



## SPEECH FUNCTION IN PATIENTS WITH AND WITHOUT PALATAL PROSTHESIS AFTER COMBINED MAXILLECTOMY AND MANDIBULECTOMY

### KEYWORDS

maxillectomy, mandibulectomy, functional communication

**Dr. B. S. Premalatha**

Department of Speech Language Studies, Dr. S. R. Chandrashekhara Institute of Speech and Hearing, Bangalore.

**Ms. Sujatha S**

Department of Speech Language Studies, Dr. S. R. Chandrashekhara Institute of Speech and Hearing, Bangalore.

**Ms. Mereen Rose Babu**

Department of Speech Language Studies, Dr. S. R. Chandrashekhara Institute of Speech and Hearing, Bangalore.

### ABSTRACT

The study aims at documenting the usefulness of palatal prosthesis in improving articulation, resonance and speech intelligibility, in patients subjected to combined maxillectomy and mandibulectomy, which is a rare condition. Perceptual and objective examination by using CSL 4400 revealed an improvement in speech and skills with prosthesis.

### INTRODUCTION

The maxillectomy and / or mandibulectomy surgery can lead to combined effects of cosmetic deformity and functional disability. Among this include speech impairment such as imprecise articulation, varied resonance and reduced overall speech intelligibility. Patients who have undergone both maxillectomy and mandibulectomy, which is a rare condition, will have an effect more severe than those experienced after surgeries of only maxilla or mandibular lesions.

Though there are literatures available on the speech characteristics in either maxillectomy and / or mandibulectomy subjects, there is limited information documented regarding the combined effects on speech of patients who have undergone both maxillectomy and mandibulectomy with reconstruction surgery and prosthetic management after the surgery.

### CASE REPORT

Two male subjects (A and B) aged 48 years and 61 years had undergone combined maxillectomy and mandibulectomy for extensive lesion of buccal mucosa, were reported to us with the complaint of reduced clarity in speech and difficulty in swallowing. Subject A had undergone partial left maxillectomy and hemi mandibulectomy with temporary tracheostomy with post operative radio therapy and chemo therapy for the same. Mandibular defect was reconstructed by PMMC flap. Subject B had undergone mandibulectomy and segmental maxillectomy with temporary tracheostomy for recurrence of squamous carcinoma on the right infra temporal fossa and posterior maxilla with a past history of oral sub mucous fibrosis excision and reconstruction with radial forearm flap on right cheek and buccal pad on left cheek 7 months back. The defect was reconstructed by free fibula flap. Both the subjects have been using palatal prosthesis following maxillectomy surgery.

They were evaluated by both perceptual and objective assessment including examination of oral structures and functions, articulation examination and resonatory assessment. CSL 4400 instrument was used to evaluate acoustic parameters of resonance as objective analysis for both the subjects with and without palatal prosthesis.

Articulation of speech sound was assessed using Kannada Articulation Test. Speech intelligibility and nasality by using spontaneous / responsive speech and conversation sample by 3 speech language pathologists with 5 years of experience.

Objective evaluation included measurement of formant frequencies and 2<sup>nd</sup> formant transition of vowels /a/, /I/ and /u/ in isolation and in

words such as /a/ in /a:ne/, /i/ in /illi/ and /u/ in /u:ta:/ which had embedded vowels was examined spectrographically. The mouth to microphone distance was kept at 6 cms with digital signal at 44100Hz per channel with 32 bit resolution.

Oral Peripheral Mechanism Examination (OPME) revealed deviated lip to left side in subject A and to right side in subject B, missing teeth on top row, with intact tongue and its movement. Velar elevation was restricted. Intra oral pressure could not be built by the subjects due to inadequate lip seal. OPME of both the subjects indicated that both of them had palatal obturator in order to close the defect created by maxillectomy.

Articulatory errors such as misarticulation of bilabials, labio dentals, palatals, fricatives, and affricate sounds characterized by distortions were observed. Perceptually, the SLP's rated speech samples with prosthesis better than without prosthesis.

Spectrographic analysis without the palatal prosthesis revealed all formant frequencies (F1, F2, and F3) to be deviated from normal due to the presence of anti resonances and also not clearly visible without the prosthesis. These unobservable formant frequencies could be due to presence of hypernasality. It was noted that dampening of the energy was more without the prosthesis than with prosthesis, thus attributing to the perception of hypernasality.

Assessment of second formant transition and duration of transition did not differ significantly with and without palatal prosthesis indicating that speech intelligibility is predominantly affected by the nasal air emission and rate of speech rather than imprecise placement of tongue following the surgery. It was observed in the perceptual evaluation of speech intelligibility of words to be better with prosthesis [4].

### DISCUSSION

One of the main impacts of patients submitted to maxillectomy and / or Mandibulectomy is the impairment of speech intelligibility [3]. The undesirable coupling between the oral and nasal cavities reduces intra-oral air pressure during speech production causing articulatory imprecision, hypernasal speech, nasal air emission, and reduced vocal loudness [1,3]. Same results were observed in our present study also.

Prosthetic consideration is necessary to provide optimal care for maxillofacial patients and the speedy recovery to normal life [2]. The amount of nasal air emission was reduced when the subjects used their prosthesis, thereby enabling them to speak more intelligibly with less effort.

The adequacy of the tongue movement on speech intelligibility, with and without prosthesis was also assessed using the second formant transition. The range of formant transition and duration of transition did not vary significantly. Therefore it could be seen that the subjects with partial maxillectomy and hemi – mandibulectomy, the speech is predominantly affected by the nasal air emission and rate of speech (ROS) rather than the imprecise placement of the tongue following the surgery. Formant frequencies F2 and F3 were observed to be deviated from normals due to the presence of anti – resonances. Improper velopharyngeal closure resulted in nasal air emission and perception of misarticulation of fricative, velar and bilabial productions.

Preservation of the mandible and maxilla is key to good functional and cosmetic results after surgical excision in oral cancer. Combined surgery for extensive resection of lesions of maxilla and mandible such as maxillectomy and mandibulectomy either partial or total along with reconstruction of the defect usually results in considerable decrease in quality of life. Thus, to conclude, the use of prosthesis would help in better speech intelligibility in terms of reduced nasal air emission, better placement of the tongue for producing speech sounds with less effort.

#### References:

1. Plank DM, Weinberg B, Chalian VA (1981) Evaluation of Speech following prosthetic obturation of surgically acquired maxillary defects. *Journal of Prosthetic Dent* 45(6): 626-38
2. Master SB, Sahukar SK, Valladares VC (1985) Prosthetic Considerations in the Surgical Planning for Maxillectomy and Mandibulectomy Patients. *Indian Journal of Cancer* 24:125-132
3. Teles VDC, Krook MIP, Lauris JRP (2006) Speech evaluation with and without palatal prosthesis obturator in patients submitted to maxillectomy. *Journal of applications of oral sciences* 14(6):421-6
4. Tobey EA, Lincks J (1989) Acoustic analyses of speech changes after maxillectomy and prosthodontic management. *The Journal of Prosthetic Dentistry*, 62(4):449-455