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Original Research Article

Complications of neck dissection and their management: Retrospective study

Sheetal Kumari [1,*]

[1] *Dept. of ENT, Government Medical College and Hospital, Jammu and Kashmir, India*

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ABSTRACT

Introduction: Neck dissection (ND) is a surgical procedure performed in treating head and neck cancer patients with or without cervical nodal neck metastasis. The aim of neck dissection is to achieve loco-regional control thus optimizing the cancer cure rate. Various complications may potentially occur following this surgery. Previous studies done have documented the complication rate following neck dissection surgery to range between 5% to 15%. Most of the complications are inevitable and various efforts have been made to try and reduce complications by modifying the aggressive surgical procedure. The objective of this study is to report the various complications, its rate in various neck dissection procedures, their management and to seek improved patient care and outcome.

Material and Methods: A systematic review of 73 patients who underwent neck dissection for various head and neck cancers from August 2017 to July 2020. These patients were studied for post-operative complications and their management.

Results : Out of 73 patients, Vascular injury observed in the current study was internal jugular vein (IJV) and was seen in 2 (2.7%) cases and was repaired intraoperatively. Throracic duct injury was identified in 3(4.1%) and it was identified and ligated intraoperatively. Immediate post-operative complication being hemorrhage was seen among 2 cases, both the cases were re-opened. Marginal mandibular nerve and spinal accessory nerve injury was observed in 3 cases and they both came under the delayed type of complications.

Conclusion: A careful preoperative assessment, meticulous surgical technique, high quality postoperative care and appropriate rehabilitation are the cornerstone of preventing and managing complications.

1. Introduction

Head and Neck cancer (HNC) is a disease of the upper aerodigestive tract and is one of the most frequently diagnosed cancer worldwide. A high rate of cancers involving the head and neck are reported across the Asian region, with notable variations between countries. Head and neck cancers account for 30 percent of the total cancer burden in India in which cancer of the tongue, mouth, pharynx account for more then 80 percent of the case.[1] The most important prognostic factor in the management of head and neck cancer is the presence of cervical lymph node metastasis. Neck dissection has been a well-established procedure for diagnosing (staging) and treating head and neck cancer for almost a century.[2] It is the vital step in eradicating the regional lymph node metastasis.[3] 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.[4]

Since, Crile introduced radical neck dissection at the beginning of the 20th centuary, a few changes have been proposed by Hays Martin in 1951 and Suarez which

* *Corresponding author*.
E-mail address: g.gphonshashetal@gmail.com (S. Kumari).

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aimed for a more conservative approach to preserve vital anatomical structures in the neck without compromising the completeness of lymph node removal. The transition from radical to selective neck dissection has resulted in fewer complications and lower morbidity, at the same time preserving surgical efficacy and compliance with oncological principles.

Depending on the location and extend of the tumour. The type of neck dissection performed may be Radical, Modified, Selective and extended and either unilateral or bilateral. Complications of neck dissections are divided into three major categories Wound complications, Nerve complications and Vascular complications. Additional immunosuppressant caused by conditions such as diabetes or relative malnutrition should be optimized since they predispose to complications including wound infections.[5] Although neck dissection is a common surgery performed by any otorhinolaryngologist but there is no available local study that comprehensively review and analyse the complications of this surgery. A great amount of lessons could be learnt from this study that will subsequently open a window of opportunity for quality improvement in the surgical practice, and to avoid potential complication thus reducing morbidity and mortality rate among our patients who had underwent this surgery.

Chemotherapy has been investigated as an alternative approach to primary surgical resection. 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.[6] The aim of the present study is to report the various types of complications encountered during neck dissections and their rates in various neck dissection procedures Management of these complications and also risk factors after neck dissection and to seek improved patient care and outcome.

2. Material and Methods

A retrospective review of 73 patients admitted in the department of ENT and Head and Neck Surgery, SMGS Hospital, Govt. Medical College Jammu from august 2017 to July 2020, who underwent neck dissections for various head and neck cancers like squamous cell carcinoma of upper aerodigestive tract, thyroid malignancy.

Data retrieved from case records of patients which included clinical history, examination, routine investigation, specific investigations surgery details, intraoperative findings, postoperative complications, management and rehabilitation. The criteria for inclusion in the study were neck dissection along with the dissection of primary tumour, neck dissection as primary procedure as in case of unknown primary, neck dissection after chemo radiotherapy and unilateral neck dissection. Neck dissection has been classified into ”radical” neck dissection (RND),”modified radical” neck dissection (MRND)or ’Selective” neck dissection (SND) procedures. In the present series, RND removed all lymph nodes from level 1 to 5 together with the sternocleidomastoid muscle, internal jugular vein, and the spinal accessory nerve, while the MRND removed the lymph nodes of the same levels but preserved the latter three structures. The SND procedure may include removal of lymph nodes levels **I** to **III** or IV or levels **II** to IV according to the primary tumor.

Moreover, MRND and RND were performed via tri-flapped incision, while a bi-flapped incision was adopted for the SND. 73 patients who met the inclusion criteria were analyzed retrospectively to identify risk factors and probability of wound complications. All patients who received CRT underwent neck dissection between 12 to 14 weeks after the end of the treatment. The variables assessed included ,age, gender, smoking habit, alcohol abuse, diabetes, preoperative blood values, preoperative lymph node status, surgical time, type of neck dissection, concomitant surgical procedure, pathological nodes and nodal extra capsular spread. Cases submitted to surgery after CRT, cN staging was assessed at the end of the CRT. Immediate onset complication is defined as complication that occur within the first 24 hrs period following surgery. Early onset complication that occurs or detected beyond 24 hrs until day 7 of post operative period. Late onset complication is defined as complications that occur or detected after day 7 of post operative period.

Ethical clearance was obtained from the intuitional ethics committee, GMC Jammu (IEC/GMC/2021/582/A-11).

Data were entered into spreadsheets and analyzed for simple descriptive statistics using the SPSS statistics for windows version.

3. Results

Table 1 Shows potential complications after neck dissection.Table 2 depicts the distribution of the patients according to primary site of the disease. Total number of patients in the study group is 73(N=73). 49(67.1%) were male patients and 24(32.8%) were female patients. Mean age was found to be 51 years.

3.1. Complications were broadly classified into

1. Intra operative complications
2. Immediate postoperative complications
3. Delayed post operative complications.

3.2. Intra -operative com plications

Vascular injury was observed in the current study wherein, internal jugular vein injured in 2 (2.7%) cases.

Also, lymphatic injury was found wherein, thoracic duct injured in 3(4.1%) cases.

3.3. Immediate post operative complications

Haemorrhage noted in 2(2.7%) cases.

3.4. Delayed post-operative complications

Nerve injury was found in the study, wherein, marginal mandibular nerve in 2(2.7%) cases and spinal accessory nerve 1(1.3%) cases. Chylorrhoea was seen in 1(1.3%) cases. Wound dehiscence was present in 1(1.3%), flap necrosis was seen 2(2.7%) cases and recurrence was noted in 1(1.3%) cases. In case of vascular injury, internal jugular vein injured in 2(2.7%) cases. In both the cases the injury noted intraoperatively and repaired. In case of lymphatic injury, thoracic duct injured in 3(4.1%). In all the three cases thoracic duct injury identified intraoperatively and serial ligations done.

3.5. Immediate post-operative complications

Hemmorhage seen in 2(2.7%).In both the cases,neck reopened and hemostasis achieved.

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4. Discussion

Intraoperative events, such as hemorrhage, loss of a venous suture resulting in air embolism, chylous leakage due to thoracic duct injury, and arrhythmia because of carotid bulb manipulation, are habitually promptly managed. These events may, however, 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.[7]

RND is performed less frequently these days. Five level neck dissection (usually MRND) are currently limited to patients presenting with clinical neck disease (stage 2b and higher) in the setting of oral cavity cancers and for advanced laryngeal and hypopharyngeal cancers. Malgonde and kumar did a similar study in 82 patients in 2020 in which 55 were male and 27 were female and his observations were most of the head and neck cancers were squamous cell carcinoma with most common pathology being well differentiated squamous cell carcinoma. In their study they found out of 82 patients, 66(80.48%) did not develop any complications, while 16(19.51%) experienced some complications. our results are almost similar to their results.

If concurrent en-bloc resection of a primary oral or oropharyngeal lesion is to be carried out the resultant through and through defect increases the rate of infection in the neck although topical treatments with either antiseptics or antibiotics have been demonstrated to be beneficial.[8] Davidson et al. noted that the type of ND did not alter the rate of complications. Similarly wound or systemic complications did not correlate with preoperative haemoglobin level, haematocrit, white blood cell or platelet count. In our study we also could not confirm any association between preoperative blood values and the occurance of complications.

The vascular supply of the cervical skin is derived from the external carotid artery superiorly and the subclavian artery inferiorly. Trifurcations or incisions parallel to the carotid artery should be avoided particullarly in salvage cases after radiotherapy .MRND and RND were performed via amodified schobinger incision, while apron incision was adopted for the SND. The vertical limb of schobinger incision was placed behind the carotid artery to minimise the risk of rupture.

R pellani, Gmerchante et al underwent study on predictive factors for postoperative wound complications after neck dissection in year 2013, and found approximately 20% of patients in their series experienced postoperative wound complications which is similar to our study. Their results also showed that previous concurrent CRT for head and neck tumours and type of neck dissection were associated with a high risk of wound complications. They also advised the use of pedicled flap in those cases who previously had CRT in order to have the tissue as best oxygenated as possible.

The key to treatment of a chyle fistula is prevention which demands knowledge of the relevant anatomy and intraoperative identification can be 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[9] Prior radiotherapy affects post ND healing. this effect is dose-dependent; higher doses result in more extensive fibrosis, hypoxia and decreased leukocyte migration.[10]

Prevention of nerve injury demands excellent anatomical knowledge and awareness of variations. Meticulous surgical technique when handling and working in the vicinity of nerves is required. Intraoperative nerve monitoring is increasingly popular with surgeons in an attempt to avoid nerve injury.[11] Where possible integrity of the cranial nerves should be maintained unless it compromises tumour resection. During dissection while raising the upper flap the most important branch of the facial nerve the marginal mandibular The major part of the circumoral musculature is supplied by the marginal mandibular branch of the facial nerve .Marginal mandibular nerve makes an curve below and in front of the angle, about one finger breadth below the mandibular.[12] The distance of the marginal mandibular branch of the facial nerve from the inferior border of the mandible has been studied by number of workers,[13] and varies from 1.4cm to 1.75cm.Therefore,in order to avoid damaged to the nerve in the submandibular region,

Table 1: Pontential complication after neck dissection

Immediate		**Intermediate**		**Late**
Local	General	Local	General	
Bleeding airway obstruction increased ICP caroted sinus syndrome nerve injury	Pneumo-thorax	Seroma chylous fistula infection wound dehiscence carotid artury flap failure fistula	Basal collaspse bronchpn eumonia deep vein thrombosis	Recurrence distant metastasis hypertrophy ic scar

Table 2: Distribution of disease in the patients.

Primary site of disease	**Number O patients**
Oral	
Gingivobuccal sulcus carcinoma	21(28.7%)
Carcinoma tongue	10(13.6%)
Lower lip verrucous carcinoma	6(8.2%)
Recurrent oral carcinoma	3(4.1%)
Thyroid neoplasms	
Papillary carcinoma of thyroid	7(9.5%)
Follicular carcinoma of thyroid	3(4.1%)
Medullary carcinoma thyroid	1(1.3%)
Salivary gland tumours	
Parotid tumors	6(8.2%)
Submandilular gland carcinoma	2(2.7%)
Other	
Carcinoma larynx	6(8.2%)
Mandibular adamantinoma	1(1.3%)
Secondaries in neck	

Table 3: Type of neck dissection which the patients underwent in the hospital.

Comprehensive neck dissection	Selective neck dissection
Radical neck dissection=8 (10.9%)	Supraomohyoid neck dissection =16(21.9%)
Modified radical neck dissection=38(52.0%)	Anterior neck dissection=8(10.9%)
	Posterolateral neck dissection=1(1.3%)
	Anterolateral neck dissection=2(2.7%)

Table 4: Complications of neck dissection

Complication		**Number of cases**
Intraoperative	Vascular injury internal jugular vein	2(2.7%)
	Lymphatic injury thoracis buct	3(4.1%)
Immediate Postoperative	Haemmorhage	2(2.7%)
Delayed Postoperative	Nerve injury	3(4.1%)
	Chylorrhoea	1(1.3%)
	Wound delhiscence	1(1.3%)
	Flap necrosis	2(2.7%)
	Recurance	1(1.3%)

the incision should be made >1.5cm below the angle of mandible and parallel to the lower border of mandible. Syndrome of decrease range of abduction in the shoulder joint and pain following RND is due to sacrifice of the SAN. Preservation of that structure during neck dissection helps inameliorating the syndrome.[14] The development of modified procedures have helped to reduce the adverse effects of the classical operation and yet preserve its effectiveness in oncological terms.Preoperative CRT,and RND or MRND with a 3 flap incision ,are risk factors for major wound complications in patients undergoing neck dissection.[15]

5. Conclusions

A careful preoperative assessment, meticulous surgical technique, high quality postoperative care and appropriate rehabilitation are the cornerstones of preventing and

managing complications. Modified procedures should be used to reduce the adverse effects of the classical operation.

6. Ethical Approval

The study was approved by the institutional ethics committee.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Author biography

Sheetal Kumari, Senior Resident https://orcid.org/0000-0001-6413-4583

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