Original Article
Modified transnasal endoscopic maxillectomy: a novel surgery style of maxillary malignant tumor

Yonghua Bi1,2, Shuangba He1, Tao Guo1, Jingwu Sun1

1Department of Otolaryngology, Head and Neck Surgery, Anhui Provincial Hospital of Anhui Medical University, Hefei 230000, People’s Republic of China; 2Department of Otolaryngology, Head and Neck Surgery, Tongling City People Hospital, Tongling 244000, People’s Republic of China

Received January 14, 2016; Accepted April 6, 2016; Epub June 15, 2016; Published June 30, 2016

Abstract: Background: Over the past decade, the indications of endoscopic surgery had been applied to the selected cases of malignant tumors. The acceptable morbidity and outcomes suggested that this technique could be available for the management of sinonasal malignant tumors. Objectives: To present our initial experience with the novel technique, modified transitional endoscopic maxillary, improve method of surgery for maxillary malignant tumor. Clinical and radio-anatomic imagery would be presented to describe and define this novel technique. Methods: Surgical patients with carcinoma of nasal cavity, ethmoid sinus and maxillary sinus treated from October 2008 to May 2012 were reviewed. Ten patients underwent transmogrification endoscopic maxillectomy. Describing clinic and radioanatomic analysis of pre- and post-endoscopic maxillectomy. Results: Ten patients had surgical treatment of nasal cavity, ethmoid sinus and maxillary sinus lesions. Modify transnasal endoscopic maxillectomy was utilized in six cases. Complete resection was achieved in six patients. Follow-up of patients alive was 12-36 months, the survival was 100%. One case was recurrent in 1 year post-operation; Open surgery was applied to resect the tumor and the remnant maxillary bone. Conclusions: Clinical and radioanatomic imagery demonstrated a significantly improvement in access to nasal cavity, ethmoid sinus and maxillary sinus. Modified transnasal endoscopic maxillectomy was a novel surgery style aimed to nasal malignant tumors.

Keywords: Endoscopic, maxillotomy, maxillectomy, malignant tumor

Introduction

Sinonasal malignant tumors were accounting for only 3% to 5% of all head and neck malignant tumors [1, 2]. Although they were associated with substantial histological heterogeneity, surgery played a key role in their management. Ketcham et al have been regarded as a major advance in the management of sinonasal malignancies since 1960s [3]. Considering of craniofacial resection combined approach performed by a surgical team including otolaryngologists and neurosurgeons. However, this approach had been associated with a morbidity and per-operative mortality that was not negligible.

As surgical skills had improved with the progression of instrumentation and surgical techniques, there were increasing reports of the resection of tumors occurring outside the nasal cavity and sinuses using the endoscope [4-6]. Transnasal endoscopic surgery had revolutionized the treatment of inflammatory diseases and benign tumors of the sinonasal tract. These reports included tumors involving the basisphenoid, anterior skull base, and periorbita, as well as the pterygopalatine fossa and infratemporal fossa [4-6]. Over the past decade, data from several centers worldwide had demonstrated that endoscopic resection of malignant sinonasal tumors could be extended to sinonasal and the anterior skull base with acceptable morbidity and outcomes suggesting that this technique could be included among the surgical options available for the management of sinonasal malignant tumors. The natural evolution in progressively expanding the indications of endoscopic surgery had been its application to selected cases of malignant tumors.

To overcome impair of open surgery to sinonasal malignant tumors, our team-group had extended the approach to maxillary lesion using
A novel surgery style of maxillary malignant tumor

modified transnasal endoscopic maxillectomy. We reviewed our initial surgical experience with this technique and analyze the pre- and post-operative radioanatomy imaging to determine the surgery style of feasibility by modified transnasal endoscopic maxillectomy.

Materials and methods

Retrospective review identified 10 patients who underwent resection of lesions of maxillary confined to T1 and T2 without lymph node metastasis and distant metastasis from 2008 to 2013. Although there must be no invasion outside the bone of maxillary sinus, invading the medial wall may be accepted. Results of cases utilizing modified transnasal endoscopic maxillectomy technique were described.

Ten patients who had undergone modified transnasal endoscopic maxillectomy from October 2008 to May 2013 were retrospectively reviewed. The average age was 51.1 yrs (SD 10.5 y); the male-to-female ratio was 7:3. Seven had squamous-celled carcinoma of nasal cavity, ethmoid sinus and maxillary sinus, two patients had nasal inverted papilloma canceration located in maxillary sinus. And one patient had nasal cavity, ethmoid sinus and maxillary sinus neuroendocrine carcinoma. Preoperative imaging with multiplanar high-resolution computed tomography (CT) (Figure 1) and magnetic resonance imaging (MRI) scans with contrast was performed to determine the extent of the tumor extension into the maxillary. Before the surgery, radiation therapy were given to the ten cases in order to acquire to the clear surgery boundary. The dosage of preoperative radiotherapy was 50 Gy. All surgeries were performed by the senior author (J.W.SUN.).

Figure 1. Nasal cavity and maxillary SCC (A) showing the CT imaging of the invading of Nasal cavity and maxillary SCC before radiotherapy and pre-operation (B) showing the CT imaging of the result of pre-operation radiotherapy (C) the CT imaging of modified transnasal endoscopic maxillectomy after 3 month postoperation (D) the CT imaging of modified transnasal endoscopic maxillectomy after 1 years post-operation.
A novel surgery style of maxillary malignant tumor

Surgery approach

This modified TEM was performed under general anesthesia in patients with carcinoma refer to the maxillary sinus. Surgical pledges soaked in physiological saline adrenaline were applied in the nasal cavity. The modify TEM process were shown by Figures 2, 3. A vertical incision was made in the mucosa of the lateral wall along the anterior margin of the inferior turbinate (IT) to the nasal floor (B) the resection of maxillary median wall (C) the resection of maxillary anterior wall (D). Resection of the tumor inside maxillary sinus with microdebrider (E-H) respective showing the resectiong of orbital floor, the lateral wall of maxillary sinus, Last resect floor of maxillary sinus and horizontal plate of Palatine bone.

Figure 2. The indicating of the surgery process of modified transnasal endoscopic maxillectomy (A) the pre-operation of endoscopic maxillectomy (B) the resection of the maxillary median wall (C) the arrow show the maxillary anterior, lateral and post walls resection.

Figure 3. The surgery process of modified transnasal endoscopic maxillectomy (MTEM). (A) A vertical incision was made in the mucosa of the lateral wall along the anterior margin of the inferior turbinate (IT) to the nasal floor (B) the resection of maxillary median wall (C) the resection of maxillary anterior wall (D). Resection of the tumor inside maxillary sinus with microdebrider (E-H) respective showing the resectiong of orbital floor, the lateral wall of maxillary sinus, Last resect floor of maxillary sinus and horizontal plate of Palatine bone.
A novel surgery style of maxillary malignant tumor

the maxillary sinus lateral wall margin. After the maxillary sinus medial and anterior wall were resected, the maxillary sinus posterior wall, orbital floor, the maxillary sinus lateral wall included anterior parts of zygoma were also respectively dissected out. At Last floor of maxillary sinus and horizontal plate of Palatine bone were resected. In the process of the whole operation, in order to clear observe the visual field and ablate the soft tissues. Angulated endoscopic and microdebrider drill must be used in the surgery. Unipolar and bipolar electrotome were used in the coagulation, the bleed could be get to well control. The image data before the radiotherapy pre-operation hint nasal cavity and ethmoid sinus invasing, the ethmoid sinus include the median orbital paper plate were resected.

After the maxillary bone were resected, Distilled water flush the surgery cavity and soak for 30 second. Then the anti-cancer drug (5-FU) also flushes the surgery cavity. Two weeks later, post-operation radiotherapy will continue to cure.

Results

This modified transnasal endoscopic maxillectomy was performed in ten patients with lesions in nasal cavity, ethmoid sinus, maxillary sinus. Transnasal endoscopic maxillectomy was utilized in ten cases. Complete resection was achieved in ten patients. Follow-up of patients alive was 12-36 months, the survival was 100%. One case was recurrence in 1 year post-operation later. The recurrent tumor and the remnant maxillary bone was resected by open surgery. The massive bleeding was not observed in the surgery.

Discussion

Nasal cavity and nasal sinus malignant tumor were always considered to adopt open surgical approach before transnasal endoscopic technique. With the continuous development of transnasal endoscopic techniques, transnasal endoscopic surgery had revolutionized the treatment of inflammatory diseases and benign tumors of the nasal cavity and nasal sinus. In recent years, there were many publication analyzing cohorts of patients enhanced the interest of otolaryngologists towards less invasive methods of treatment [7-15]. However, the surgical technical was challenged by the criticism of those who believed that endoscopic surgery, as it did not achieve an en bloc resection, was consisted with the principles of oncologic surgery.

Nicolai P et al [16] and Hanna et al [17] both reported the observation of 184 and 120 patients. Both series included patients where endoscopic surgery was used either alone (72.8% vs 77.5%) or in combination with frontal or subfrontal craniotomy (27.2% vs 22.5%) for sinonasal malignancies. The distribution of patients reflected the variable prevalence of histologies found in various geographical areas. With no major differences in the mean follow-up time (34.1 vs 37 months), the 5-year disease-specific survival in the two series for the entire patient cohort was also quite similar: 81.9% vs 87%. These authors also pointed out different criteria used for patient could lead to variability. Aimed to the hospital stay, operative time, perioperative complications and survival data. They were more inclined to reserve an endoscopic approach for patients with relative-ly earlier disease stage, and no or limited skull base invasion.

Eloy et al [18] analyzed two groups of patients treated at the same institution with either transnasal endoscopic (n=18) or craniofacial resection (n=48) for tumors involving the anterior skull base. A statistically significant difference in terms of median hospital stay (3.5 vs 7.0 days) and median operative time (261.5 vs 625.5 min), while perioperative complications were highly similar in the two groups (27.8 vs 25.0%). There was no statistically difference in overall survival between the two groups, at last the authors concluded that early and intermediate stage anterior skull base malignacies could be safely and successfully treated with transnasal endoscopic resection.

Lund VJ et al [19] reported that the major criticisms concern the short follow-up time, the limited number of patients, and the fact that most series grouped together different histologies. These factors all affected the evaluation to the post-operation results of nose tumors, paranasal sinuses, and skull base through endoscopic surgery. In our approach, visualization of all surgery location were sufficient to operate to dissect out the maxillary, because the maxillary walls could be accessed through angulated
endoscopic, microdebrider drill and all kinds of crook forceps. The advantages of the novel approach presented the absence of facial incisions and osteotomies, decreasing hospitalization time, better controlling of bleeding, improving visualization of tumor borders, and reducing morbidity and mortality rate were commonly cited as the major advantages of endoscopic surgery compared with open surgery. Quality-of-life must be improved without the defect of face.

Conclusion

Modified transnasal endoscopic maxillectomy is a novel surgery trial to the maxillary invasion of nasal cavity and sinonasal malignant tumor. Endoscopic visual magnification may help to decrease the morbidity of traditional compare with open approaches. The most benefit is absence of severe facial deformity and functional impairment. Through the process of surgery and the follow-ups, modified transnasal endoscopic maxillectomy is feasible and can be used for early stage maxillary carcinomas combined with pre- and post-operative radiotherapy. Further, more cases and multi-institutional studies are needed to evaluate the feasibility of modified transnasal endoscopic maxillectomy because of preliminary exploration.

Acknowledgements

The radiology supported radio-image dates and the manuscript is guided by J.W.SUN.

Disclosure of conflict of interest

None.

Address correspondence to: Yonghua Bi and Jingwu Sun, Department of Otolaryngology, Head and Neck Surgery, Anhui Provincial Hospital of Anhui Medical University, Hefei 230000, People’s Republic of China. E-mail: biyonghua2015@sina.com (YHB); biyonghua2016@hotmail.com (JWS)

References

A novel surgery style of maxillary malignant tumor

