RESEARCH ARTICLE

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Effect of Jaw Mobility in Oral Cancer Survivors with Deltopectoral Flap

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Abstract

Aim: To find the effectiveness of structured exercise protocol on jaw mobility in oral cancer patients post commando surgery. **Materials and Methodology:** This study was conducted in Karad. Patients post commando surgery for oral cancers were included in this study. The prior consent form was taken. In pre-assessment VAS was taken and range of motion of temporomandibular joint was measured by measurement scale. Included participants received therapeutic jaw mobility exercises protocol, 4 times a week. Post intervention data was collected by using VAS and range of motion of temporomandibular joint. The experimental results were also statistically analysed. **Conclusion:** On the basis of the result of our study, it can be concluded that therapeutic jaw mobility exercises helps in improving jaw mobility and decrease in pain. This study concluded that there was improvement in ROM of the temporomandibular joint which improved activities of daily living.

Major Findings: The study found that therapeutic jaw mobility exercises significantly improved the range of motion (ROM) of the temporomandibular joint and reduced pain in oral cancer patient's post-commando surgery. These improvements enhanced the patients' ability to perform activities of daily living, thereby increasing their overall quality of life.

Keywords: Commando Surgery, Jaw Mobility, Oral Cancer

1. Introduction

Oral cancer is the sixth most common cancer all across the world[1]. It is a major health problem in many parts of world. Its incidence is low in western countries[2]. It remains one of the most common form of cancer on Indian subcontinent and in other parts of Asia. It accounts for 35% in men in all over India[3]. Buccal mucosa squamous cell carcinoma is rare form of oral cavity cancer[4]. It is also an aggressive form and contains high rate of local regional recurrence. Buccal mucosa squamous cell carcinoma is caused by habitual tobacco chewing and smoking with or without alcohol intake[5]. In early stage buccal squamous cell carcinoma surgery or radiotherapy are considered as a suitable treatment, whereas for advanced tumours postoperative radiation combined with surgical excision is recommended. It occurs commonly in age group of 50-80 years[6]. Alcohol, tobacco and quid chewing are well recognized risk factors for development of buccal mucosa squamous cell cancer[7]. Immune defects, defects of carcinogen metabolism, or defects in DNA-repair enzymes are the other factors which are responsible for cancer. It mostly affects oropharynx, floor of the mouth and lips, inner lining of cheeks, lateral border of tongue[8]. The COMMANDO operation stands for Combined Mandibular and Neck Dissection Operation. It is a complicated operation applied for 1st degree malignancy of the oral cavity. It is a surgical operation for malignant tumours which involves

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resection of portions of the mandible in continuity with the oral lesion and radical neck dissection[9]. After surgery patient complaints of postoperative complications such as pain, restriction of movements at the operated side, chest pain and breathlessness, swelling of the operated side of cheek, and limited mouth opening. Composite resection of the head and neck is also referred to as the "commando" procedure, which involves the resection of primary tumour, a part of the mandible and surrounding cervical lymph nodes[1,10]. This surgery is mainly done in cancers affecting the tongue, maxilla, mandible, palate, floor of mouth, larynx pharynx[11].

Procedure of taking deltopectoral flap: Outline of the flap lies on anterior chest wall just below the clavicle, the base of the flap is marked at a distance of 2 cm from the lateral border of the sternum because this is the place where the perforators of internal mammary artery enters the anterior chest wall. The superior edge of the flap lies just below the clavicle and inferiorly it can extend up to the 4th or 5th intercostal space, the flap became most reliable when it is limited to the deltopectoral groove but it can extend to the deltoid muscle depending upon reach and size of the defect. The skin incision is placed and it is deepened till the deltoid muscle, the skin, the subcutaneous tissue and the deltopectoral facia are incised, once the deltoid muscle is identified the dissection is continued medially, the blood vessels supplying the flap lies superficial to the deltopectoral facia, hence the plain of dissection should be deep to the facia so that the facia is included into the flap this will insure good and reliable vascularity to the flap, dissection is continued over the pectoralis major muscle stay deep to the facia throughout the dissection, dissection is continued till we reach at distance of 2 cm from the lateral border of sternum, 2cm distance from lateral border of sternum and clean dissection deep to the deltopectoral facia are enough to preserve the vascularity to the flap. Bleeding at the edges of the flap is the sign of good vascularity. After completion of flap harvesting transfer the flap to the defect, the donor site is covered with split thickness skin graft[12].

The temporomandibular joint dysfunction include, fibrosis due to radiotherapy, scarring, weakness and atrophy of the muscle producing the movement after surgery, which leads to stiffness of joint. So the patient may feel difficulty in aspects of daily life like mouth opening, chewing, swallowing, mastication and speech[13]. Physiotherapy plays a major role in the rehabilitation of patients with oral cancers who undergo various treatments including head and neck exercises, mouth opening exercises, and shoulder mobility. It prevents and treats multiple complications arising because of cancer treatments[14]. This study includes therapeutic jaw mobility exercises for patients undergone commando surgery which will help to improve jaw mobility and will decrease the pain[15]. Therapeutic exercises refers to a wide range of physical activities that focuses on restoring and maintaining strength, endurance, flexibility, stability[16]. The goal of therapeutic exercises is to return patient to a fully functioning, pain-free state[17]. Therapeutic exercises involves movement prescribed to correct impairments, restore muscular and skeletal function and maintain a state of wellbeing[18]. Exercise as a therapeutic approach involves repeated, regular activity to increase a person's resistance to illness and length of recovery[19]. Physiotherapy rehabilitation program helps cancer survivors in restoring themselves physically, emotionally, and socially to gain proper functional Range of the Motion (ROM) and improve the quality of life[20].

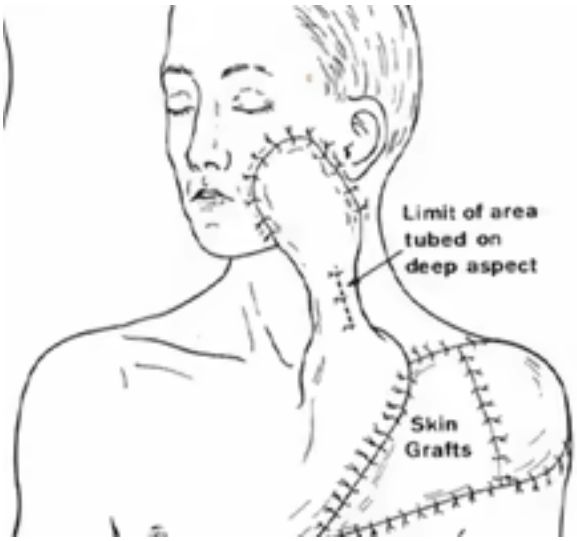


Figure 1. Deltopectoral flap.

2. Materials and Methods

The subjects were selected according to inclusion and exclusion criteria. Total 15 subjects were taken according to inclusion criteria. The inclusion criteria were subjects with age group 45-75 who had undergone commando surgery and with reduced jaw mobility after surgery. The exclusion criteria were subjects with metastasis and physical incapacity to endure treatment. Demographic data of the subjects was also taken. The prior consent form was taken. Before data collection, the aim and procedure were explained to the subjects in their preferred language.

In pre-assessment VAS was taken and range of motion of temporomandibular joint was measured by measurement scale. Included participants received therapeutic jaw mobility exercises protocol 4 times a week. Post intervention data was collected by using VAS and range of motion of temporomandibular joint. The experimental results were also statistically analysed.

3. Statistical Analysis

1. Statistical analysis of the recorded data was done by using the software Instat.
2. Percentages for each demographic variable was calculated.
3. Data was calculated.
4. MS Excel was used for drawing various graphs with given frequencies and for master chart.
5. Two tailed P value of visual analogue scale for pre and post intervention is < 0.0001 and < 0.0001 respectively.
6. Two tailed P value of range of motion of temporomandibular joint for pre and post intervention is < 0.0001 and < 0.0001 respectively.

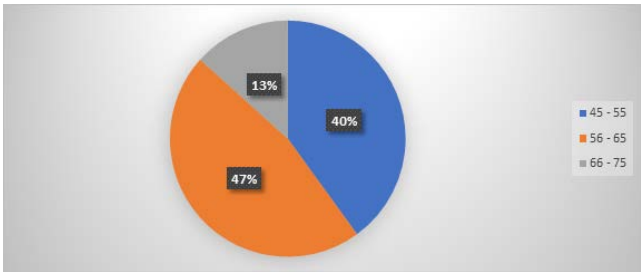
4. Result

4.1 Age Related Variation

Table 1. Age Related Variations : shows age related distribution, 40% were between age group 45-55, 47% were between age group 56-65 and 13% were between group 66-75.

Table 1. Age related variations

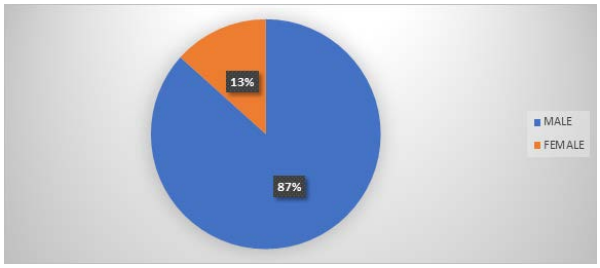
Age Group	Participants
45 - 55	6
56 - 65	7
66 - 75	2



Graph 1. Shows age related distribution, 40% were between age group 45-55, 47% were between age group 56-65 and 13% were between group 66-75.

Table 2. Gender wise variation

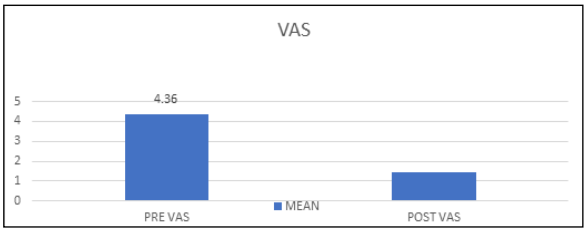
Male	13
Female	2



Graph 2. Shows gender wise distribution in which 87% were male and 13% were female.

Table 3. The VAS score

VAS	Mean ± SD	P Value
Pre Intervention	4.360 ± 1.405	< 0.0001
Post Intervention	1.467 ± 0.9904	< 0.0001



Graph 3. The pre intervention VAS score is 4.360±1.405 and the post intervention VAS score is 1.467±0.994. P value is < 0.0001 which is considered extremely significant.

4.2 Gender Wise Variation

Table 2. Gender wise Variation: Shows gender wise distribution in which 87% were male and 13% were female Which shows that male ratio is higher in suffering from oral cancer due to high rate of smoking and alcohol intake.

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4.3 VAS

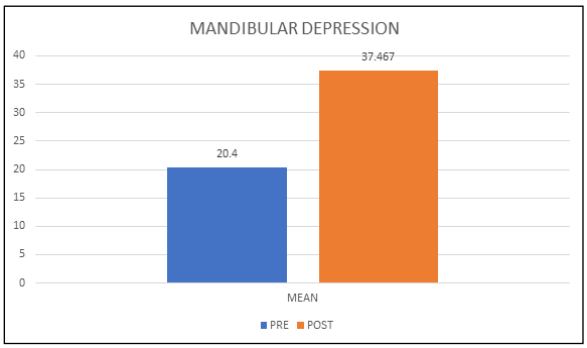
The pre intervention VAS score is 4.360±1.405 and the post intervention VAS score is 1.467±0.994. P value is < 0.0001 which is considered extremely significant.

4.4 Range of Motion

4.4.1 Mandibular Depression

Table 4. Mandibular depression

Range of Motion(Mandibular Depression)	Mean ± SD	P Value
Pre Intervention	20.400 ± 4.626	< **0.0001**
Post Intervention	37.467 ± 5.566	< **0.0001**

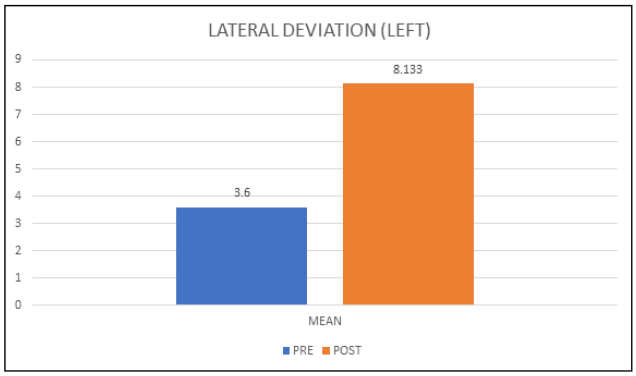


Graph 4. The pre intervention mandibular depression was 20.400 ± 4.626 and the post intervention mandibular depression score is 37.467 ± 5.566. The P value is < 0.0001 which is considered extremely significant.

4.4.2 Lateral Deviation (Left)

Table 5. Lateral deviation (Left)

Range of Motion (Lateral Deviation)	Mean ± SD	P value
Pre Intervention	3.600 ± 0.986	< **0.0001**
Post Intervention	8.133 ± 1.060	< **0.0001**

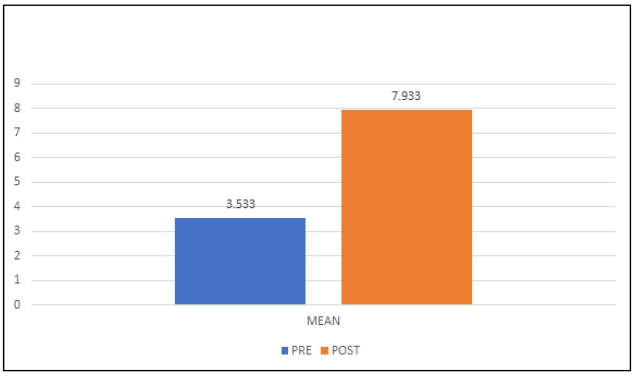


Graph 5. The pre intervention lateral deviation (lt) was 3.600 ± 0.9856 and the post intervention lateral deviation (lt) is 8.133 ± 1.060. The P value is < 0.0001 which is considered extremely significant.

4.4.3 Lateral Deviation (Right)

Table 6. Lateral deviation (Right)

Range of Motion (Lateral Deviation)	Mean ± SD	P Value
Pre Intervention	3.533 ± 1.727	< **0.0001**
Post Intervention	7.933 ± 1.624	< **0.0001**

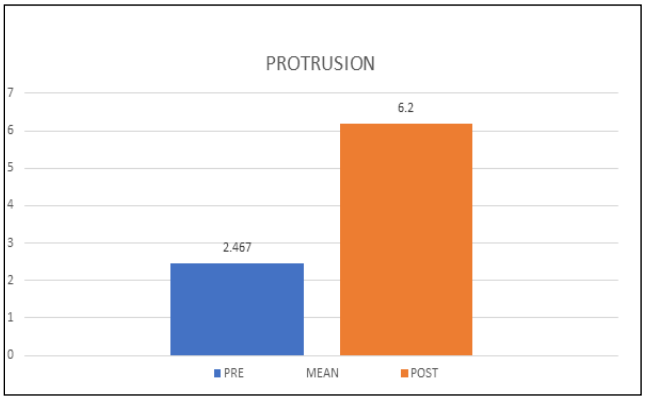


Graph 6. The pre intervention lateral deviation (Rt) was 3.533 ± 1.272 and the post intervention lateral deviation (Rt) is 7.933 ± 1.624. The P value is < 0.0001 which is considered extremely significant.

4.4.4 Protrusion

Table 7. Protrusion

Range of Motion (Protrusion)	Mean ± SD	P Value
Pre Intervention	2.467 ± 1.356	< 0.0001
Post Intervention	6.200 ± 1.821	< 0.0001



Graph 7. The pre intervention protrusion value is 2.467 ± 1.356 and the post intervention protrusion value is 6.200 ± 1.821. The P value is <0.0001 which is considered extremely significant.

5. Discussion

The aim of the research was to study the effect of jaw mobility in oral cancer survivors with deltopectoral flap. Buccal mucosa squamous cell carcinoma survivors suffer from high rate of morbility associated with chemotherapy, radiation and surgery. Jaw mobility is important component of activities of daily life, it helps in mastication, speaking, swallowing. In oral cancer survivors with deltopectoral flap there is restrictions in jaw mobility due to decrease range of motion. Postoperative therapeutic jaw mobility exercises have positive outcomes that potentially increase quality of life of such subjects. The result of the present study showed that improvements in terms of reduction in pain using VAS.

Total population in the research was 15 in which both females and males participated. Out of which 13 individuals were male and 2 individuals were female. According to study by Jia Deng a higher incidence of malignant tumours of head and neck cancer in men associated with alcohol and smoking[7]. The study was conducted in the duration of 3 months their demographic details were collected like age, gender and other surgery related details. Table and Graph 2 shows gender wise distribution in which 87% were male and 13% were female. Which shows that male ratio is higher in suffering from oral cancer due to high rate of smoking and alcohol intake. Oral cancer accounts for 35% in men in all over India.

This study shows age related distribution, 40% were between age group 45-55, 47% were between age group 56-65 and 13% were between group 66-75. This shows age group of 50-60 is more affected. VAS (Visual Analogue Score) is significantly improved in individuals with mean (4.360±1.405) before intervention and (1.467±0.9904) after intervention. The study has been done by Nicola Crichton on reliability of VAS.

Improving range of motion of temporomandibular joint is the main aim of this study. Range of motion of mandibular depression is significantly improved with mean (20.400±4.626) before intervention and (37.467±5.566) after intervention. According to the study of Nancy Walker, Richard W. Bohannon, Denise Cameron. This study has proved discriminant validity of temporomandibular joint range of motion measurements obtained with a ruler. Based on reliability found is this study use of any of TMJ ROM measures examined is justified. Range of motion of lateral deviation to left is significantly improved with mean (3.600±0.9856) before intervention and (8.133±1.060) after intervention. Range of motion of lateral deviation to right which is significantly improved with mean (3.533±1.727) before intervention and (7.933±1.624) after intervention. Range of motion of protrusion which is significantly improved with mean (2.467±1.356) before intervention and (6.200±1.821) after intervention.

Physical therapy has shown to help relax the muscles, increase joint flexibility, reduce fatigue, manage difficulty in swallowing as well as mouth opening, and subsequently improve physical and functional wellbeing. The implications of physiotherapy management protocols relieve cancer pain in palliative care . Physiotherapy treatment has been beneficial for symptomatic relief and improving quality of life in cancer patients. Physiotherapy in postoperative complications of head and neck cancers have been proved that multidisciplinary rehabilitation should be made an integral part of the total management of the head and neck cancer survivors. Physiotherapy rehabilitation program helps mainly postoperatively such cancer survivors in restoring themselves physically, emotionally, and socially to gain proper functional Range of the Motion (ROM) and thus improve the quality of life.

6. Conclusion

On the basis of the result of our study, it can be concluded that therapeutic jaw mobility exercises helps in improving jaw mobility and decrease in pain. This study concluded that there was improvement in ROM of temporomandibular joint which improved activities of daily living.

7. Limitations

1. Since the study group size was small, study results cannot be generalized for the entire population. The limitations faced were because of the shorter duration for study.
2. There is lack of study on intervention working on jaw mobility in oral cancer patients with deltopectoral flap

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