Transfacial nasal approach to paranasal sinuses, nasopharynx and anterior skull base

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Abstract

There are different surgical approaches to remove lesion involving the large central lesions of nasal cavity, sinus and nasopharynx with anterior skull base and retromaxillary extension depending on the site extent and the type of tumor. In this paper, we are describing a method that is rhinological and is a direct approach for removal of such lesions in 6 patients.

Keywords Lesion · Transfacial approach · Modified de Fries transfacial nasal approach

Introduction

The ability to remove a tumor completely is dependant on the amount of exposure we get to obtain clear surgical margins. This in turn decides tumor clearance or recurrence and thus patient outcome. Thus, the surgical approach has always been an important aspect of the patient outcome both in terms of morbidity and mortality. This is especially true for tumors of nose, paranasal sinuses and nasopharynx. An array of approaches has been illustrated each having its advantages and disadvantages. The important aspects to be considered before selecting an approach for such lesions are listed as per the level of significance.

1. Ability to get clear margins. These includes
 - a) Superior margin when the cribriform plate is involved with extradural anterior skull base involvement.
 - b) Posterolateral margin with spread to pterygo-palatine fossa.

- c) Lateral involvement of orbital contents.
- d) Trans-septal involvement of bilateral sinuses.
2. Ability to control bleeding.
3. Repair of CSF leak or dural defect and prevent brain herniation in case of involvement of anterior skull base.
4. Prevention of injury to adjacent structures like lacrimal system, orbital contents etc.
5. Cosmesis.

Various approaches described for such lesions include Transantral (Denker's) approach, Lateral rhinotomy approach, Translabial (midfacial degloving) approach, Transfacial approach and Craniofacial approach. Each approach has its pros and cons when considered as regard to the tumor site, extent and histology. We describe our experience with transfacial approach first described by de Fries et al [1], which is more suitable for large central lesions with/without bilateral sinus involvement, with/without anterior skull base involvement, with/without retromaxillary extension and review the literature on other approaches for similar lesions.

Surgical Technique

All the cases were operated under general anesthesia. The incision consists of a standard lateral rhinotomy (Moore's) incision on the side of lesion with the superior end of incision continued transversely along the glabellar crease (Fig. 1A). The lip-splitting Weber Ferguson incision (Fig. 1B) is not required unless there is lateral extension into maxilla. The lip splitting incision, if required, is connected with bilateral gingivobuccal incisions and the upper lip is elevated up to pyriform aperture on both sides. Now, the nose flap including the columella and cartilaginous septum is elevated from the anterior spine and maxillary crest after an incision on the mucoperichondrium and mucoperiosteum of the floor. Then the cartilaginous septum is separated from the bony septum. Lateral and transverse osteotomies are performed on both the sides as in rhinoplasty. The entire external nose (including the entire external nasal pyramid)

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Fig. 1 Incisions for the transnasal facial approach: **(a)** Lateral rhinotomy incision with extension to opposite alar crease and transverse globellar incision **(b)** Lip splitting Weber Ferguson incision with transverse globellar incision

Fig. 2 Elevated flaps retracted by two large mastoid retractors enabling panoramic view of nasal cavity from floor of nose to cribriform plate and medial orbital walls on both sides

Fig. 3 Plaster cast applied to keep the bony flap in place

Fig. 4 Pre-operative CT scans

is mobilized and elevated as a vascular flap with an intact pedicle skin and subcutaneous tissue. The elevated flap is retracted by two large mastoid retractors (Fig. 2) giving a panoramic view of nasal cavity with bilateral sinuses, nasopharynx and cribriform plate. If necessary the nasal process of maxilla, medial maxillary wall and posterior maxillary wall can be removed for better exposure of the pterygomaxillary space. Lesion is seen directly and the extent of tumor involvement is assessed. If required en bloc tumor removal from both ethmoids along with the lamina papyracea, entire bony septum, both medial walls of maxillary antrum and the anterior wall of sphenoid sinus can be performed. The benign tumor of nasopharynx, posterior ethmoids, sphenoid and clivus with parasellar and pterygopalatine fossa exten-

sion can be removed. Operative microscope can be used if necessary. Tumor extension into the anterior cranial fossa can be removed as described by Panje et al [2] by additional incisions along the eyebrows from the glabellar incision and elevation of nasofrontal flap as in osteoplastic frontal sinus surgery and drilling the posterior frontal sinus. After en bloc tumor resection of tumor, the nasal flap is repositioned in its original position. The septal mucoperiosteum is sutured at the floor with 4-0 chromic catgut and rest of the skin is closed in two layers. The entire nasal cavity and nasopharynx is packed with gelfoam and ribbon gauze smeared with antibiotic ointment. Plaster cast is applied to keep the bony flap in place (Fig. 3).

Fig. 5 showing post-operative CT scans.

Fig. 6 showing post-operative scar.

Case reports

Six patients were operated by the transfacial nasal approach between 1991 and 1999 at Basavanagudi ENT Care Centre for extensive lesions involving paranasal sinuses and nasopharynx with extensive anterior cranial fossa extradural intracranial extension on pre-operative CT scan (Fig. 4). The age of the patients ranged from 13 years to 55 years. Four of them were males and two were females. The histopathological diagnosis varied from angiofibroma in three of them and giant cell tumor, meningioma and squamous cell carcinoma in one each. The patients with giant cell tumor, meningioma and squamous cell carcinoma had post-operative radiotherapy. The patient with meningioma required additional craniotomy for anterior cranial fossa involvement. The follow up period ranges from 7 years to 15 years. There was no recurrence or mortality during this period. The post-operative CT scan (Fig. 5) revealed healthy cavity without any signs of recurrence. One of the patients had persistent watering from eye on operated side. The post-operative scar was not cosmetically revealing in any of the patients (Fig. 6).

Review of literature

The earliest attempt for tumor removal from nose and paranasal sinus was made by Denker [3, 4] who improved the access of Caldwell Luc procedure in 1926 by resecting the anterior surface of maxilla, pyriform aperture and ascending process of maxilla. It allows resection of lateral nasal wall and local nasal cavity access but is limited by soft tissue of nose and lip. Conley [5] used an extended bilateral sublabial incision with degloving of nose and midface (also known as facial degloving approach) as an approach to the nasal and nasopharyngeal cavities. It has an obvious cosmetic advantage and gives a good exposure to both sides of nose paranasal sinus including nasopharynx but is not direct and involves too many steps to achieve degloving. Retraction of lip and facial skin makes it difficult to expose superior portions of nasal cavity, cribriform plate and the medial orbital walls. Septal translocation along with facial degloving as advocated by Sofferman [6] and Bingham et al [4] improves the access. However, superior exposure is still a problem.

The first external exposure to these cavities is lateral rhinotomy and was described as early as 1902 by Moore

[7]. It gives an excellent exposure of nasal, paranasal and nasopharyngeal cavities [7, 8]. However, it is only useful for unilateral lesions. The facial scar is negligible and acceptable in most of the cases [8]. Bridger [9] extended the incision over nasion and described its use for ethmoidal cancers. DeFries et al [1] popularised this approach and termed it transfacial approach that is highlighted by present authors.

Dandy [2] introduced craniofacial surgery in 1941 for orbital tumors. It was popularized by Ketcham et al [10] who made it an accepted option for nasal sinus apex tumors. It leads to a dramatic increase in survival from 15% to 50%. However, it had a significant associated morbidity and mortality mainly due to osteomyelitis of bone flap and frontal lobe retraction. This led to various modifications in technique leading to two schools of thought. First described by Sundaresan and Shah [11] advocating separate bifrontal craniotomy in conjunction with a separate lateral rhinotomy. Second one is described by Cheeseman et al [12] using minicraniotomy and lateral rhinotomy through a single incision. Both of these techniques had significant osteomyelitis of bone flap due to improper vascularity. Panje et al [2] developed transfacial intracranial approach via a “swinging” nasofrontal bone flap for simultaneous neurosurgical and otolaryngological en bloc removal of anterior skull base tumors.

Conclusion

The Modified de Fries transfacial nasal approach provided a wide exposure for total removal of extensive benign lesions of nose, paranasal sinus and nasopharynx with extension into the parasellar and the pterygopalatine fossa and for debulking of extensive malignant lesion prior to radiotherapy and chemotherapy. It provides a panoramic view of entire nasal cavity from nasal sine to nasopharynx and from cribriform plate to nasal floor and thus helps preserve and protect vital structures such as the eyes and the brain. Most of the other

methods except craniofacial resection provides limited exposure in spite of forcible retraction and is cause for high recurrence rates and CSF leaks and blindness. Craniofacial resection though as effective has high morbidity and mortality.

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