Canine fossa approaches in endoscopic sinus surgery – our experience

V. Anand · S. Santosh · A. Aishwarya

Abstract

Objective To define the role of canine fossa approach when standard endoscopic endonasal sinus surgery technique fails.

Study design Retrospective review of all endoscopic sinus surgeries performed from 1992 to 2007.

Result Out of 1612 endoscopic sinus surgeries for various indications, CFA was used in 80 patients (4.96%) and among this 15 had bilateral procedure. The various diseases which required CFA were allergic fungal sinusitis (AFS), Fungal ball, Chronic invasive aspergillosis, antrochoanal polyp, inflammatory polyp, Mucocoele and Maxillary cyst, inverted papilloma and Juvenile Nasopharyngeal Angiofibroma (JNA). Eight patients had minor complications (cheek swelling – 6, facial pain – 2) which resolved in 5 days.

Conclusion Canine fossa approach offers an ancillary approach to failed standard endoscopic endonasal technique thereby avoiding other more invasive procedures.

Keywords CFA – canine fossa approach · FESS – Functional Endoscopic Sinus Surgery · CRS – Chronic rhinosinusitis · ACP – Antrochoanal Polyp · IP – Inverted papilloma · JNA – Juvenile Nasopharyngeal Angiofibroma

Introduction

Functional Endoscopic Sinus Surgery (FESS) has become the standard surgical intervention for patients with chronic sinusitis refractory to medical therapy. It is aimed at restoring normal sinus mucosal physiology [1]. Mini FESS is more functional than standard technique and addresses narrow transitional spaces and reestablishing drainage through natural ostia [2]. The application of Endoscopic Sinus Surgery has been extended from inflammatory to non-inflammatory sinus disorder and is also used to approach skull base, pituitary, orbit, pterygopalatine and infratemporal fossa [3, 4]. The principle of surgery is to completely extirpate the disease with preservation of healthy sinus tissue and to restore ventilation and drainage of all sinuses. The standard endoscopic endonasal technique fails to achieve these in difficult situations. In such cases, ancillary approaches are made for better visualization and instrumentation. Hence this combined approach Endoscopic Sinus Surgery (ESS) avoids traditional radical procedure. We present our experience for various indications.

Materials and methods

We reviewed all Endoscopic Sinus Surgery (ESS) performed at our hospital from January 1992 to December 2006 retrospectively. A total of 1612 endoscopic sinus surgeries were performed during this period. Of this, combined approach endoscopic sinus surgery was performed when there was difficulty in visualization and clearance of disease. For maxillary sinus Canine Fossa Approach (CFA) was used in which 5mm trocar and cannula was used. Anterior wall of maxillary sinus was perforated at the lateral aspect of canine fossa just above the root of canine and premolar (Fig. 1). A 70° endoscope was used to visualize through the middle meatal antrostomy and straight blade microdebrider was passed through the cannula (Fig. 2). CFA was used in 80 patients (4.96%) patients and among this 15 had bilateral procedure. The various diseases which

V. Anand · S. Santosh · A. Aishwarya
MCV Memorial ENT Trust Hospital,
Pollachi, India

V. Anand (✉)
email: entanand@md2.vsnl.net.in

Fig. 1 Canine fossa puncturing – cannula in place

Fig. 2 Microdebrider through cannula and 70 degree endoscope used for endo nasal view

required CFA were allergic fungal sinusitis (AFS), Fungal ball, Chronic invasive aspergillosis, antro choanal polyp, inflammatory polyp, Mucocoele and Maxillary cyst, inverted papilloma and Juvenile Nasopharyngeal Angiofibroma (JNA). Two cases of failed MMA required CFA to identify maxillary sinus ostium. One out of five hallers cells require additional CFA (Table 1). Among the 80 CFA procedure eight had minor complications (cheek swelling – 6, facial pain – 2) which resolved in 5 days. Most of the patients had pain tingling in relation to the incisors canine on the side of CFA. However this was temporary and disappeared within 6 weeks. Persistent symptoms were treated with carbamazepine for 2–3 months following which symptoms resolved.

Results

Chronic rhinosinusitis, allergic nasal polyp and AFS

All the patients were managed by preoperative steroid and endoscopic sinus surgery. Among 1142 patients of Chronic

Fig. 3 Microdebrider inside the maxillary sinus viewed using 70 degree endoscope

Rhinosinusitis 21 required combined approach ESS (1.83%). Among these eight had bilateral CFA and one had associated oro antral fistula. The antral side of fistula was better visualized by CFA and tract curetted.

Among 245 patients of allergic nasal polyp, 20 (8.16%) required CFA to remove the disease completely from maxillary sinus. Disease from the lateral wall and floor of maxillary sinus is better accessed by CFA compared with the transnasal route.

Among 109 AFS patients 26 (23.85%) required combined approach ESS. Disease in the ethmoid and sphenoid was approached by endonasal approach. Twenty patients required CFA. The allergic mucin in recesses alveolaris and recess zygomaticus were better cleared after CFA. Seven patients required bilateral procedure. CFA was also useful in placement of catheters inside maxillary sinus for postoperative irrigations.

Antro choanal Polyp (ACP)

A 51 cases of ACP were treated by endoscopic approach. In Thirty four cases polyp was completely removed by standard technique. Seven patients (13.73%) required CFA as adjunctive procedure. The age range was 9–50 yrs in CFA group. Polyps were completely excised along with their pedicle. (Fig. 4) There was no recurrence in any of these patients. However, CFA was avoided in children with unerupted teeth.

MISC

Eight cases of maxillary cyst located in lateral wall of maxillary sinus were removed by CFA.

Aspergilloma

Five cases of chronic aspergilloma of maxillary sinus were operated by endoscopic middle meatal antrostomy. One

case required complementary CFA. No recurrences were noted.

Inverted papilloma (IP)

Eleven patients of IP were treated by endoscopic approach. A standard sphenoethmoidectomy and wide middle meatal antrostomy was done. Tumour was debulked and the pedicle of tumour was excised along with wide margins of normal mucosa. Five cases required adjunctive CFA. Among the 11 patients two had recurrence one of them a 67-year-male had recurrence after four years, where we found that the tumor was coming out of the previous CFA (Fig. 5). However in this patient the biopsy of the recurrent tumor was Squamous cell carcinoma.

Juvenile Nasopharyngeal Angiofibroma (JNA)

Two cases of JNA were managed exclusively by endoscopic technique by combined approach. Endoscopic ethmoidectomy and wide middle meatal antrostomy was done. Posterior wall of maxillary sinus was removed to expose the tumor in pterygopalatine fossa. CFA made visualization and instrumentation easy. Simultaneously we were able to use a Radiofrequency probe via CFA and suction instrumentation via nose. Internal maxillary artery was dissected and cauterized and tumor excised in toto.

Discussion

Combined Endoscopic Sinus Surgery has been reported for maxillary sinus, frontal sinus, pterygoid region, lateral sphenoid sinus and retro bulbar orbit [5, 6, 7]. We had difficulties in visualization and instrumentation in maxillary sinus, frontal sinus and pterygopalatine fossa. The standard endoscopic technique to maxillary sinus is middle meatal antrostomy (MMA). The inferior, lateral, and anterior wall, recessus zygomaticus and recessus alveolaris and recessus prelacrimalis of maxillary sinus are difficult to approach. The additional approach to maxillary sinus are inferior meatal antrostomy, sub labial Caldwell luc, canine fossa puncture and medial maxillectomy [8–10]. Among these endoscopic MMA and CFA offers better visualization and instrumentation and is simple and more functional. Endoscope and instrument can be used in both ways. Polyp, pus and fungal debris needs complete removal which is achieved with minimal morbidity in CFA. The landmarks in canine approach are 1) mid pupillary line and horizontal line running along the lower border of nasal ala. 2) Lateral aspect of canine fossa high above the 3rd and 4th teeth (canine and premolar), infero lateral to infra orbital foramen. The trocar should be aimed towards the maxillo ethmoid angle. By this approach instrumentation is possible in inferior, lateral and with some difficulty in anterior wall of maxillary sinus. The antral side of oro antral fistula is better visualized and curet-

ted by the CFA. Inferior meatal antrostomy is indicated as dependent drainage in mucociliary disorders. Medial maxillectomy and sublabial Caldwell-Luc approach cause mucosal damage and are indicated in more radical procedures. Pterygopalatine fossa can be approached endoscopically by middle meatal transpalatine approach, middle metal trans-antral approach and inferior turbinectomy [11]. We found combined middle meatal antrostomy and CFA simpler.

The complications of combined approach in maxillary sinus are cheek swelling, facial pain, facial numbness, cheek pain, dental numbness, gingival complications and facial tingling. Most of these complications resolve within the first month of surgery [12]. In our series one case with inverted papilloma had a malignant transformation and it had extended into the soft tissue of cheek via the CFA induced bony defect. However this would have happened in any other type of sub labial approach.

Even though CRS, nasal polyp and AFS are different disease entities they have common features of chronic inflammation of sinus mucosa. Preoperative steroids are used to reduce the inflammation. The principles of FESS were followed in all the diseases. Postoperative steroid drops were used to prevent recurrence. In recurrent AFS regular endoscopic mucosal staging is done and treatment modified [13–15].

Aspergilloma is a non invasive mycotic infection in immuno competent host and the usual site is maxillary sinus [16]. Complete removal of fungal ball in the maxillary is easily dealt with canine fossa approach.

Antro choanal polyp originates from maxillary sinus antrum which passes through accessory or natural maxillary sinus ostium into the Nasopharynx. The origin of ACP is multitudinous. The common site is posterior wall followed by inferior and lateral walls. The principle of treatment is to identify and remove the origin of polyp in maxillary antrum along with main bulk of polyp. Endoscopic sinus surgery is the approach of choice. The problems are a) narrow space in pediatric age and b) Inaccessibility of the lateral wall of maxillary antrum. Combined approach by canine fossa technique with angled endoscope and a straight debrider through trocar proved to be safe and effective. The risk of injury to bone growth center and permanent tooth by this approach is low compared to Caldwell-Luc operation. It should be done only in developed maxillary sinus after radiographic evaluation. our clearance rates by this technique is similar to other series [8].

Inverted Papilloma (IP) is a benign mucosal tumor of nose and paranasal sinus which commonly originate in the lateral nasal wall with extension into the adjacent sinuses. Although it is histologically benign, these lesions are locally aggressive and are associated with malignant potential in 9% of cases. Because of this, aggressive surgical management is the principle of treatment. Lateral rhinotomy and medial maxillectomy is the standard management. With the evolution of endoscopic surgery several studies reported

good outcomes. The tumor commonly invades maxillary sinus. The lateral and anterior walls of maxillary sinus are difficult to excise endoscopically. The adjunctive procedure required is endoscopic medial maxillectomy, Caldwell Luc or canine fossa approach. Our experience shows CFA is much simpler and easier in maxillary sinus excision, but we suggest avoiding any unnatural opening like CFA or Caldwell Luc in locally invasive disease with malignant potential as the tumor can extend through this opening in recurrent cases. Endoscopic medial maxillectomy can be considered as first choice in difficult maxillary sinus tumor removal. Our results of 9% recurrence rate is consistent with other published results [9, 10].

JNA is a vascular and invasive tumor with high incidence of persistence and recurrence. Surgical excision is the treatment of choice and various surgical approaches have been reported. Endoscopic approach has been tried since 1996 and has been reported with good results [18]. The tumor has finger like extensions at the origin of sphenopalatine foramen with extension into posterior nasal space, pterygopalatine fossa and sinuses. Limited tumour can be excised completely by endoscopic technique. CFA to the pterygopalatine fossa allows a easy instrumentation for maxillary artery cauterization and tumor manipulation.

Conclusion

Among the combined endoscopic sinus surgeries, ancillary CFA is a useful approach in difficult surgical situations. Canine fossa approach to maxillary sinus can be done without compromising the sinus physiology. It is simpler, less invasive and also is more functional.

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