# **Original Research Article**

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# Management of neck dissection complications in head and neck cancers

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### **ABSTRACT**

**Background:** Neck dissection is a vital step in eradicating the regional lymph node metastasis. The aim of study is to establish the incidence of post-operative complications in patients undergoing neck dissection and its management. **Methods:** A cross-sectional retrospective study of 82 patients admitted in the department of general surgery, BMCRI from June 2016 till January 2018 who underwent neck dissections for various head and neck cancers. These patients were studied for post-operative complications and their management.

**Results:** Intra-operative complication being vascular injury (IJV repaired-2 cases), nerve injury and lymphatic injury (thoracic duct identified and serial ligation in 3 cases and right-side lymphatic duct injury in 1 case). Immediate post-operative complication being hemorrhage among 2 cases, re-opened in 1 case and managed by compression dressing in 1 case. Delayed complications being nerve injury among which marginal mandibular nerve injured in 5 cases, phrenic nerve in 1 case, vagus nerve in 1 case, spinal accessory nerve in 13 cases (palsy in 3 cases and praxia in 10 cases). Another delayed complication being chylorrhoea in 2 cases which was managed conservatively. Wound dehiscence noted among 4 cases, 2 of them were major (1 required redo flap, 1 managed conservatively) and 2 of them were minor complications.

**Conclusions:** In our study, there were no peri-operative deaths. Nerves were most common structures injured. A careful pre-operative assessment, meticulous surgical technique, high quality post-operative care and appropriate rehabilitation help in preventing and managing complications.

Keywords: Complications, Chylorrhoea, Metastasis, Management, Neck dissection, Post-operative, Rehabilitation

### INTRODUCTION

Neck dissection is procedure which is both diagnostic and therapeutic for head and neck cancers. It is a vital step in eradicating the regional lymph node metastasis. Neck dissection in the initial days involved the removal of level 1 to level 5 lymph nodes along with sternocleidomastoid, spinal accessory nerve and internal jugular vein. Hence radical neck dissection lead to numerous complications. Because of close proximity to neurovascular structures

certain complications are known to occur.<sup>2</sup> Hence neck dissections have been modified in order to decrease the complications without compromising the oncological clearance.

In 1952, Martin began to address the morbidity associated with the RND. Since then, the focus of criticism against the RND has addressed the related morbidity, causing other surgeons, including Jesse and Ballantyne, to search for cervical lymphadenectomy

procedures that could provide oncologic cure with less morbidity.<sup>3</sup>

Depending on the location and extent of the tumor, the type of neck dissection performed may be radical, modified, selective and extended and either unilateral or bilateral. Complications of neck dissection affect every surgeon regardless of experience and technical skill. In addition to the various medical complications that may occur after any surgical procedure in head and neck region, a number of surgical complications may be related to the neck dissection.<sup>4</sup>

Complications of neck dissection are divided into three major categories: wound complications, nerve complications, vascular complications. co-morbidities such as cardiac, respiratory and hepatic disease are common place in patients undergoing neck dissections in either an elective or therapeutic sense. Additional immunosuppression caused by conditions such as diabetes or relative malnutrition should be optimised since they predispose to complications including wound infection.<sup>5</sup>

Chemotherapy has been investigated as an alternative approach to primary surgical resection with the aim of preserving organs in patients with advanced head and neck tumors. Neck metastatic disease is one of the most significant prognostic factors; metastases generally respond less to organ preservation protocols than primary tumors. Thus, planned and salvage ND after chemotherapy has been proposed for patients with advanced regional disease, although there is a possible higher rate of complications.<sup>6</sup>

### **METHODS**

Retrospective review of 82 patients admitted in the department of General Surgery, BMCRI, from June 2016 to January 2018, who underwent neck dissections for various head and neck cancers like squamous cell carcinoma of upper aerodigestive tract, thyroid malignancies. Data retrieved from case records of patients which included clinical history, examination, routine investigations, specific investigations, surgery details, intaoperative findings, postoperative complications, management and rehabilitation.

### Inclusion criteria

- Patients with squamous cell carcinoma of head and neck region
- Post chemo-radiotherapy head and neck cancers.
- Malignancy of thyroid and salivary glands.

### **RESULTS**

Table 1 depicts the distribution of the patients according to primary site of disease. Total number of patients in the study group=82 (N=82). 55 (67.07%) were male patients

and 27 (32.92%) were female patients. Mean age was found to be 51 years.

Table 1: distribution of the patients according to primary site of disease.

Primary site of the disease	Number of patients
Oral carcinoma	
Gingivobuccal sulcus carcinoma	26
Carcinoma tongue	9
Lower lip verrucous carcinoma	2
Recurrent oral carcinoma	2
Thyroid neoplasms	
Papillary carcinoma of thyroid	8
Follicular carcinoma of thyroid	4
Medullary carcinoma of thyroid	1
Salivary gland tumors	
Parotid tumors	6
Submandibular gland carcinoma	3
Others	
Carcinoma of nasopharynx	3
Carcinoma of mandible	2
Post chemoradiation carcinoma	1
larynx	1
Carcinoma of pyriform fossa	1
Mandibular adamantinoma	1
Recurrent SCC of scalp	1
Secondaries in neck	12

Table 2: Type of neck dissection which the patients underwent in the hospital.

Comprehensive neck dissection	Selective neck dissection
Radical neck dissection = 4	Supraomohyoid neck dissection = 16
Modified radical	Anterior neck dissection = 12
neck dissection	Posterolateral neck dissection = 1
= 44	Anterolateral neck dissection = 2

Among that oral carcinoma patients were 39 (47.56%) in number. In that gingivobuccal sulcus carcinoma were 26 (31.7%), carcinoma tongue were 9 (10.9%), lower lip carcinoma were 2 (2.4%), recurrent oral carcinoma were 2 (2.4) patients.

Among the thyroid neoplasms we had 13 (15.85%) patients, out of which 8 (9.7%) patients had papillary carcinoma, 4 (4.8%) of them had follicular carcinoma and 1 (1.2%) patient had medullary carcinoma of thyroid.

Among the salivary gland tumors we had 9 (10.97%) patients, out of which 6 (7.31%) patients had parotid tumors and 3 (3.65%) patients had submandibular gland tumors.

Another set of miscellaneous group had 21 (25.6%) patients which included 3 (3.65%)carcinoma of nasopharynx patients, 2 (2.4%) patients with carcinoma of mandible, 1 (1.2%) patient of post chemo-radiation for carcinoma larynx, 1 (1.2%) patient with carcinoma of pyriform fossa, 1 (1.2%) patient with mandibular adamantinoma, and 1 (1.2%) case of recurrent carcinoma of scalp. Then we had 12 (14.63%) patients with secondaries in the neck.

Table 2 depicts the type of neck dissection which the patients underwent in the hospital. 52 (63.41%) patients in present study group underwent comprehensive neck dissection, among that 4 (4.8%) patients underwent radical neck dissection,44 (53.65%) patients underwent modified radical neck dissection and 8 (9.7%) patients underwent functional neck dissection. 27 (32.9%) patients in our study group underwent selective neck dissection, among that 16 (19.51%) patients underwent supra-omohyoid neck dissection, 8 (9.75%) patients underwent central neck dissection,1 (1.2%) patient underwent posterolateral neck dissection and 2 (2.4%) patients underwent anterolateral neck dissection.

Patients with Dukes A stage did not receive postoperative chemotherapy and were advised regular follow up. 38 patients received post-operative chemotherapy. 18 patients were given radiotherapy. New evidence suggests a role for anti-inflammatory drugs in the treatment and prevention of colon and rectal cancers.

Results were tabulated based on the complications following neck dissections, which are depicted in Table 3.

### Complications were broadly classified into

- Intra-operative complications
- Immediate post-operative complications.
- Delayed post-operative complications.

# Intra-operative complications

Vascular injury was observed in the current study wherein, internal jugular vein injured in 2 (2.4%) cases.

Also, lymphatic injury was found wherein, thoracic duct injured in 3 (3.65%) cases.

# Immediate post-operative complications

Haemorrhage noted in 2 (2.4%) cases.

### Delayed post-operative complications

Nerve injury was found in the study, wherein, marginal mandibular nerve 5 cases (6.09%), phrenic nerve (1) (1.2%), vagus nerve (1) (1.2%), spinal accessory nerve (13) (15.85%) were recorded.

Table 3: Complications of neck dissection.

Complications		Number of cases
	Vascular injury; internal jugular vein	2 (2.4%)
Intraoperative	Lymphatic injury; thoracic duct	3 (3.65%)
Immediate post-operative	Haemorrhage	2 (2.4%)
Delayed post- operative	Nerve injury	20 (24.39%)
	Chylorrhoea	2 (2.4%)
	Wound dehiscence	4 (4.87%)
орстанус	Flap necrosis	1 (1.2%)

In chylorrhoea was seen in 2 (2.4%) cases. Wound dehiscence was present in 4 (4.87%) cases and flap necrosis was seen in 1 (1.2%) case.

### Management of neck dissection complications

*Intra-operative complications* 

In case of vascular injury, internal jugular vein injured in 2 cases. In both the cases the injury noted intraoperatively and repaired.

In case of lymphatic injury, thoracic duct injured in 3 cases. In all three cases thoracic duct injury identified intra-operatively and serial ligations done.

*Immediate post-operative complications* 

Hemmorhage seen in 2 cases. In one case, re-opened and hemostasis was achieved. In another case, managed conservatively by compression dressing.

Delayed post-operative complications

Nerve injury was found in the study wherein, marginal mandibular nerve (5), phrenic nerve (1), vagus nerve (1), spinal accessory nerve (13) were recorded.

Nerve injuries are the most common complications that we came across in present study. 5 patients with marginal mandibular nerve injury were managed conservatively. 1 patient with phrenic nerve injury was intubated and managed in ICU for quite a period of time and then he expired.1 patient with vagus nerve injury was managed conservatively. Among 13 patients with spinal accessory nerve injury, neuropraxia noted in 10 cases which recovered gradually. But 3 patients had palsy, were managed conservatively and physiotherapy was given.

Chylorrhoea was found in 2 cases and even they were managed conservatively.

Wound dehiscence was seen in 4 cases. Major wound dehiscence noted in 2 cases, among that redo flap done in

one case and another case managed conservatively. Minor wound dehiscence noted in 2 cases and were managed conservatively.

Flap necrosis was seen only in 1 case. Necrosis noted at the y- junction of the flap and managed conservatively with regular dressing and debridement.

### **DISCUSSION**

Neck dissection stays as an important step in eradicating the regional lymph node metastasis in head and neck cancers. Although neck dissection is a technically well-established procedure, complications still occur. Intra-operative events, such as hemorrhage, loss of a venous suture resulting in gas embolism, chylous leakage due to thoracic duct injury, and arrhythmia because of carotid bulb manipulation, are habitually promptly managed; these events may, howe¬ver, be disastrous for the patient. Careful dissection and ligature of vessels are extremely important to avoid intra and postoperative hemorrhage. Hematomas are avoided by careful hemostasis and continuous suction drainage.

Chylous leakage occurs in 1 to 2.5% of neck dissections, mostly in the left side. The more easily accessible portion of the thoracic duct is located along the medial aspect of the internal jugular vein; consequently, this is the most common injury site. Positive pressure ventilation maneuvers may help locate and repair this injury if it is found during the procedure. Prior radiotherapy affects post-ND healing. This effect is dose-dependent; higher doses result in more extensive fibrosis, hypoxia, and decreased leukocyte mi¬gration. Procedure.

Eighty two patients were included in the study group. 55 (67.07%) were male patients and 27 (32.92%) were female patients. Among that oral carcinoma patients were 39 (47.56%) in number. In that gingivobuccal sulcus carcinoma were 26 (31.7%), carcinoma tongue were 9 (10.9%), lower lip carcinoma were 2 (2.4%), recurrent oral carcinoma were 2 (2.4) patients. Among the thyroid neoplasms we had 13 (15.85%) patients, out of which 8 (9.7%) patients had papillary carcinoma, 4 (4.8%) of them had follicular carcinoma and 1 (1.2%) patient had medullary carcinoma of thyroid. Among the salivary gland tumors we had 9 (10.97%) patients, out of which 6 (7.31%) patients had parotid tumors and 3 (3.65%) patients had submandibular gland tumors. Another set of miscellaneous group had 21 (25.6%) patients which included 3 (3.65%) carcinoma of nasopharynx patients, 2 (2.4%) patients with carcinoma of mandible, 1 (1.2%) patient of post chemo-radiation for carcinoma larynx, 1 (1.2%) patient with carcinoma of pyriform fossa, 1 (1.2%) patient with mandibular adamantinoma, and 1 (1.2%) case of recurrent carcinoma of scalp. Then we had 12 (14.63%) patients with secondaries in the neck.

Fifty two (63.41%) patients in our study group underwent comprehensive neck dissection, among that 4 (4.8%)

patients underwent radical neck dissection,44 (53.65%) patients underwent modified radical neck dissection and 8 (9.7%) patients underwent functional neck dissection. 27 (32.9%) patients in preent study group underwent selective neck dissection, among that 16 (19.51%) patients underwent supra-omohyoid neck dissection, 8 (9.75%) patients underwent central neck dissection,1 (1.2%) patient underwent posterolateral neck dissection and 2 (2.4%) patients underwent anterolateral neck dissection.

Intra-operative complications included vascular injury i.e. internal jugular vein injured in 2 cases. In both the cases the injury noted intra-operatively and repaired. Lymphatic injury included thoracic duct injury in 3 cases. In all three cases thoracic duct injury identified intra-operatively and serial ligations done.

Immediate post-operative complications include haemorrhage, noted in 2 cases. In one case, re-opened and hemostasis was achieved. Another case managed conservatively by compression dressing.

A study done by Prim et al, concluded that nerve injury during neck dissection is not uncommon; it may result in loss of function or pain syndromes. The incidence is low after functional ND (in a 442-patient series): accessory nerve injury -1.68%; marginal mandibular nerve injury -1.26%; hypoglossal nerve injury -0.56%; and sympathetic cervical nerve injury -0.42%. 10

Nerve injuries are the most common complications that we came across in our study. Five patients with marginal mandibular nerve injury were managed conservatively. Study by Batstone et al, concluded, marginal mandibular never injury usually occurs when the upper flap is elevated or during level 1 dissection (submental/submandibular triangles); it may cause dysfunction of the lower lip depressor muscle, resulting in an asymmetric smile but no severe sequelae. 11

One patient with phrenic nerve injury was intubated and managed in ICU for quite a period of time and then he expired. One patient with vagus nerve injury was managed conservatively. Among 13 patients with spinal accessory nerve injury, neuropraxia noted in 10 cases which were recovered gradually. But 3 patients had palsy, were managed conservatively and physiotherapy was given.

Chylorrhoea was seen in 2 cases, even they were managed conservatively. wound dehiscence was seen in 4 cases. Major wound dehiscence noted in 2 cases, among that redo flap done in 1 case and another case managed conservatively. Minor wound dehiscence noted in 2 cases and were managed conservatively. flap necrosis was seen in 1 case. Necrosis noted at the y- junction of the flap and managed conservatively with regular dressing and debridement.

Co-morbid conditions such as diabetes, hypertension, cardiac, respiratory and relative malnutrition were optimized before the patient was posted for surgery. Enhancement of nutritional status with either a nasogastric tube or percutaneous gastrostomy was done preoperatively. Preoperative optimization is required to minimize risk of complications. Postoperatively general systemic co-morbidities were managed effectively with high quality health care which included a team of physicians, anesthetists and surgeons. Aggressive respiratory support is mandatory in encouraging patients to clear secretions to improve pulmonary function.

In present study, there were no peri-operative deaths. Nerves were the most common structures injured.

A careful pre-operative assessment, meticulous surgical technique, high quality post-operative care and appropriate rehabilitation help in preventing and managing the complications.

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