Midfacial Degloving Surgical Approach : Experience at Siriraj Hospital

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Abstract

Midfacial degloving surgical approach is an excellent alternative to the lateral rhinotomy in exposure to the nasal cavity, paranasal sinuses and the nasopharynx. By lifting the soft tissue from the midportion of the face, many extensive benign tumors such as inverted papilloma, nasopharyngeal angiofibroma and some limited malignant lesions could be safely removed. This procedure could be combined with other approaches such as transtemporal, intracranial approach to resect more extensive tumors around the orbit, central skull base, as well.

This technique was applied in 40 cases, ranging from 12-72 years of age and in a variety of diseases in Siriraj Hospital from 1991 to 2000. Fifty five per cent were diagnosed as inverted papilloma and 20 per cent were nasopharyngeal angiofibroma. The surgical technique in this operation was emphasized and it has proved to be an extensively valuable procedure for wide exposure of the operative field without any external scar. Functional outcome was obtained in most of the cases with minimal complications.

Key word : Midfacial Degloving Approach, Surgical Technique, Inverted Papilloma, Nasopharyngeal Angiofibroma, Complications

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The midfacial degloving surgical approach (MFD) is a procedure that combines a bilateral sublabial incision with the rhinoplastic incision to expose midfacial structures including nasal cavities, paranasal sinuses, zygomas, orbital floors and the nasopharynx. It is an approach that combines facial plastic skill with oncologic expertise. In fact, there are several ways to reach midfacial regions: transfacial, transnasal and

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transoral approaches. Lateral rhinotomy, which was first described by Moer in 1902, is an example of transfacial approach and this operation has remained popular until now. In the year 1906, Denker extended the sublabial incision in Caldwell Luc operation (transoral approach) to the frenum that allowed access to the nasal cavity and maxillary sinus simultaneously and he resected part of the lateral nasal wall[1-3]. It was Portmann and Retrouvey in 1927 who were the first to perform transoral radical maxillectomy for the treatment of malignancy[3-5], and William, in 1957, applied rhinoplastic incision (transnasal approach) in association with external facial skin incision to remove a sinonasal tumor[5].

Until the 1970s, a number of surgeons lead by Maniglia (1971), Casson (1974), Conley and Price (1979), Allen and Siegel (1981) and Price (1986) described MFD[2,3,5-7]. Initially, this surgical approach was utilized only to access some benign and small locally invasive malignant tumors confined to the nasal cavity and paranasal sinuses. Since then, many otolaryngologists have applied this operation to treat other conditions besides tumors such as bilateral Lefort fractures, penetrating midface injury, orbital hypertelorism, craniofacial dysostoses, septal perforation and hereditary hemorrhagic telangiectasia[4,7-9]. Recently, this operation has been extended to combine with other approaches such as intracranial or transtemporal approach to access the central skull base, orbit and infratemporal fossa regions for extensive tumor removal[3,6,10].

It was the purpose of this study to share the authors' experience with this surgical technique to highlight the usefulness of this approach and encourage its use among otolaryngologists and finally to emphasize the problems and complications that might be encountered with this surgical procedure.

MATERIAL AND METHOD

MFD has been performed in Siriraj Hospital, Mahidol University since 1991. All patients who underwent this operation with a considerable range of pathological conditions both neoplastic and non-neoplastic in the nose, paranasal sinuses and the nasopharynx from 1991 to 2000 were reviewed. Technical problems and post-operative complications were analyzed. There was a total of 40 cases in the present study. Thirty were male and ten were female. The age range was from 12 to 72 years old, with an overall mean age of 38.1 years.

Under general anesthesia, patients were placed in the supine reverse Trendelenberg position and the orotracheal tube was fixed to the center of the mouth. The oropharynx and hypopharyx were packed with gauze and both nasal cavities were decongested with 1 per cent ephredrine solution. Temporary tarsorrhaphy was also performed in order to protect the cornea during surgery. Then, 1 per cent xylocaine with 1 : 100,000 epinephrine solution was infiltrated to the nasal septum, intercartilagenous region, the floor of the nose and gingivobuccal sulcus to reduce bleeding. The operation was started with a wide sublabial incision above the upper first molar region from one side to another and deepened down to the bone (Fig. 1). By extending this incision posterolaterally to reach both maxillary tuberosities, the internal maxillary artery could also be ligated without entering the antrum. The mucoperiosteum were then elevated from both anterior maxillary walls up to the inferior orbital rims and margins of the nasal pyramid by periosteal elevator (Fig. 2). Care should be taken not to injure the infraorbital nerves during elevation near the infraorbital foramens. At this stage, a routine rhinoplastic incision was made in each limen nasi and collumella. Intercartilagenous incision (Fig. 3) would give access to the soft tissue over the dorsum of nose and the nasal framework was then skelatonized with scissors. The incision was then extended medially into total transfixion or septocolumellar incision (Fig. 4) along the dorsal and caudal border of septal cartilage separating it from the medial crura of lower lateral cartilages and

Fig. 1. A sublabial incision which extends from the first upper molar from one side to the other.

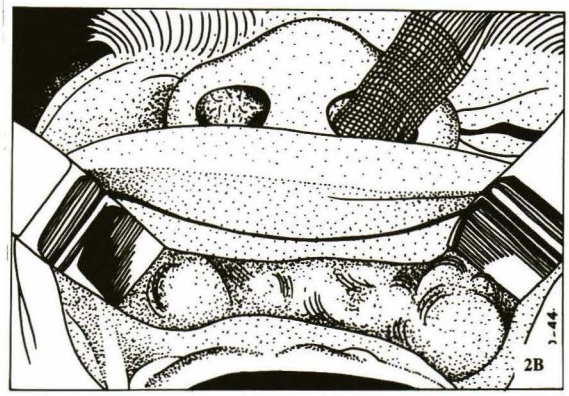

Fig. 2. The mucoperiosteum is elevated with a periosteal elevator from both anterior maxillary walls up to the inferior orbital rims and nasal pyramid margins.

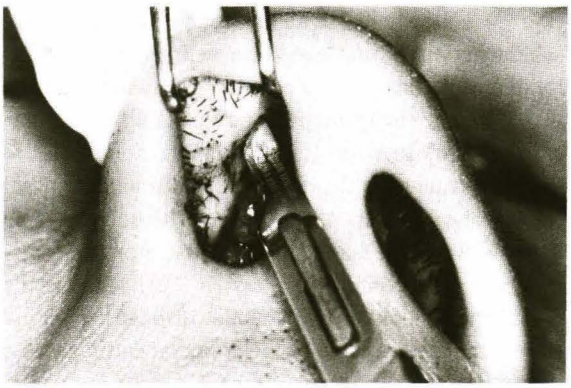

Fig. 3. An intercartilagenous incision is made between the upper and lower lateral cartilages.

Fig. 4. A total transfixion or septocolumellar incision is carried down between the dorsal and caudal borders of the septal cartilage and medial crura of the lower lateral cartilages.

it was further continued across the floor of the nose (as piriform aperture incision) on each side to join the intercartilagenous incisions laterally and finally forming a complete circumvestibular incision. The piriform aperture incisions were then connected to the previous sublabial incision. Usually, the soft tissue attached to the edges of the piriform aperture at the lateral nasal wall had to be cut to connect the skelatonized nose with the anterior maxillary area bilaterally and the midfacial flap including the lower lateral cartilages and the columella was degloved upward to the glabella, infraorbital rim and the zygomatic level by either two big Penrose rubber drains inserted from the nostrils through the sublabial incision superiorly (Fig. 5) or by Layla self-retraining brain retractor[11]. The Penrose drains should be fixed by using two heavy arterial clamps to the head drapes and be released every 15-20 minutes to improve flap circulation. At this point, the periorbita could be retracted further upward allowing for exploration of the orbital floor

Fig. 5. Two penrose drains are inserted from each nostril through the sublabial incision and retracted upward.

and the zygoma by extending the periosteal elevation laterally. In order to gain adequate intranasal exposure for tumor removal, medial maxillectomy and/or ethmoidectomy should be performed. This may also be combined with nasal bone osteotomy or inferior orbital rim resection depending on tumor extent. Removing the posterior wall of the maxillary sinus to disclose the pterygomaxillary space and gain full access to the nasopharynx required removal of both the posterior wall of maxillary antrum and the ascending process of the palatine bone[4-6]. After en bloc resection, the cavity was usually packed with antibiotic vasaline gauze. At the termination of surgery, the nasal structures were reapplied to the edge of the piriform aperture by suturing the nasal lining to the mucoperiosteal lining. Chromic 3-0 was usually placed at the columella base to the midline soft tissue before the sublabial incision was approximated. Intranasal incisions were meticulously sutured with nylon 5-0 to minimize post-operative vestibular stenosis or fistula. Finally, the dorsum of the nose was taped with micropore tape or Aquaplast splint to reduce post-operative edema and hematoma. For procedures involving the nasopharynx and pterygomaxillary space, if perfect hemostasis could not be obtained, posterior nasal packing was always applied. Removal of packing was usually started on the third post-operative day and completed on the fifth day.

RESULTS

Table 1 outlines the 40 cases who underwent the midfacial degloving approach for a wide range of indications.

Inverted papilloma is a benign tumor found in the nasal cavity and paranasal sinuses. This tumor needs wide excision because of its tendency to recur frequently and progress to malignancy. In the present study, the large number of inverted papilloma cases accounted for the male preponderance (15 : 7) and the age range was 22 to 68 years with the mean age of 44.9 years. All selected cases had tumors confined to both the nasal cavity and maxillary or ethmoid sinuses.

The most frequent benign tumor of the nasopharynx is the juvenile nasopharyngeal angiofibroma. This tumor is composed of both vascular and fibrous tissue. All selected cases for MFD in the present study had tumors extending to both nasopharyngeal and nasal cavities. All of them were adolescent males with an age range from 12 to 25 years and a mean age of 17.2 years.

For fibro-osseous disease, three had fibrous dysplasia and the operation was applied in order to remodel the maxilla shape, whereas one had an ossifying fibroma (Fig. 6). The mean age of this group was 18.5 years and the age range was 13-24 years. Small nasopharyngeal tumors were also operated on in 3 cases. All of them were non-squamous cell carcinoma. One had an adenoid cystic carcinoma in his nasopharynx; one had a pleomorphic adenoma and the last had a paraganglioma that extended from the Eustachian tube opening.

MFD was also applied to other diseases in the present study such as a cavernous hemangioma in the nasal cavity; hemangiopericytoma of the nasal septum and rhinosporidiosis in the nasopharynx. It should be noted that 37.5 per cent (15/40) of the present cases received a variety of other surgical approaches ranging from intranasal, Caldwell- Luc, transpalatal and lateral rhinotomy surgery before this procedure and revision MFD itself did not add any technical difficulties. During the operation, none of the presented cases was converted to lateral rhinotomy or other approaches.

The results of surgery in the present study were satisfactory. There was no death or major complication after operation. However, minimal sequalae

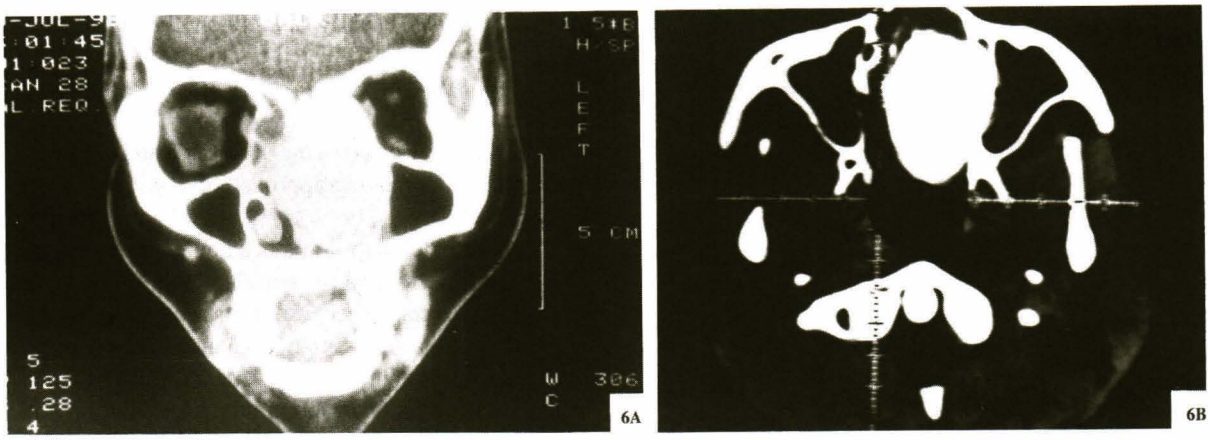

Fig. 6. Ossifying fibroma.

Table 1. Pathology treated with MFD.

Diseases	Cases	%
Inverted papilloma	22	55
Angiofibroma	8	20
Fibro-osseous disease	4	10
Nasopharyngeal tumor	3	7.5
Miscellaneous	3	7.5
Total	40	100

was found in 5 cases. (12.5%) Two had nasal synechia and one had septal perforation. One case of nasolacrimal duct obstruction and another case of nasal ala widening were also observed.

DISCUSSION

Surgical access to the midface structures for the removal of both benign and malignant lesions remains difficult and sometimes inadequate[6]. Previously there were four surgical alternative approaches to the nasal cavity, paranasal sinus and the nasopharynx such as the transantral approach; transpalatal approach, trans-sublabial approach and lateral rhinotomy approach[1,5]. Each approach was found to have its own advantages and disadvantages. Limited exposure especially with tumors beyond the confines of this region or a malignant condition is the major problem for the first three approaches[1,5]. Lateral rhinotomy that has been used for almost 100 years is an excellent and adequate approach for the midface region but it places a thoroughly visible scar on the face that is troublesome to young patients and women [2]. It is also limited due to its unilaterally[2,5].

Midfacial degloving surgical approach is a combination of sublabial and rhinoplastic incisions to expose bilateral zygomas, orbits, maxillas, pterygopalatine fossae and the nasal cavities. By performing medial maxillectomy and ethmoidectomy, one could access superiorly to the cribiform plate, anterior cranial fossa, floor of frontal sinus and inferomedial part of the orbital apex; posteriorly to the pterygomaxillary fossa, infratemporal fossa, posterior wall of sphenoid sinus, clivus and the nasopharynx; laterally to both mandibular coronoid processes and inferiorly to oral cavity[3,6,10]. The surgery could be performed simultaneously for large and multiple tumors on both sides and leave no visible facial scar post-operatively[2,3,5-7]. For its wide exposure, instruments access to reach the posterior aspect is possible, hemostasis could be achieved under vision and internal maxillary artery could be controlled to reduce operative bleeding. Actually, palatal dysfunction and oronasal fistula could also be prevented[6,9].

Candidates for this procedure are first focused on tumors mainly in the nasal cavity, paranasal sinus and the nasopharynx. Most large and multiple benign sinonasal tumors, such as inverted papilloma, nasopharyngeal angiofibroma, hemangioma, hemangiopericytoma, fibroma, schwannoma, pleomorphic adenoma, chondroma, nasal glioma, and chordoma; and certain limited low grade malignancies such as chondrosarcoma of the nasal septum, mucoepidermoid carci-

noma, acinic cell carcinoma, malignant melanoma, esthesioneuroblastoma and small squamous cell carcinoma, have been mentioned in the literature for their successful removal *via* this approach[1,3,4,6,7,9,12-15]. This should be the operation of choice for patients who resist the necessary operation because of concern of a visible facial scar especially in adolescents, children, keloid former and being a public figure, [1,2,6]. In the present study, most of the cases had benign lesions, such as inverted papilloma and nasopharyngeal angiofibroma etc. There was only one case of adenoid cystic carcinoma performed by this procedure and it was confined to the nasopharynx.

Inverted papilloma is an ideal benign lesion that has an insidious and aggressive clinical course [2,16-20]. Partial removal of this tumor should be discouraged. Previously, the favorable procedure for this tumor was lateral rhinotomy. MFD provides an unlimited exposure to the piriform aperture and the anterior maxillary wall when compared to lateral rhinotomy or Weber Ferguson incision. Lateral rhinotomy could be associated with upward contraction of the alar margin and the Weber Ferguson incision may give rise to upper lip and nasomaxillary groove asymmetry, medial canthal deformity and lower lid edema[3]. En bloc dissection of the lateral nasal wall in MFD could be accomplished by performing medial maxillectomy. This procedure could extend to include sphenoethmoidectomy or partial resection of the medial orbital wall as the extent of disease dictated [2,6]. Lesions involving the cribiform plate should be removed by a combined frontal craniotomy and midfacial degloving approach[6]. The MFD procedure might be combined with a frontal sinus osteoplastic flap in cases of extensive pathology involving the frontal sinus. It is the authors opinion that most cases of lateral rhinotomy are suitable and could be managed more expeditiously with MFD.

Juvenile nasopharyngeal angiofibroma is another benign vascular tumor that occurs exclusively in young adults. It usually presents with unilateral nasal obstruction and recurrent massive epistaxis. Adequate surgical removal is the treatment of choice for this pathology. For tumors limited to the nasopharynx, the transpalatal approach is considered optimal but for those extending beyond the nasopharynx into the nasal cavity and/or paranasal sinuses, transfacial approach or a combined transfacial with transpalatal approaches should be accomplished. In the present study, most patients were under 20 and had extensive tumors in the nasal cavity and paranasal sinuses. MFD certainly provides adequate exposure once the lateral nasal wall has been removed or swung laterally and the internal maxillary artery could also be ready for ligation in case of uncontrolled bleeding by this approach[3,6]. Intracranial extension for this vascular tumor has been reported in 10-20 per cent of cases[21]. A combined intracranial with extracranial surgical approach makes a previously unresectable tumor potentially removable. Intracranial exploration defines the margin of the tumor and only the tumor portion that could be safely removed without loosing control of major feeding vessels are resected. This procedure is then followed by the extracranial MFD approach to remove the neoplasm in continuity[3,6,21].

Fibro-osseous disorder of the facial bone is another disease that could be excised *via* the MFD approach. The disease has a high recurrence rate and needs multiple surgeries. Under adequate exposure, resecting and contouring the diseased bone could be achieved to the level of cosmetic acceptance and obstruction relief.

As mentioned before, this procedure could be applied for other than tumor removal in other conditions such as midface fractures, craniofacial dysostoses, septal perforation and orbital hypertelorism. After the degloving part of the procedure is complete, reduction and plating for extensive midfacial trauma such as bilateral Lefort fractures or exploration for severe penetrating facial injury could be obtained. Good exposure to the alveolar ridge, maxillary bone, orbital rims and the nasal bone could be simultaneously achieved by this step[7]. Without performing medial maxillectomy, exposure is considered adequate for the repair of septal perforation [9]. Recently, MFD was also modified by the use of septal transection and bilateral nasal osteotomies to improve more exposure to some selected cases[22].

This procedure has been reported to have no major complications[1,2]. Post-operative epistaxis, moderate nasal crusting, infraorbital numbness, nasolacrimal duct obstruction and vestibular stenosis are considered minor sequelae mentioned by many authors [1-3,5-7]. Others have indicated alar base widening, nasal tip rotation, collagen deposition of the nasal dorsum and oroantral fistula as disadvantages for this operation[6]. Actually, post-operative epistaxis is the result of extensive resection and improper nasal packing[1]. Moderate nasal crusting is also the result of extensive resection and it could be diminished by post-operative normal saline solution irrigation and cleaning periodically[6]. However, a few cases of

atrophic rhinitis after the operation have been reported in the literature[1,6]. Infraorbital numbness and paresthesia are other complaints reported post MFD but this phenomenon is only a transient effect after nerve retraction[6,7]. Nasolacrimal duct obstruction (epiphora) usually occurs during lateral nasal wall resection. The nasolacrimal duct should be sharply cut with scalpel at a level 1cm below the orbital floor to prevent this drawback and no stent is required after the duct transection. In case the duct is found to be too narrow, the eversion maneuver should be considered[6,7].

Vestibular stenosis was initially reported by many authors[2,5,6]. This could be coped with by careful placing of the bipedicle incision at the lateral nasal mucosa just beyond the anterior piriform aperture and leaving this anterior strip of nasal mucosa for closure after medial maxillectomy (bone and mucosa cut)[2,3,7]. In order to prevent post-operative alar base widening, a deep stitch of 3-0 chromic catgut should be placed to pull the lateral crura of the lower lateral cartilage to the soft tissue in the medial sublabial incision region. Usually before closure, a transfixion suture should be carefully placed to reposition the nasal tip properly and the base of the columella should be sutured to the midline soft tissue with good approximation of the frenum[6]. This technique could diminish the upward rotation of the nasal tip. Deformity of the nose might occur following extensive removal of the ascending process of the maxilla. However, no facial growth disturbance has been reported in infants or young adults after MFD[6].

In the present study, two patients developed post-operative nasal synechia that was the result of early post-operative packing removal and poor follow-up and both of them had synechia lysis thereafter. One patient developed post-operative epiphora and this was corrected by an ophthalmologist. The other had widening of the alar base and small nasal septal perforation but neither was concerned about their symptoms.

SUMMARY

The midfacial degloving operation is an excellent procedure in approaching paranasal sinuses, nasal cavity and the nasopharynx without leaving any unsightly facial surgical scar. It gives good access for tumors in the midfacial region. However, for tumors extending close to the cribiform plate, fovea ethmoidalis or the orbit, additional approaches should be combined. It is considered a safe operation and can be used as an alternative to lateral rhinotomy with fewer surgical complications.

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การผ่าตัดวิธี Midfacial degloving approach : ประสบการณ์ที่โรงพยาบาลศิริราช

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Midfacial degloving approach เป็นการผ่าตัดอีกวิธีหนึ่งในการเข้าถึงส่วนของโพรงจมูก โพรงไซนัสและลำคอหลังโพรงจมูก ได้อย่างมีประสิทธิภาพนอกเหนือจากวิธีดั้งเดิมคือ lateral rhinotomy approach แพทย์หู คอ จมูก สามารถทำการผ่าตัดเนื้องอกชนิดต่าง ๆ เช่น inverted papilloma, nasopharyngeal angiofibroma และมะเร็งบางชนิดในบริเวณนี้ได้โดยทำการยกผิวหนังและเนื้อเยื่อบริเวณใบหน้าส่วนกลางขึ้นเท่านั้น นอกเหนือจากนี้ วิธีการผ่าตัดดังกล่าวยังสามารถใช้ร่วมกับการผ่าตัดวิธีอื่น เช่น transtemporal และ intracranial approach เพื่อทำการตัดก้อนเนื้องอกที่มีขนาดใหญ่ที่ฐานกะโหลก และกระบอกตาได้อีกด้วย

ในช่วงปี พ.ศ. 2534 ถึง 2543 คณะผู้วิจัยได้ทำการผ่าตัดเนื้องอกชนิดต่าง ๆ ด้วยวิธี Midfacial degloving approach ในผู้ป่วยจำนวน 40 ราย อายุตั้งแต่ 12 ถึง 72 ปี ที่ภาควิชาโสต นาสิก ลาริงซ์วิทยา คณะแพทยศาสตร์ศิริราชพยาบาล พบว่าวิธีการผ่าตัดดังกล่าวสามารถตัดเนื้องอกในบริเวณจมูก โพรงไซนัส และลำคอหลังโพรงจมูกได้ผลดี โดยไม่มีรอยแผลบนใบหน้า ไม่ทำให้เสียหน้าที่ของอวัยวะหลังผ่าตัด และพบภาวะแทรกซ้อนหลังผ่าตัดน้อย สำหรับรายละเอียด เทคนิคการผ่าตัด จะได้นำเสนอต่อไป

คำสำคัญ : การผ่าตัด Midfacial degloving, เทคนิคการผ่าตัด, เนื้องอก inverted papilloma, nasopharyngeal angiofibroma ภาวะแทรกซ้อน

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