The role of maxillofacial surgeon in the management of skull base tumors

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Abstract

The complexity of tumors extending to the skull base compartments is technically demanding for maximum visualization, control of the vital structures, adequate tumor resection and/or reconstruction. Management of such widely extending tumors requires a team approach and close co-operation between the neurosurgeon, maxillofacial surgeon, oto-rhino-laryngologist and ophthalmic surgeon. This article emphasizes on the role of maxillofacial surgeon in the surgical planning of such extensively involving tumors via facial translocation.

Introduction

Access to the skull base and its related structures were possible as a result of severe and sustained brain retraction, which invariably lead to increased postoperative neurovascular complications such as brain contusions, intracranial hemorrhage and neurovascular damage[1,2]. It is a measure of success that many of these obstacles have been overcome by means of novel applications of operative techniques. It is true to say that there are no areas of the brain's surface that are denied surgical access[1]. This is made possible only with a close co-operation between the neurosurgeon, maxillofacial surgeon, oto-rhino-laryngologist and ophthalmic surgeon. The role of a maxillofacial surgeon in the surgical planning of such extensively involving tumors is through facial translocation. The facial translocation has been developed as a new approach to access the skull base. It consists of extensive modular facial disassembly which includes displacement of composite facial soft tissue flap and craniofacial skeleton. It creates surgical field with epicenter in nasopharynx and infratemporal fossa allowing easy expansion into sphenoid bone and cranial fossae as well as craniovertebral junction[2]. Reconstruction is functional and esthetic. Versatility of this approach permits expansion into neighboring craniofacial regions with minimal brain retraction[2-3].

Principles of facial translocation

The design and placement of the flap should be esthetic and functionally acceptable that best serves the interests of the patient. The basic principle of facial translocation is simplicity of the flap design. Even in complex skull base surgery, logical and procedural steps are important. The second principle is adequate exposure for a good visualization to allow its complete removal and preservation. The third principle is anatomic integrity of the tissues during surgical dissection. According to Janecka I.P the anatomic structures are considered modular as most organs are composed of anatomic and functional components, a terminal pedicle of blood and nerve supply and distinct relation to tissues that lies superficially, deep and to each fascia[2-4]. The fourth principle is esthetic and functionally acceptable choice of approach.

The anatomical considerations of facial translocation include the following: a) Facial anatomy has developed through the embryonic fusion of fronto-nasal, maxillary and mandibular process. Normally the fusion takes place in the midline or in the paramedian region. These lines of fusion present minimally traumatic lines of surgical separation of facial units, b) the primary blood supply is via the external carotid, which has lateral-to-medial direction of flow. Division of tissues in the midline involves distal rather than proximal blood supply with less ischemic risk to the displaced tissues, c) the midface contains multiple hollow anatomic spaces like the oral and nasal cavities, nasopharynx, para-nasal sinuses that facilitate surgical access to the central skull base[5].

The factors affecting the choice of approach are: a) location and extent of the tumor, b) protection of key anatomic structure, c) preservation of visceral functions and speech, d) maintenance or reestablishment of the stability of the craniovertebral junction, e) achieving the best possible cosmetic result.

The disadvantages of facial translocation are: a) traverse of the nose and mouth contaminate the surgical wound with oropharyngeal bacterial flora, b) prolong postoperative endotracheal intubation and temporary tracheostomy may be required, c) postoperative complications like surgical scaring, vestibular stenosis, retraction of the columella, collapse of the nasal tip, necrosis of the flap and rarely facial disfigurement[7].

Case Reports

Case 1: A 35 year old female suffering from minor salivary gland tumor involving anterior cranial base, nasopharynx, para-pharyngeal space, infratemporal fossa and posterior choana reported to our department

(Fig. 1). Her chief complaint was nasal obstruction and difficulty in swallowing. To access such extensive tumor, a lefort I osteotomy with mid palatal split along with zygomatic swing osteotomy pedicled with cheek flap was carried out (Fig. 2). Excellent access was obtained and the lesion was excised in toto. Post-operatively a favorable esthetic outcome was achieved (Fig. 3).

Case 2: A 42 year old male came with the complaint of swelling in his right cheek and difficulty in breathing through his nostrils. The previous MRI study showed a tumor involving bilaterally all the paranasal air sinuses extending up to the anterior skull base. The patient gave history of previous surgery where an attempt to excise the tumor via transantral approach through the right maxillary sinus was done. Failing to remove the tumor in toto the present MRI study shows cystic outward growth via the transantral opening causing a swelling on his right cheek, bony erosion of the orbital floor and medial orbital wall compressing the lacrimal duct leading to epiphora (Fig. 4). Sensation in the cheek is not affected as the infraorbital nerve was not involved. An extended naso-maxillary-cheek flap was raised along with medial maxillotomy on the contralateral side. An osteotomy was performed at the fronto-nasal junction to access the frontal sinuses (Fig. 5). Complete access was obtained and the tumor was excised in toto.

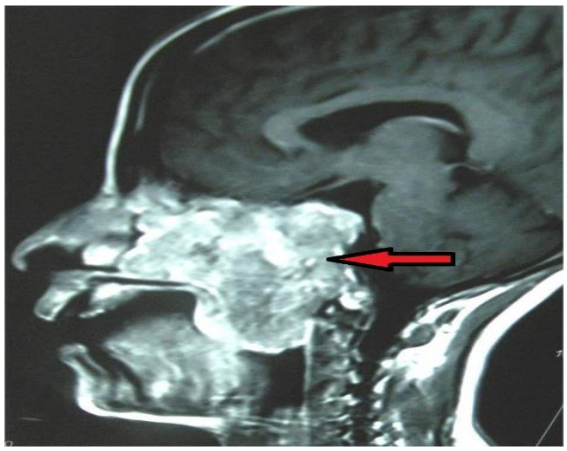

Fig. 1: CT showing tumor from the minor salivary gland involving anterior cranial base, nasopharynx, para-pharyngeal space, infratemporal fossa and posterior choana

Fig. 2: Lefort I osteotomy with mid palatal split along with zygomatic swing osteotomy pedicled with cheek flap access osteotomy

Fig. 3: Post-operative outcome

Fig. 4: Pre-operative picture show swelling in his right cheek

Fig. 5: Access was obtained by extended naso-maxillary-cheek flap along with medial maxillotomy on the contralateral side. An osteotomy was performed at the fronto-nasal junction to access the frontal sinuses

Discussion

Skull base surgery has become into a subspecialty encompassing multiple specialties namely neurosurgery, maxillofacial surgery, otolaryngology and plastic surgery. Detailed knowledge of the microneuroanatomy of the skull base enables the surgeon to make more aggressive surgical approaches. The most important goal in skull base surgery is minimizing retraction of the brain tissue, since excessive retraction may lead to cerebral contusion, intracerebral hemorrhage, and neuronal damage. Lesions involving the anterolateral portion of the middle cranial fossa, orbit and those with significant extension into the pterygoid fossa cannot be approached adequately by either routine neurosurgical or otosurgical approaches. Extensive operative displacement of tissues alters the anatomy and physiology of affected structures[5]. Such changes have different consequences for the neural and the facio - viscerocranium. Post surgical facial edema is self limiting but retraction induced brain edema however may be deleterious[4-6]. In such cases a facial translocation technique is indicated.

A team approach is more effective in the treatment planning of such cases. The role of a maxillofacial surgeon in such cases is to provide the neurosurgeon a good access via the transfacial approach for more efficient and cosmetic outcomes.

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