POST-SURGICAL SHOULDER REHABILITATION OF SELECTIVE NECK DISSECTION WITH PECTORALIS MAJOR MYOCUTANEOUS FLAP RECONSTRUCTION IN “SICK” SYNDROME PATIENTS

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ABSTRACT
Selective neck dissection (SND) is a surgical procedure developed to remove cervical lymph nodes at the risk of invasion metastasis. It is distinguished from radical neck dissections wherein there is the retention of one or more groups of lymph nodes. In this case, a 45-year-old male shopkeeper diagnosed with malignancy of lower anterior alveolus from 45-36 region (stage IV – T4a N2Cm0) underwent SND, segmental mandibulectomy, and reconstruction with pectoralis major myocutaneous flap (PMMC flap) on the left side. On assessment, before the SND, Scapular malpositioning, inferior medial border prominence, coracoid pain, and dyskinesia of scapular movement (SICK) were identified. The patient was referred for physiotherapy with the complaint of inability to maintain saturation, difficulty in decannulation, and shoulder dysfunction on postoperative day 3 (POD-3). Chest physiotherapy comprising of breathing and suctioning techniques aided early decannulation. Furthermore, a prompt shoulder rehabilitation program for six months had a positive impact on the overall functioning and quality of life of the patient.

KEYWORDS: Selective Neck Dissection; Reconstruction with PMMC flap; SICK syndrome; Physiotherapy Rehabilitation.

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INTRODUCTION
Head and Neck cancer accounts for 5 percent of all malignant tumors and more than 60,000 cases are diagnosed worldwide annually.¹ The majority of cases diagnosed are squamous cell carcinoma. Oral cancer in India has a high incidence and is directly associated with the chewing of betel quid with tobacco leaves or stems and other tobacco habits. Metastasis of squamous cell carcinoma and Merkel cell carcinoma of the head and neck through lymph nodes is the commonest. Typically, surgical excision of the tumor is advised when its size is sufficiently small to yield functionally satisfactory results, thereby making neck dissection a beneficial method for treatment.

Selective neck dissection (SND) involves cervical lymphadenectomy with the preservation of one or more lymph node groups.²³ The tissue damage and loss during removal of the tumor are managed by Pectoralis major myocutaneous (PMMC) flap. It is the widely used pedicle flap in large cancer tumors and more than 60,000 cases are diagnosed worldwide annually.¹²³ The tissue damage and loss during removal of the tumor are managed by Pectoralis major myocutaneous (PMMC) flap.

Prompt shoulder rehabilitation with early mobilization prevents and improves post-surgical shoulder dysfunction.

PATIENT AND OBSERVATION
A 45-year-old male, the shopkeeper by occupation, tobacco chewer since 26 years, visited Dental OPD of Sharad Pawar Dental College, with the complaint of painful non-healing ulcer over the lower front region of the jaw from the past two months. The ulcer was initially small and gradually increased to about 5x3 cm. One month before surgery, he presented with a burning sensation on the consumption of hot and spicy food, change in consistency of saliva from normal to thick and ropy, difficulty in mastication, and tooth exfoliation. He had nerve paresthesia over the lower lip. On local extra oral examination, left submandibular lymph nodes and right submandibular lymph nodes were oval, fixed, and tender, whereas bilateral temporomandibular joint had smooth and synchronous movement with no deviation. On intraoral examination, ulceroinfiltrative lesion present over the lower anterior region of the head and neck, and the lesion was well-defined, everted edges, and reddish-white color. On palpation, the lesion had tenderness, induration, and firm consistency, and was fixed to the underlying mucosa. On clinical investigation, an incisional biopsy of the lesion revealed well-differentiated squamous cell carcinoma and lower anterior alveolus malignancy from 45-36 regions (Stage IV A – T4a N2Cm0). The patient underwent SND on both
sides (up to level IV) with structures sacrificed at Levels IA, IB, IIA, II B, III, IV, and submandibular gland preserving Internal Jugular Vein, Spinal Accessory Nerve and Sternocleidomastoid Muscle. The surgeons performed composite resection of the lesion over the lower anterior region and segmental mandibulectomy from 47 to angle of mandible on the left side. Furthermore, they took a PMMC flap from the left side, raised it, and tunneled to approximate over the defect side (Figure 2).

On postoperative day-3, the patient was referred to the physiotherapy department for early decannulation and shoulder mobilization. Musculoskeletal observation revealed left shoulder depression with prominent acromion, right lower cervical and upper thorax scoliosis (Figure 1A), and increased thoracic kyphosis. On observation from the posterior aspect, the medial and inferior border of the scapula is prominent bilaterally along with downward rotation on the left side. On the visual analog scale (VAS), the pain score over the shoulder joint was 3/10 at rest and 5/10 on movement. Besides, he had restricted shoulder range of motions (Table 1) and altered scapulohumeral rhythm. On respiratory examination, there was a reduction in chest movements on the left side and bilateral chest expansion. There was a reduction in the air entry at lower zones of the lungs, with the left side more than the right. Besides, he had secretions and occasional crepitations at the right lower zones, anterior aspect.

Chest physiotherapy was started with humidification, nebulization, deep breathing exercises, and forced expiratory technique (huffing) with splinting of the PMMC graft area followed by suctioning. Post-treatment, the patient had improved air entry and oxygen saturation level. Besides, the treatment included, monitored and supervised bedside exercises, ambulation, and active-assisted shoulder exercises within a pain-free range of motion. From the postoperative day-4, partial closure of the tracheostomy tube was initiated followed by complete closure. On the eighth day, decannulation was achieved successfully. Furthermore, there was an improvement in the VAS score over the shoulder joint. During discharge, a home exercise program was prescribed and asked for follow-up after 15 days. The goal during follow-up was to improve scapular dyskinesia by the release of tightened structure, activation of scapular stabilizers, and progressive resistance training of rotator cuff muscles (Table 2). Stretching of pectoralis minor and active-assisted to active range of motion exercises has been given to improve joint mobility and integrity. The scapular stabilizer strengthening started with activation exercises including kinesis taping, electrical stimulation, and shrug exercises. The Rotator-cuff muscle strengthening started with activation exercises and progressed to thera-band exercises.

Table 1: Range of Motion, Pain and Disability of Arm, Shoulder and Hand (DASH) on postoperative day 3, 15, 2 months and 6 months

| MOVEMENTS | POD-3 | POD-15 | POD-2 MONTHS | POD-6 MONTHS |
|------------|-------|--------|--------------|--------------|
| FLEXION    | 40°   | 60°    | 90°          | 120°         |
| ABDUCTION  | 30°   | 60°    | 90°          | 120°         |
| EXTERNAL ROTATION | 15° | 20° | 30° | 45° |
| PAIN ON VAS | At rest: 3/10 | At rest: 2/10 | At rest: 1/10 | At rest: 0/10 |
| At movement: 2/10 | At movement: 4/10 | At movement: 2/10 | At movement: 1/10 |
| Disability of Arm, Shoulder and Hand (DASH) | NA | NA | 60 | 31 |

Table 2: Exercise Regimen for Shoulder

| Sr No. | GOML | EXERCISES |
|--------|------|-----------|
| 1      | The flexibility of the tightened structure | Stretching of Pectoralis minor |
| 2      | Range of motion | Initially from Passive to Active assisted to Active shoulder ROM exercises Using pulleys to fixation holder |
| 3      | Scapular stabilizer Activation | Kinesio Taping – Upper and Lower Trapezius Electrical stimulation- Lower Trapezius in sitting shoulder flexion and external rotation, and prone horizontal abduction |
| 4      | Scapular stabilizers strengthening | Push-ups on a stable surface. Frontal shrugs with 30-degree abduction |
| 5      | Rotator cuff strengthening | Rhythmic stabilization exercise (Supine Position)- shoulder in 20-30 degrees of scapular plane abduction and progressed to 90 degrees of elevation Progressed to Elastic thrombi band exercises |
| 6      | Supraspinatus | Elevation of the arm (Scapula) in the empty arm position |
| 7      | Infraspinatus and Teres minor | External rotation in side-lying, standing at 45-degree scapular plane abduction of arm |

Figure 1: Postoperative Day-3 SND. (A) The anterior view shows sutures after PMMC flap reconstruction at the neck region (B) The posterior view shows malposition of the scapula, wherein the medial border and inferior angle of the bilateral scapula is prominent, and the left scapula is in downward rotation.
DISCUSSION
Scapula plays a vital role in ensuring the integrity of the shoulder joint kinematics. The rotator cuff and scapular muscles provide static and dynamic stabilization to the joint for optimum ROM. The present case has idiopathic SICK syndrome type 2 before surgery, which progressed to type 3 following surgery. The weakness of the scapular muscles mainly the lower trapezius, serratus anterior along with rotator cuff muscles are present in SND and are managed by prompt physical therapy rehabilitation. All the findings related to scapular and shoulder dysfunction present in this case have been managed with current evidence as discussed in the treatment part. Umehara et al. in their study of Shoulder horizontal abduction stretching to pectoralis minor muscle have increased shear elastic modulus of pectoralis minor muscle, therefore improve scapular kinematics during arm elevation. Walker DL et al study on the effect of electrical stimulation on scapular position during exercises has shown positive results and applied in the present case. Lee J-H et al used various shrug exercises to change scapular kinematics and scapular rotator muscle activities in subjects with scapular downward rotation syndrome.

Yueh-Hsia Chen et al in his study on scapular muscle strengthening exercises with motor control techniques for one-month duration post SND involving Spinal Accessory Nerve has shown positive results for shoulder pain and range of motion as consistent with the findings in the present case. Evan R.L. et al in his study of NMES with bilateral exercise for upper trapezius activity post-SAN compromised head and neck surgery has proven to be effective in improving shoulder dysfunction. The shoulder rehabilitation program given to the patient has been depicted in table 2. Shoulder range of motion, pain on VAS, and disability of arm, shoulder, and hand (DASH) used as outcome measures and taken on postoperative days 3, 2 months, and 6 months. A tremendous improvement has been found in shoulder function after six months of comprehensive evidence-based program observed.

CONCLUSION
Many studies focus on the management of shoulder dysfunction secondary to PMMC flap reconstruction but a dearth of literature that targets in context to scapular dyskinesis. In this case, the shoulder rehabilitation program helped to ameliorate the scapular malpositioning by activation and strengthening of the scapular stabilizer muscles. Besides, it helped in improving SICK syndrome. Consistent shoulder rehabilitation program improves functional outcomes in patients with compromised scapular kinetics and movement dysfunction after SND with PMMC reconstruction.

COMPETING INTEREST
The authors declare that they have no competing interests.

INFORMED CONSENT
Written and Oral informed consent was obtained from the participant included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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AUTHOR’S CONTRIBUTION
All authors made the best contribution to the concept, assessment and evaluation, data acquisition and analysis, and interpretation of the data. No competing interests.

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Figure 2: Pectoralis major myocutaneous flap (PMMC). (A) A free pedicled pectoralis major myocutaneous flap is taken for reconstruction after segmental mandibulectomy. (B) Postoperative image showing grafted PMMC flap with sutures.

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