ethmoid cells is a challenging task. The lateral placement of the endoscopic endonasal approach makes it insufficient for sufficient exposure, necessitating the adoption of prolonged transnasal procedures or external approaches.

Aim: The purpose of this study was to evaluate the success rate of endoscopic procedures performed via the nose using endoscopes, or endoscopic treatments performed through the nose using transnasal methods or external approaches. **Methods**: In order to formulate findings, subjects with mucoceles originating from supraorbital cells that were treated with an external transpalpebral approach, fat obliteration in the supraorbital cell cavity, and an endonasal extended approach to the frontal sinus were evaluated.

Results: In supraorbital cells, where inferior and anterior wall erosion was observed in every subject penetrating the orbit, mucocele was discovered in 8 cases. In two of the cases, there was additional evidence of posterior wall erosion where the mucocele capsule touched the meningeal. In all eight patients, the illness was cured. However, due to mucocele recurrence, a novel combination transpalpabral and endonasal technique with supraorbital cell cavity fat obliteration was used in 4 participants.

Conclusion: Treating mucocele in supraorbital cells treated with main or revision surgery has a 100% success rate. Bone drilling, mucosal excision, and supraorbital cell cavity fat obliteration provide a comprehensive treatment approach demonstrating significant surgical aggressiveness for mucocele therapy.

Keywords: Endoscopic surgery, mucocele, obliteration, supraorbital cell, transpalpabral approach

INTRODUCTION

Mucoceles are pseudotumors that originate from isolated ethmoidal cells or paranasal sinuses and have mucopurulent or mucous contents. For treating rhinologists, the effective surgical therapy of these entities remains a major issue.[1]

The intricate pneumatization pattern obstructing the frontal sinus drainage channel from the endoscope's direct vision is a contributing factor to these difficulties. A variety of craniofacial strategies have been explored to address this problem.[2] These methods may not be appropriate for benign instances or situations with little involvement, while they may be

acceptable for malignant disorders due to the hazards involved. Endonasal endoscopy and keyhole craniotomies are two minimally invasive procedures that have been widely employed to reduce the dangers associated with this method.[3]

Endonasal methods have demonstrated less morbidity while evaluating the disease of the nasal cavity. Nevertheless, they have several drawbacks, such as inadequate dural closure, restricted workspace when many surgeons are operating, anterior cranial fossa access laterally away from the midline, and incapacity for microsurgical dissection in complicated situations, and limitations when treating anterior skull base.[4] The supraorbital technique was shown to provide enhanced visualisation and access in these challenging anatomic locations, facilitating the effective and better management of large lesions and anterior skull base therapy.[5]

The anterior ethmoid cells that exhibit invasion in the frontal orbital plate are known as supraorbital cells. Ten percent of revision endoscopic procedures result in mucocele, which is closed and caused by drainage blockage of the supraorbital cells.Six Because of their position, these mucoceles make it difficult to access these supraorbital cells surgically. This requires using a variety of endonasal and exterior surgical procedures.7. The purpose of the current study was to evaluate the efficacy of endonasal or combination transpalpabral and endonasal surgical therapy of the mucocele in supraorbital cells.

MATERIALS AND METHODS

The goal of the current retrospective clinical investigation was to evaluate the efficacy of endonasal or combination transpalpabral and endonasal surgical therapy of the mucocele in supraorbital cells. The study's data came from the institute's Department of Opthalmology. The information was extracted from the Department's prior medical records. Subjects with mucocele in the supraorbital cells who had endonasal surgery with an endoscope and a combination transpalpabral and endonasal approach met the study's inclusion requirements. Subjects with frontal sinus mucocele met the exclusion criteria. After the procedure, all patients had ENT evaluation, nasal endoscopy, CT (computed tomography), and MRI (magnetic resonance imaging). Using 0° and 30° endoscopes, general anaesthesia was used for all surgical procedures. A range of endonasal surgical techniques were applied on the research patients.

In addition to unilateral frontal sinus drainage between the nasal septum and the orbital papyracea lamina, two participants had ethmoidectomy, middle maxillary antrostomy, and laminectomy. The medial wall of the supraorbital cells was visible through the endoscope, and the cavity was marsupialized to the frontal sinus in order to resect the area. Anterosuperior septectomy, bilateral frontal sinus drainage between the two papyraceous laminas of the orbits, and frontal sinus connectivity to the supraorbital cells were all part of Lothrop-modified frontal drainage performed on the other two individuals.

The external transpalpabral technique was used on the remaining 4 cases, with a modified Lothrop frontal drainage after a 2 cm incision. After resecting the supraorbital cell mucosa, the bone was drilled, and the fat was used to completely obliterate the supraorbital cell cavity. The controls included computed tomography and nasal endoscopy.

RESULTS

Eight participants in this research developed supraorbital cell mucocele, which was treated surgically. Two female and six male volunteers made up the research. The research participants ranged in age from 38 to 62, with a mean age of 51.2±3.62 years. Four individuals complained of proptosis, while the remaining four had pre-septal cellulitis accompanied by proptosis and suppuration.

Two participants had damage to their left orbit, whereas the remaining six subjects had damage to their right orbit (Table 1). Before the second revision surgery, which involved 2 subjects undergoing a craniotomy for anterior communicating artery aneurysm with frontal sinus obliteration, 2 subjects for facial trauma, and 4 subjects for chronic sinusitis, all 8 study participants had undergone previous surgical management in the paranasal sinus region, almost a decade earlier. As indicated by Table 1, no papyracea lamina was observed on the side of the mucocele in two of the individuals. Using computed tomography (CT), all research participants showed erosion of the superior and anterior supraorbital cell walls as well as mucocele penetration into the orbit.

When the mucocele made contact with the meninges in two of the individuals, posterior wall erosion was also evident. Due to drainage stenosis in the supraorbital cells, the recurrence was observed in a short period of time in 4 participants who underwent marsupialization of the mucocele to the ethmoid cavity using a combination transpalpabral and endonasal approach.

A combination endoscopic endonasal and transpalpabral technique was used to do the revision surgery. The supraorbital cell cavity and ethmoid cavity were able to communicate once more. However, the supraorbital cell cavity was completely filled with fat after the mucosa was removed in its entirety and the bone was drilled.

Following surgery, none of the participants experienced any complications, and they were all released from the hospital a day after the procedure. For every patient, corticosteroids and physiological solution washing were recommended. Sucking was

used to periodically remove crusts and secretions. All of the participants showed satisfactory progress throughout the 2.5-year follow-up assessment.

DISCUSSION

Supraorbital ethmoid cells are observed anterior to the anterior ethmoidal artery, posterior and lateral to the frontal sinus, and drain posteriorly and laterally to the frontal ostium in the frontal recess. They characterise the pneumatization in the orbital plate of the frontal bone. Typically, anterior ethmoid cells give rise to supraorbital ethmoid cells. They may, therefore, also originate from the area of the posterior ethmoid. The size may vary, and Zhang L et al. (2007) reported the observation of several supraorbital cells.

In a 1997 research by Owen RG et al., supraorbital cells were found in 15 out of every 100 adult patients' anatomy; in a subsequent analysis, it was found in 14 out of 242 specimens. In a 1959 literature review, Dixon FW10 found that in 200 examined specimens, the frequency of supraorbital cells was close to 5%. Supraorbital cells appear as several focal sinuses or multiple septa inside the sinuses on a CT scan of the paranasal sinuses. The frontal sinus is positioned posteriorly and laterally by supraorbital cells. In axial slices, they are seen posterior to the crista galli process. According to Choby G et al.'s 2008 description, supraorbital ethmoid cells are present in 28.5% of the 100 CT samples used to evaluate the paranasal sinuses.

The drainage of the supraorbital cells is visible on a nasal endoscopy as an aperture in the frontal ostium, anterior and lateral ethmoid sectors, and in front of the ethmoid artery. According to Jang DW et al.'s 2014 description, the anterior ethmoid artery may be visualised posterior to the drainage hole by identifying the supraorbital ethmoid cell drainage aperture. Making a pathologic diagnosis of the supraorbital ethmoid cell is an essential step in selecting the most appropriate surgical technique for access. In 2004, Chiu AG et al. found that undrained supraorbital cells were present in the frontal sinus during approximately 10% of revision endoscopic procedures.

Four of the study's individuals had preoperatively diagnosed involvement of the supraorbital cells in their illness; when the initial operation failed, more severe revision surgery was carried out. Alternatively, modified Lothrop frontal drainage may be used to treat the bilateral frontal sinus infection or to improve access. A modified Lothrop frontal drainage protocol was described in earlier literature studies by Friedel ME et al.(2012) and Eloy JA et al.(2011). This protocol involves performing anterosuperior septectomy, Draf II-B, and anterior ethmoidectomy in order to introduce the endoscope from the contralateral nasal opening in order to improve vision and angle to lateral mucocele. Additional research by Knipe TA et al. (2007) and Albathi M. et al. (2016) outlined further guidelines for managing lateral mucocele utilising an endoscope to reach the lateral supraorbital cell and its marsupialization to the nasal cavity. This strategy combines a transpalpabral and endonasal combination technique.

In four individuals who had the combined approach, excellent vision was seen with the endonasal approach, which allowed for nasal cavity drainage and amplitude control, and the transpalpabral approach, which allowed for good vision perpendicular to the supraorbital cell. Preventing leakage from closing cells due to scarring is another problem. Debridement and corticosteroid washes are essential components of postoperative therapy in order to achieve this. In order to maintain the drainage open throughout time, Man LX et al. (18) (2013) recommended utilising a stent constructed of a paediatric biliary T-tube inserted by frontal trephination endoscopically using an endonasal route.

Following mucocele marsupialization to the ethmoidal cavity using a combined approach, drainage obstruction and mucocele recurrence were observed in the same four participants as their symptoms. The existence of titanium microplates, which were used for face reconstruction many years ago, in two of these participants likely, caused an ethmoidal distortion, which might account for the return of mucocele and the drainage stenosis. A large drill was utilised for the revision surgery on the two patients, and the resected bone-like material was employed for the frontal sinus obliteration in the craniotomy. This substance may be the cause of recurring infections that result in drainage stenosis. Revision surgery was performed using a combination technique on these patients. On the other hand, the hyperplastic mucosa was removed, and then the cell cavity was completely filled with fat using a supraorbital cell bone drill.

CONCLUSION

Taking into account its limitations, the current study comes to the conclusion that treating mucocele in supraorbital cells that are treated with main or revision surgery has a 100% success rate. Bone drilling, mucosal excision, and supraorbital cell cavity fat obliteration provide a comprehensive treatment approach demonstrating significant surgical aggressiveness for mucocele therapy.

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TABLES

Characteristics	**Percentage (%)**	**Number (n)**
Mean age	51.2±3.62	
Gender		
Males	75	6
Females	25	2
Complaint		
Proptosis	50	4
Pre-septal cellulitis with suppuration and proptosis	50	4
Affected orbit		
Right	25	2
Left	75	6
Revision surgery		
Craniotomy	25	2
Facial trauma	25	2
Chronic sinusitis	50	4

Table 1: Demographic and disease characteristics of the study subjects

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Gender	Presenting symptoms	Previous surgery	Erosion of posterior wall	Erosion of orbit	Surgical approach	Revision surgery: surgical	Resolution
Female	Proptosis	Chronic sinusitis		Yes	Draf II b	No	Yes
Female	Proptosis	Chronic sinusitis		Yes	Draf II b	No	Yes
Male	Proptosis	Nasal polyp		Yes	Draf III	No	Yes
Male	Proptosis	Facial trauma		Yes	Draf III	No	Yes
Male	Pre-septal cellulitis with suppuration and proptosis	Nasal polyp		Yes	Marsupialization	Supraorbital cell obliteration	Yes
Male	Pre-septal cellulitis with suppuration and proptosis	Craniotomy	Yes	Yes	Marsupialization	Supraorbital cell obliteration	Yes
Male	Pre-septal cellulitis with suppuration and proptosis	Craniotomy		Yes	Marsupialization	Supraorbital cell obliteration	Yes
Male	Pre-septal cellulitis with suppuration and proptosis	Facial trauma	Yes	Yes	Marsupialization	Supraorbital cell obliteration	Yes

Table 2: Surgical approaches for supraorbital cell mucocele in the study subjects