Impact of Endoscopic Skull Base Reconstruction on Patient Quality of Life

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Abstract

**Background:** For different lesions involving the skull base, the reconstruction of the possible resulting defects by the available tissues and methods is important for success of surgery. The process of reconstruction would have a considerable impact on patient quality of life thereafter.

**Objective:** Evaluation of the impact of endoscopic skull base reconstruction on patient quality of life as regards sinoanasal symptoms including nasal discharge, nasal crustation and olfaction.

**Methods:** Patients who had endoscopic skull base reconstruction for skull base defects (more than 1cm) between May 2013 and January 2016 were followed for 6 months and monitored for sinoanasal symptoms.

**Results:** During the initial postoperative period the percentage of nasal discharge, nasal crustation and smell dysfunction that occurred was 55, 65 and 65% respectively in the first month. Those were subsequently 20, 15 and 30% after six months. The use of vascularized local flaps showed a worse impact on olfaction and almost similar effect like free grafts for nasal crustation but less disturbing nasal discharge.

**Conclusion:** Endoscopic skull base reconstruction for large skull base defects has its variable impact on patients quality of life which depends on the method used for reconstruction and the extent of primary pathology. Overall, the impact is short term, self limited.

**Key Words:** Skull base – Reconstruction – Quality of life.

Introduction

The advances in endoscopic use to address the disease processes that affect the skull base using the different nasal corridors have affected the functional aspect of the nose and consequently the patient quality of life. Endoscopic skull base surgery has its advantages as a minimally invasive and effective procedure to reach different areas but this would result in communication between the nose and the cranial cavity; a fact that has to be addressed and has its sequences on the physiology of the nose.

Even though the nasal route has saved the patients from the problems of open surgical approaches, its impact on the patient feeling of being well has not been sufficiently assessed in the literature [13].

The skull base surgery has its complex anatomical relations making patients more vulnerable to morbidity due to either disease processes affecting this region or the proposed treatment.

Studying patient quality of life after endoscopic skull base surgery is important for proper identification of possible risks associated with the surgery and help preoperative informed consent taking process so as to help both the surgeon and the patient make the right treatment option. The patients social and personal aspects may be affected as a result of surgery. This necessitates proper preoperative counseling to address patients worries and concerns.

**Material and Methods**

In this study, twenty patients with different skull base lesions amenable to endoscopic skull base surgery were enrolled at Cairo University Hospital (Kasr Al-Ainy) from May 2013 to January 2016.

The skull base lesions included different brain lesions as pituitary tumors, nasal tumors, spontaneous and traumatic CSF leaks. Reconstruction of skull base defects was done using flaps as nasoseptal flaps, middle turnibate flap and grafts as septal mucoperichondrium, fat and fascia lata.
Patients were followed after the surgery weekly at the first month then after three months and six months, time intervals for development of sinonasal symptoms including nasal discharge, crustation and smell dysfunction.

Results

The following charts show the percentage of patients suffered from different nasal symptoms during the initial postoperative period and 3 and 6 months later after endoscopic skull base surgery.

Prospective data collection, use of direct patient symptoms reporting and confirmation by endoscopic nasal examination was done at multiple time points.

Post operative sinonasal symptoms:

It should be noted that in the flap group no nasal crustation observed in four cases in which the donor site septal cartilage was covered by reverse flap.

Table (1): Post operative sinonasal symptoms in both groups.

<table>
<thead>
<tr>
<th>Sinonasal symptoms</th>
<th>Free grafts</th>
<th>Vascularized flaps</th>
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<tbody>
<tr>
<td><strong>Nasal discharge:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One month</td>
<td>7/10 (70%)</td>
<td>4/10 (40%)</td>
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<tr>
<td>Three month</td>
<td>5/10 (50%)</td>
<td>2/10 (20%)</td>
</tr>
<tr>
<td>Six months</td>
<td>3/10 (30%)</td>
<td>1/10 (10%)</td>
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<tr>
<td><strong>Nasal crustation:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One month</td>
<td>7/10 (70%)</td>
<td>6/10 (60%)</td>
</tr>
<tr>
<td>Three month</td>
<td>6/10 (60%)</td>
<td>4/10 (40%)</td>
</tr>
<tr>
<td>Six months</td>
<td>2/10 (20%)</td>
<td>1/10 (10%)</td>
</tr>
<tr>
<td><strong>Smell dysfunction:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One month</td>
<td>6/10 (60%)</td>
<td>7/10 (70%)</td>
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<tr>
<td>Three month</td>
<td>3/10 (30%)</td>
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</table>
**Discussion**

Rhino-neurosurgical interventions carry the risk of sinonasal morbidity such as subjectively disturbing crustung and viscous secretion which may persist for months. Negative factors contributing to such morbidity are the application of nasoseptal or other mucosal flaps, excessive resection of turbinate tissue, big surgical cavities and radiotherapy. Generally, the nasal physiology is disturbed postoperatively for a longer time without application of flaps. Chronic crusting is the term used in literature after about more than six months of complaint [9].

Postoperatively, synechia may occur frequently [8]. Rarely, empty nose syndrome is observed as maximum variation of chronic rhinitis sicca [5]. Persistent mucosal congestion may appear in the remaining paranasal sinuses (especially in the anterior ethmoid sinus and in the maxillary sinus) after resection of the middle concha and wide antrostomy [4]. Postoperative sinusitis can develop directly or after some time.

Postoperative hyposmia or anosmia may be an inevitable consequence of necessary resection at the skull base. Apart from this functional loss, the rate of postoperative disturbances of olfaction increases parallel to the extent of performed intranasal tissue resections. In addition to resection of parts of the middle and superior turbinates, posterior septectomy and the application of nasoseptal flaps may contribute to postoperative functional disturbances of the olfactory mucosa [14]. In single reports, only few patients are concerned (9%) [17]. Other authors noticed only a temporary effect that exists in up to 50% of the patients for example after routinely performed pituitary surgeries for about 3-6 months. The reason for this seems to be a secondary edema development in the surgical site [7]. A dorsal septal defect with consecutively altered air passage may also play a causative role (conductive olfaction loss) [11].

Another issue regarding the use of nasoseptal flap is the bare cartilage of the nasal septum surface which causes crustation and adhesions [18]. So, several methods have been introduced to cover the donor site such as free middle turbinate mucosal grafts [12] or reverse rotation flap [2].

In their study, De Almeida et al. [3] found that NSF elevation was not a risk factor for these complications, which is compatible with the results of the study by Pant et al. [16] that showed no significant difference in nasal crusting when comparing the group with NSF reconstruction with other groups.

In our study we used and assessed the reverse rotational flap in the flap group and found that nasal crustation in the first month postoperatively was 70% in the free graft group and 60% the flap group. Furthermore within the flap group, the patients with reverse rotational flap had minimal or no crustation in the same period.

One disadvantage of the reverse rotational flap is that it prevents the use of the contralateral septal mucoperichondrium flap but the need for bilateral flaps is rarely needed in the endoscopic nasal surgery [10].

During the initial postoperative period, crusting occurs, requires debridement and has a bad effect on the postoperative quality of life. The reverse rotational flap seems to help rapid and complete remucosalization of the septal donor site and decreased crusting within the first 1 to 2 postoperative weeks [2].

We found also that the incidence of nasal discharge and disturbed smell was higher in the patients in which the skull base is reconstructed by grafts probably due to the use of avascular tissues with no blood supply which takes some time to be taken and gain blood from the surrounding tissues, on contrast to the nasal vascularized flap which has more rapid, complete healing and coverage.

Maryam Jalessi et al., in their study concluded that although deterioration of some nasal symptoms including sense of taste/smell in the early postoperative period (in the first month) was noted in the patients who had nasoseptal flap done for re-construction of the skull base that returned to baseline until 3 months after the surgery, reconstruction with this flap did not lead to a decline in the sinonasal quality of life comparing to the control group. Moreover, the use of patient questionnaire for evaluation of olfaction may not have the same accuracy as the smell identification tests. Although harvesting this flap is quite easy and fast, it needs oto-laryngologist experience with septal surgery to reduce the nasal and olfactory complications [14].

In our study the smell dysfunction (in the form of hyposmia and altered taste) in the flap group occurred in 70% after 3 months and 40% after six months, while in the graft group it reached 60% after three months and 20% after 6 months. The nasal discharge occurred in the flap group in 20% after 3 months and 10% after six months, while in the graft group it reached 50% after three months.
and 30% after six months. Fat free grafts were associated with cacosmia for three to six months in some patients.

Two factors here contributed to the high incidence of smell dysfunction in the flap group, that’s; the resection of the primary tumor involving the anterior skull base and and the possible sacrifice of the olfactory fibers during dissection of the nasoseptal flap.

In a study done by Alobid, Isam et al., in April 2013, they concluded that endoscopic endonasal surgery using vascularized septal flap for reconstruction for skull base defects has a short-term (3 months) negative impact on patient’s olfaction and mucociliary clearance [1]. This is contradictory to our result which showed a higher incidence of smell dysfunction in the flap group but this may be attributed to the extent of tumor resection in those cases as noted before.

The use of a nasoseptal flap in surgery does not affect long term patient quality of life and sinonasal function after endoscopic skull base reconstruction. Pathology is a better predictor of morbidity, with loss of function from radiotherapy or resection of functional areas such as the olfactory apparatus having a greater impact. Short-term impairments of sinonasal related symptoms are predictable and self-limited [6].

Compliance with ethical standards:
Ethical approval:

The study protocol was presented to the committee of research ethics for human subjects and an approval was obtained before the start of the study. All procedures performed in studies were in accordance with the ethical standards of the national research committee. All patients enrolled gave their written informed consent before any surgical procedure.

Funding:
All financial support for this study was provided by Cairo University Hospital.

Conflict of interest:
None.

References


