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RESEARCH ARTICLE

ROLE OF PHYSICAL THERAPY IN THE MANAGEMENT OF OROFACIAL CANCER

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Abstract

Aim: To review the existing literature on orofacial cancer and imply the importance of physiotherapy in the management of orofacial Cancer.

Methodology: Search strategies from databases like Google Scholar, PubMed, PubMed Central, Scopus Index, Cochrane library and cross-references of retrieved articles. Full text and abstracts articles from the year 1988-2018 were included.

Discussion: Oral cancer, referring to cancer that starts in any part of the mouth is the eleventh most common cancer in the world. Symptoms like fatigue, trismus, pain, cachexia, xerostomia etc. greatly reduce the quality of life of the individual suffering from orofacial cancer. The conventional treatment modalities given depend upon the severity and type of cancer and include chemotherapy, surgery, and radiotherapy. Physiotherapy given along with the conventional treatment substantially improves the quality of life and helps in managing the adverse effects of the treatment. Techniques like manual therapy, dry needling, stretching, MFR, therapeutic exercises, TENS, cryotherapy and postural re-education can be used to facilitate the patient.

Conclusion: Physiotherapy management along with other conventional modes of treatment is essential to recuperate from complications of orofacial **cancer.**

Introduction:-

Oral cancer is the eleventh most common cancer in the world. India alone accounts for one-fifth of all oral cancer cases and a one-fourth of all oral cancer deaths. Oral cancer refers to cancer that starts anywhere in the mouth including the lips, inside cheeks, the front two-thirds of the tongue, the floor of the mouth, jaw and the gums[1].

Incidence, Prevalence, and Mortality

Two-thirds of the global incidence of oral cancer occurs in developing countries; half of those cases are in South Asia[2]. Oral cancer incidence and mortality are high in the Indian subcontinent; Papua New Guinea; and Taiwan, China, where tobacco chewing is common, as well as in Eastern Europe, France, and parts of South America (Brazil and Uruguay), where alcohol consumption is high[2]. Survival rate in the United States, 5-year survival has improved by more than 11 percentage points between 1992 and 2006. The five-year survival is now approximately 65 percent.

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In Europe, it is approximately 50 percent. In India, five-year survival is less than 35 percent[2]. Over 90% of all malignancies of the oral cavity are squamous cell carcinomas (SCC) arising from the lining mucosa, the squamous epithelium[3].Malignant tumors of the oral cavity include Carcinoma in situ (intraepithelial malignancy), Squamous cell carcinoma, Verrucous carcinoma, Basaloid SCC, Adenoid SCC, Adeno-squamous carcinoma and Papillary SCC[3].

Etiology and Risk Factors

Tobacco use-

Tobacco smoke from cigarettes, cigars, or pipes can cause cancers anywhere in the mouth or throat, as well as causing cancers of the larynx (voice box), lungs and esophagus[4.] Oral tobacco products (snuff or chewing tobacco) are linked with cancers of the cheek, gums, and inner surface of the lips[4].

Drinking alcohol-

Epidemiological studies indicate that drinking alcoholic beverages increases the risk of oral cancer two to six-fold and is an independent risk factor, with risk increasing with quantity consumed[2].

Ultraviolet (UV) light-

Cancers of the lip are more common in people who have outdoor jobs where they are exposed to sunlight for long periods of time.10 Ultraviolet (UV) radiation may cause skin cancer on the lip[1].

Poor nutrition-

Iron deficiency, vitamin A, E and C deficiencies, nutritional deficiencies are linked with oral cancer[3].

Viruses- Human Papillomavirus (HPV) linked to throat cancer (including cancer of the oropharynx) is HPV16. The other viruses are Epstein-Barr virus (EBV), Herpes simplex virus (HSV), Human immunodeficiency virus (HIV)[1,4]. Occupational and Environmental exposures- Breathing in asbestos fibers, wood dust, dry-cleaning solvents or certain types of paint or chemicals is associated with an increased risk of laryngeal squamous cell carcinoma[5].

Chronic trauma and infection-

It now seems clear that chronic trauma from sharp teeth, restorations, or dentures can contribute to oral cancer risk[2]. Chronic infections like candidiasis, syphilis may also increase the risk of oral cancer[3].

Common Complications in Orofascial cancer

Pain:-

A recent survey shows that in reality, upwards of 30% of patients receive poor pain control, especially in the last year of their lives. This 30% represents 46,020 patients "failing per year"[6]. Post-operative pain, spasmodic pain, osteoradio necrotic jaw pain, nerve compression and plexus invasion[7]. Pain can be evaluated by Visual Analogue Scales (VAS), Numerical Ratings Scales (NRS), The Brief Pain Inventory (BPI), and McGill's Pain Questionnaire[8].

Modalities like massage spray and stretch technique can be used. Electrotherapy modalities like TENS[9] that stimulates the surface of the skin and provides an analgesic effect, SWD and MWD tend to relax the muscle and reduce the pain, IRR increases blood flow and reduces pain, laser which activates components of mitochondrial respiratory chain and promotes blood flow thereby reducing pain. Therapeutic exercises[8,9] like mandibular mobilization exercises both active and passive will provide significant pain relief in the temporo-mandibular region. Graded and purposeful activity[9] bears a direct effect on tissue functions, thus leading to a counter-irritation phenomenon of pain relief. Relaxation exercises[10] helps to release tension and thereby pain in the muscles of the jaw and neck. Postural re-education is important to attempt correction of postural abnormalities early in rehabilitation in order to avoid further dysfunctional movement patterns or adoption of protective postures resulting in muscle spasm and muscle imbalances. Mobility exercises[11] commonly increase the subject's awareness of posture, motion patterns, and breathing and neck isometric exercises. Manual therapy techniques like the manual distraction of the joint junction and mobilization of the condyle-disc complex help in reducing pain. Trigger point release techniques like deep pressure kneading and dry needling also decrease pain significantly. Myofascial release of the contracted fascia of the face, head, and neck may help in reducing pain.

Cancer-Related Fatigue

The National Comprehensive Cancer Network has defined cancer related fatigue as a ‘‘distressing persistent, subjective sense of tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning”[12]. Unlike typical fatigue, cancer-related fatigue (CRF) is disproportionate to exertion level and is not relieved by rest or sleep[13,14]. Common Causes are Chemotherapy can affect the blood-producing cells of the bone marrow, leading to low red blood cell counts. This results in reduced oxygen and nutrition carrying capacity of the blood. The muscles and other tissues are malnourished leading to easy fatigability. Cancer itself can cause fatigue by spreading to the bone marrow and causing anemia. The normal protein and hormone levels are changed due to cancer and its treatment which can, in turn, cause or worsen fatigue. Treatments kill normal cells and cancer cells, which leads to a build-up of cell waste. The body uses extra energy to clean up and repair damaged tissue. Cancer can also cause fatigue indirectly by forming toxic substances in the body that change the way normal cells work. Fatigue can be assessed by - Visual analog scale, Brief Fatigue Inventory, Cancer Fatigue Scale, Fatigue Symptom Inventory, Multidimensional Fatigue Inventory, Revised Schwartz Cancer Fatigue Scale, Piper Fatigue Scale and Functional Assessment of Chronic Illness Therapy-Fatigue Scale (FACIT-F)[15,16].

Management includes general exercise prescription for people undertaking or having completed cancer treatment is low to moderate intensity, regular frequency (3-5 times/week) for at least 20 minutes per session, involving aerobic, the resistance of mixed exercise types. Start and maintain an exercise program of both endurance and resistance exercises. Examples of endurance exercises are marching, walking, jogging and swimming. Examples of resistance exercises are lightweights, weight cuffs. Standing balance exercises, aerobic exercises and flexibility exercises also need to be included. The goal is to maintain a balance between rest and activity during times of high fatigue so that valued activities can be maintained. Energy conservation techniques like pacing and delegation, schedule activities at the time of peak energy levels, attend to one activity at a time, use distractions like games, music, reading, socializing, use of assistive devices[16].

Trismus

It is defined as a tonic contraction of the muscles of mastication (masseter, temporalis or pterygoid muscles) and results in a limited ability to open the mouth[17]. Common Radiation therapy involving the temporo-mandibular joint, the pterygoid muscles, or the masseter muscle is most likely to result in trismus[17]. A tumor may grow into or near mouth-closing muscles, inducing a reflex contraction. This reflex contraction prevents the stretching of mouth closing muscles, which results in trismus. Surgery may induce scar tissue which reduces mouth opening due to scar contraction in mouth closing muscles. Additionally, radiotherapy may induce fibrosis in mouth closing muscles as a late radiation effect[18,19,20]. its Impact could be- Impaired oral hygiene, swallowing, speech, eating, nutrition; compromised airway clearance and aspiration of food[21]. Trismus is clinically diagnosed by examination of the maximal inter-incisal distance [MID] of less than 30-45 mm caused by contracture[22]. Ideally, this can be measured using a millimeter scale with the patient seated upright[23] (Fig: 1).

Other authors have used a classification for trismus such as[24]:

1. Mouth opening of > 30 mm indicated light trismus
2. Mouth opening of 15-30mm indicated moderate trismus
3. Mouth opening of < 15 mm indicated severe trismus

Trismus Approaches[22,25-28,29] - Intra-oral and extra-oral massage, therapeutic ultrasound to muscles of mastication, moist heat to the affected area, neural electrical muscle stimulation, dry needling to masticatory muscles having trigger points, traction - 3 grades of Kaltenborn can be used grade I traction (loosen), grade II traction (tighten) and grade III traction (stretch). Grade I initially is used to reducing the chance of the painful reaction, CRAC (contract-

relax, antagonist contract), Hold-Relax techniques, active exercises such as performing lateral excursions of the mandible for 5 minutes every 3-4 hours. Appliances- Externally acting devices like rubber plugs, wooden tongue blades (Fig:5), dynamic bite openers (Fig:3), screw - type mouth gag, fingers. Therabite System (Fig:2) seems to be effective in the reduction of cancer-therapy-induced trismus. Dynamic splint Trismus System (Fig:4) can be used to prevent and reduce contractures of masticatory muscles[23,24].

Fig:2:-Therabite

Fig 3:-Engstrom Stretcher

Fig:4:-Dynamic Jaw Spilnt

Fig:5:-Tongue Blades

Internally acting devices rely on the patient's depressor muscle to stretch the elevator muscles. Tongue blade, plastic tapered cylinder, and modified spatula. Tongue blade (FIG) can be used to pry open the mouth. The stack of wooden tongue blades can be used to keep the mouth open.

Cachexia

"Cachexia" is derived from Greek "kakos" meaning "bad" and "hexis" meaning "condition". Cachexia is characterized by weight loss involving depletion of host adipose tissue and skeletal muscle mass[30]. The cancer anorexia-cachexia syndrome is a hypercatabolic state characterized by anorexia and loss of body weight associated with reduced muscle mass and adipose tissue[31]. It can be diagnosed by following table[32]

Test	Finding
Body Weight	Unintentional weight loss (>5% during preceding 6 months)
Skeletal muscle mass	Decreases biceps, quadriceps muscle mass
Food intake recall or diary	Anorexia and/or decreased food intake
Fatigue	Increased
Range of motion	Usually impaired
Quality of life	Decreased scores
Karnofsky Performance Scale	Decreased scores

Management includes Resistance exercises – These exercises can prevent as well as stop further progression of muscle wasting in cancer patients. Resistance exercise is defined as multiple repetitions of static or dynamic muscular contractions that increase muscle mass[30]. Strength training[33] – strength exercise, in which a variety of exercise-adopting (body or equipment) weight loads (with variable intensities, often expressed as a percentage of the maximal repetition) is performed, with no specific duration. Aerobic exercises[33] – This should be carried out in a continuous manner, and during which intensity resides between values of maximal oxygen consumption ranging from 40% to 70%, with a recommended duration between 30 to 60 min, 3 to 5 times for the week.

Dysphagia

It has been derived from the Greek word “phagein” which means "to eat”. Thus, dysphagia has been defined as any disruption in the swallowing process of the bolus from the oral cavity all through the stomach[3]. Common causes in head and neck cancer patients, dysphagia may be caused by surgical ablation of muscular, bony, cartilaginous, or nervous structures or may be attributable to the effects of anti-neoplastic agents including radiation and/or chemotherapy[34].

Management includes Rehabilitative exercises which are those meant to change and improve the swallowing physiology in force, speed or timing, with the goal being to produce a long-term effect, as compared to compensatory interventions used for a short-term effect[35]. Rehabilitative exercises involve retraining the neuromuscular system to bring about neuroplasticity since pushing any muscular system in an intense and persistent way will bring about changes in neural innervations and patterns of movement[35]. Postural strategy[34] – Postural strategies are simple techniques designed to alter the bolus flow. A chin down posture improves the base of tongue contact to the posterior pharyngeal wall, opens the vallecular space, and puts the larynx in a more protected position[36]. Rotation of the head to the affected side will facilitate the closure of the weakened pharynx and assist transport of the bolus through the unaffected side[37]. Head tilt to the intact side provides a gravity assist in bolus flow through the oral cavity and pharynx. A side-lying position may be useful in a delayed swallow or with poor airway protection as it slows the flow of the bolus through the pharynx. Sensory procedures provide altered sensory feedback during swallowing. Alterations in bolus volume, taste, and temperature can be used to affect changes in swallowing physiology[34]. For example, cold and added pressures (thermal-tactile stimulation) have been shown to increase the speed of initiation of the swallow response[38]. Added pressure on the tongue by a utensil also increases sensory feedback. The activity of chewing will transmit sensory impulses to the pharynx. Therefore, a diet which can be chewed softly should be made use of when possible. Finally, the sensory-motor integration achieved during self-feeding helps to normalize swallow patterns. Therefore, patients should feed themselves whenever possible. Diet modifications and food presentation[34] - Thickening liquids may slow the rate of bolus flow through the pharynx for patients with a delayed swallow. A pureed diet can be used if surgical resection or trismus prevents chewing. Foods prepared with sauces and gravies may be useful for a xerostomic patient. Alternating solids and liquids can reduce pharyngeal stasis. Liquids can be presented by a cup, straw, spoon, or syringe, depending on specific patient needs. A glossectomy spoon is specially designed to push food into the pharynx, bypassing the oral phase of the swallow. Therapeutic Exercises are TMJ range of motion exercises, movement of the tongue and swallowing exercises will be useful for patients who have structural or tissue damage[34]. Resistance exercises are used for strengthening musculature. There are two main types of exercises: Swallowing exercises[35] follows many of the principles of neuromuscular rehabilitation. These exercises are an a) Effortful swallow, b) Mendelssohn’s maneuver, c) Super Supra-glottic, d) Masako maneuver, e) McNeill Dysphagia treatment protocol.

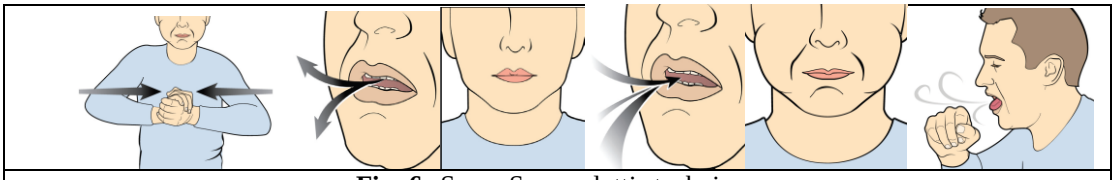

Fig: 6:-Super Supra-glottic technique

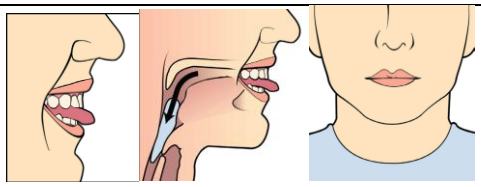

Fig: 7:-Masako maneuver

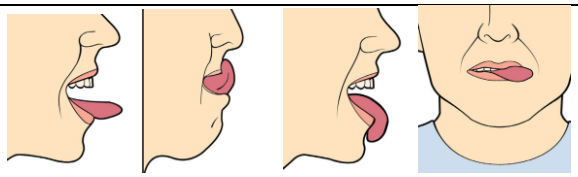

Fig: 8:-Tongie strengthening techniques

Non-swallowing exercises[35] are those that do not involve the act of swallowing. These exercises aim to strengthen specific muscle groups and then transfer the gains to the act of swallowing. Finally, non-swallowing exercises can be done by patients who cannot eat orally (are tube fed) or that post-surgery who are temporarily restricted from eating orally. These are: Shaker head lift. Tongue strengthening. (FIG)Lee Silverman voice treatment.

Expiratory muscle strength training can be essential for improving dysphagia. Biofeedback[34] - The Swallowing Workstation provides biofeedback for a range of treatment applications. Surface electromyography (EMG) biofeedback provides visual and auditory feedback for added motivation and success during therapy. Surface EMG combined with respiratory training can provide feedback on the coordination between respiration and swallowing. Intraoral tongue array sensors provide visual biofeedback during tongue-strengthening exercises. Oral prosthetics[34] - Oral prosthetics can offer structural support and compensation to oro-pharyngeal structures that were lost or altered post-surgery. Palatal lowering prostheses re-contour or lower the palate to allow the remaining portion of the resected tongue to contact the palate when swallowing. Obturators can fill a palatal defect, preventing food leakage into the nasal cavity and establishing more normal intraoral pressure. Use of these devices can significantly reduce oral residue.

Xerostomia

In this condition which Salivary gland hypo function is the condition of having reduced saliva production due to various causes. It usually leads to the subjective complaint of oral dryness which is termed Xerostomia. The term xerostomia comes from the Greek word xeros (dry) and stoma (mouth), which means dry mouth.39 It leads to numerous oral sequelae including mucosal dryness, difficulty in chewing, swallowing and speaking, burning and pain of oral mucosa, propensity to damage of oral mucosa and infection, increased fungal infection, demineralization of teeth and increase in caries, dysgeusia, halitosis and difficulty in wearing dentures[40]. Radiation-induced xerostomia starts in the first week of RT during which salivary flow decrease for 50%-60%[41].

Management includes Laser - The use of laser infrared light of 904nm (low-level laser therapy, LLLT) on salivary glands in the treatment of xerostomia has proved to be not only simulative but also regenerative[42]. Electrical stimulation[43] - Electrical stimulation has also been used as a therapy for salivary hypo-function but has been inadequately investigated clinically. A device that delivers a very low voltage electrical charge to the tongue and palate has been described although its effect was modest in patients with dry mouth. Diet - The combination of chewing and acidic taste, as provided by chewing gums or solid food or fruits, preferentially acidic (apple, pineapple, carrots etc.) can be very effective in stimulating saliva flow for patients who have the remaining salivary function. Patients with dry mouth must be told not to use sweets, the sweetener in food and drink and various other sugar products due to the increased risk for dental caries[44].

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