

## Piezosurgery Removal of Mandibular Tori: A Case Series

Pozzetti E<sup>1,2\*</sup>, Garibaldi J<sup>2</sup>, Cassinotto E<sup>2</sup>, Figliomeno E<sup>2</sup>, Merlini A<sup>2</sup>

### Abstract

**Introduction:** Tori mandibularis are exostosis of the lingual side of the mandible, categorized as development defects. The etiology is multifactorial and the excision is not always required. Piezosurgery results as a useful device for exostosis removal because it causes less bleeding and discomfort in the postoperative healing, it is characterized by a micrometric and selective cutting for hard tissue.

**Materials and methods:** At Galliera Hospital (Genoa, Italy) 4 patients demanding a partial or complete denture or reporting pain, were referred for tori mandibularis removal.

The surgical procedure was standardized and performed by the same surgeon, using piezoelectric technology, and accomplished with chisel and mallet for en-block removal.

**Results and Conclusion:** tori mandibularis removal mean measured 6.9 mm (range 5.3-7.6) in antero-posterior dimension and 18.3 (range 12.6-23.1) in bucco-lingual dimension. Piezosurgery appeared effective for exostosis removal and provides a good healing and a better comfort for the patient.

**Keywords:** Piezosurgery; Tori Mandibularis; Exostosis; Pre-prosthetic Surgery; Osteotomy

### Introduction

Torus mandibularis is a common exostosis that develops along the lingual aspect of the mandible above the mylohyoid line, in the region of canines and premolars. These exostoses are developmental defects that appears as localized bony protuberances arising from the cortical plate and they are composed by compact bone with small amount of trabecular bone and fibrofatty marrow [1, 2].

The prevalence of tori mandibularis is in a wide range, from 0, 54% to 64,4%, and correlates with ethnicity, in fact there is an higher prevalence in Asians and Inuit [3, 4]. The etiology of this lesion is multifactorial including both genetic with autosomal dominant inheritance and environmental influences. In a study of Eggen the genetic determination was estimated to be 30%, while the remnant was interpreted by occlusal overload as bruxism or heavy food consumption and other clinical variables as malocclusion, Angle class or curve of Spee. Another study suggests an association between these lesions and a rich-in-calcium diet, unsaturated fatty acids and vitamin D [5].

An important theory on the tori mandibularis is the functional matrix hypothesis in which compressive stresses may lead to buckling of the mandible in the mental foramen region, which has a reduced bone volume.

### Affiliation:

<sup>1</sup>Department of Dentistry, IRCCS San Raffaele Hospital and Dental School, Vita Salute University, Milan, Italy

<sup>2</sup>Department of Odontostomatology, Galliera Hospital, Genoa, Italy

### \*Corresponding Author

Enrico Pozzetti, Department of Dentistry, IRCCS San Raffaele Hospital and Dental School, Vita Salute University, Milan, Italy.

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Osteogenic periosteum in these regions is stretched and this tension leads to new bone formation and consequently of tori [6, 7].

Generally, surgical resection is not required for mandibular torus, as long as the condition remains asymptomatic. However, treatment is indicated when subjective symptoms such as discomfort, pain, articulation disorder or if this condition determinates an instability of dentures. A further indication for surgical removal is earning an adequate bone graft for bone regeneration; it could be used for en-block harvest or autogenous particles for guided bone regeneration [8-10].

Invented in 1988 by Tommaso Vercellotti, Piezosurgery is a precise and soft tissue-sparing technique for bone cutting, based on ultrasonic microvibrations and on the concept of “pressure electrification”. When electric tension is applied to certain materials like quartz and Rochelle salts, it generates an expansion and contraction of the material, producing ultrasonic vibrations. The piezoelectric device is characterized by having ultrasonic vibrations in the frequency range of 25-29 kHz, an oscillation (amplitude) of 60-210 µm, and power up to 50 W; this allows selective cutting only on hard structures without damaging soft tissue [11].

## Materials and Methods

A sample of 4 patients (2 men, 2 women) with a mean age of 63.66 years (range: 60-68 years) at the time of recruitment referred to Galliera Hospital (Department of Odontostomatology) in Genoa (Italy) requiring a removable partial or complete denture between October 2022 and February 2023. All these patients presented two mandibular exostosis (one left sided and one right sided), known as tori mandibularis, in premolars region. This condition represents a contraindication for the removable prosthetic rehabilitation, consequently the patient’s required pre-prosthetic surgical treatment.

All the patients reported:

- Good systemic health
- Need of removable prosthetic rehabilitation
- No heavy smokers (<20 cigarettes/day)

The sample was surgically treated between December 2022 and January 2023.

## Surgical procedure

The patients were informed about all the surgical method and the derivational risks of this procedure; after that, they signed an informed consent. Under local anesthesia (2% of Mepivacaine Hydrochloride with adrenaline 1:100000) it was elevated a lingual mucoperiosteal flap to exposing tori

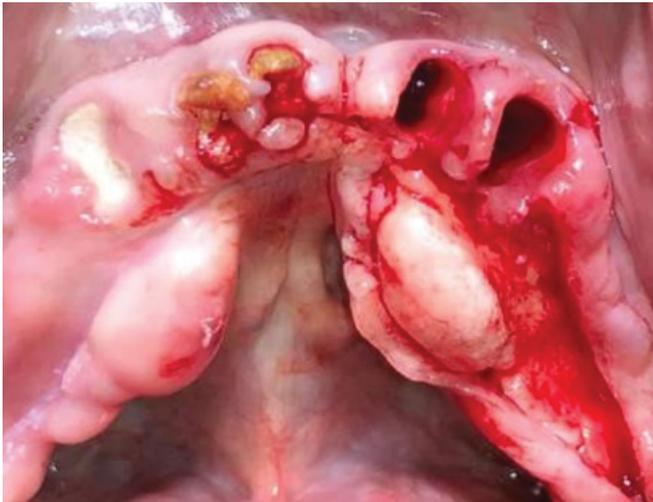
mandibularis. When the exostosis area was accessible, the surgeon (J.G.), with the auxilium of piezoelectric instrument (Mectron Piezorurgery 3, Mectron® Medical Technology, Genoa, Italy), started the cut to delimitate tori mandibularis. For the osteotomy of the tori, the authors chose an aggressive tip (Mectron OT7-a), with cortical bone modality. When the lesion was sufficiently separated from the mandibular cortical plate, the surgeon proceeded to remove the block with scalpel and mallet. Following, using the Mectron OT-9 tip the operator recontoured the lingual cortical plate in order to smooth the bone to avoid possible decubitus. Eventually the operator sutured with a resorbable suture (Vycril, Polyglactin 910, Ethicon 4/0 with a 19 mm needle), choosing sling sutures between two teeth and single sutures in edentulous area. After the surgical procedure the patient was medicated with an intramuscular injection of betametasona 4 mg and ketorolac 30 mg in order to reduce post-operative pain and swelling. Finally, the patient was educated in the post-surgical behaviours. Postoperative medication included antibiotics (Amoxicillin and Clavulanic acid 1000 mg), analgesics and anti-inflammatory medicine (paracetamol). The prosthetic phase began after the healing of the soft tissue, at least one month after the surgical procedure.



**Figure 1:** Osteotomy performed with Piezosurgery 3 (Mectron® Medical Technology, Genoa), in detail the tip OT7-a and OT-9.



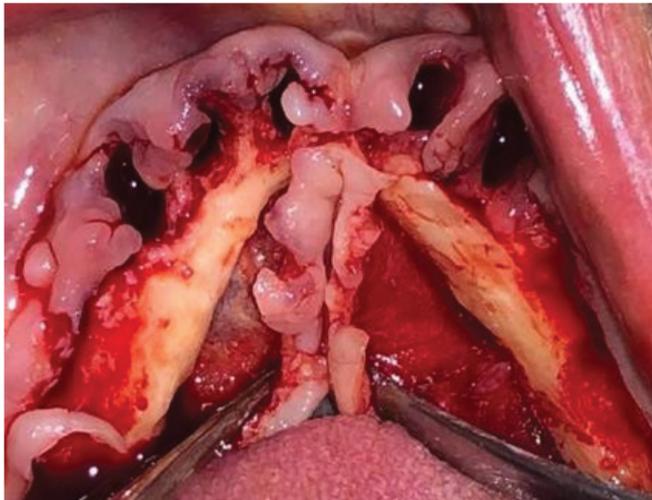
**Figure 2:** At the initial stage the patient presented tori mandibularis, hopeless teeth and the necessity of mandibularis rehabilitation with a removable complete denture.



**Figure 3:** Extraction of teeth, elevation of lingual mucoperiosteal flap and exposition of tori.



**Figure 6:** Patient presented tori mandibularis, posterior edentulous areas and the request of a removable partial denture.



**Figure 4:** Excision of tori mandibularis and osteoplasty to recontour the lingual cortical plate.



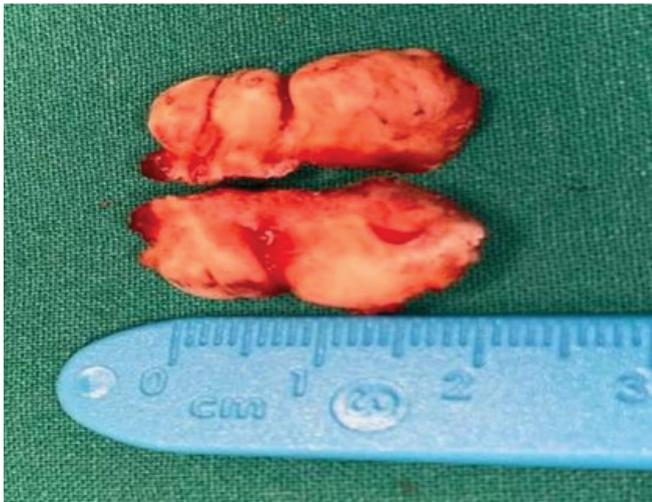
**Figure 7:** Tori mandibularis removed and sling sutures applied between two teeth and single sutures in posterior areas.



**Figure 5:** Measurement with periodontal probe.

## Results

The tori mandibularis were removed en-block and they mean measured 6.9 mm (range 5.3-7.6 mm) in anteroposterior direction and 18.3 mm (range 12.6-23.1 mm) in the transverse plane. During the surgical procedure the piezoelectric technology caused less bleeding and less vibrations compared to rotating tools; although a greater amount of time was required for the surgical procedure. At the 7-day follow-up sutures were removed with the soft tissue appeared healthy and the patients reported a low grade of pain, manageable with FANS. Diagnosis of exostosis was confirmed by anatomopathological examination, which revealed compact bone tissue compatible with tori mandibularis. At the 1-month follow-up the tissue appeared stable, and it was possible to proceed to prosthetic rehabilitation taking the first impression.



**Figure 8:** Completed osteotomy and measurement of tori mandibularis.



**Figure 9:** One month follow-up, before the beginning of prosthetic phase.

## Discussion

Tori mandibularis are a cortical bone ipergrowth on the lingual side of the mandible and they represent a development anomaly of the oral cavity. The surgical excision is not always required, but it is necessary when the patient needs a removable prosthesis or if these exostosis cause long lasting oral pain exacerbated by swallowing and mastication, presence of ulceration of the overlying mucosa or there is the necessity of autologous bone graft [12-15].

In this procedure the surgeon must be aware of the rich vascularization and innervation of this region, the presence of the submandibular and sublingual glands and their ducts. Accordingly, bone exposure of tori mandibularis require a mucoperiosteal flap without lingual release incisions. Furthermore, for osteotomy and osteoplasty the piezoelectric

system, due to the selective cutting action on hard tissue, is a safer solution than rotating instruments. During the removal procedure of exostosis, the osteotomy can be performed with conventional tools such as saws and burs, that generate an important amount of heat in the cutting area. Overheating of adjacent tissue may delay the healing process causing osteonecrosis and diminished regeneration [16]. These tools are highly effective in cutting bone tissue but are not discerning for bone, and thus can produce significant damage the surrounding soft tissues, in particular nerves and vessels [17]. Bone scrapers, gouge-shaped bone chisels, trephines and ronguers can also find application [18].

Piezosurgery technique is an alternative that overcomes the limits of traditional instrumentation in oral bone surgery. The main advantages include soft tissue protection, optimal visibility in the surgical field, decreased blood loss, less vibration and noise, increased comfort for the patient and protection of tooth structure [19].

Not only is this technique clinically effective, but histological and histomorphometric evidence of wound healing and bone formation in experimental animal models has shown that tissue response is more favorable in Piezosurgery than it is in conventional bone-cutting techniques such as diamond or carbide rotary instruments [20].

On the other hand, this methodic requires a greater amount of time in the osteotomy phase compared to classical tools. Despite Piezosurgery has become a very common technique in different fields of dentistry like maxillary sinus lift, surgery of impacted teeth, apicectomy, orthognatic surgery and many more, there's a lack of literature about its application in exostosis removal.

## Conclusions

Although exostosis removal is not always mandatory, it is required for prosthetic rehabilitation, pain or autogenous bone graft harvest.

With the limitations of this case series, the authors reported the utility of piezoelectric surgery in tori mandibularis removal and its clinical use.

Further investigations with a larger sample size and case-control RCT between piezoelectric and rotating instruments are needed to clarify the histological and clinical differences between these two methodics.

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## Conflict of Interest

The authors have read and approved the submitted version of the paper and have contributed significantly to the work.

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