

Patient-Focused Management Of Shoulder Disability Post-Neck Dissection: A Pilot Study

Research Article

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Abstract

Background: Shoulder disability, which includes pain, limitation of shoulder joint movement and anatomical abnormalities occurs at a high frequency in patients undergoing neck dissection for head and neck cancer. Very often, these patients require full physical ability to perform their jobs. Hence, physical rehabilitation is an important aspect to improve their post-operative quality of life (QoL). Studies have found that physiotherapy is well-tolerated in this patient group following surgery, and have the potential to improve the functional outcome and QoL.

Aims & Objectives: The aim of this prospective pilot study was to obtain a subjective assessment of shoulder disability in patients operated for neck dissection at 1- and 6-months postoperatively, and to determine the role played by simple physiotherapy exercises in their rehabilitation.

Methods: 15 patients who underwent neck dissection were taught simple shoulder and neck exercises at the time of discharge, to be performed at home daily. At every post-operative follow-up visit, these exercises were reinforced. The patients were given a subjective shoulder disability questionnaire at the one-month and six-month follow up periods, which focused on the patient's perception of his/her own disability and limitations. These two questionnaires were then compared to assess improvement/worsening of shoulder disability and any further management was undertaken based on this outcome.

Outcome: Selective neck dissection was found to have better outcomes as compared to radical/modified radical procedure, and patients who regularly followed the shoulder exercises were found to have significantly reduced disability at the end of 6-month postoperative period.

Conclusion: Simple physiotherapy exercises can produce drastic improvements in physical rehabilitation of such patients, and hence should become an integral part of their follow up to improve the QoL.

Keywords: Neck Dissection; Physiotherapy; Rehabilitation; Shoulder Disability; Spinal Accessory Nerve.

Introduction

For decades, the gold standard for treatment of cervical metastasis was radical neck dissection (RND) as described by George Crile in 1906. Current oncologic philosophy allows for treatment of appropriately staged neck disease with modified radical neck dissection (MRND) or selective neck dissection (SND).

Adequate surgery entails excision of the primary tumour, reconstruction of the defect if required and removal of cervical chain of lymph nodes to prevent/eliminate local metastasis. The overriding principle of ablative procedures for cancer is to clear and not to conserve. Over the years, in the quest for adequate safety margins, important structures have become casualties. What started as radical neck surgeries with removal of muscle, vein and nerve has trickled down over many years to removal only if war-

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ranted, and even then, to attempt to spare at least the vein and nerve.

Unfortunately, spinal accessory nerve injury is very common following neck dissection surgery or lymph node excision, due to its location directly within the field of surgery. The relatively tenuous nature of the nerve and the necessity to manipulate it during surgery also contributes to its injury. Literature shows around 46% of patients undergoing RND retire postoperatively due to shoulder discomfort with 30% reporting moderately severe to severe pain. In selective neck dissection, 23% complained of discomfort and decreased mobility at 1 month, improved to 10% at 6 months. The incidence of associated signs and symptoms is 47% to 100%, 18% to 77%, and 31% to 40% following a RND, MRND, and SND, respectively [1].

The signs and symptoms of accessory nerve shoulder dysfunction include painful, weakened and deformed shoulder, trapezius atrophy, decreased range of motion, drooping of shoulder and scapular flip sign [2]. Ignoring such symptoms for prolonged period of time can lead to irreversible conditions such as frozen shoulder [3, 4]. Rehabilitation of shoulder following spinal accessory nerve injury can be undertaken in the following ways—scapula orthotic support, soft tissue therapy, electrotherapy/infrared heat, active and active-assisted cervical and shoulder exercises, resisted exercises and stretching and mobilisation exercise. Aim of the rehabilitation is to maintain or improve the range of motion of the cervical spine, maintain passive gleno-humeral joint range of motion, improve scapular muscle strength and prevent secondary pathologies such as adhesive capsulitis [3].

Materials and Methods

Aims and Objectives

This is a questionnaire based, prospective pilot study, the aim of which is to obtain a subjective assessment of shoulder disability in patients operated for neck dissection at 1- and 6-months postoperatively and to determine the role played by simple physiotherapy exercises in their rehabilitation.

Rationale

Patients are usually non-compliant to physiotherapy appointments and prefer simple exercises that can be done between their daily schedule. Complex exercises cannot be monitored and are less likely to be followed. Patients are more worried about subjective issues as compared to EMG/inclinometer testing.

Inclusion and Exclusion Criteria

All patients undergoing unilateral neck dissection (RND, MRND, SND) for malignant head and neck cancer were included, with the understanding that they would follow the post-operative instructions and exercises without defecting. Any patient with pre-existing cervical/shoulder dysfunction were to be excluded.

Method

15 patients who underwent accessory nerve-sparing neck dissection were taught simple shoulder and neck exercises at the time of

discharge, to be performed at home daily.

At every post-operative follow-up visit, these exercises were reinforced.

The patients were given a subjective shoulder disability questionnaire (Shoulder pain and disability questionnaire) at the one-month and six-month follow up periods, which focused on the patient's perception of his/her own disability and limitations.

These two questionnaires were then compared to assess improvement/worsening of shoulder disability and any further management was undertaken based on this outcome.

Results

Of the 15 patients included, 3 had local/regional recurrence within 6 months and were excluded, 1 patient expired during the study period, and 1 patient was non-compliant and failed to follow up. 10 patients were compliant and regular with follow up.

Average pain score: 24.4% at 1 month and 6% at 6 months.

Average shoulder disability score: 16.35% at 1 month and 4% at 6 months.

The above-mentioned preliminary results showed a significant improvement in shoulder function and pain at 6 months with regular simple physiotherapy.

Discussion

The spinal accessory nerve is a cranial nerve originating as 2 parts: the accessory portion from the medulla and the spinal part from the lateral portion of the ventral column [1]. Both the sternocleidomastoid and trapezius muscles receive motor innervation from the spinal accessory nerve [3]. The upper part of the trapezius muscle is innervated by the accessory nerve, whereas the lower and middle parts also receive branches from the posterior parts of C3 and C4. The accessory nerve fuses with one or two cervical contributing branches (C2–3) in level 5 [4].

The trapezius muscle, which is made up of three parts, plays a major role in shoulder function. The upper and lower thirds rotate the scapula during abduction, whereas the middle third stabilizes the scapula [3]. Sacrifice or injury of the spinal accessory nerve leads to denervation and atrophy of the trapezius muscle with the onset of shoulder disability; patients show shoulder droop, pain, weakness and limited range of motion [5].

Neck dissection has been a valuable method of treating the neck in the head and cancer since Crile first described the classic radical neck dissection (RND) in 1906, in which a complete removal of nodes from level I to IV, along with the sternocleidomastoid muscle (SCM), internal jugular vein (IJV) and spinal accessory nerve (SAN) were required [6]. The following 50 years after Crile's description of RND, shoulder dysfunction was accepted as a minor side effect. Even in 1951, Maurice Ewing and Hayes Martin characterized the postoperative disability after RND as "variable and seldom incapacitating" [7].

Various modifications of RND have been developed over years to produce better functional and cosmetic results. Suarez originally described functional neck dissection (FND) in 1963; however, Bocca popularized this technique in Europe [8].

The gold standard for treatment of head and neck cancer is based on appropriate planning of surgical, radiotherapeutic, and medical strategies aimed to treat both the primary lesion and the neck; at the same time, special attention must be paid to minimize permanent sequelae with a negative impact on the quality of life [9]. Theoretically, neck dissections sparing the SAN should result in no or only slight shoulder dysfunction and pain when compared with RND, although this is not always the case. Severe upper extremity impairment with functional motor deficits, stiffness of the neck, or shoulder pain that may radiate to the face, or a combination of these, has been found in 60% to 80% of patients receiving treatment with RND [10].

Kuntz AL et al. studied shoulder function in different types of neck dissections, MRND-RND-SND, from a subjective point of view. The results collected from questionnaires confirmed that the three forms of neck dissection affect quality of life differently; in particular, they recorded a trend toward decreased pain after treatment in SND and MRND cases. Analysis can also be performed according to shoulder function; in the same publication by Kuntz et al., the MRND group reported greater shoulder disability at 6 months compared to the SND group, but by 12 months there was no difference between the two groups [5]. In a study by Cappiello et al., two groups of 20 were compared patients after neck dissection: group A was received a SND involving clearance of levels II-IV, while group B received a SND involving clearance of levels II-V. Group B had higher percentage of muscular sequelae; electromyographic abnormalities were less frequently found in group A than in group B, but even though a higher number of abnormalities was found by electrophysiological testing, only a limited number of patients, mostly in group B, referred shoulder function disability affecting daily activities [5].

In our study, a significant decrease in shoulder pain is observed over a 6 month post-operative period, which corresponds to findings from multiple studies in literature [1, 5, 7]. Shoulder disability scores also show a significant decrease over the same time period with regular physiotherapy.

Physical therapy plays an important role in promoting function and reducing pain by maintaining the length of muscles, range of movement, and preventing secondary complaints such as adhesive capsulitis. Progressive training with resistance exercises may improve scapular stability and the strength of the upper extremity and serve as an adjunct to standard physiotherapy [3].

Our present study can be improved and expanded in the following ways: increasing the number of patients and expand to a

long-term prospective study, adding objective shoulder function assessment tools to correlate with subjective values, consider the effect of adjuvant treatment/radiotherapy and finally, find a feasible method of monitoring the exercises daily.

Conclusion

Shoulder pain and reduced shoulder movement are common sequelae following neck dissection, secondary to accessory nerve injury. Early physiotherapy targeted at facilitating nerve recovery and increasing scapular muscle strength may help to reduce the effects of ANSD. Literature review by McGarvey et al shows a lack of evidence to support the effectiveness of physiotherapy on ANSD and is also inconclusive with respect to the type and timing of physiotherapy intervention that may be effective. As such, there is a need to establish whether early, appropriate physiotherapy management has a positive effect on shoulder pain, function and quality of life. The outcome of such a study has the potential to improve functional outcomes and quality of life in this patient group, and ultimately to develop best-practice guidelines for management.

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