



# Obturator prostheses with intramucosal retention system in patients with maxillectomy

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## Abstract

**Purpose** To evaluate the intramucosal retention system in patients' masticatory efficiency and quality of life in this case series.

**Material and Methods** A total of 3 individuals with maxillectomy were included for rehabilitation with a complete obturator prostheses with an intramucosal retention system (OPI). The complete obturator prostheses was made for 60 days, and electromyography assessments and bite force were applied before, after 30, 60, and 90 days of surgery and prostheses installation. The University of Washington Quality of Life Questionnaire (UW-QoL) and the Obturator Functional Scale (OFS) were also administered at baseline and in the same follow-up periods. The electromyography was evaluated on both sides of the masseter, temporalis, and buccinator muscles while chewing hard and soft food. The maximum bite force was recorded in the central incisors and both sides of the first molar region.

**Results** Bite force values increased in the first molar region, and muscular electrical activity remained constant. Items related to the taste and swallowing of the UW-QoL impacted. Most OFS questionnaire data responses indicated that patients improved in swallowing liquid foods and appearance.

**Conclusions** The rehabilitative capacity improves masticatory efficiency and QoL in adults maxilectomized and rehabilitated with OPI analysis in the study. Further clinical studies should be encouraged to determine the effectiveness of this retentive system.

**Keywords** Palatal obturator · Intramucosal insert · Electromyography · Bite force · Quality of life

## Introduction

Head and neck cancers are the seventh most common type of cancer worldwide. Almost half of head and neck cancers affect the oral cavity [1]. The estimate is that for each year of the 2023/2025 triennium, 15,100 new cases of oral cancer are diagnosed in Brazil [2]. Oral and oropharyngeal

squamous cell carcinoma (OSCC and OPSCC) represent an essential problem in global public health [1, 3]. Significant risk factors for developing OSCC and OPSCC are tobacco smoking and alcohol intake [1, 3]. Ameloblastomas are benign but locally invasive neoplasms that may grow to massive proportions and cause significant morbidity. Although some types of ameloblastoma can be treated predictably with aggressive surgical treatment, recurrent ameloblastoma, and metastasizing ameloblastoma are still challenging to treat [4].

Surgery is the most used method to treat invasive neoplasm [5]. The aesthetic and functional sequelae of this treatment approach, particularly in advanced-stage patients, impact the ability to speak, chew, and swallow and create a negative esthetic impact on the patient's external appearance, leading to a decline in the quality of life [6]. The functional and aesthetic rehabilitation with prostheses in patients undergoing extensive resections

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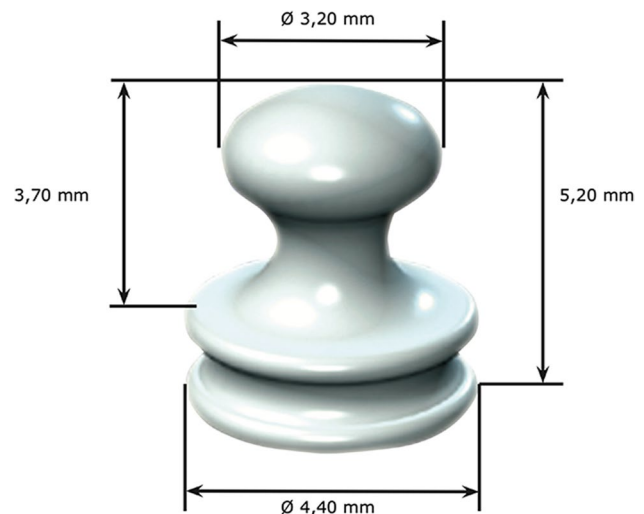
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constitutes one of the biggest challenges for the multidisciplinary team due to its extreme difficulty [7]. However, prosthetic rehabilitation is more challenging for patients with edentulism because of its retention and stability. Maxillofacial prostheses contribute to improving social well-being [6]. The intramucosal insert system is a method that emerged to improve the stability and retention of prostheses [8–11]. Zirconia is, therefore, a promising material for use as an intramucosal insert. The zirconia inserts have a highly polished surface that minimizes the formation and accumulation of biofilms [9].

The masticatory performance and maximum occlusal strength of prosthetically rehabilitated maxillectomy patients may present similar results to healthy individuals [12, 13]. The bite force is a physiological characteristic related to quality of life. It can influence an individual's nutritional quality because it is related to masticatory efficiency, food grinding, and digestion [14]. Previous studies present the assessment of bite force as an effective method to verify an individual's chewing efficiency [12, 13]. Besides the analysis of bite force, muscle characteristics can be studied using electromyography (EMG), which many researchers use to assess the effects of rehabilitation, changes in muscle behavior, and efficiency of treatments [15–17]. Surface electromyography provides data on the myoelectric output of jaw muscles, which reflects the force output. Therefore, EMG analysis of the masticatory strengths during chewing represents a reproducible and reliable method to assess neuromuscular coordination during standardized dynamic activities and thus quantify functional recovery in these patients [18, 19].

The Quality of Life (QoL) of individuals with oral and maxillofacial defects and wears of an obturator prostheses has also shown a strong correlation with the function of the obturator [20, 21]. Certain sounds are very sensitive to airflow, which, when pronounced, verify hypernasality and hyponasality, attesting to the effectiveness of the obturator in improving speech [20–23]. However, the success of prosthetic rehabilitation may depend on multiple factors, including the type of tumor and staging [12]. The intramucosal retention system protocol has been reported to improve anatomical outcomes and speech when comparing prostheses without an intramucosal retention system design [11]. However, reports about the oral functioning of patients treated with this relatively novel technique need to be improved, and there aren't reports associating obturator prosthesis with an intramucosal retention system. Therefore, this pilot clinical study aimed to compare masticatory performance, maximum bite force, EMG, and QoL in patients rehabilitated with an obturator prostheses before and after the installation intramucosal retention system. The hypothesis was that the intramucosal retention system would improve patients' masticatory efficiency and quality of life.



**Fig. 1** The shape and dimensions of zirconia intramucosal inserts according to Muchor (Dyna Dental Engineering, Hatsteren, The Netherlands) [10]

## Materials and methods

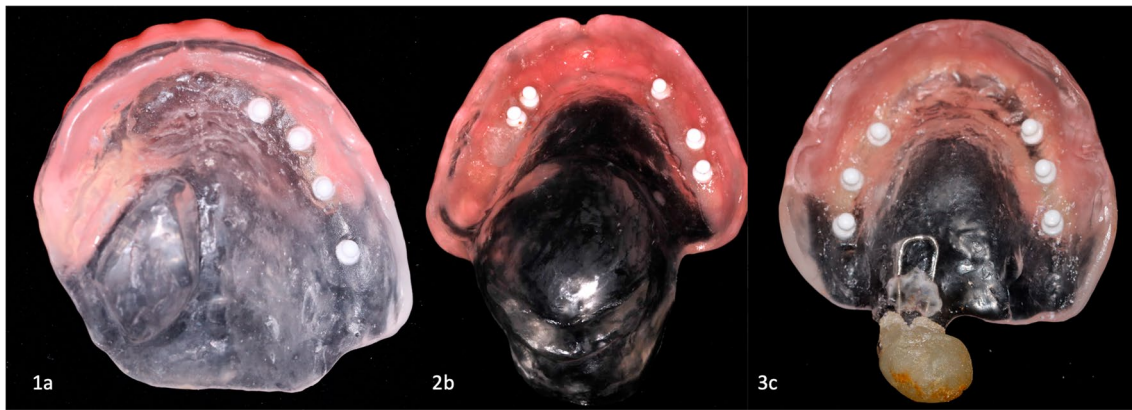
### Study design, ethical issues, and eligibility criteria

This cross-sectional study comprises individuals who were rehabilitated with an obturator prostheses with an intramucosal retention system (OPI). The study was approved by the Institutional Ethics Committee (No: 10473719.9.0000.5149) and the patient's identity remained anonymous in accordance with the Declaration of Helsinki.

Patients edentulous rehabilitated with a complete obturator prostheses were included in this study. Exclusion criteria were implants, cognitive impairment or the inability to understand. The obturator prostheses and lower conventional dentures were made following the rigorous clinical and laboratory protocol [23]. After 60 days of prostheses installation, the patients underwent surgery to install an intramucosal retention system.

### Clinical procedures

The zirconia buttons were planned using a CAD software program (Exocad). A monolithic zirconia buttons design was used an intramucosal system model that is no longer in the manufacturer's portfolio and, therefore, commercially unavailable, and buttons were fabricated out of presintered zirconia blocks (IPS, e.max ZIRCAD) by using a 5-axis milling machine (CORiTEC 550i; imes-icore) (Fig. 1). The mucosal measurement was performed by computed



**Fig. 2** The zirconia buttons were fixed on the obturator prosthesis in the places corresponding (n = 3)

tomography, altering the radiation dose to visualize soft tissue. A surgical guide was used for the perforations. Sites over 4 mm thick were selected to maintain a more than 1 mm gap between the insert (depth 3 mm) and the bone [9]. Once the inserts' depth and position were determined, the corresponding positions were transferred onto the denture with an indelible pencil. Then, the zirconia buttons were fixed on the complete obturator prosthesis in the places corresponding to the markings using maxi-cut drills and self-curing acrylic resin (Fig. 2).

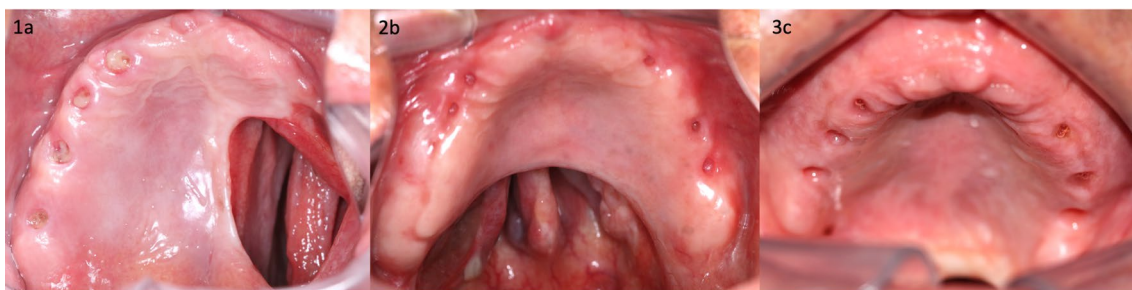
In the surgical phase, under local anesthesia, a number 801 spherical drill 3.0 mm diameter (Komet, Jet) with the approximate diameter of the zirconia block, under abundant irrigation with saline, in order to prepare the receptor sites of the retention system, was used to make the perforations in the mucosa on the alveolar ridge to house the intramucosal retention system (Fig. 3). The length of the active part of the cutter corresponds to the depth of the retention system's receptor site. After the preparation of the insert sites, the complete obturator prosthesis was inserted in the patient's mouth (Fig. 4). The prostheses were assessed for stability, tissue rebound, and regular occlusal contacts. The patients were instructed not to remove for three days and to have a soft diet, as removing

it can lead to mucosal scarring, requiring a repeat of the surgical procedure. On the third day after, the prostheses were removed and cleaned thoroughly. The insert sites were thoroughly flushed with saline, and the prostheses were re-inserted in the mouth. The patient was instructed to continue his soft diet, gradually progressing to a regular diet after seven days, and remove the prostheses only for cleaning. After 30 days of inserting the complete obturator prosthesis with an intramucosal retention system, this system was evaluated through EMG, bite force, and a QoL questionnaire application. The tests of EMG and bite force were repeated after 60 and 90.

### Experimental procedure for EMG and bite force

Electromyography and bite force data were collected in four sessions: after the complete obturator prosthesis was installed without the intramucosal system and thirty, sixty, and ninety days after the intramucosal retention system was installed in the prosthesis. The data were collected before and after installing the intramucosal system for quality of life.

The EMG signals were recorded in a device using eight channels with 16-bit resolution (New Miotool; Miotec)



**Fig. 3** The perforations in the mucosal on alveolar ridge to house the intramucosal retention system (n = 3)

with differential surfaces active electrodes. Software (Mio-tecSuite version 1.0.1108) was used to analyze and process muscle surface signals. A disposable double electrode for EMG monitoring made of polyethylene foam with medical adhesive, double Ag/AgCl contact, and low-impedance adherent hydrogel was used to record the electromyographic signals in each muscle. The electrodes were placed at exact points corresponding to the external location of the muscles whose electrical activity was measured: masseter (MM), temporalis (MT), and buccinator (MB) muscles, on both sides, during periods of rest and chewing. The electrodes were placed on the skin in the region of the belly of both the right (RM) and left masseters (LM) and on the skin in the anterior portion of the right (RT) and left temporalis muscle (LT) [22]. In the orbicularis muscles, the electrodes were positioned in the midline, superior (SO) and inferior (IO) to the vermilion of the lips. To record the activity of the right (RB) and left buccinator muscle (LB), the electrodes were positioned at the meeting point (angle of about 90°) from the vertical line, from the outer corner of the eye, with the horizontal line, parallel to the floor, from the labial commissure [20, 24]. EMG was performed under favorable environmental conditions, in accordance with previous studies [20, 24–26]. The value of the electromyographic signal was recorded in microvolts ( $\mu\text{V}$ ) per second [20, 22]. The efficiency of the masticatory cycle in the dynamic evaluations (chewing and speech) was analyzed through the integral of the envelope of the electromyographic signal. EMG recordings were performed in the following order: (1) MM and MT: activity was recorded at rest for 5 s; during habitual chewing of hard (3 g of peanuts) and soft (5 g of sliced banana) food for 10 s; (2) MB: activity was recorded at rest for 5 s; during habitual chewing of hard (3 g of peanuts) and soft (5 g of sliced banana) food for 10 s; (3) MB and MO: activity was recorded during the pronunciation of several words (sixty-six, Mississippi, frog, farofa, syrup, porridge, bread, banana, whale, hand, apple) for up to 50 s. The subject was instructed to pronounce each syllable slowly, and before pronouncing a new syllable, lightly seal the lips.

Bite force recordings were performed after electromyographic tests. Bite force was measured in the region of the right and left first molars and in the region of central incisors [21] using a digital dynamometer (DMD; Kratos Equipamentos Industriais Ltda, Cotia, São Paulo, Brazil) with a capacity of 15 mm and a capacity of 1000N, adapted for oral conditions and recorded at 30, 60 and 90 days after CIP installation. The device has a scale in N, a "set-zero" key that allows exact control of the values obtained, and a "peak" record, which facilitates reading the maximum force while obtaining the values. The patient was instructed to bite the transducer with maximum force for 10 s. The maximum bite force was recorded in N by recording the "peak" force

indicated on the screen for further analysis. The highest value recorded was considered the individual's maximum bite force.

### QoL assessment tool and satisfaction

The University of Washington Quality of Life Questionnaire (UW-QoL), a self-administered instrument, consists of 12 items related to everyday issues for individuals with head and neck cancer [27]. The scores can range 0 to 100, and higher scores are indicative of better QoL, following a 4-point ordinal response format, i.e., "no", "little", "moderate", "very/extreme". The instrument has been translated into Portuguese, with validation for the Brazilian population [27].

The Obturator Functional Scale (OFS) scale consists of 15 questions assessing eating and speech problems in obturator device users and their satisfaction with lip position and esthetics, in addition to a question about dryness of mouth [28]. The answer to each question was evaluated on a numerical value from 0 to 100. A score of 100 indicates that the patient is asymptomatic or extremely satisfied in the respective domain, and a score of 0 indicates maximum distress or dissatisfaction. Item 11 was not evaluated because prosthetic rehabilitation does not include removable partial dentures with the presence of clasps. The scores can range 0 to 100, and higher scores are indicative of better QoL, following a 4-point ordinal response format, i.e., "no", "little difficulty/difference/dissatisfaction", "moderate difficulty/difference/dissatisfaction", "very/extreme difficulty/difference/dissatisfaction" [28].

The questionnaires were applied as an interview, always by the same researcher (MCA at two different time points: before and after the installation of the intramucosal retention system.

## Results

The patient's demographics and treatment details are presented in Table 1. The bite force values remained increased in the first molars region, mainly in 60 days of obturator prosthesis use (Fig. 4). It is possible to notice an improvement after the surgery. The results varied according to the region where there was loss of supporting bone structure due to surgery to remove the tumor. Regarding EMG values, there was variation in the results both in chewing soft and hard foods and in speaking in all muscle groups (Table 2).

The items related to the appearance and taste mood of the UW-QoL questionnaire after the installation of the OPI in all evaluated periods, patients report improvement (Table 3). For P1, taste and saliva improved; P2 improved shoulder and mood, but activity and pain were worse; P3 improved

**Table 1** Clinicodemographic profile of individuals (n = 3) rehabilitated with complete obturator prosthesis with an intramucosal retention system (OPI)

Variables	n
Sex	
Male	3
Female	0
Ethnicity	
White	2
Black	1
Age	
40–59	2
60–69	1
Material status	
Married	2
Single	1
Oral diagnosis	
Squamous cell carcinoma	2
Ameloblastoma	1
Radiotherapy	
No	1
Yes	2

swallowing, speech, shoulder, and taste, but saliva worse. There was improvement and stability in some domains of analysis when observing patient satisfaction before and after installing the intramucosal retention system in the obturator prosthesis. Most OFS questionnaire data responses indicated that patients showed improvements regarding liquid food intake and dry mouth after obturator prosthesis installation for all periods evaluated. P1 taste, eating, and speech improved; P2 improved his shoulder, swallowing liquids and pronouncing words; P3 improved swallowing, shoulder, and taste, but eating and speech were worse (Table 4).

## Discussion

This study identified a significant improvement in patients' QoL and OPI functionality, accompanied by a progressive increase in bite force values as a function on time. Based on the findings of this study, the hypothesis is that the

intramucosal retention system would improve chewing efficiency and quality of life in this group of patients who use OPI prostheses was accepted. Further studies on the topic are encouraged.

The relationship between the prevalence of oral neoplasms according to sex is well clarified in the literature. The most common diagnosis of SCC (66.66%) in our study shows a higher prevalence in the literature for males, as they are more exposed to risk factors [2, 3]. Maxillary defects after maxillectomy can result in damage to chewing, swallowing, speech, and respiratory dysfunctions, seriously affecting the patient's quality of life [6, 21, 22]. Thus, maxilla reconstruction is considered after maxillectomy to minimize and restore oral function and maintain psychological receptivity [21]. The obturator prostheses for maxillary defects have an option for rehabilitation, but retention, stability, and support are a big challenge [6].

The installation of an intramucosal retention system was suggested by Hans Nordgren and developed by Gustav Dahl [11] at the end of the first half of the twentieth century. Dahl (1966) [11] reported using mushroom-shaped stainless steel or chrome-cobalt alloy inserts with sizes proportional to the thickness of the mucosa, thereby facilitating their insertion and improving denture retention. Histologically, it has been documented that the tissue in contact with the inserts becomes keratinized and is not painful (may or may not show mild inflammation) [10]. Zirconia used as the intramucosal insert material has been documented to be biocompatible and have a favorable soft tissue response. The technique described here is simple and fast that can be used to customize the insert depth to the patient's existing soft tissue thickness.

The intramucosal retention system is an alternative method to the bone implant for those edentulous patients in regions where they received radiotherapy. As a therapeutic agent, ionizing radiation hinders the multiplication of cells with high mitotic development, causing oral alterations, including osteoradionecrosis [29]. Obturator prostheses with an intramucosal retention system are a safe, effective, and minimally invasive way to bring greater comfort and stability to the oral rehabilitation of these patients. The surgery to create the retention is low complexity. However, the patient's physician was asked



**Fig. 4** Obturator prostheses with intramucosal retention system installed in patient's mouth (n = 3)

**Table 2** Results of the Electromyography tests of individuals (n=3), both in chewing soft and hard foods and speaking, in all muscle groups (µV)

Period													
Condition	Side/ Muscle	Before surgery			30 days			60 days			90 days		
		P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3
Soft food	RT	20.82	29.96	10.76	16.44	25.70	14.04	17.17	44.21	11.98	21.38	45.53	9.25
	LT	16.29	12.19	12.08	22.41	13.92	13.25	28.16	19.55	10.74	36.11	10.28	8.02
	RM	19.87	26.13	24.92	31.13	28.46	30.23	9.28	21.71	23.43	9.36	22.16	20.30
	LM	9.79	287.01	18.28	25.26	79.16	16.96	19.31	134.54	15.33	18.69	15.22	11.57
	RB	28.88	22.57	18.10	9.97	19.70	24.95	13.12	23.93	25.63	10.86	18.23	21.70
	LB	12.97	21.99	16.26	17.57	16.96	16.45	23.55	14.88	14.71	18.39	10.24	12.94
	SO	-	-	-	-	-	-	-	-	-	-	-	-
	IO	-	-	-	-	-	-	-	-	-	-	-	-
Hard food	RT	24.68	31.98	10.82	20.53	20.71	15.12	40.48	50.60	9.77	31.82	23.38	13.18
	LT	25.68	12.15	20.63	17.88	11.88	16.17	37.68	19.71	12.36	58.14	9.07	15.35
	RM	61.43	29.20	26.03	32.92	30.03	38.13	14.27	145.41	18.92	12.45	13.02	16.36
	LM	23.96	312.2	21.78	19.42	82.17	18.93	26.38	35.38	12.60	28.71	15.75	20.80
	RB	43.92	29.02	16.32	17.81	22.35	26.34	12.50	41.26	27.35	13.01	17.48	45.47
	LB	28.56	16.79	9.41	21.78	13.19	18.57	25.13	10.48	21.68	22.30	11.86	22.33
	SO	-	-	-	-	-	-	-	-	-	-	-	-
	IO	-	-	-	-	-	-	-	-	-	-	-	-
Speaks	RT	-	-	-	-	-	-	-	-	-	-	-	-
	LT	-	-	-	-	-	-	-	-	-	-	-	-
	RM	-	-	-	-	-	-	-	-	-	-	-	-
	LM	-	-	-	-	-	-	-	-	-	-	-	-
	RB	22.93	8.79	20.69	8.84	13.22	26.05	9.46	45.84	26.66	11.76	11.66	30.15
	LB	11.15	10.39	13.68	14.91	12.95	23.22	12.18	12.20	18.68	12.58	9.47	17.63
	SO	1628.37	17.44	10.66	12.47	83.01	16.77	9.94	20.53	23.92	10.95	22.16	15.81
	IO	45.47	76.71	39.45	18.81	115.29	51.25	22.19	57.65	57.09	21.31	23.38	48.58

RT, temporal right; LT, left temporal; RM, right masseter; LM, left masseter; RB, right buccinator; LB, left buccinator; SO, superior orbicularis; IO, inferior orbicularis

**Table 3** Results of the University of Washington Quality of Life Questionnaire (UW-QoL) applied to individuals (n=3) rehabilitated with a complete obturator prosthesis before and after installation an intramucosal retention system

Domain	Quality of Life					
	Before surgery			After surgery		
	P1	P2	P3	P1	P2	P3
Pain	75	100	100	75	75	100
Appearance	100	100	100	100	100	100
Activity	100	100	100	100	75	100
Recreation	100	75	100	100	75	100
Swallowing	100	33	33	100	33	100
Chewing	100	50	50	100	50	50
Speaks	100	67	67	100	67	0
Shoulder	100	0	33	100	33	100
Taste	67	100	33	100	100	100
Saliva	67	33	33	100	33	0
Mood	100	25	100	100	75	100
Anxiety	100	67	100	100	67	100

Outcome scale from 0 to 100 for symptoms, a higher score represents fewer symptoms and consequent improvement in quality of life

**Table 4** Results of the Obturator Functional Scale (OFS) applied to individuals (n = 3) rehabilitated with a complete obturator prosthesis before and after installation an intramucosal retention system

Obturator Functional Scale		Before surgery			After surgery		
Subscale		P1	P2	P3	P1	P2	P3
A – eating problems	Chew food	Little difficulty	Moderate difficulty	Little difficulty	No difficulty	Moderate difficulty	Much difficulty
	Swallow liquids	No difficulty	Moderate difficulty	Little difficulty	No difficulty	Little difficulty	Little difficulty
	Swallow food	No difficulty	Little difficulty	Much difficulty	No difficulty	Much difficulty	Much difficulty
B – problems speech	Voice difference	No difficulty	Little difficulty	Little difficulty	No difficulty	Moderate difficulty	Much difficulty
	Speak in public	No difficulty	Little difficulty	Much difficulty	No difficulty	Moderate difficulty	Much difficulty
	Nasal speech	No difficulty	Little difficulty	Little difficulty	No difficulty	Little difficulty	Much difficulty
	Pronounce words	No difficulty	Little difficulty	Little difficulty	No difficulty	No difficulty	Much difficulty
C – Other problems	People understand	No difficulty	Little difficulty	Little difficulty	No difficulty	Moderate difficulty	Much difficulty
	Dry mouth	No difficulty	Little difficulty	Much difficulty	No difficulty	Much difficulty	Much difficulty
	Appearance	No difficulty	No difficulty	No difficulty	No difficulty	No difficulty	No difficulty
	Numb upper lip	No difficulty	No difficulty	Little difficulty	No difficulty	No difficulty	Little difficulty
	Social events	Little difficulty	Moderate difficulty	No difficulty	No difficulty	Moderate difficulty	No difficulty
	Insert the obturator	No difficulty	Moderate difficulty	No difficulty	No difficulty	No difficulty	Little difficulty
	Weird upper lip	No difficulty	Moderate difficulty	No difficulty	No difficulty	No difficulty	Little difficulty

Outcome scale from 0 to 100 for symptoms, a higher score represents fewer symptoms and consequent improvement in quality of life

about the surgical risk due to the patient profile included in our study. After surgery, the patient's cooperation is necessary since the obturator prosthesis must be perfectly fitted to the newly operated mucosa so that healing occurs surrounding the intramucosal retention system to have the most excellent possible stability. It is a delicate and decisive step for the success of the treatment, as it can cause discomfort to the patient when inserting the obturator prosthesis in a healing region so that the mucosa surrounds the retention system. If the patient does not adapt to the obturator prosthesis with an intramucosal retention system, we can reverse the entire procedure by removing the retentions. The patient's mucosa returns to normal within a few weeks.

There are several methods for analyzing masticatory efficiency in scientific research. Among them, the masticatory efficiency test consists of chewing natural foods. After chewing, the final grinding product is collected and analyzed with sieves of different diameters [17, 20, 28]. The evaluation of chewing activity can also be done by applying subjective tests where participants are instructed to assign scores to report on chewing. Electromyography is also a widely used method to assess the efficiency of the masticatory muscles [19, 22]. Monitoring muscle activity through electromyography (EMG) is an irreplaceable

way to verify the physiological conditions of the muscular system [24]. Surface electromyography is currently a part of the evaluation that quantifies the function of the masticatory muscles of patients in dentistry [21]. This test presents itself as a safe, easy, and non-invasive method that allows the objective quantification of the studied muscle energy [24]. There was variation in the activity of muscle contraction in the moments of chewing soft foods, hard foods and speaking throughout the test period in the three patients, demonstrating the change in the adaptation of the use of the intramucosal retention system fixed in the obturator prostheses by the patient and the better distribution of force over time. These variations are also related to the region where the maxillary defect is located and the distribution of the intramucosal retention system in the prosthesis area. We believe that the variation in the results of the electromyography test alterations may be related to two factors, such as the patient's difficulty in adapting to the intramucosal retention system at first after surgery to open the holes in the mucosa since healing does not occur immediately; and the redistribution of forces during chewing, since the intramucosal retention system brings more stability to the prosthesis, allowing the patient to be more comfortable when masticating and speaking.

One of the main factors that can influence the masticatory process is the occlusal force during chewing, in addition to the lateralizations and occlusal contacts that an individual presents [18, 30]. Poor chewing can change the choice of foods selected to make up an individual's diet, negatively influencing their health and leading to pathological conditions such as malnutrition. When analyzing the bite force test, there was an increase in force over time, followed by stabilization. The intramucosal retention system aims to stabilize the obturator prosthesis, making the patient more confident in the chewing movement. The hypothesis is that there was a muscle re-education for the new situation in which the patient finds himself. The stability brought by the prosthesis is mainly responsible for the improvement in bite force. Although this study did not use the same bite force measurement method as previous studies, the bite force values were lower than the average values reported for patients wearing conventional complete dentures [15].

Systemic health and the patient's oral health can influence the measurement and perception of QoL [6]. In the present study, patients reported improvement in food swallowing; they felt the taste of food again, there was an improvement in pain in the shoulder region, and also an improvement in mood. Because it is a subjective perception, the OIP improved the quality of life of these patients. Based on the results of clinical tests results, intramucosal retention system provide adequate patient retention and stability of the obturator prosthesis and comfort to the patients.

## Conclusions

Limitations of this study concern a relatively small sample evaluated, but arguably with a longitudinal design contemplating the dynamics of chewing and the perceptions of maxilectomized and rehabilitated adults with OPI. Based on the findings of the present study, the rehabilitative capacity improves masticatory efficiency and QoL in adults maxilectomized and rehabilitated with OIP analysis in the study. Masticatory efficiency, bite force, and QoL underscored the significance of careful consideration when selecting the appropriate oral rehabilitation. Further clinical studies should be encouraged to determine the effectiveness of this retentive system.

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## Declarations

**Competing interests** The authors declare no competing interests.

**Ethical approval** Approved by institucional Ethics Committee.

**Informed consent** Obtained.

**Conflict of interests** The authors declare that they have no conflict of interest.

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