

# Physiotherapy Rehabilitation In The Case Of Oral Squamous Cell Carcinoma With Lower Left Gingivobuccal Sulcus About Smokeless Tobacco

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## ABSTRACT

*The oral cavity's squamous cell carcinoma is the 12th most prevalent cancer worldwide and the 8th most common in men. It is responsible for as much as one-third of India's tobacco-related cancer cases. Indians are more prone to gingivobuccal cancer because of their tobacco use. This risk is caused by a lack of knowledge about the dangers of smokeless tobacco use. This case involved a male patient who had a history of tobacco chewing for 30 years which later caused pain and swelling at the left cheek the patient was diagnosed with squamous cell carcinoma with lower gingivobuccal malignancy further he underwent modified radical neck dissection with hemimandibulectomy, extensive local excision, and reconstruction using a pectorals major my cutaneous (PMMC) flap. Following the surgery cervical, and temporomandibular ranges were reduced associated with weakness in the neck and upper extremity musculature. Physical rehabilitation was designed for betterment in the symptoms faced by the patient and to improve this activity of daily living. Even while oral squamous cell carcinoma and lower gingivobuccal cancer are highly avoidable and easily detectable, they nevertheless pose a serious threat to public health. In this instance, medical and physical therapy were successful in treating this patient.*

Keywords: - Oral cancer, Physiotherapy, Rehabilitation, TMJ.

## INTRODUCTION

India is the third-largest producer of tobacco in the world According to Jhanjee (2011) and the IBEF, with about half of its output used domestically. All areas of the body are susceptible to the negative effects of smoking, including respiratory and heart conditions, oral cancer, and the escalation of asthma and other respiratory disorders. Over 6 million fatalities globally are attributed to tobacco use each year. Almost two-thirds of deaths worldwide are caused by non-communicable illnesses, and one of the main causes of deaths that may be prevented is tobacco use (WHO, 2015). (1) Oral cancer is among the most prevalent cancers worldwide, particularly in underdeveloped nations but also in industrialised nations. The most prevalent histology is squamous cell carcinoma (SCC), with alcohol and tobacco use serving as the primary etiological variables. While it is reasonably easy to diagnose a disease early on, advanced illness presentation is rare (2).

The oral cavity's squamous cell carcinoma is the 12th most prevalent cancer worldwide and the 8th most common in men. It is responsible for as much as one-third of India's tobacco-related cancer cases. Due to their tobacco use, Indians are more susceptible to gingivobuccal complex cancer. 3 The retromolar trigone, lower gingiva, gingivobuccal sulcus, and buccal mucosa make up the lower gingivobuccal complex. In the Indian subcontinent, chewing tobacco is the most common cause of mouth cancer (3).

There have been reports linking the use of smokeless tobacco (SLT) to malignancies of the pancreas, oesophagus, and oral cavity, as well as potentially malignant illnesses of the mouth. As long as other tobacco products have been around, so has smokeless tobacco (SLT), either orally or through the nose. various smokeless tobacco products, chewing tobacco, snus, snuff, khaini, gutka, toombak, shammah, mishiri and tuibur. Over the years, investigations have linked the use of SLT to malignant illnesses of the mouth, oesophagus, and pancreas, as well as a potential association with cardiovascular disease, hypertension, peptic ulcers, and mortality (4).

This case report is about a male diagnosed with oral squamous cell carcinoma of lower left gingivobuccal complex cancer and was further operated on for Modified radical neck dissection with Hemimandibulectomy with wide local excision and pectoralis major myocutaneous (PMMC)

Flap reconstruction. Even if surgery is successful in removing the malignant carcinoma, the patient still has structural defects, reduced social and psychological confidence, and other negative outcomes that we call surgical affectability. A comprehensive rehabilitation regimen was required to lessen the effects of the surgeries and enhance his standard of living (5).

## **PATHOPHYSIOLOGY**

The oral cavity stretches from the edge of the lips' vermilion colour to the junction of the hard and soft palates on the superior side and the circumvallate papillae of the tongue on the inferior side. The upper and lower gums, retromolar trigone, the floor of the mouth, buccal mucosa, lip, oral tongue, and hard palate are the several anatomical subsites that make up the oral cavity. Planning oncologic therapy requires consideration of the unique anatomical features of these subsites, despite their proximity. 2

Over thirty carcinogens, including tobacco-specific N-nitrosamines (TSNAs), nitrite, nitrate, and heavy metals like nickel, cadmium, and chromium, have been found in smokeless tobacco (SLT) products.

Ingesting and processing the carcinogens included in SLT products results in their metabolic activation, according to a conceptual model of SLT-associated carcinogenesis. Uncontrolled cell development results from the carcinogens' production of DNA adducts and subsequent mutations in the genes p53, K-ras, and other genes. Reactive oxygen species production, oxidative stress, and persistent local inflammation are a few other modifications that could further promote tumour growth. Reduced apoptosis-enhanced angiogenesis and cellular transformation are the results of mechanisms like Akt and protein kinase A activation. Other substances included in SLT products, such as areca nut and polycyclic aromatic hydrocarbons, may also be responsible for the cancer that SLT users get in addition to TSNAs. Promoter methylation of tumor-suppressor genes is one example of an epigenetic mechanism that causes uncontrolled growth.

To establish a logical treatment strategy, it is necessary to understand the gingivobuccal complex cancer's mode of propagation. The underlying soft tissue, muscles, bone, and neurovascular structures may be invaded as a result of local spread to nearby structures. In order to reach the buccal or labial gingiva, gingivobuccal cancer spreads along the surface mucosa and the submucosal soft tissue. As a result of the periosteum's strong protective function, the cancer does not continue straight through the cortical bone and undamaged periosteum towards the cancellous portion after this. The tumor instead moves towards the alveolus along the gingiva that is linked to it. Following infiltration through the dental pores (in patients without teeth) or dental sockets on the alveolar ridge, the mandible is affected. The mandibular canal and the cancellous portion of the mandible are the next areas these cells go along as they follow the tooth root. As a result of this knowledge, surgical resections that preserve the mandible have evolved. The most often affected site of metastasis is the cervical lymph nodes.

## CASE PRESENTATION

A 42-year-old male patient with a history of tobacco chewing for 30 years was brought to our inpatient department. The patient was alright 2 months back when he noticed swelling over the left cheek. The patient previously went to a local hospital, where a tissue biopsy was done and then he was referred to our hospital for further treatment. On palpation swelling over the left cheek, angle of mandible for 2 months, and difficulty in chewing food since 2 months. On palpation tenderness, grade 2 was present on the left cheek. on the left lower back region of the jaw extending from 1 cm behind the angle of the mandible and 1 cm below the Ala tragus line to the submandibular region swelling was noted. Inadequate mouth opening approx 2 fingers was noted.

The patient was suggested for Ultrasound Sonography (USG) of the neck A well-defined heterogeneously hyperechoic, predominantly solid lesion with internal vascularity on colour Doppler is seen arising from the medial aspect of the left submandibular region- likely suggestive of neoplastic etiology. The left lobe of the thyroid appears mildly bulky and shows a hyperechoic solid lesion, wider than taller with smooth margins- TIRADS III lesion.

Further, USG guided Fine Needle Aspiration Cytology (FNAC) of the Left lobe of the thyroid gland revealed Smears are moderately cellular, showing squamous epithelial cells, few cells with (a high ratio of the cross-sectional area of the nucleus divided by that of cytoplasm) N: C ratio, hyperchromatic nuclei and irregular nuclear chromatin. Foamy macrophages and occasional giant cells are also noted against a necrotic background mixed with blood.

The patient was further investigated by Computed Tomography (CT) Scan of the neck which revealed ill-defined enhancing nodular soft tissue mass in the left postero-inferior gingiobuccal sulcus arising from adjacent left buccal mucosa extending up to the retromolar trigone. Significant erosion of the both outer and inner cortex of the body of the left hemimandible involving the roots of the molar teeth. Mandibular nerve canal is involved suggesting the possibility of perineural spread. Heterogeneously enhancing necrotic enlarged lymph nodes on the left side at level 1B (submandibular) causing a contour bulge to the left submandibular region. consistent with a neoplastic mass arising from the left gingivobuccal sulcus with metastatic cervical lymphadenopathy. a biopsy-proven case of squamous cell carcinoma, the patient was intubated and surgery was done by Modified radical neck dissection with Hemimandibulectomy with wide local excision and pectoralis major myocutaneous (PMMC) flap reconstruction. Immediately after post- surgery patient was shifted to the surgical Intensive Care Unit (SICU) under observation. After 48 hours, the patient was moved to the ward as he was stable. He reported having trouble moving his neck and discomfort at the site of the suture after surgery. The patient was referred to physiotherapy management for the aforementioned problems.

### CLINICAL FINDINGS

consent from the patient was obtained. His build was mesomorphic, and he had hemodynamic stability. Upon observation, the patient was observed sitting upright, with their leg extended and their shoulders neutral. The cervical range of motion was reduced with reduced opening of mouth associated with pain in the left mandibular and cervical region. The Numerical Pain Rating Scale (NPRS) is 6/10 on movement and 3/10 on rest. The temporomandibular joint measurement was taken by TheraBite range of motion scale, mouth opening was 2 centimeters. The Mallampati score was performed by mouth opening and tongue maximally protruding the score obtained was IV (only hard palate was visible).

VARIABLE	MOVEMENT	DEGREES	
Range of motion of Cervical joint	Flexion	0-35	
	Extension	0-40	
		Right	Left
	Lateral flexion	0-35	0-30

Table 1: Range of motion of the cervical joint pre-rehabilitation

VARIABLE	MOVEMENT	RIGHT	LEFT
Manual muscle testing	Cervical flexors	3/5	2/5
	Cervical extensors	3/5	2/5
	Lateral flexion	3/5	2/5
	Shoulder flexion	4/5	2/5
	Shoulder extension	4/5	3/5
	Abductors	4/5	2/5
	Adductors	4/5	2/5
	Medial rotator	4/5	2/5
	Lateral rotator	4/5	2/5

Table 2: Manual muscle testing pre-rehabilitation

### PHYSIOTHERAPY INTERVENTION

Patient education and counselling about the recent condition. The physiotherapy rehabilitation was planned for 2 weeks with the patient's and relatives' consent. The rehabilitation protocol was intensively well-planned addressing the patient's problems such as pain management, maintaining the functional capacity of the lungs, improving cervical range of motion, improving mouth opening (to relieve trismus), improving cervical muscle strength, to improving shoulder muscle strength.

The patient's ability to do everyday activities, reduce discomfort, and enhance mouth movement and opening were the short-term objectives. The ultimate goals were to preserve the level of movement and mouth opening that had been reached.

GOALS OF PHYSICAL REHABILITATION	INTERVENTION	DURATION AND FREQUENCY
Pain management	Positioning Postural re-education Relaxation	Every 2 hourly
To maintain functional capacity of lungs	Inspiratory muscle training Thoracic expansion Diaphragmatic breathing	10 repetitions, thrice a day (with breath hold for 2-3 seconds).
To improve cervical range of motion	Chin tucks Active range of motion exercises of cervical flexion, extension, lateral flexion and side flexion.	10 repetitions, twice a day.
To improve mouth opening	Chin tucks Mouth opening and closing exercises Mirror therapy	10 to 15 repetitions, twice a day.
To improve cervical muscles strength	Cervical isometrics for flexion, extension, side flexion and lateral flexion.	10 repetitions, twice a day.
To improve shoulder muscles strength	Active range of motion exercises in all planes improve scapular muscle strength with scapular protraction and retraction Progress all exercises with weights	10 to 15 repetitions, twice a day.

Table 3: Physiotherapy intervention

## Follow up

The patient was assessed using NPRS, Mallampati score, temporomandibular joint in centimeters, range of motion, and manual muscle testing before and after the rehabilitation program. There was a significant improvement in the range and strength of the cervical and shoulder.

OUTCOME	COMPONENT	PRE REHABILITATION		POST REHABILITATION	
<b>NPRS</b>		6/10		2/10	
<b>Mallampati score</b>		Class IV		Class II	
<b>Temporomandibular joint in (centimetres)</b>	Mouth opening	2 cm		3.5 cm	
<b>Range of motion</b>	Cervical	<b>DEGREES</b>		<b>DEGREES</b>	
	Flexion	0-35		0-50	
	Extension	0-40		0-60	
	Lateral flexion	<b>RIGHT</b>	<b>LEFT</b>	<b>RIGHT</b>	<b>LEFT</b>
		0-35	0-30	0-45	0-45
<b>MANUAL MUSCLE TESTING</b>	Cervical flexors	3/5	2/5	4/5	3+/5
	Cervical extensors	3/5	2/5	4/5	3+/5
	Lateral flexion	3/5	2/5	4/5	3+/5
	Shoulder flexion	4/5	2/5	4+/5	3+/5
	Shoulder extension	4/5	3/5	4+/5	3+/5
	abductors	4/5	2/5	4+/5	3+/5
	adductors	4/5	2/5	4+/5	3+/5
	Medial rotators	4/5	2/5	4+/5	3+/5
	Lateral rotators	4/5	2/5	4+/5	3+/5

Table 4: Outcome measures with post-rehabilitation score

## DISCUSSION

In this case study, a 42-year-old man who had oral squamous cell carcinoma of the lower left gingivobuccal complex cancer underwent two weeks of rehabilitation before undergoing a modified radical neck dissection with hemimandibulectomy involving wide local excision and reconstruction using a pectoralis major myocutaneous (PMMC) flap. After receiving treatment for two weeks, the patient demonstrated improvement.

Mangulkar et al. reviewed a variety of therapeutic techniques for placing patients in educational environments. These techniques included breathing exercises, mouth opening motions, neck flexibility exercises, and exercises incorporating assistive strategies and mouth PNF. Mouth opening restriction is the most prevalent postsurgical disadvantage experienced by individuals with cancer of the oral cavity, which makes day-to-day tasks difficult. Physiotherapy employs a range of strategies, such as mouth opening exercises and goldfish exercises, to effectively treat patients with restricted mouth opening. These approaches not only help patients accomplish basic everyday tasks but also improve their condition. Therapeutic benefits of many stretching techniques have been demonstrated(6).

Rogério Eduardo Tacani et al. (7) conducted a retrospective study To reduce the morbidities brought on by the disease and its treatment, physiotherapy is crucial to cancer rehabilitation, especially for patients with head and neck cancer. With an average of 19 sessions and discharge after treatment, physical therapy was found to be effective in reducing pain and lymphedema in patients with late post-treatment complications of head and neck cancer. The combination of manual lymphatic drainage, TENS, mechanical massage therapy, stretching exercises, and patient education was also found to be beneficial.

Renu Pattanshetty et al. (8) conducted a case study that had a commando resection in addition to treatment for head and neck cancer. The report details the patient's entire physical therapy demands. Survivors of buccal mucosa cancer experience significant morbidity from chemotherapy, radiation therapy, and surgery, among other treatments. Exercises for postoperative rehabilitation are beneficial and may improve the subjects' quality of life.

## CONCLUSION

In conclusion, physiotherapy plays a vital role in the comprehensive management of oral squamous cell carcinoma (OSCC). It not only aided in the recovery process post-surgery, radiation, or chemotherapy but also addressed the functional impairments and quality of life issues that often arise in patients with OSCC. Through a tailored approach, physiotherapy helps restore oral functions, alleviate pain, improve range of motion, and enhance overall well-being. However, the effectiveness of physiotherapy in OSCC management may vary depending on individual patient factors and treatment modalities. Therefore, a multidisciplinary approach, involving close collaboration between oncologists, surgeons, and physiotherapists, was crucial for optimizing outcomes and providing comprehensive care to patients with oral squamous cells with lower gingivobuccal cancer.



## References

1. Chandrupatla SG, Tavares M, Natto ZS. *Tobacco Use and Effects of Professional Advice on Smoking Cessation among Youth in India. Asian Pac J Cancer Prev APJCP. 2017 Jul 27;18(7):1861–7.*
2. Montero PH, Patel SG. *CANCER OF THE ORAL CAVITY. Surg Oncol Clin N Am. 2015 Jul;24(3):491–508.*
3. Misra S, Chaturvedi A, Misra NC. *Management of gingivobuccal complex cancer. Ann R Coll Surg Engl. 2008 Oct;90(7):546–53.*
4. Gupta S, Gupta R, Sinha DN, Mehrotra R. *Relationship between type of smokeless tobacco & risk of cancer: A systematic review. Indian J Med Res. 2018 Jul;148(1):56–76.*
5. Gupta S, Gupta R, Sinha DN, Mehrotra R. *Relationship between type of smokeless tobacco & risk of cancer: A systematic review. Indian J Med Res. 2018 Jul;148(1):56–76.*
6. Bhoyar SS, Sharath HV, Kochar SS, Nerkar S. *Importance of Cardiac Rehabilitation and Mouth Opening Exercises in Oral Squamous Cell Carcinoma: A Case Report. Cureus. 2023 Dec;15(12):e50954.*
7. Tacani RE, Machado AFP, Goes JCGS, Marx AG, Franceschini JP, Tacani PM. *Physiotherapy on the Complications of Head and Neck Cancer: Retrospective Study. Int J Head Neck Surg. 2015 Dec 1;5(3):112–8.*
8. Pattanshetty RB, Patil SN. *Role of Manual Therapy for Neck Pain and Quality of Life in Head and Neck Cancer Survivors: A Systematic Review. Indian J Palliat Care. 2022;28(1):99–112.*