EVALUATION OF ANTERIOR MANDIBULOTOMY AS AN APPROACH FOR SURGICAL RESECTION OF DEEP SEATED LESION

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ABSTRACT

Anterior mandibulotomy (mandibular swing) is an essentialsurgicalapproachto tumors of the oral cavity, oropharynx and parapharyngal space. Objectives: to evaluate the feasibility of the technique, to determine frequency of complications and outcomes.

This study consisted of 11 patients surgically treated for primary tumors in oral cavity, oropharynx and parapharyngeal space which included 7 females (64%) and 4 males(36%) with a mean age of 41.3 years, range from 40–65 years; lesion size range was 4-8 cm in greatest dimension. All patients underwent planned mandibular swing approach as part of the ablative surgery for different lesion in oral cavity, oropharynx and parapharyngeal space. Preoperative work-up included mandible evaluation with panoramicradiography that provided information on the dental anatomy and the mental foramen position. The mandibular swing approach that performed for patients has been evaluated regarding the surgical exposure which was obtained and achievement of these procedures.

Paramedianmandibulotomy was used in 9 cases (82%) which used for exposure of lesions in oropharynx and parapharyngeal space, while median mandibulotomy was used in 2 cases (18%) which used for lesions in oral cavity. monocortical plate and screws were used in ten cases (91%), while transosseous wiring used in one case (9%) which result in subsequent nonunion mandibular osteotomy site. In ten cases (91%) the exposure was good, while in one case (9%) the exposure was limited. these procedures allow total removal of lesion in ten cases(91%) and it allowedubulking of one case (9%). Only three patients (27%) have been received postoperative radiotherapy as adjuvant treatment for malignant lesion. The complication related to mandibular swing approach has been assessed and it was found that complication rate through the following up period that range from 6 – 18 months was 36%. One patient had lost one of the incisors adjacent to the mandibulotomy site during the operation. One patient suffered from bony nonunion, one patient suffered from facial neuroparesis due to marginal mandibular nerve injury. The complication rate related to osteotomy was 18%.

The lower lip splitting with paramedianmandibulotomy with miniplate fixation, is a safe, simple and reliable technique for providing excellent access to tumor of the oral cavity, oropharynx and parapharyngial space.

Keywords: Oral Cavity Tumors, Mandibular, Oropharynx, Parapharyngial Space

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INTRODUCTION

Mandibulotomy allows excellent exposure and excision of tumors in the oral cavity, oropharynx, parapharyngeal space, Nasopharynx and base of skull\(^1,2\).

Medial mandibulotomy can be advancecategorized into midline (median) mandibulotomy, where the genioglossus and geniohyoid muscle are inserted and paramidline (para median) mandibulotomy, where the mylohyoid muscle is inseted and have to be transected in median but may cause swallowing return delay function, but in paramidlinemandibulotomy these muscles can be preserved although the canine might be harmed. A central incisor tooth might need to be extracted in midline mandibulotomy while in paramidlinemandibulotomy, it's not the case \(^3,6\).

To prevent some of the movements at the mandibulotomy site, notch osteotomy is preferred after fixation with restriction in mandibular up-down and right-left movements but front-back movement is not \(^7\).

Mandibulotomy complications associated with the site, type of fixation (wires or plates), osteotomy type (straight or notched) and team experience with intermaxillary fixation conduction \(^8\). However, nonunion and osteoradionecrosis were reported with variation in complication rate \(^9,10\).

MATERIALS AND METHODS

Over the 3-year period from 2016 to 2018 at Al-Hussein medical city (Karbala city/Iraq and AL-Salam private Hospital(IN AL-Hila city /Iraq), a consecutive series of 11 patients (7 female "64%" and 4 males "36%") their age range from 40 – 65 years. The primary lesions of the oral cavity, oropharynx, or parapharyngeal space for wholly patients underwent surgical resection of the anterior mandibulotomy. The present study was design to include only medically fit patients who have oral, oropharyngeal or parapharyngeal lesion which needed mandibular swing approach to facilitate their excision. Exclusion criteria included: surgery in mentolabial region/pre-existing anomaly, grossed offensive of oral cancer, tumor close on mandible in a beforehand irradiated patient, offensive of the inferior alveolar nerve or canal by tumor, and massive soft tissue disease contiguous to the mandible. Regarding to the region to be approached, patients were categorized to three groups as shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Patients distribution basing to the region of lesion</th>
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<tbody>
<tr>
<td>Group</td>
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<tr>
<td>-------</td>
</tr>
<tr>
<td>A</td>
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<td>B</td>
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<td>C</td>
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Preoperative assessment

Wholly patients were evaluated preoperatively by examined clinically and radiographical assessment that included mandible evaluation with panoramic radiography that provided information about the dental anatomy and the position of the mental foramen. To evaluate the primary lesion, fiberoptic endoscope, examination under anesthesia, computed tomography examinations were done, also angiography was used.
Operative Technique

The skin incision was made, under general anesthesia, from the lower lip toward the hyoid bone then extended to mastoid region in a curvilinear fashion. All tissues were incised until the mandible was reached. The lower lip was divided in the middle up to the gingivalabial sulcus. Lateral incision (1.5cm in length) was made in the gingivalabial sulcus on each side. The periosteum was raised; two mini plates (2mm) four- or six-hole plates were adapted to the contour of the symphysis 5mm beneath the plane of the tooth roots at the outer cortex of the mandible. Drill holes were employed previously the bone is separated and appropriate-sized screws were selected. The median (between 2 central incisors) or paramedian (between lateral incisor and canine) mandibular osteotomy is then implemented. The portions of the osteotomy were concluded throughout both cortices with a fine saw or surgical burr. Incision through the mucosa was then extended along the ipsilateral glossogingival sulcus, sendoff a cuff of mucosa (about 1cm) on the mandible to accelerate close. The tumor was then excised with safety margin, and the lesion was delivered in the neck and removed in block with the nodal dissection specimen. The defect was reconstructed using various methods including primary closure, riven thickness skin graft orradial forearm free vascularized flap (reliant on the resected level and the site of the primary lesion. The floor of mouth (gingivoglossal sulcus) was closed with 3/0 vicryl interrupted sutures. The two pieces of the mandible were reapproximated and fixed collectively using a two mini plates. The lip musculature, mucosa and vermilion border are cautiously reapproximated by exploiting 4/0 vicryl interrupted sutures while skin closed with 5/0 polypropylene suture. Postoperatively, nasogastric tube feedings continued for 10 days then oral feeding was started with liquids then gradually to a semisolid diet then normal diet within 1 month. The mandibular swing approach that performed for patients has been evaluated regarding the surgical exposure which was obtained and achievement of these procedures.

RESULTS

In present study, there were 11 cases with different pathology at different sites as mentioned on Table 2, lesion size range was 4-8 cm in greatest dimension and for all these cases , mandibular swing was recommended for access to provide wider exposure of these pathology and facilitate their total removal.

Table 2: Full pathological information of the study patients

<table>
<thead>
<tr>
<th>Pathology</th>
<th>No.</th>
<th>Site</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurofibroma</td>
<td>2</td>
<td>Floor of Mouth</td>
<td>A</td>
</tr>
<tr>
<td>Adenoid Cystic Carcinoma</td>
<td>1</td>
<td>Sublingual salivary gland, floor of mouth</td>
<td>A</td>
</tr>
<tr>
<td>Squamous Cell Carcinoma</td>
<td>1</td>
<td>Base of tongue</td>
<td>B</td>
</tr>
<tr>
<td>Osteoma</td>
<td>1</td>
<td>Medial side of ramus extend to oropharynx</td>
<td>B</td>
</tr>
<tr>
<td>Branchial Cyst</td>
<td>1</td>
<td>Parapharyngeal space</td>
<td>C</td>
</tr>
<tr>
<td>Fibrosarcoma</td>
<td>1</td>
<td>Parapharyngeal space</td>
<td>C</td>
</tr>
<tr>
<td>Pleomorphic Adenoma</td>
<td>3</td>
<td>Parapharyngeal space</td>
<td>C</td>
</tr>
<tr>
<td>Nasopharyngeal Carcinoma</td>
<td>1</td>
<td>Pharynx and parapharyngeal space</td>
<td>C</td>
</tr>
</tbody>
</table>
Orthopantomograph (OPG) was the first screening procedure applied in all cases to detect the bone lesion and to determine site of osteotomy. In all cases (100%) computed tomography (CT scan) was used to assess the primary lesion and neck. Preoperative histopathological study was possible for 5 of these cases (45%). Three cases (27%) were under treatment of Roux for lip splitting incision, while McGregor technique was applied with the remaining number of cases (73%), on the other side, Robson way wasn’t used in the present work. The anterior mandibulotomy approaches (median, paramedian) have been performed for the patients of this series. Paramedian mandibulotomy was used in 9 cases (82%) which used for exposure of lesions in oropharynx and parapharyngeal space, while median mandibulotomy was used in 2 cases (18%) which used for lesions in oral cavity. The main fixation method after the mandibulotomy was the monocortical and bicortical osteosynthesis using monocortical plate and screws which used in ten cases (91%), while transosseous wiring used in one case (9%) which subsequently complicated by nonunion mandibular osteotomy site. In ten (91%) cases of these eleven cases the exposure was good, while in one case (9%) the exposure was limited. These procedures allow total removal of lesion in ten cases (91%) and it allowed debulking of one case (9%).

The complication related to mandibular swing approach has been assessed and it was found that complication rate through the following up period that range from 6 – 18 months was 36%. One patient had lost one incisor adjacent to the mandibulotomy site during the operation which managed by reassurance of patient and subsequent replacement of tooth by fixed bridge. One patient suffered from bony nonunion who managed by removal of transosseous wire, debridement of osteotomy site, removal of fibrous tissue and fixation with 2 mini plates, one patient suffered from facial neuroparesis due to marginal mandibular nerve injury who managed postoperative period by electroneurography (E.N.G) which reveal neuropraxia, reassurance, oral steroid (prednisolone 60 mg/day) and physiotherapy, and only one patient had orocutaneous fistula which managed successfully by fistulectomy and pressure dressing. No patients suffered from malunion, wound sepsis or plate exposure during the immediate or late postoperative period. Most patients had pain at the temporomandibular joint for maximum of 10 days without symptoms of residual temporomandibular joint or deformity. There was adequate cosmetic and an acceptable occlusion results in most patients. Most patients were discharged within 10 days of surgery. All complications have been managed during the period of follow up.

DISCUSSION

The preoperative evaluation of cases by radiographical and histological studies in correlation with the clinical examination give clue for type, location, size and extension of the lesion thus allowing the surgeon to plan the proper facial bone osteotomy to approach the lesion. An organized sequence of available radiographs was followed to evaluate the different types of lesions represented in this study. In all cases (100%) the first screening procedure was the orthopantomograph (OPG) to detect the bone lesion and to determine site of osteotomy, although Peter M et al. since 1979 described the limitation of plain skull radiographs which are:

(1) The inherent limitation lies in the unavoidable superimposition of adjacent and over lying soft tissue and bone structure.

(2) If actual bone erosion is presented it will not be demonstrable unless at least 50% of bone destroyed

Jatin shah et al., recommend that in any patient require mandibulotomy radiographic assessment of mandible must be performed before surgery and panoramic view of mandible is usually satisfactory. According to the current study circumstances and in agreement with this author, the OPG were first aid in demonstrating the bony extension of tumor, to determine the site of osteotomy and determine if there is...
adequate distance between teeth which permit performing osteotomy without need for tooth extraction and also to exclude presence of any other bone lesion.

Angiography is a further radiographic method which used with CT scan for parapharyngeal space lesion to rule out possibility of vascular lesion, and this agree with Saito, 2007 (13). Histopathological study was possible for only 5 patients (45%), in 6 patients (55%) were either not accessible or biopsy was unsafe as for lesion in parapharyngeal space and this agree with John et al, 1990 in that the temptation to biopsy a parapharyngeal space mass is hazardous and should be discouraged (14).

The types of lip splitting incisions were used are McGregor which used in 8 cases (73%) and Roux incision used in 3 cases (27%), while Robson incision was not used as it is not popular, in this study the Roux incision had poor aesthetic results, but reasonably good functional results, while the McGregor incision had good aesthetic and functional results. This agreed with the findings of Rapidis et al (15).

Regarding the type of osteotomy, paramedian mandibulotomy was used in 9 cases (82%) which used for exposure of lesions in oropharynx and parapharyngeal space, while median mandibulotomy was used for excision of oral lesion in 2 cases (18%).

In this study we did not find any difference between these two types of osteotomy and this agree with Dai et al. 2004 (16). Although, from a theoretical point of view, they advocated the paramedian mandibulotomy as the insertions of the geniohyoid and genioglossal muscles were preserved and there were better results with regard to post-surgical sucking and swallowing function as recommended by Stell and Maran 2012 (4,5,17,18).

Regarding the type of fixation, many fixation methods have been reported, like wire osteosynthesis (4), arch bar and bone screws, miniplates with monocortical screws (19), Kirschner wires (20) and dynamic compression plates (8).

In this study, monocortical plates osteosynthesis were performed on ten cases 91% of patients with no immediate postoperative malocclusion being encountered. However, a postoperative nonunion developed in the one case (9%) that underwent direct transosseous wiring, and it is believed that the fragment mobility due to the nonrigid fixation and previously irradiated mandible might have promoted these complications, this agree with Woong Nam et al, 2006 (21).

In this study ten cases of these eleven cases (91%), the exposure was good which permit total removal of lesions while in one case (9%) the exposure was limited and allow debulking only because it was large and extended to base of skull, therefore the mandibular swing approach consider an excellent way to gain access to bulky tumor in these sites as described by Jatin Shah 2012 (1,4,5,12,18).

The global complication rate reported in the literature is around 20% (4), and this generally consists in occlusion disturbances, disorders relating to sensitivity in the area innervated by the lower dental nerve, temporomandibular joint pain, periodontal problems, wound infection and aesthetic changes due to the lip-splitting procedure. Most of mandibulotomy patients in the present study had an uncomplicated recovery. The complication related to mandibular swing approach has been assessed and it was found that complication rate through the following upper period that range from 6 – 18 months was 36%. One patient had lost one incisor during the operation. One patient suffered from bony nonunion, one patient suffered from facial neuroparesis due to marginal mandibular nerve injury, and only one patient had orocutaneous fistula. Osteotomy related complications which include nonunion and tooth loss were occurred in 2 patients (18%) and this agrees with what was reported by other investigators (21,22).

CONCLUSION
The lower lip splitting with paramedian mandibulotomy with miniplate fixation, is a safe, simple and reliable technique for providing excellent access to tumor of the oral cavity, oropharynx and parapharyngeal space. The preoperative dental assessment is necessary in preventing mandibulotomies complications and McGregor incision is easily the best option among the three lip-splitting incisions that studied.

ETHICAL CLEARANCE

The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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REFERENCES


