

## Original article

### Articulation of speech of patients treated with radicular attachment assisted obturator following maxillectomy

Islam MS<sup>1</sup>, Chowdhury F<sup>2</sup>, Yazdi KS<sup>3</sup>, Azam MS<sup>4</sup>, Rahman MM<sup>5</sup>, Rahman SA<sup>6</sup>, J Nessa<sup>7</sup>

#### Abstract:

**Background:** Obturators are used to separate the oro-nasal opening. These improve speech and other oral functions as well as provide psychological support to the patients. Adding radicular attachments in an obturator makes more effective. **Objective:** To evaluate and compare the effectiveness of obturator with radicular attachment and conventional obturator in articulation of speech. **Materials and Methods:** Fifty patients, age ranged from 18 to 72 years, with maxillectomy defect were selected as the sample of the study. Among them 25 patients were treated with obturator with radicular attachment and another 25 patients were treated with conventional obturator. After insertion of obturator, data were collected on the basis of articulation of speech. **Results:** Patients treated with obturator with radicular attachment showed significantly better (P value <0.001) articulation of speech. **Conclusion:** Obturator with radicular attachment is more effective than conventional obturator.

**Key words:** maxillectomy; Obturator; radicular attachment; speech

DOI: <http://dx.doi.org/10.3329/bjms.v13i3.19152>

Bangladesh Journal of Medical Science Vol. 13 No. 03 July '14. Page: 298-301

#### Introduction

Maxillary defect may be congenital or acquired. Acquired maxillary defect are usually result from surgery or trauma<sup>1</sup>. Maxillary defect results in communication between the oral and nasal cavities<sup>2</sup>; that have serious problems as far the relationship between structures and functions: inability to chew, swallow, disorders in phonation, aesthetic and important psychological implications<sup>3</sup>. Obturator prosthesis is used for maxillary defective patients and can result in an improvement in speech, mastication, swallowing and aesthetic by closing the oro-nasal communication<sup>4</sup>. Palatal obturators may be used alone or in combination with plastic reconstructive surgery<sup>5</sup>.

It is a great challenge for dental surgeon to rehabilitate the patient with maxillectomy defects to re-establishing oro-nasal separation. In most patient

this goals are met by means of prosthetic rehabilitation with obturators, but in some cases, the prosthesis is usually non-retentive and non-stable<sup>6</sup>. To overcome these short comings, it could be improved by making the prosthesis as retentive and stable as possible. Conventional obturator may exert an unfavorable stress to the remaining tooth/teeth which may lead to inflammation to supporting tissue of abutments.

Attachment retained prosthesis are alternative to conventional clasp retained prosthesis<sup>7</sup>. An attachment consists of two functional units, one part incorporated into the abutment and another part, fixed into removable prosthesis.

Use of attachment(s) can have a dramatic effect on the stability and retention of the obturator prosthesis in partially edentulous maxillectomy patients<sup>6</sup>. Attachments combined with post-resection obturator are mostly used to improve retention but it is neces-

1. Dr. Md. Shahidul Islam, Asstt. Prof. & Head, Dept. of Prosthodontics, Rangpur Dental College & Hospital, Rangpur, Bangladesh
2. Dr. Farhana Chowdhury, Associate Professor and Head, Conservative Dentistry, Bangladesh Dental College.
3. Dr. Kazi Shagufa Yazdi, Assistant Professor, Paediatric dentistry, Bangladesh Dental College.
4. Dr. Md.Saiful Azam, Consultant- Dept of OMFS, BSMMU, Bangladesh
5. Dr. Md. Masudur Rahman, Assistant Professor-Prosthodontics, BSMMU
6. Dr. Syed Atiqur Rahman, Lecturer-Dental Unit, Sir Salimullah Medical College, Dhaka
7. Prof. Dr. Jebun Nessa, Professor & Head, Children and Preventive Dentistry, BSMMU

**Corresponds to:** Dr. Md. Shahidul Islam, Assistant Professor & Head, Dept. of Prosthodontics, Rangpur Dental College & Hospital, Rangpur, Bangladesh. E-mail: [smsshaheen0407@yahoo.com](mailto:smsshaheen0407@yahoo.com)

sary to compensate stress during mastication as well as to prevent food impaction into the defect. As the advancement of radicular attachments, the combination of ball and socket attachment, obturator may be beneficial for rehabilitation of partially edentulous maxillectomy patients.<sup>8</sup> Radicular attachments are simple connectors consisting of two parts. One part connects to the root of remaining tooth and the other part to the acrylic base over denture obturator<sup>9</sup>. Radicular attachment is readily available, easily fabricable, easy to use and economical. The placements of radicular attachments have an improved effect on the stability and retention of the obturator prosthesis in partially edentulous maxillectomy patients<sup>10</sup>.

The aim of this study was to evaluate and compare the effectiveness of obturators with radicular attachment and conventional obturators for the rehabilitation in term of speech of post-maxillectomy patients.

### Materials and methods

A prospective comparative study was carried out during the period of July'2008 to June'2011 in the department of prosthodontics, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. Fifty patients, based on following criteria- partial maxillectomy defect, partially dentate, periodontally sound remaining tooth/teeth, adult patients, at least 4 month after the maxillary surgery were taken as the subjects of the study. Patients with congenital maxillary defect, debilitated patients, extremely xerostomic patients, patients with restricted mouth opening, insufficient interarch space for placement of attachment and patients with other intraoral surgery along with maxillectomy were excluded from the study. Relevant data were collected at base line and in an every follow up visit according to parameter of articulation of Speech. The study was approved by ethical committee of Bangabandhu Sheikh Mujib Medical University (BSMMU)

*Articulation of Speech:* Speech of the respondents was categorized in to three groups like good, fair, and poor on the basis of *Listener Judgments*. Three healthy and sound listeners who were not involved in this prosthetic work listened to the patient's speech and rated the defectiveness and adequacy of speech. Their judgments were made on a 3 points scale such as - Grade I - Good, clear speech with no nasality, Grade II - Fair, speech with some nasality, Grade III - Poor, speech not clear at all<sup>11</sup>.

### Procedure:

Patients seating in the upright position, intraoral examination were done thoroughly, special attention given to the healing surface, size of the defect, scar tissue band and remaining teeth. A gauze piece was tied with thread and dipped with petroleum jelly (Vaselin) and then the gauze piece was packed into the defect before impression making. Impression was made by alginate impression material (Lygin, USA) as it is elastic in nature and easy to handle<sup>12</sup>. Model was prepared with dental stone (Diestone, USA). Unfavorable undercut was blocked out. Trial denture was prepared and try-in was performed. Obturator with denture was processed in laboratory performing routine procedures. When the obturator was inserted properly and checked for adaptability, placement of radicular attachment was considered. Tooth was selected for placement of the radicular attachment. Endodontic treatment and tooth reduction was done of selected tooth for placement of radicular attachment. Root canal preparation for radicular attachment is similar to that for a post space<sup>6</sup>. Pattern for male part of attachment was fabricated with self cure acrylic resin (Ashvin, India). The pattern was cast in dental laboratory. After finishing and polishing of male part, pattern for female part was made on male part. Casting, finishing and polishing of female part was done. The male component of the attachment was checked for its fit in the prepared root canal. When the fit was found satisfactory, the male component was cemented using GIC luting cement (GC, Japan). After cementation, the location of the male component was transferred to the final prosthesis for fixation of the female component. The prosthesis was fully relieved at that point.

The female component was attached to the male part and fixed to final prosthesis with the help of auto polymerizing resin (Ashvin, India). The prosthesis was then removed and the position of the component was rechecked. The prosthesis was finished, polished and inserted into patient's mouth. The patient was instructed for maintenance of prosthesis. The post insertion follow-up and patient care was carried out at the prescribed intervals of time.

### Statistical analysis

The collected data were analyzed by Statistical Package for Social Science- SPSS Version- 16 (IBM). Statistical significance was determined according to the objectives of the study. The results were presented in tabulated form and figures.  $\chi^2$  test

was done to find out the p value. p value of <0.05 was considered as significant.

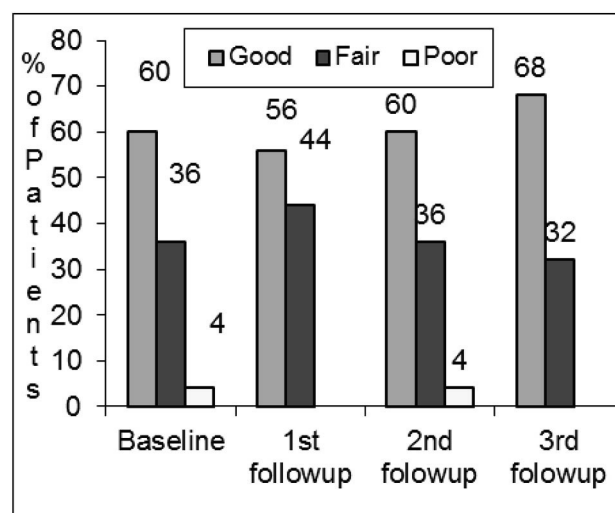
**Results**

At the day insertion, majority (n=15, [60.0%]) of patients showed good speech, and with group II obturator, 2 (8.0%) patients showed good speech. At 1<sup>st</sup> follow up visit, majority (n=14, [56.0%]) of patients showed good speech and 11 (44.0%) patients showed fair speech with group I obturator while with group II obturator, 1 (4.0%) patient showed good speech, 13 (52.0%) patients showed fair speech. At 2<sup>nd</sup> follow up visit, maximum (n=15, [60.0%]) of patients showed good speech, 9 (36.0%) patients showed fair speech with group I obturator. In group II obturator, 2 (8.0%) patients showed good speech, and majority of (n=14, [56.0%]) patients showed poor speech. At 3<sup>rd</sup> follow up visit, 17 (68.0%) patients showed good speech and 8 (32.0%) patients showed fair speech with group I obturator. In group II obturator, 5(20.0%) patients showed good speech, majority of (n=14, [56.0%]) patients showed fair speech. Analysis revealed that all follow up visits including at the day of insertion articulation of speech were statistically significant between group I and group II obturator.

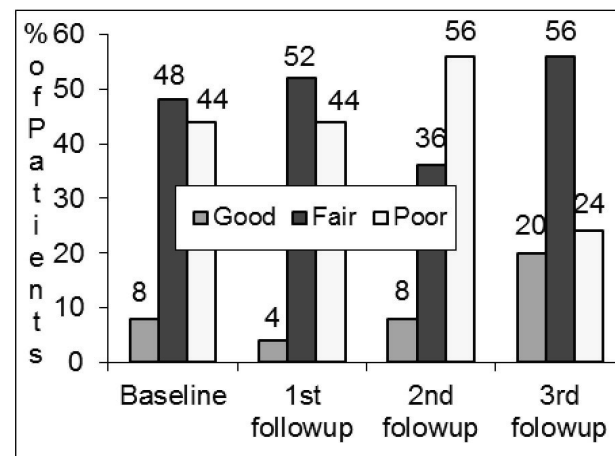
**Table I:** Distribution of patients according to articulation of speech with obturator (n=50).

Speech	Group I		Group II		P value
	n <sub>1</sub>	%	n <sub>2</sub>	%	
<b>Base line</b>					
Grade I	15	60.0	2	8.0	0.001 <sup>s*</sup>
Grade II	9	36.0	12	48.0	
Grade III	1	4.0	11	44.0	
<b>1<sup>st</sup> follow up</b>					
Grade I	14	56.0	1	4.0	0.001 <sup>s*</sup>
Grade II	11	44.0	13	52.0	
Grade III	0	0.0	11	44.0	
<b>2<sup>nd</sup> follow up</b>					
Grade I	15	60.0	2	8.0	0.001 <sup>s*</sup>
Grade II	9	36.0	9	36.0	
Grade III	1	4.0	14	56.0	
<b>3<sup>rd</sup> follow up</b>					
Grade I	17	68.0	5	20.0	0.001 <sup>s*</sup>
Grade II	8	32.0	14	56.0	
Grade III	0	0.0	6	24.0	

p value reached from  $\chi^2$  test, S=Significant at P<0.05 Grading: Grade I - Good, no licking of liquid through nasal cavity and Grade II - Poor, licking of liquid through nasal cavity.



**Fig 1:** Distribution of patients according to speech with group I obturator



**Fig 2:** Distribution of patients according to speech with group II obturator

**Discussion**

Obturator prostheses are commonly used in the rehabilitation of maxillectomy patients, as it helps in separating the oral and the nasal cavities and restores normal deglutition and speech and improves the facial aesthetics<sup>10,13</sup>. Brown<sup>14</sup> and Desjardins<sup>15</sup> have suggested using extracoronal and intracoronal direct retainers for engaging the remaining teeth to maximize support, retention, and stability. The retentive design is critical in the sub-total maxillectomy patient who has lost extensive structures. The placement of a radicular attachment produces a more favorable effect to enhance retention, stability and support; and reduces the leverage forces to the

remaining teeth<sup>17</sup>. In the present study, obturators with radicular attachment showed better articulation of speech and it improved speech intelligibility than that of conventional obturators. Dubravka et al<sup>8</sup>. (2010) have reported that obturator with radicular attachment speech rehabilitation of post-maxillectomy patient is comparatively better using obturator with radicular attachment than conventional obturator. It might be due to radicular attachment provides good retention and sufficient stability that prevent movement of obturator thus allow production of good speech without any nasal emission of voice.

Padmandabhan et al<sup>6</sup> (2009) reported that obturator with radicular attachment have good retention and stability which helps in clear speech. Ramaraju et

al<sup>10</sup>. (2010) stated, obturator with radicular attachment effectively improve speech of post-maxillectomy patients. Regarding Speech, the result of current study correlates with above mentioned previous study.

### Conclusion

By radicular attachment the obturator gets retention and stability from root of abutment tooth. Thus it improves articulation of speech. For ball and socket joint it is easy to insertion and remove, so patient feel more comfort. Obturator with radicular attachment does not show metallic clasp, so it is more aesthetic. It can be concluded that obturator with radicular attachment is more acceptable than conventional obturator.

### References:

1. Parel SM, Branemark PI, Ohnell LO, Svensson B. Remote implant anchorage for the rehabilitation of maxillary defects. *J Prosthet Dent* 2004;**86**:377-81. <http://dx.doi.org/10.1067/mpr.2001.118874>
2. Koyama S, Sasaki K, Inai T, Watanabe M. Effects of defect configuration, size, and remaining teeth on masticatory function in post-maxillectomy patients. *Journal of oral Rehabilitation* 2005;**30**:635-641.
3. Tirelli G, Rizzo R, Biasotto M, Di Lenarda R, Argenti B, Gatto A, Bullo F. Obturator prostheses following palatal resection: clinical cases. *Acta Otorhinolaryngol Ital* 2010;**30**:33-39
4. Keyf F. Obturator prostheses hemimaxillectomy patients, *J Oral Rehabil* 2001;**28**:821-829.
5. Taylor T, Gerrow J, Brudvik J. Resin-bonded components for maxillofacial prosthesis construction: a clinical trial. *J Prosthet Dent* 1988;**59**:334-339. [http://dx.doi.org/10.1016/0022-3913\(88\)90186-2](http://dx.doi.org/10.1016/0022-3913(88)90186-2)
6. Padmandabhan TV, Kasim M, Rajiv KG. Radicular attachment assisted prosthetic rehabilitation of a patient with a unilateral maxillectomy defect secondary to adenocystic carcinoma. *J Indian Prosthodont Soc* 2009;**9**:28-32.
7. Grossmann Y, Madjar D. Resin-bonded attachments for maxillary obturator retention: a clinical report. *J Prosthet Dent* 2004;**92**:229-232. <http://dx.doi.org/10.1016/j.prosdent.2004.06.024>
8. Dubravka M, Aleksandra A, Milica JK. Prosthodontic Rehabilitation after Partial Maxillary Resection by Obturator Denture Retained with the System of Attachments – Case Report : *Serb Dent J* 2010; **57**(2):109-113
9. Pavlatos J. Root-supported overdentures. *CDS Rev* 1998;**91**:20-25
10. Ramaraju AV, Sujan S, Reddy N. Prosthetic Rehabilitation of acquired maxillary defect with hollow bulb obturator Retained by combination of cast clasp Zest-Anchor type ball radicular attachment – A case report. *J Clin Diag Res* 2010;**4**(3):2577-2581
11. James F, Lubker, James W, Schweiger. Nasal Airflow as an Index of Success of Management of Cleft palate. *J Dent Res* 1969;**48**:368. <http://dx.doi.org/10.1177/00220345690480030801>
12. Rahman MM, Sultana A, Rahman MM, Haider IA. Difference of techniques for preparation of obturators. *Bangladesh J Oral Health* 2005;**7**(1):24-28
13. Romesh S, Shitu J, Singh BP, Neelam M, Chaturvedi TP, Prithviraj DR. Oral Rehabilitation Of A Patient With Sub - Total Maxillectomy. *Contemp Clin Dent* 2011;**2** ( 1 ) : 63 - 65 <http://dx.doi.org/10.4103/0976-237X.79293>
14. Brown KE. Peripheral consideration in improving obturator retention. *J Prosthet Dent* 1968; **20**:176-81. [http://dx.doi.org/10.1016/0022-3913\(68\)90143-1](http://dx.doi.org/10.1016/0022-3913(68)90143-1)
15. Desjardins RP. Obturator prosthesis design for acquired maxillary defects. *J Prosthet Dent* 1978; **39** : 424 - 35 . [http://dx.doi.org/10.1016/S0022-3913\(78\)80161-9](http://dx.doi.org/10.1016/S0022-3913(78)80161-9)
16. Hanada T, Furuta S, Moriyama I, Hanamura Y, Miyanochara T, Ohya M, King GE. Maxillary osteomyelitis secondary to osteopetrosis. *Rhinology* 1996;**34**:242-44.
17. The VKS-OC Radicular Attachment; A Root Cap Application that has stood the test of time. *The Dent-Liner* 2013;**17**(1): 3-4. Down loaded from www.dent-line.com on 24/09/2013.