

## Case Report

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# Prevention and treatment of maxillo-mandibular disorders following an interrupted mandibulectomy: The role of guide flange prosthesis

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### Introduction

Ameloblastoma is an odontogenic epithelial tumor without induction of odontogenic ectomesenchyme. Although classified as a benign tumor, ameloblastoma can be very extensive and may involve an invasion of the immediate surrounding structures with a high potential for recurrence [1].

It is developed from tooth-forming cells without a mesenchymal component. Ameloblastoma is the most common benign maxillary tumour, accounting for 1% of all maxilla-mandibular cysts and tumours and about 10% of odontogenic tumours [2,3].

Often asymptomatic, it mainly affects the mandible (more than 80%). It occurs at any age, with a peak incidence around the third and fourth decades with a predominance for the pre-molar-molar angular region [1].

The treatment is primarily surgical. The choice of the type of

intervention, radical or conservative, is dominated by the volume of the lesion, its location, the age, the state of health of the patient, the anatomic-clinical and histological type of the tumor, the evolutionary potential and the possibility of regular follow-up of the patient [1,2].

Due to its prolonged latency and aggressiveness, its surgical treatment often results in considerable mandibular loss of substances.

Mandibular interrepting resection disturbs the various mandibular functions and leads to a lateral deviation of the residual segment towards the surgical site. This mandibular deviation causes a facial deformation, more or less evident, depending on the location and the extent of the loss of substance. This results in very significant aesthetic, functional and psychological damages affecting the patients' quality of life.

When the bone continuity is interrupted and the patient's general condition allows it, surgical reconstruction is desirable.

In these circumstances, anastomosing fibula bone transfer is the procedure of choice [4]. However, in the presence of a medical contraindication or if the patient refuses surgery, guide flange prosthesis is indicated for re-education of the patient's neuromuscular system to achieve an acceptable occlusion between the remaining natural teeth [5,6].

Through a clinical case, we will discuss the interest of the guide flange prosthesis in the prevention of significant deformations and fibrous retractions, which settle immediately after an interrupting mandibulectomy, also called segmental when a surgical repair is not performed.

### Presentation of the clinical case

Ms. X, 38 years old, was referred to us by her maxillofacial surgeon for prosthetic rehabilitation.

The medical history revealed that she had undergone an unreconstructed interrupted hemi-mandibulectomy following a mandibular ameloblastoma.

### Exobuccal examination (Figure 1 and Figure 2) shows:

- A deformation of the entire mandibular arch altering the contours of the face
- A facial asymmetry with a flattened right hemisphere characterized by
  - the disappearance of the relief of the horizontal branch and mandibular angle;
- A deviation of the mandible toward the resection side;
- A horizontal lateral cervical sub-mandibular scar on the right side that is detrimental to aesthetics;
- and a moderate limitation of the mouth opening.

### The endobuccal examination (Figure 3 and Figure 4) reveals:

- A poor oral hygiene with significant tartar deposits, especially with regard to surgical resection
- A loss of mandibular substance exceeding the median line
- The presence of several scar flanges
- Absence of the teeth of sector 4 and of the left incisal block contralateral to the resection
- Absence of the alveolar ramparts
- Decreased lingual mobility
- And a significant alteration of the dental articulation with an impossibility for the patient to obtain a normal occlusion spontaneously. In oral closure, the healthy arch is placed medial to the maxillary arch with an anterior hollowness.

### Therapeutic decision

Interrupting losses of substance that are not reconstructed by surgery are generally untreatable, since removable prosthetic restoration will have no use in the absence of a firm seat, and on the contrary, it may be traumatic and uncomfortable for the patient.



**Figure 1:** Aplasia of the right hemiface with deviation of the chin towards the resected side.



**Figure 2:** Horizontal lateral scar.



**Figure 3:** Loss of substance beyond the midline with scar flange.



**Figure 4:** Significant alteration of the dental articulation with anterior hollowness.

In addition to functional rehabilitation and physiotherapy, guide flange prosthesis in a dentate patient allow the restoration of “normal” functioning of the manducatory apparatus.

The guide flange prosthesis will take the form of a palatal plate with shaped hooks fitted with a palatal flap called an inclined plane (Figure 5).

The recovery of a correct occlusion facilitated the subsequent restoration of the oral cavity.

### Stages of implementation

Primary alginate impression of the maxilla is realized using a commercial impression tray to obtain a working model.

A palatal plate in transparent resin is fabricated and stabilized with shaped clasps.

Cold resin curing is modelled as an inclined palatal plane directly in the mouth, straddling the premolar-molar region on the opposite side of the resection, thus forcing the mandible to regain a suitable occlusion (Figures 5, 6 and 7).

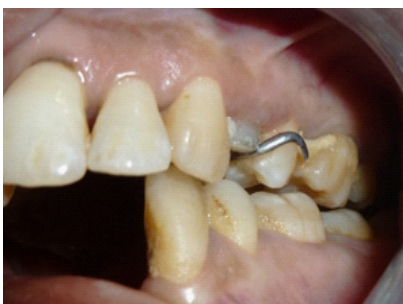
Check-ups demonstrated an improved centering of the mandibular movements.



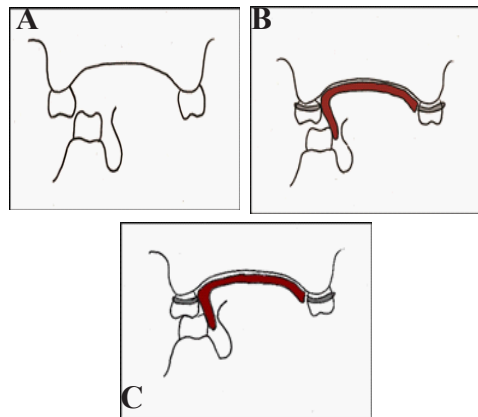
**Figure 5:** Production of a palatal plate in transparent resin on a maxillary model



**Figure 6:** The guide appliance has an inclined palatal plane placed astride the premolar-molar region.



**Figure 7:** he guide flange prosthesis forces the mandibular stump to regain a proper occlusion.



**Figure 8:** Role of the guide flange prosthesis  
a) Severe mandibular deviation towards the side of the resection  
b) The guide appliance has an inclined palatal plane that forces the mandibular stump into a correct occlusion.  
c) Restoration of an adequate occlusion favorable to the various oral functions.

### Discussion

Mandibular continuity defects related to surgical resection of mandibular tumours, represent a real challenge for the maxillofacial prosthodontist.

The interrupting mandibular resection causes a loss of proprioception, masticatory muscle disinsertions, and scar retractions homolateral to the surgical side, leading to a disturbance of the static and dynamic function of the manducatory apparatus [7]. The residual mandibular segment undergoes a retraction and a latero-deviation towards the operated side at the vertical dimension at rest and of occlusion, with a loss of normal dental articulation and difficulties in feeding and phonation.

The loss of mandibular continuity also leads to mandibular rotation. Indeed, traction of the residual mandibular fragment by the suprahyoid muscles causes a downward displacement and rotation around a point of support located at the level of the mandibular condyle, thus giving an anterior gap [8].

These disorders are initially the result of an imbalance in neuromuscular function between the resected side and the healthy side. In a second phase, they will stabilize and be fixed by scar straps.

The functional disorders are more or less important depending on the quantity of soft tissue and bone resected, the site of the loss of substance, the degree of loss of motor and sensory innervation, the degree of lingual dysfunction, the number and quality of the lost and residual teeth, the wound closure technique and finally the moment of the beginning of the treatment [9].

Early management is therefore essential to minimize maxillo-mandibular imbalance.

As far as possible, immediate surgical reconstruction, using free vascular fibula flaps is always desirable, especially following the removal of a benign tumor. It aims to limit or even eliminate postoperative complications, to regain mandibular continuity in the following days, to harmonize the face, to normalize orofacial functions and to provide a good basis for subsequent prosthetic rehabilitation.

When surgical repair is not desirable or feasible, an intermaxillary block between the teeth of the remaining mandibular segments is often performed postoperatively. However, this solution can only be used temporarily until the guide flange prosthesis is developed because it interferes with feeding and monitoring of the healing process and complicates oral hygiene.

In order to limit the aesthetic, functional and psychological consequences of loss of mandibular continuity, the fabrication of a guide appliance offers to the operated patient an essential improvement in their quality of life. Guide appliances are prostheses with a vestibular or palatal flap, called an inclined plane, on which the vestibular or palatal faces of the antagonist arch will rest and slide. When closed, the flap prevents transverse displacement and guides the remaining mandibular part so that the teeth can be properly engaged [10].

The guide flange prosthesis are made in the dentate subject and can take many configurations depending on the resection. They can be made in both the maxilla and the mandible. However, maxillary appliances are preferred for the correction of significant mandibular deviations [11,12].

The maxillary prosthesis offers better support and prosthetic stability and avoids the need to rest on a mandibular stump traumatized by surgery.

Depending on the clinical situation, the inclined plane can be associated with a polymethyl methacrylate resin palatal plate, as in most cases. However, it can be associated with a removable partial metal prosthesis when it is necessary to replace missing teeth in the maxilla. If the mandible easily regains occlusion, a metal guide appliance can be made. If some resistance is encountered during mandibular manipulation, an acrylic resin flap is recommended since it offers the advantage of being easily relined and adjusted (Figure 8) [12].

Rehabilitation of mandibular dynamics with a guide appliance is more effective when the resection involves bone structures with minimal loss of soft tissue without associated lymph node dissection or radiation therapy. Patients treated for ameloblastoma are ideal candidates for this type of device [13].

Guide flange prosthesis can be used as an emergency treatment, waiting for a definitive mandibular reconstruction of better quality if it is considered later, after surgical reconstruction has failed or when the patient's general condition contraindicates surgical repair.

To optimize the results, the wearing of these guide appliances should be combined with several sessions of physiotherapy. During these exercises, the patient should hold the chin with his or her hand and move the mandible to the side contralateral to the surgery, starting the second week after surgery. The main goal is to retrain the mandibular muscles to restore an acceptable maxillomandibular relationship for the residual hemimandibula, so that the patient can control the opening and closing movements adequately and repeatedly [13].

However, these appliances should be used by the patient on an interim basis until an acceptable occlusion is achieved. They should be used only occasionally to reinforce proprioception.

## Conclusions

The guide flange prosthesis prepared before surgical removal of a mandibular tumor with sacrifice of the mandibular con-

tinuity and placed immediately after the operation render an invaluable service to our patients, modifying their quality of life, from a functional, aesthetic and especially psychological point of view.

It is fundamental to keep in mind that the management of these patients is complex. It can only be effective if it is the result of close collaboration between the different specialists involved (surgeon, prosthodontist, physiotherapist, psychologist...).

## Declarations

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