

## RETENTION AND QUALITY OF LIFE OF DIFFERENT MANUFACTURING TECHNIQUES OF PALATAL OBTURATOR FOR ACQUIRED PALATAL DEFECT IN TREATMENT OF POST COVID-19 ASSOCIATED MUCORMYCOSIS (CAM)

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### ABSTRACT

**Introduction:** In Egypt mucormycosis post COVID-19 recovery affected mainly patients on steroid therapy & uncontrolled diabetes. Maxillary defect after fungal debridement required a proper prosthetic rehabilitation with properly designed obturator which can be assessed by obturator function scale

**The aim of this study** was to evaluate the quality of life and retention evaluation of two different manufacturing techniques of palatal obturator for acquired palatal defect in treatment of post COVID-19 Associated Mucormycosis (CAM)

**Materials and methods:** For each of twelve patients enrolled in this study, two CoCr alloy frameworks were constructed by two different manufacturing techniques: conventional lost wax tech (group I) and selective laser melting printing technique SLM (group II). Retention was evaluated for both obturators at delivery using digital force gauge. Patient satisfaction was evaluated for both groups after 1 month usage of each obturator with two weeks gap in between by Obturator Functioning Scale (OFS). Data were collected & statistically analyzed to compare both groups by independent t-test, the p-value was considered significant at the level of <0.05.

**Results:** The two studied groups showed statistically insignificant difference in retention but highly statistically significant in OFS where group (II) showed high improvement in obturation function with 100%-75% than group (I).

**Conclusion:** The (SLM) for fabrication of palatal obturator of acquired palatal defect in treatment of post (CAM) provided a better quality of life than those fabricated with conventional lost wax technique. Retention of obturator fabricated with SLM showed no difference from those fabricated with conventional lost wax technique

**KEY WORDS:** Mucormycosis, 3D printing, framework retention, conventional lost wax technique, Obturator Functioning Scale, Acquired palatal defect.

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## INTRODUCTION

The evolution of severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) appeared in 2019 leading to a worldwide breakthrough pandemic. <sup>(1,2)</sup> COVID-19 patients reported to have numerous signs and symptoms combined with immune-suppression attributed to an impaired cell mediated immune response along with the acute respiratory distress syndromes (ARDS) <sup>(3)</sup>. This caused in an extensive spectrum of bacterial and fungal infections, in conjunction with chronic diseases as diabetes mellitus, lung diseases, tumors, or even may be developed as a hospital acquired infection as ventilator-associated pneumonia. <sup>(4-6)</sup>

Mucormycosis is an uncommon fungal infection caused by various species of mucorales that directly affect the immunocompromised patients leading to a life-threatening situation with high mortality rate that can reach up to 50% of cases <sup>(7,8)</sup>. Mucormycosis most frequently occurs in patients with hematological disorders especially malignancies, diabetes mellitus or patients treated with steroids. <sup>(9-12)</sup> It might be transmitted through unsterilized oxygen lines and ventilators or even hospital bed linen <sup>(13)</sup>. The inhaled spores can form hyphae that attack the paranasal sinuses and spread further through anatomical sites and blood circulation within the skull triggering rhino-orbital or rhino-cerebral infection <sup>(14)</sup>

A resurrection of the fungal infection has been documented during the pandemic, either in parallel or after the recovery from the viral infection, mitigating what's known as: COVID-associated mucormycosis (CAM). <sup>(15)</sup> The precise correlation between the fungal and viral infection remains blurred, but the most common theory necessitates that the unintentional use of corticosteroids in treatment of the viral infection in an immune-compromised patients, particularly those with uncontrolled diabetics can play a major role. <sup>(16)</sup> Another possible hypothesis is that the combination of biochemical modifications caused by the viral infection, including elevated ferritin levels, acidosis,

and acute cortisol stress response with raised serum glucose levels, can create the ideal environment for the evolution and spread of the fungal infection. <sup>(17,18)</sup>

Although early diagnosis is a key factor, the fungal infection can proliferate rapidly gaining access to the mucous membranes and invade the blood circulation leading to vascular thrombosis and subsequent necrosis, ulceration and underlying bony destruction. <sup>(19)</sup> The surgical intervention to terminate the propagation of infection to the vital organs of the body is inevitable. In general, the surgical resection can be destructive creating oral, orbital or even facial defects. This demands proper prosthodontic rehabilitation with obturator for the resected site to re-establish the patient's quality of life. <sup>(20)</sup>

Although most of these CAM cases have been described and reported from India. <sup>(21)</sup> Further regions have documented the presence of spikes in the fungal infection levels during the pandemic, including Egypt <sup>(22)</sup> Chile <sup>(23)</sup> and Iran. <sup>(24)</sup>

Retention and stability of maxillofacial prosthesis is prime concern as distal most abutment near the defect has more rotational forces which leads to dislodgement of obturator. Designing of obturator must be done carefully as preservation of what left after surgery is prime concern to the prosthodontist. <sup>(25)</sup>

Quality of health is a subjective, phenomenological, multidimensional built up based on individual's internal frame of reference. Patients who undergo maxillectomy as line of treatment for CAM as those treated post tumor resection always concerned with quality of life (QoL) expected post resection. <sup>(26)</sup>

A well-designed constructed obturator should have a positive impact on an individual's QoL. Rehabilitation of hemi maxillectomy cases tends to improve oral health-related quality of life [OHRQoL] but not all of the patients accept the obturator as a line of treatment and also the obturator misfits may contribute to their rejection. Subjective function of the obturator can be assessed

by Obturator Functioning Scale (OFS) which is the most frequently used tool to assess the health-related quality of life (HRQOL) The scale was established by Memorial Sloan Kettering Cancer Center (New York, NY, USA) as a means of assessing self-reported functioning of an obturator.<sup>(27-29)</sup>

Kornblith et al.<sup>(30)</sup> established the OFS to assess eating ability, speech, and cosmetic satisfaction. It consists of 15 questions to assess the patient's capability to eat and speak with obturator prosthesis and their satisfaction with the restoration of lip position and its aesthetic effects. All items were rated on a 5-point Likert scale.<sup>(26)</sup>

The aim of this study was to evaluate the retention and quality of life for palatal obturator of acquired palatal defect in treatment of post COVID-19 Associated Mucormycosis (CAM) constructed by two different methods, conventional lost wax technique and selective laser melting printing technique (SLM).

## MATERIALS AND METHODS

### A. Patients' selection

Twelve patients, 7 males and 5 females with age ranged between 45-65 years old were selected in this study from outpatient clinic of Prosthodontic Department of Future University in Egypt and Oral and Maxillofacial Prosthodontics Department Faculty of Dentistry Ain Shams University. The inclusion criteria were patients with diabetes mellitus disease with acquired palatal defects due to maxillary resection and total recovery from COVID-19 Associated Mucormycosis (CAM). The rehabilitation included the construction of definitive obturator that was done at least three months after the surgical intervention. The palatal defects were classified according to class I and II Aramany's Classification<sup>(25)</sup> where Class I resection was performed in the anterior midline of the maxilla, with abutment teeth present on one side of the arch. Class II where the defect was unilateral and

retaining the teeth on the opposite side. All patients involved in the study had adequate mouth opening, full opposing mandibular dentate and no facial scarring or disfigurement. The exclusion criteria for the study included patients with pre-existing congenital cleft defects or traumatic acquired defects from wound or gun shots and malignancies. All participants instructed to follow a restricted oral hygiene measures. Patients were clearly informed about the study and each patient has signed a written informed consent form. The faculty's ethics committee approved the research protocol (FUE. REC No. (23)/9-2022) by the end of the study only eight patients (four males and four females) completed the study. Unfortunately, two patients deceased and another two had CAM recurrency.

### Construction of obturator

#### B 1- Clinical procedures

Primary impression in an appropriate stock tray was taken for the upper and lower jaws with irreversible hydrocolloid impression material (Alginmax, Major Prodotti. Dentari SPA. Moncalieri. Italy) after blocking all undesirable undercuts of the defect using small pieces of vaselinezed gauze. A definitive hollowed closed bulb obturator was designed following the design principles given by Aramany's for Class I-II maxillary defects considering stability, retention and load distribution by the application of tripod principal.

Mouth preparation following the planned design was made in patient's mouth including all occlusal rests and planned guiding planes. Using rubber base impression material (Impregum F, Polyether impression material medium consistency, ESPE, Germany) with proper special tray for final maxillary impression that assured maximum distribution of forces to all available teeth, remaining hard palate, lateral walls of the defect and remaining alveolus was made fig (1). Finally the master cast was obtained by using hard stone. (Ultra rock; Kalabhai, India).

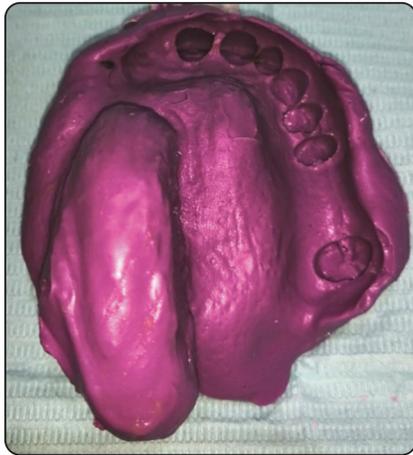


Fig. (1) Final maxillary impression

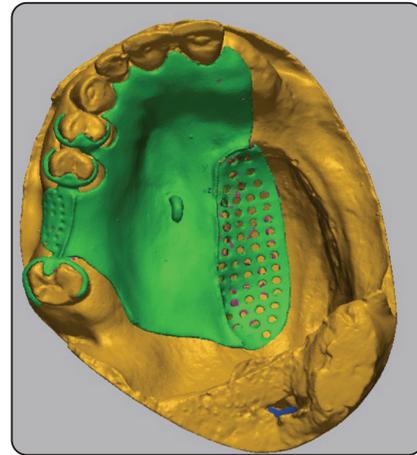


Fig. (2) Virtual geometric centre site

### **B 2- Digital designing and grouping**

Desktop scanner was used to scan the master cast which was fixed on the scanner table and scanned using 3Shape D850 scanner (D850, 3Shape, Copenhagen, Denmark). The STL files were imported, and the 3Shape software program (3Shape dental designer, 3Shape A/S, Copenhagen, Denmark) was used to design the partial denture framework. The software constructed a meshwork design for a framework to control the angulation of the cast, to determine the insertion and removal direction and to measure the available undercut.

### **B 3-Determination of the geometrical center of maxillary framework**

The STL file of partial denture framework was converted to OBJ and imported to a 3D computer graphics software (Autodesk 3ds Max, Autodesk Media and Entertainment, USA) to determine framework geometrical center. 3D MAX software manipulated the 3D image till it became horizontal and geometrical center was automatically detected. A metal hooked shape was inserted to coincide with the center without projecting from the fitting surface of the major connector of the designed framework. A new STL file of the modified framework was exported from the software for manufacturing purpose. Fig(2)

Two frameworks were constructed for each patient by two different manufacturing techniques following the planned design. First manufacturing technique fabricated with conventional lost wax tech (group I) while the second manufacturing method (group II) fabricated by selective laser melting printing technique (SLM)

### **C- Fabrication of final obturator**

Sixteen frameworks were finished, polished and tried in the patients' mouth to check the adaptation and fit. Maxillomandibular jaw relationship was recorded using wax wafer technique. Teeth setting were done and wax try-in was performed. Heat cured acrylic resin (Vertex Regular and Vertex Implacryl, Vertex Dental B.V., Zeist, The Netherlands) was used for processing of the waxed-up obturators. Both obturators were delivered to each patient by the following manner.

First, patients were given the obturator fabricated with conventional technique to be used for four weeks followed by two weeks gap period. Later, the second obturator fabricated with SLM technique was given to patient for another four weeks.

### **D- Evaluation of retention of final obturator**

Retention was evaluated for both obturators at delivery session where a metallic ring was attached

to the hook on the outer surface of the obturator at the position of geometric center. A digital force gauge (HF-100 Digital Push Pull Gauge Force Gauge HF-100N) was used to measure retention, it was prepared by choosing the measurement unit in Newtons and the peak hold option was selected. The desired adapter tension hook was attached to the sensing head and the display was adjusted to zero through the zero button before taking each measurement.

The obturator was inserted in the patient mouth and kept intra orally for 5 min for settling before the metallic ring was engaged to the central hook. Patient was seated in upright position with relaxed lip where the palate and maxillary ridge were at nearly 45 degree to the floor. Dislodging force was applied to the obturator until it was forced out of its position. Retention force was considered as the maximum force needed to completely dislodge the denture. The measurements was repeated 5 times at 5 min intervals for each obturator and average value was recorded. Fig(3)



Fig. (3) Retention measured at delivery with digital force gauge

#### ***E-Obturator Functioning Scale and patient satisfaction.***

Patient satisfaction was evaluated four weeks post delivery for each group (I) and (II) separately with intermediate gap two weeks in between.

The functioning of the obturator was assessed through Obturator functioning Scale through a validated questionnaire. The questionnaire was given to the patients in Arabic to obtain relevant data for assessment .It included five domains: functional complaints, overall masticatory ability, masticatory ability for different types of food, effect on mental and daily life and overall denture satisfaction.

The obturator functioning scale was assessed in 1-15 questions in terms of no difficulty on a 5-point Likert Scale. Points 1 represent “not at all difficult” and point 2 stood for “a little difficult”. Point 1 and 2 were considered as “No Difficulty” on the scale. Points 3, stood for ‘somewhat difficult’, point 4 for ‘very much difficult’ and point 5 for ‘extremely difficult’ and point 3, 4, and 5 were considered as ‘Difficulty’ table (1). The questions included in the questionnaire .

Q1-Difficulty in chewing,

Q-2 Xerostomia (Dry Mouth),

Q-3 Leakage while swallowing of food,

Q-4 Numbness of the upper lip,

Q-5 Patient avoids going in family and social events and functions. (Avoidance of social activities)

Q-6 Difficulty in inserting the obturator

Q-7 Difficulty in pronouncing words

Q-8 Difficulty in talking in public

Q-9 Speech difficult to understand (Improper pronunciation)

Q-10 Difficulty in talking on the phone

Q-11 Nasal speech (Hyper nasal voice)

Q-12 Voice different from before and after the surgery (Voice changes pre and post surgical)

Q-13 Funny looking upper lip. (Facial disfigurement)

Q-14 Dissatisfaction with outlooks

Q-15 Noticeable clasp of obturator on front teeth. (Metallic display of obturator)

TABLE (1) Questionnaire was given to the patients in arabic native language

	Question	ANSWER 1	ANSWER 2	ANSWER 3	ANSWER 4	ANSWER 5
1	Difficulty in chewing,					
2	Xerostomia (Dry Mouth),					
3	Leakage while swallowing of food,					
4	Numbness of the upper lip,					
5	Patient avoids going in family and social events and functions. (Avoidance of social activities)					
6	Difficulty in inserting the obturator					
7	Difficulty in pronouncing words					
8	Difficulty in talking in public					
9	Speech difficult to understand (Improper pronunciation)					
10	Difficulty in talking on the phone					
11	Nasal speech (Hyper nasal voice)					
12	Voice different from before and after the surgery (Voice changes pre and post surgical)					
13	Funny looking upper lip. (Facial disfigurement)					
14	Dissatisfaction with outlooks					
15	Noticeable clasp of obturator on front teeth. (Metalic display of obturator)					

**Statistical methodology**

Data were collected, revised, coded, and entered to the Statistical Package for Social Science (IBM SPSS) version 23. The quantitative data were presented as mean, standard deviations and ranges when parametric. Also, qualitative variables were presented as number and percentages. The comparison between groups with qualitative data was done by using Chi-square test. The comparison between two groups with quantitative data and parametric distribution were done by using Independent t-test. The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant at the level of <0.05.

**RESULTS**

**Section A : Retention**

A statistically insignificant increase (P>0.05) was observed in the mean of retention of obturator fabricated in group (I) by conventional lost wax technique compared to those fabricated in group (II) by selective laser melting printing technique (SLM) as shown in table (2),fig (4)

TAB(2) Mean values, SD and Independent t-test of retention for the studied groups p>0.05: Non significant (ns)

Retention	Group I No. = 8	Group II No. = 8	Test value	P-value	Sig.
Mean±SD	3.96 ± 1.31	5.14 ± 1.25	1.835•	0.088	NS
Range	2.1 – 5.8	3.8 – 7.5			

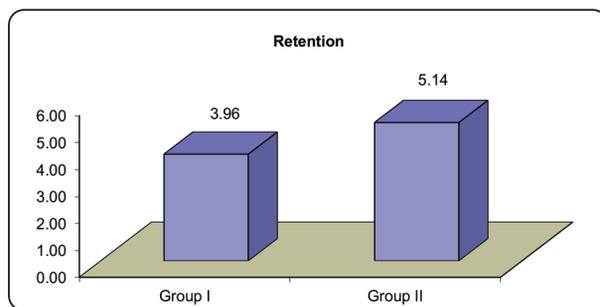


Fig. (4) Chart bar showing change in mean of retention in group I & II

### Section B: Patient satisfaction

As showed in table (3) and fig (5), all patients in both groups were satisfied with their prostheses regarding family socialization and going to events, no Difficulty in pronunciation of difficult words , no Difficulty in talking on the phone, no Funny looking of the upper lip, no weird look or dissatisfaction with look and no nasal speaking. However, the obturator fabricated in group (II) by selective laser melting printing technique (SLM) showed high satisfaction regarding no difficulty in

chewing food, no difficulty in public speaking, no change in voice before and after surgery, no leakage during swallowing, no difficult during insertion of obturation and no noticeable clasp of obturator on front teeth. Obturator fabricated in group (I) by conventional lost wax technique showed high unsatisfaction regarding difficulty in chewing food, xerostomia, leakage during swallowing, difficult during insertion of obturation, difficult talking in public, change in voice before and after surgery and noticeable clasp of obturator on front teeth.

TAB (3) The questions included in the questionnaire compared between two studied groups

Question (?)	Group I	Group II	Test value	P-value	Sig.
Difficulty in chewing food	7 (87.5%)	1 (12.5%)	9.000	0.003	HS
	1 (12.5%)	7 (87.5%)			
Xerostomia (dry mouth)	6 (75.0%)	2 (25.0%)	4.000	0.046	S
	2 (25.0%)	6 (75.0%)			
Leakage during swallowing food	5 (62.5%)	1 (12.5%)	4.267	0.039	S
	3 (37.5%)	7 (87.5%)			
Numbness in the upper lip	0 (0.0%)	0 (0.0%)	NA	NA	NA
	8 (100.0%)	8 (100.0%)			
Patients avoid going in family and social events and functions	3 (37.5%)	1 (12.5%)	1.333	0.248	NS
	5 (62.5%)	7 (87.5%)			
Faces difficulties while inserting an obturator	6 (75.0%)	1 (12.5%)	6.349	0.012	S
	2 (25.0%)	7 (87.5%)			
Difficulty during talking in public	7 (87.5%)	1 (12.5%)	9.000	0.003	HS
	1 (12.5%)	7 (87.5%)			
Difficulty in pronouncing different words	4 (50.0%)	3 (37.5%)	0.254	0.614	NS
	4 (50.0%)	5 (62.5%)			
Speech difficult to understand	6 (75.0%)	1 (12.5%)	6.349	0.012	S
	2 (25.0%)	7 (87.5%)			
Difficulty in talking on the phone	4 (50.0%)	2 (25.0%)	1.067	0.302	NS
	4 (50.0%)	6 (75.0%)			
Nasal speech	4 (50.0%)	1 (12.5%)	2.618	0.106	NS
	4 (50.0%)	7 (87.5%)			
Change of voice before and after the surgery	8 (100.0%)	2 (25.0%)	9.600	0.002	HS
	0 (0.0%)	6 (75.0%)			
Funny looking of the upper lip	2 (25.0%)	0 (0.0%)	2.286	0.131	NS
	6 (75.0%)	8 (100.0%)			
Weird look or dissatisfaction with look	2 (25.0%)	1 (12.5%)	0.410	0.522	NS
	6 (75.0%)	7 (87.5%)			
The noticeable clasp of obturator on front teeth	7 (87.5%)	0 (0.0%)	12.444	0.000	HS
	1 (12.5%)	8 (100.0%)			

*P>0.05: non significant (NS); P<0.05: Significant (S); P <0.01: Highly significant (HS) \*: Chi-Square Test*

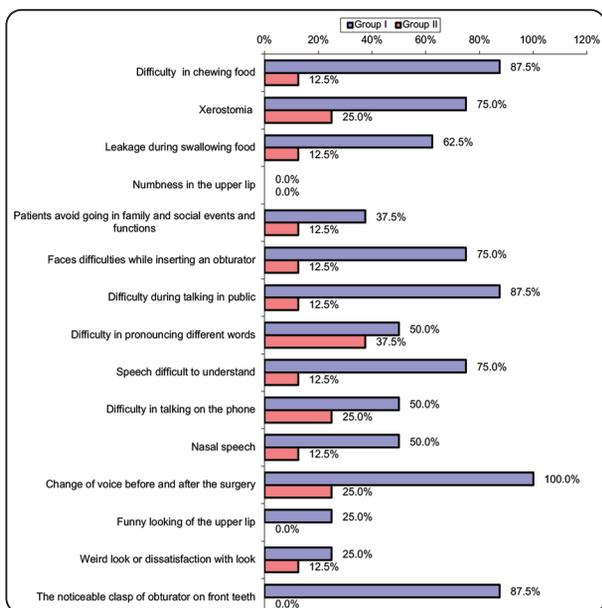


Fig. (5) chart bar showing answers of questions used in questions in two compared groups

## DISCUSSION

Mucormycosis is a rapidly progressive, life-threatening infection and considered the third most prevalent opportunistic fungal infection after candidiasis and aspergillosis. It was the first described by Paltauf in 1885<sup>(31)</sup>. Black fungus is the common name for mucormycosis that caused havoc in India during the catastrophic COVID-19 epidemic's second wave (between April and June 2021) by a fast and deadly surge with up to a 50% fatality rate. While the real reason for such a sharp rise during the second wave is still unknown, it has been discovered that patients with risk diseases as diabetics and immunocompromised who have recovered from COVID-19 infection are more susceptible to mucormycosis.<sup>(12)</sup>

In Egypt several studies reported the presence of CAM cases during the third pandemic wave. Fouad et al<sup>(20)</sup> reported that 96.2% of CAM cases where diabetic patients and 76.9% where patients had previous corticosteroid treatment. Uncontrolled diabetic patients with acquired palatal defects post-

surgical resection for the necrotic maxillary tissue due CAM were included in this study.<sup>(20)</sup>

Reconstruction of surgical acquired defect includes different treatment approach including prosthetic obturators, non-vascularised grafts and free tissue transfer. Abnormal oronasal or oroantral communication closure can be done by reconstructive surgery with surgical flap, but requires technical experience and possibility of donor morbidity at the flap harvest site and increased procedure time<sup>(25)</sup>

Limited cases were reported in literature review regarding treatment of mucormycosis and osteomyelitis in the maxilla for post COVID-19. A clinical report by El Charkawi H and El Sharkawy O<sup>(21)</sup> of virtual digital rehabilitation of two patients with post-COVID 19 pre surgical resection was reported. A rehabilitative mesh supporting the prosthesis was designed on a 3Ds printing skull reconstruction. The patients used the immediate prosthetic obturator post resection then it was replaced later by a delayed one.

The selection of proper reconstructive line of treatment differs from one case to another but still has the main target of proper sealing of the defect to prevent oronasal communication with restoring normal functions as speech, swallowing, mastication and finally facial appearance. Maxillofacial definite obturator gives an excellent simple noninvasive treatment protocol.<sup>(23-24)</sup> Metal framework obturator prosthesis provides longevity of the prosthesis and sensitive thermal conductivity of metal with less bulk and weight.<sup>(25)</sup>

Digital workflow has been employed recently into maxillofacial rehabilitation. Data acquisition is the first step in digital workflow with the use of intraoral scanners for digital-based planning regardless of whether conventional treatment modalities are later used for rehabilitation. However, it is required to use both cone beam computed tomography and three-dimensional (3D) printing to record the depth and dimension of defected areas in maxillary defects.<sup>(32, 33)</sup>

Park et al. compared the trueness of conventional impression technique and intra oral scanning. The study recommended that the stone cast from the conventional techniques express better details specially in the palatal area than the digital intra oral scanning impression technique. <sup>(34)</sup> The use of desk top scanners to scan master cast obtained from secondary impression was preferred in this study.

A successful obturator design is the basis for the proper function. Thus, the designing of this maxillary obturator was carefully carried out using the remaining palate and teeth to maximize retention, support, and stability. Moreover, when the defect is large and remaining dentition is compromised a challenge is evoked to ensure a better long-term prognosis. <sup>(35,36)</sup>

The definitive obturator composed of two parts , a metallic framework and an acrylic resin obturator bulb, and the defect in this study corresponded to Aramany's class I occurring in one-half of the palate. The metallic framework stabilizes anticipated cantilever forces along fulcrum line, whereas the remaining teeth and the palate provide stability for the prosthesis during mastication and speech <sup>(35)</sup>

Reducing the weight of the obturator by hollowing the bulb portion enhances the retention and stability of the obturator on the unsupported side. Hollowed obturator improves the cantilever mechanics of suspension and avoids torquing of the remaining supporting structures <sup>(35)</sup>

Alageel et al.<sup>(37)</sup> reported that retention in RPDs is commonly provided by clasp designed in a variety of forms (such as I-bar and circumferential clasp) and materials (such as wrought wire, cast metals, or acrylic resin). Frank et al.<sup>(38)</sup> stated that the retention of a clasp in an RPD should be between 3 and 7.5 N. However, this can vary according to the clasp form, location, undercut depth, composition, and guide planes. Accordingly, improvement of retention can be achieved by optimizing the shape, undercut depth, and fabrication process. <sup>(37)</sup>

The obturator clasps present with laser-sintering technology were reported to have better fatigue resistance and higher precision than cast clasps. Although group (II) (SLM) showed high retention value on digital force meter in comparison to group (I) by conventional lost wax technique. However, the Independent Samples T- Test in table (1) shows statistically insignificant difference between the two studied group with P. Value of increase ( $P > 0.05$ ). Such finding may be contributed to the limited number of clasping on the intact side and depth of defect that affect retention of the obturator. <sup>(37,39)</sup>

Schweiger et al <sup>(41)</sup> reported that the measured retentive force and the survival times after 65,000cycles of aging of the two groups conventional lost wax technique and selective laser melting printing technique (SLM) were 13.6 N and 15.7 N respectively .He concluded that SLM showed higher survival than conventional lost wax technique . <sup>(40, 41)</sup>

The Functional Obturator Scale was selected to measure the OHQRol due to its satisfactory reliability, validity and agreement with reported complaints in many languages. The Arabic version of the OFS seems to be a valid instrument and can be used efficiently in Arabic-speaking patients. The OFS has been used in numerous investigations allowing comparisons to be made more easily. <sup>(42-44)</sup>

The results of the present study showed that there were a high significant difference between group (I) & (II) . Where group (I) showed 87.5% difficulty in chewing, talking in public and insertion of obturator, 100% change in voice post-surgical procedure and 87.5% showed noticeable clasp of obturator on front teeth while in group (II) 87.5% showed no difficulty in chewing, talking in public and insertion of obturator, 75% no change in voice post-surgical and 100% showed no noticeable clasp of obturator on front teeth. While in socialization and general facial appearance both groups showed significant improvement which were in agreement with Ali et al<sup>(42)</sup> that mentioned that the rehabilitation of maxillary defects using obturator prosthesis which

is an appropriate, not invasive treatment option that improves quality of life. <sup>(26,42)</sup>

## CONCLUSION

Maxillofacial prosthodontist plays a critical role for early detection and reconstruction prosthetically for CAM patients post surgical. The selective laser melting printing technique (SLM) for fabrication of palatal obturator of acquired palatal defect in treatment of post (CAM) showed remarkable adaptation and fit on compared to those fabricated with conventional lost wax technique but not much difference regarding retention specially in maxillofacial cases obturators. Obturator functioning scale aids to provide a valuable mean in evaluating the patients' response to the functioning of the obturator. This can be concluded from this study that patients showed remarkable satisfaction with the obturator fabricated with SLM technique on compared to conventional lost wax technique specially with functional activity as swallowing, speaking in public and insertion of obturator easily. Within the limitation of this study obturator has significantly improved the quality of life and has a greater impact on CAM patient psychology after the maxillectomy in short term follow up. It is recommended for long term studies to evaluate the survival rate of two different technique of fabrication SLM & conventional lost wax technique.

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