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Spinal Accessory Neuropathy after Level V Neck Node Clearance

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Abstract: Head and neck cancers are a significant problem in several regions of the world, particularly in developing countries like India. To evaluate the injury of spinal accessory nerve after level V neck node clearance It is prospective case study of 48 patients subjected to neck dissection. Nerve integrity was evaluated before and after the procedure using surface EMG. Mean EMG values were 119.17±17.696 µV in preoperative; and 68.24±25.307µV in postoperative patients. (P value <0.0001) EMG can be considered as a sensitive and painless method benefitting early diagnosis of XI cranial nerve dysfunction. Our study suggests the advantage of using EMG in the trapezium to confirm the diagnosis and to guide early physical therapy intervention in probable neuropathies of this nerve.
Keywords: EMG (electromyography), spinal accessory neuropathy.

INTRODUCTION

Head and neck cancers are a significant problem in several regions of the world, particularly in developing countries like India. Head and neck cancer in India has distinct demographic profile, risks factors, food habits, family and personal history. The head and neck region constitute several delicate, intricately organized structures vital for basic physiological needs, and crucial for appearance, expression, and social interaction [1].

The main prognostic factor associated with head and neck cancer is the presence of lymph node metastasis in the neck, and neck dissection (ND) is the gold standard treatment for such metastases.

However, this procedure may cause severe morbidity. One of the most common complications stemming from ND is shoulder dysfunction caused by manipulation of the spinal accessory nerve (XI cranial nerve) - which causes atrophy of the trapezius muscle.

There are mainly two methods to assess the function of spinal accessory nerve –Clinical and Electromyography. Clinical methods include assessment of pain, stiffness, numbness and arm abduction test. EMG as a method to detect trapezius dysfunction is reliable [2, 3]

MATERIALS AND METHODS

This is a Hospital based prospective study conducted at department of Otorhinolaryngology, SMS Medical College and Hospitals, Jaipur, during the period from Feb 2016 to Dec 2017. 48 eligible Head & Neck cancer patients were involved in the study on first cum first basis. We took off patients with previous head & neck surgery, previous irradiation and/or chemotherapy, neurological disease (CVA, MS, MND), recent RTA, previous breast, shoulder joint surgery and diabetes mellitus.

All the patients selected were told about the study and signed a free and informed consent form.they were subjected to EMG study of their motor nerve conduction by a qualified professional in pre-operative and post-operative period (after around one month of the procedure) [4, 5]

EMG examinations were carried out with the patient seating down, two electrodes were fixed to the skin, in the thickness of the upper muscle belly of the trapezium, placed in the middle point The action potentials (electrical activity) of the trapezium muscle motor units were recorded during maximum isometric muscle contraction (MIMC) in three Five-second series, with a five second interval between each series, according to the technique described by De Luca [6]. In the motor neuroconduction study carried out by EMG, for signal acquisition, we used as a reference for normalization, the collection of values from the median in *Root Mean Square* (RMS) of the MIMC electromyography signal. The data is presented in microvolts (mv), after using a band pass filter of 20 to 500 Hz.

RESULTS

In our study 41 patients were male and 7 were females with maximum number of patients falling in the age group of 41-50 years.

The mean value of action potential was 119.17±17.696 µV in preoperative; and 68.24±25.307µV in postoperative. (P value <0.0001)

Table-1: Age distribution of patients

Age group (years)	Number of patients	Percentage
20-30	10	20.83%
31-40	13	27.08%
41-50	16	33.33%
51-60	5	10.41%
>60	4	8.33%
Total	48	100%
Mean±SD	42.31±11.45	Range (20-72 yrs)

Table-2: Gender distribution of patients

Gender	Number of patients	Percentage
Male	41	85.41%
Female	7	14.58%
Total	48	100%
Male:Female	5.85:1	

Table-3: Mean EMG values preoperatively and post operatively

	PreOp	Post Op(1 month)	p value
Mean ± SD	119.17±17.696	68.24±25.307	<0.0001

DISCUSSION

Neck dissection is an essential part of oncological clearance of surgery and this forms an inevitable part of surgical oncological principles. Incourse of time to reduce shoulder dysfunction in different time phase's different surgeons suggested various types of neck dissections in order to reduce the morbidity (eg. modified neck dissection, selective neck dissection).

The XI cranial nerve is formed by a cranial root and a spinal root. The common trunk crosses the jugular foramen, together with the glossopharyngeal and vagus nerves, dividing itself into an internal and one external branch. The internal branch joins the vagus and goes along with it. The external branch has the spinal root fibers; it has its own route and moves obliquely downwards and to the back, innervating the trapezium and the sternocleidomastoid muscles. The accessory nerve may be joined by the deep neck plexus of the sternocleidomastoid muscle; however, its motor contributions remain uncertain [7,8].

Recent studies have confirmed in their electromyography findings the deterioration which happens in immediate post-op and the gradual improvement which happens in the subsequent months after surgery; however, without recovery of the original function of the accessory nerve. Electrophysiological evaluations have shown that, despite the nerve's anatomical integrity, the risk is even greater whenever the neck's posterior triangle is involved (level V) [9-11].

Cappiello *et al.* Observed that the MRND increase shoulder morbidity when compared to SND[12]. On the other hand, Koybasioglu et al. reported that the accessory nerve function is better in MRND when compared to the lateral ND, because of the traction applied to the nerve during sternocleidomastoid muscle retraction, in order to expose the surgical field[13]. Another study led by Tsuji et al. also confirms the complete or incomplete denervation of the trapezium muscle caused by the axonal injury to the XI cranial nerve, even if it is preserved, because of the traction caused to the accessory nerve during ND[14]. In our study, all the patients had a decrease in post-op electrical activity, with a significant difference in the group in which sublevel IIb was added to level V.

CONCLUSION

Based on findings in our study, EMG can be considered as a sensitive and painless method benefitting early diagnosis of XI cranial nerve dysfunction. Our study suggests the advantage of using EMG in the trapezium to confirm the diagnosis and to guide early physical therapy intervention in probable neuropathies of this nerve.

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