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*Original Article*

# Comparative study of complications of comprehensive neck dissection in primary neck and irradiated neck

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**Abstract**

*Due to close relationship of vital structures in the neck, certain complications are inherent to neck dissection (ND) for the treatment of patients with metastatic neck disease of squamous cell carcinoma.*

***Aim:*** *To compare the incidence of complications of Comprehensive ND done in primary neck and in irradiated neck.*

***Methods:*** *A cross sectional study of 267 patients with metastatic squamous cell carcinoma in the neck, with or without primary tumor, under gone ND with a curative intension, was made from January 2007 to December 2011 (five years). It was done to identify perioperative complications and to compare them in NDs done in primary neck and in irradiated neck.*

***Result:*** *Total 267 patients with unilateral Comprehensive ND, with or without en-block of the primary tumor, were studied. There was no death. The most frequent complication was marginal mandibular nerve injury (4.05% in primary neck and 8.51% in irradiated neck) followed by intra operative hemorrhage (1.16% in primary neck and 3.19% in irradiated neck).*

***Conclusion:*** *There were no perioperative death in either category; nerves were the most commonly injured structures. Complications were higher in neck dissection in irradiated neck than in primary neck dissection.*

***Key Words:*** *Neck Dissection; complications of Neck Dissection*

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## Introduction

The neck dissection has remained an essential aspect of head and neck cancer management for over a century. During this time its role has expanded from a purely therapeutic option into an elective setting in part promoted by efforts to reduce its morbidity. Although the neck dissection provides clinicians ways to deal cervical disease, its reliability and safety can only be assured if surgeons are aware of the potential complications and have enough ability to minimize such morbidity by appropriate care in the perioperative period.

Since its original description by Crile in 1906 and subsequent popularization by Hays

Martin in 1951 the Radical neck Dissection (RND) remained the standard treatment for palpable of potential cervical metastasis from head and neck cancer for many decades[1,2]. This operation provides a safe and reproducible method of comprehensively addressing cervical lymph nodes. Recurrence rates after RND vary according to the bulk of the disease present, ranging from less than 10% in the $N_0$ neck to over 70% in patients with positive nodes at multiple levels[3]. The addition of either pre-or post operative radiation therapy further reduces the incidence of failure in the neck by at least 50% for all N stages[4.5]. However, whilst the RND provided a reliable method of treating patients with head and neck cancer, it became increasingly apparent that it carried substantial morbidity and complications. Nahum described a Syndrome of decreased range of abduction in the shoulder joint and pain following RND which has been termed 'shoulder syndrome'[6]. The etiology of this syndrome is in part sacrifice of the spinal accessory nerve (SAN). With preservation of that structure during ND improve the syndrome[7]. The morbidity of the classical RND thus gave impetus to the development of modified procedures that attempted to reduce the adverse effects of the classical operation and yet preserve its effectiveness in oncological terms. The realization that it was possible to perform a complete en-block lymphadectomy with preservation of structures such as the SAN led to the development of less morbid procedures, the original concept of which is credited to Bocca[8].

Radiotherapy has been advocated as an alternative approach to primary surgical resection with the aim of preserving organs in patients with head and neck tumors[9]. Neck metastasis 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 radiotherapy has been proposed for patients with regional neck disease although there is a possibility of higher rate of complications[10]. Previous radiation encourages fibrosis between tissue planes such that subsequent surgery can be a laborious process.

The purpose of this study was to establish the incidence of complication in patients with neck metastases of squamous cell carcinoma after Comprehensive ND therapy in primary and irradiated neck.

**Methods**

Neck dissection with a curative intent was done in 267 patients with metastatic squamous cell carcinoma in the neck with or without the primary tumor (206 male and 61 female) from January 2007 to December 2011 (five years) in the department of Otolaryngology and Head-Neck surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. A cross sectional study was done.

**Result**

The total number of sides that were studied was 267 of which 173 were done in primary neck and 94 were in irradiated neck. The mean age was 53 years (34 to 72 yrs.), 206 males and 61 females. Among 173 of ND in primary neck 131 was done in en-block with the primary tumor and in 42 patients primary was hidden. Among the irradiated patients 45 cases presented with the recurrence in the primary sites as well as in the neck. In these cases enblock ND were done with the primary. Another group of 49 irradiated patients were presented with the recurrence only in the neck.

The mean age of patients was 53 years ranging from 34 to 72 years. Comprehensive Neck Dissection was done in 173 patients in primary neck, on the other hand it was 94 in irradiated neck.

**Table-I**

*Neck dissection setting*

| Time of Neck Dissection | Primary Site | No. of patients | |
|---|---|---|---|
| Primary Treatment | Oral Cavity | 79 | |
| | Oropharynx | 19 | 131 |
| | Larynx | 27 | |
| | Cheek-Skin | 06 | |
| | Occult primary | 42 | 42 |
| | Total | 173 | 173 |
| Surgery in Irradiated Neck | Oral Cavity | 21 | |
| | Oropharynx | 09 | 45 |
| | Larynx | 15 | |
| | Primary Disappeared | 26 | 49 |
| | Occult Primary | 23 | |
| | Total | 94 | 94 |

The following complications were searched : hemorrhage, wound dehiscence, infection, suppuration, chylous leakage, sub-cutaneous emphysema, pneumothorax, salivary leakage, bronchopneumonia, nerve injury (accessory, marginal mandibular, vagus, hypoglossal, phrenic nerves). Per-operative and postoperative periods were observed. Follow-up given 01 month, 06 months and 01 year after surgery to observe the long term complications.

**Table-II**

*Complication of Neck Dissection in primary Neck Vs irradiated Neck*

| Complication | In Primary neck(n=173) | | In irradiated neck(n=94) | |
|---|---|---|---|---|
| | En-block surgery (Primary+Neck) n=131 | ND in occult primary n=42 | En-block surgery ( rec. in primary+ neck) n=45 | ND only(rec.of occult primary+ rec.in , neck primary disappeared) n=49 |
| Intra operative Hemorrhage | 2 | 0 | 2 | 1 |
| Post operative Hemorrhage | 0 | 0 | 0 | 0 |
| Wound Infection | 0 | 0 | 1 | 0 |
| Wound Dehiscence | 1 | 0 | 1 | 1 |
| Chylous leakage(intra-operative) | 1 | 0 | 1 | 1 |
| Subcutaneous emphysema | 0 | 0 | 0 | 0 |
| Pneumothorax | 0 | 0 | 0 | 0 |
| Facial Oedema | 0 | 0 | 0 | 0 |
| Salivary Leak | 0 | 0 | 0 | 0 |
| Marginal mandibular N injury | 5 | 2 | 5 | 3 |
| Vagus N injury | 0 | 0 | 0 | 0 |
| Hypoglossal N injury | 0 | 0 | 0 | 0 |
| Intra operative mortality | 0 | 0 | 0 | 0 |
| Total | 9 | 2 | 10 | 6 |

There was no intra operative death. Common complication was the nerve injury; the most frequent was injury to marginal mandibular branch of facial nerve followed by accessory nerve injury.

**Discussion**

Although comprehensive neck dissection is a technically well-established procedure, complications still occur. Intra operative events such as hemorrhage, 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[11]. In irradiated ND sometimes per-operative bleeding is more due to difficult flap elevation and demarcation of tissue plain. Per-operative identification of SAN, IJV (internal jugular vein) may sometimes become difficult; and sometimes separation of great vessels is difficult which can increase the chance of leaking. In irradiated patient skin flap also become too thin to decrease its vitality. For this prior radiotherapy affects post neck dissection healing[12].

An increased complication rate is associated with ND after radiotherapy. These include wound dehiscence and flap necrosis. There was one case of postoperative wound dehiscence (ND done in primary neck) in which there was skin loss due to involvement by the tumor. It was closed primarily under tension. Other cases were irradiated.

The surgical wound infection rate was low; prophylactic antibiotic therapy was given in the preceding 24 hours to surgery. Previous radiotherapy, however, had no significant negative impact on wound infection[13]. There was one case of surgical wound infection in a patient who had under gone radiotherapy before surgery.

Although chylous leakage is rare, it occurs 01 to 2.5% of NDs, mostly in the left side, and it is most viable because of the relation of thoracic duct with the left Internal jugular vein (IJV). Positive pressure ventilation maneuvers may help to locate the leakage and repair the injury if it is faced during the procedure[14]. There were two cases during neck dissection (irradiated neck) and one in primary neck dissection, were identified and sealed during the procedure.

Nerve injury during ND is not uncommon. It may result in loss of function or pain syndromes. The incidence is low after functional ND in both primary and irradiated surgery[15].

Marginal mandibular nerve injury usually occurs when the upper flap is elevated or during level-1 dissection; it may cause dysfunction of the lower lip depsessor muscle. The injury was seen in 7 cases of primary surgery and 8 cases of surgery in irradiated neck resulting in a symptomatic smile but no severe sequlae[16].

The vagus nerve may be injured when the internal jugular vein is ligated during RND. It may cause vocal fold paralysis, or dysphasia and aspiration[17]. This complication is rare and was not occured in our series. Phrenic nerve injury is uncommon. It often goes unnoticed and may result in atelactasis and lung infiltrates[18]. We found no case of phrenic nerve injury.

With the popularization of radio-chemo therapy in 1990s to preserve organ, and considering that neck metastases is an independent prognostic factor, comprehensive neck dissection has indicated as salvage or planned surgery after a radio-chemotherapy protocol. It is also done in metastatic neck disease with occult primary[19]. However, surgical wound complication rates are about 10% when ND is undertaken from 5 to 7 weeks after the protocol[20]. Neck Dissection before radio-therapy has been suggested the

complication rate is 2.5%[21]. In this series surgical complication in primary neck dissection was 6.36% and in irradiated ND it was 17.02%.

**Conclusion**

There were no intra operative deaths .The most common complication is nerve injury, the marginal mandibular branch is the most commonly involved nerve and complications are more in neck dissection in irradiated neck.

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