

Head and Neck Malignancies and Neck Dissection Complications: A Cohort Study from a Tertiary Care Centre in Telangana, India

M MALLIKARJUN RAO¹, SHUBRANSHU JENA², RUDRA PRAKASH PANIGRAHI³, S KUMAR VASHIST⁴

ABSTRACT

Introduction: Complications after major surgery are a significant cause of morbidity and mortality, and they have been shown to harm long-term quality of life. Lymph node status is the chief prognostic indicator. In the head and neck, complications from oncosurgeries can also delay adjuvant treatment, which is known to adversely affect survival. Neck dissection is a standard procedure for head and neck cancer following resections of the primary tumour. The invasive nature of neck dissection predisposes patients to a variety of intraoperative and postoperative complications.

Aim: To analyse the complications in patients with head and neck malignancies following neck dissections.

Materials and Methods: This was a single-centre cohort study conducted at the Department of Surgical Oncology, Nizam's Institute of Medical Sciences, Hyderabad, Telangana, India. All patients diagnosed with head and neck malignancies who underwent neck dissections from July 2022 to December 2022 were included in the study. Complications such as bleeding, haematoma, infection, seroma, wound dehiscence, flap necrosis,

fistula, chyle leak, shoulder dysfunction, and nerve and vascular injuries following various neck dissections were observed until discharge. The data was entered in Microsoft excel and results were expressed in terms of frequency and percentage.

Results: A total of 67 patients were analysed in this study. Among them, 42 (62.7%) were males and 25 (37.3%) were females, with a mean age of 48 years and an age range of 25-84 years. Three patients underwent bilateral neck dissection, and a total of 70 neck sides were studied. Among the patients who received prior radiotherapy (20, 29.8%), 6 (30.0%) experienced complications, and there were no deaths.

Conclusion: Head and neck surgery carries the potential for many complications due to the presence of major vessels and nerves. Carefully performed surgery is the cornerstone of success. Thorough preoperative assessment, proper surgical technique, and postoperative care are essential in preventing and managing complications. A step-by-step approach to studying details and conducting a complete check-up of the patient after the procedure ensures optimal results with minimal late side-effects and complications.

Keywords: Chyle leak, Haematoma, Nerve injury, Seroma

INTRODUCTION

Complications after major surgery are a significant cause of morbidity and mortality and have been shown to affect quality of life [1]. Lymph node status is the chief prognostic indicator [2]. Metastatic dissemination into lymph nodes of the neck frequently occurs in head and neck cancers, downgrading the patient's curability and survival [3]. In head and neck oncosurgeries, complications can also delay adjuvant treatment, which is known to adversely affect survival [3-8]. Following resections of the primary tumour, neck dissection is a standard procedure for head and neck cancer [5,9]. Since the introduction of radical neck dissections in the early 20th century, many factors associated with treating neck dissections have affected the complication rates and morbidity associated with them. Complications encountered following neck dissections include bleeding, haematoma, infection, seroma, wound dehiscence, flap necrosis, fistula, chyle leak, shoulder dysfunction, nerve, and vascular injuries [7,10]. The transition from radical neck dissection to selective neck dissection have decreased morbidity and complications while maintaining surgical efficacy and oncological principles. These modifications still present variable degrees of shoulder dysfunction as a common complication [7,10]. 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 tumours. Neck metastatic disease is one of the most significant prognostic factors [11,12]. Hence,

the present study was conducted to evaluate the complications of neck dissections arising in head and neck malignancies following different types of neck dissections.

MATERIALS AND METHODS

The present study was a single-centre cohort study. All patients who were diagnosed and operated for head and neck malignancies with neck dissections from July 2022 to December 2022 were included as participants in the study after obtaining ethics approved IEC no. EC/NIMS/3049/2022.

Inclusion criteria: Patients with No/N1 neck status for all head and neck malignancies, those undergoing neck dissection for an unknown primary or primary neck dissection or post neoadjuvant Chemotherapy (CT)/Concurrent Chemo-Radiation (CTRTR)/Radiotherapy (RT), those with metastatic neck nodes or with primary tumour excision and neck dissection were included in the study.

Exclusion criteria: History of previous ipsilateral neck dissections or neck surgery in the past on the side of neck dissection were excluded from the present study.

Procedure

A total of 67 patients were included as subjects in the present study, by random sampling method, and the following data were collected from the patients admitted to the Surgical Oncology department at NIMS for elective neck dissection after obtaining informed consent.

Demographic parameters including age, gender, history of diabetes, hypertension, tuberculosis, history of tobacco, gutkha chewing, Smoking, alcohol, Contrast-Enhanced Computed Tomography (CECT) of the face and neck, ultrasound of the neck, biopsy/Fine-Needle Aspiration Cytology (FNAC) of the primary tumour/neck node/both. The included patients were noted for complications following neck dissections: bleeding, haematoma, infection, seroma, wound dehiscence, flap necrosis, fistula, chyle leak, shoulder dysfunction, nerve and vascular injuries. The surgical procedure followed was selective neck dissection technique. During the closure of the neck wound, proper approximation ensures complete closure of the neck and proper healing with minimum scarring. The platysma elevation of flaps was strictly subplatysmal in all dissections, and closure was done in three layers (platysma, subcutaneous tissue, and skin), which aided in better wound healing [4]. Postoperative drain management has necessary considerations in the healing of the surgical wound [4,8]. Placing drainage was considered as a separate step during the procedure, from the incision itself, to lower down the chances of infection and was monitored properly.

STATISTICAL ANALYSIS

Descriptive statistics were used, and the data were tabulated and represented as frequency, percentage, and mean±SD, bar graphs, and pie-charts. The association among various variables was calculated by the Chi-square test. Statistical Package for Social Sciences (SPSS) version 16.0 was used for analysis and p-value <0.05 was considered statistically significant.

RESULTS

A total of 67 patients who met the inclusion and exclusion criteria were included. Among them, 42 (62.7%) were males, and 25 (37.3%) were females, with a mean age of 48 years and an age range of 25-84 years. Three patients underwent bilateral neck dissection, and 70 neck sides were studied. All the study participants and subjects were observed for complications following various neck dissections until discharge. Patients who received prior radiotherapy were 20 (29.8%), and 6 (30.0%) patients out of these had complications, and no deaths occurred in this study.

[Table/Fig-1] provides the differential diagnosis of head and neck malignancies of all participants of the study, who were further planned to undergo the procedure of neck dissection.

Diagnosis	n (%)
Carcinoma buccal mucosa	33 (49.2)
Carcinoma alveolus	12 (17.9)
Carcinoma thyroid	6 (9)
Carcinoma unknown primary	1 (1.5)
Carcinoma tongue	15 (22.4)

[Table/Fig-1]: Patients diagnosed with head and neck malignancies that were planned for neck dissection.

Six patients underwent functional neck dissection, four had posterolateral neck dissection, and two had Modified Radical Neck Dissection (MRND) type 1. Radical neck dissection was done in two cases, and extended radical neck dissection in one. The most commonly performed neck dissection was Modified Radical Neck Dissection (MRND) type 2 in 43 cases, followed by supraomohyoid neck dissection in 12 [Table/Fig-2].

Type of neck dissection	Number of neck sides (N=70)
Modified Radical Neck Dissection (MRND) type 2	43
Supraomohyoid Neck Dissection (SOHND)	12
Functional neck dissection	6
Posterolateral neck dissection	4
Radical neck dissection	2

Modified Radical Neck Dissection (MRND) type 1	2
Extended radical neck dissection	1

[Table/Fig-2]: Commonly performed neck dissection (Total neck sides=70).

The most commonly injured nerve was the spinal accessory in 5 (7.5%) cases, marginal mandibular in 2 (3%) cases [Table/Fig-3], while two patients (6%) suffered vessel injury.

Nerve injury	n (%)
Spinal Accessory Nerve (SAN)	5 (7.5)
Mandibular	2 (3)
Phrenic	0

[Table/Fig-3]: Distribution of study participants according to the incidence of nerve injury.

Postoperative complications was observed in 60 patients. The most common postoperative complication observed was the development of a seroma in 25 (37.3%) cases, followed by chyle leak in 9 (13.4%) cases and dehiscence in 7 (10.4%) cases, respectively [Table/Fig-4].

Complications	n (%)
Seroma	25 (37.3)
Chyle leak	9 (13.4)
Dehiscence	7 (10.4)
Haematoma	6 (9)
Bleeding	4 (6)
Infection	4 (6)
Re-exploration	4 (6)
Abscess	1 (1.5)
3-point dehiscence	0

[Table/Fig-4]: Distribution of study participants according to complications.

The most common complication among the post-RT patients (n=20) was seroma (10.0%), wound infection, wound dehiscence, and chyle leak, occurring in 0.05% of patients each [Table/Fig-5].

Complications	n (%)
Seroma	2 (10.0)
Infection	1 (0.05)
Dehiscence	1 (0.05)
Chyle leak	1 (0.05)
Post RT re-exploration	1 (0.05)
3-point dehiscence	0
Bleeding	0
Hematoma	0
Abscess	0

[Table/Fig-5]: Distribution of post RT participants (Total N=20) with respect to complications (n=6).

Most study participants, 39 (58.2%), had their drain removed between postoperative days 5 and 7 [Table/Fig-6]. A comparison between men and women concerning the development of postoperative complications (n=60), showed that more postoperative complications occurred among men compared to women. However, these differences were not found to be statistically significant in the analysis [Table/Fig-7].

Postoperative day of drain removal (days)	n (%)
<5	9 (13.4)
5-7	39 (58.2)
8-10	18 (26.9)
>10	1 (1.5)

[Table/Fig-6]: Distribution of study participants according to the postoperative day of drain removal (n=67).

Complications	Males (%) (n=44)	Females (%) (n=16)	Total (%)	Chi-square value	p-value
Bleeding	2 (50)	2 (50)	4 (100)	0.293	0.588
Haematoma	5 (83.3)	1 (16.7)	6 (100)	1.201	0.273
Seroma	18 (72)	7 (28)	25 (100)	1.479	0.224
Abscess	1 (100)	0	1 (100)	0.604	0.437
Infection	2 (50)	2 (50)	4 (100)	0.293	0.588
Dehiscence	5 (71.4)	2 (28.6)	7 (100)	0.255	0.613
Chyle leak	8 (88.9)	1 (11.1)	9 (100)	3.570	0.059
Re-exploration	3 (75)	1 (25)	4 (100)	0.275	0.599
3-point dehiscence	0	0	0	-	-

[Table/Fig-7]: Comparison between men and women in developing complications. Total N of Complications: 60

A comparison between the age of the participants concerning the development of postoperative complications (n=60) [Table/Fig-8] revealed that patients aged 55 years or younger suffered more from seroma, abscess, and wound infection than their older counterparts, who, in turn, suffered more from wound dehiscence and chyle leak. However, a statistically significant difference was observed only for wound infection [Table/Fig-8].

Complications	≤55 years (%) (n=33)	>55 years (%) (n=27)	Total (%)	Chi-square value	p-value
Bleeding	2 (50)	2 (50)	4 (100)	0.293	0.588
Haematoma	3 (50)	3 (50)	6 (100)	0.453	0.501
Seroma	13 (52)	12 (48)	25 (100)	1.947	0.163
Abscess	1 (100)	0	1 (100)	0.604	0.437
Infection	4 (100)	0	4 (100)	3.886	0.049*
Dehiscence	3 (42.9)	4 (57.1)	7 (100)	1.314	0.252
Chyle leak	4 (44.4)	5 (55.6)	9 (100)	1.479	0.224
Re-exploration	3 (75)	1 (25)	4 (100)	0.118	0.731
3-point dehiscence	0	0	0	-	-

[Table/Fig-8]: Comparison between the age of the participants and development of postoperative complications.

*Statistically significant; Total N of complications: 60

DISCUSSION

Out of the 67 cases, 25 (37.3%) patients developed seroma, which were drained by aspiration followed by applying compression dressings. A total of 6 (9%) patients developed a haematoma, and 4 (6%) needed re-exploration.

The authors of this study observed four patients (6%) with thoracic duct injury, while a similar injury was reported by Kumari S in 4% of patients [13]. The specific procedure to be followed in neck dissection surgery was planned according to wound complications, as details are also mentioned in previous literature [4]. Wound complications were higher in MRND technique and surgery, as described in previous studies [11] or RND than in the case of SND, due to a larger area involved in the surgical field in RND procedure and its modifications. Furthermore, these procedures also involve triflapped incision technique [11], while SND technique involves biflapped incision technique, supporting the same reason. The use of three flaps results in reduced vascularisation at the periphery of the skin, leading to ischaemia [14], which explains the observed higher incidence of skin-flap necrosis or dehiscence. However, these did not occur in the present study as the authors practiced keeping a small tissue of Sternocleidomastoid (SCM) muscle intact with the posterior flap. In any case, all the RND/MRND procedures in the present study were associated with a 3-flap incision.

Most study participants 39 (58.2%) had their drain removed between postoperative days 5 and 7. The mean postoperative day of drain removal [15] for the participants was 6.5 ± 1.6 days, which was 4 days in Urquhart AC and Berg RL [16]. A total of eight male patients and one female patient presented with chylous leak, who

were managed accordingly. Many previous studies, although an uncommon complication, also depicted the surgical management of chylous leak [17]. The reported incidence of wound complications after CRT varies from 3-61%. Some authors have reported that they did not find any significant differences [3] in complications between groups of patients who were or were not submitted to preoperative RT [8,18], while others assumed that CRT [12] should be considered a risk factor [8] for wound complications. The present study reported an incidence of haematoma in 9% of patients after neck dissections, while a previous study mentioned an incidence of 4.2% of cases presenting with haematoma after head and neck surgeries [19]. Preoperative optimisation is followed in order to lower the chances of complications [4]. Co-morbidities such as diabetes, hypertension, cardiac, respiratory, and relative malnutrition were controlled and managed before the patient was prepared for surgery [4]. Enhancement of nutritional status with either a nasogastric tube or percutaneous gastrostomy, depending on the condition of the patient, was done preoperatively. Postoperatively, general systemic co-morbidities were managed effectively with high-quality healthcare, including a team of physicians, anaesthesiologists, and surgeons. Advanced respiratory support may be necessary for patients in order to clear secretions and improve pulmonary function.

If oral and oro-pharyngeal lesion resection is carried out concurrently, the resultant through-and-through defect increases [1,2,20] the wound infection rate in the neck. However, simultaneous application of antiseptics or antibiotics reduces the chances of this complication to a great extent. Meticulous suturing of the resultant defect minimises the neck infection rate. Suturing of oral mucosa in two layers helps add strength. Reducing the length of perioperative treatment with intravenous antibiotics limits the development of drug-resistant bacterial infections. All complications were successfully treated with medication and surgical revision [20].

Limitation(s)

In the present study, the small sample size presented difficulty in generalising the results. Moreover, the three-flap incision technique was used, which reduces vascularisation to the skin, increasing the chances of ischaemia.

CONCLUSION(S)

Head and neck surgery has the potential for many complications due to the presence of major vessels and nerves. Carefully performed surgery is the cornerstone of success. A step-by-step approach with attention to detail and a thorough check after the completion of the procedure will ensure optimal results without complications. The possible integrity of the cranial nerves should be maintained unless it compromises tumour resection. Modified procedures should be used to reduce the adverse effects of the classical operation and preserve its effectiveness in oncological terms. A protocol-driven approach and a vigilant and proactive emphasis in the entire perioperative period can minimise complications. Further studies are recommended in the future with the two-flap incision technique to compare the resultant complications.

REFERENCES

- Genden EM, Ferlito A, Shaha AR, Talmi YP, Robbins KT, Rhys-evans PH, et al. Complications of neck dissection. *Acta Otolaryngol.* 2003;123(7):795-801.
- Morgan JE, Breau RL, Suen JY, Hanna EY. Surgical wound complications after intensive chemoradiotherapy for advanced squamous cell carcinoma of the head and neck. *Arch Otolaryngol Head Neck Surg.* 2007;133(1):10-14.
- Goguen LA, Chapuy CI, Li Y, Zhao SD, Annino DJ. Neck dissection after chemoradiotherapy: Timing and complications. *Arch Otolaryngol Head Neck Surg.* 2010;136(11):1071-77.
- Kerawala CJ, Heliotos M. Prevention of complications in neck dissection. *Head and Neck Oncology.* 2009;12;1:35. Doi: 10.1186/1758-3284-1-35.
- Conley J. Radical neck dissection. *Laryngoscope.* 1975;85(8):1344-52.
- Newman JP, Terris DJ, Pinto HA, Fee WE Jr, Goode RL, Goffinet DR. Surgical morbidity of neck dissection after chemoradiotherapy in advanced head and neck cancer. *Ann Otol Rhinol Laryngol.* 1997;106(2):117-22.

- [7] Marchese C, Cristalli G, Pichi B, Manciooco V, Merchante G, Pellini R, et al. Italian cross-cultural adaptation and validation of three different scales for the evaluation of shoulder pain and dysfunction after neck dissection: University of California-Los Angeles (UCLA) Shoulder Scale, Shoulder Pain and Disability Index (SPADI), and Simple Shoulder Test (SST). *Acta Otorhinolaryngol Ital.* 2012;32(1):12-17.
- [8] Davidson BJ, Newkirk KA, Harter KW, Picken CA, Cullen KJ, Sessions RB. Complications from planned, posttreatment neck dissection. *Arch Otolaryngol Head Neck Surg.* 1999;125(4):401-05.
- [9] RezaNouraei SA, Upile T, Al-Yaghchi C, Sandhu GS, Stewart S, Clarke PM, et al. Role of planned postchemoradiotherapy selective neck dissection in the multimodality management of head and neck cancer. *Laryngoscope.* 2008;118(5):797-803.
- [10] Chiesa-Estomba CM, Soriano-Reixach M, Thomas-Arrizabalaga I, Sistiaga-Suarez JA, González-García JA, Larruscain E, et al. Complications after functional neck dissection in head and neck cancer patients: An observational, retrospective, single-centre study. *ORL J Otorhinolaryngol Relat Spec.* 2021;83(5):372-80. Doi: 10.1159/000514459. Epub 2021 May 19. PMID: 34010845.
- [11] Pellini R, Mercante G, Marchese C, Terenzi V, Sperduti I, Manciooco V, et al. Predictive factors for postoperative wound complications after neck dissection. *Acta Otorhinolaryngol Ital.* 2013;33(1):16-22. PMID: 23620635; PMCID: PMC3631809.
- [12] Suzuki H, Hanai N, Nishikawa D, Fukuda Y, Hasegawa Y. Complication and surgical site infection for salvage surgery in head and neck cancer after chemoradiotherapy and bioradiotherapy. *Auris Nasus Larynx.* 2017;44(5):596-601. Doi: 10.1016/j.anl.2016.11.009. Epub 2016 Dec 30. PMID: 28043710.
- [13] Kumari S. Complications of neck dissections and their management: Retrospective study. *IP J Otorhinolaryngol Allied Sci.* 2022;5(4):104-08.
- [14] Malgonde, Monika S, Manoj K. Complications after neck dissection. *Medical Journal of Dr. D.Y. Patil University.* 2015;8(4):458-62. Doi: 10.4103/0975-2870.160785.
- [15] Batstone MD, Lowe D, Shaw RJ, Brown JS, Vaughan ED, Rogers SN. Passive versus active drainage following neck dissection: A non-randomised prospective study. *Eur Arch Otorhinolaryngol.* 2009;266(1):121-24.
- [16] Urquhart AC, Berg RL. Neck dissections: Predicting postoperative drainage. *Laryngoscope.* 2002;112(7 Pt 1):1294-98. Doi: 10.1097/00005537-200207000-00028.
- [17] de Gier HH, Balm AJ, Bruning PF, Gregor RT, Hilgers FJ. Systematic approach to the treatment of chylous leakage after neck dissection. *Head Neck.* 1996;18(4):347-51.
- [18] Girod DA, McCulloch TM, Tsue TT, Eymuller EA Jr. Risk factors for complications in clean-contaminated head and neck surgical procedures. *Head Neck.* 1995;17(1):07-13.
- [19] Johnson JT, Cummings CW. Hematoma after head and neck surgery-A major complication? *Otolaryngology.* 1978;86(2):ORL-171-75.
- [20] Donald PJ. Complications of combined therapy in head and neck carcinomas. *Arch Otolaryngol.* 1978;104(6):329-32.

PARTICULARS OF CONTRIBUTORS:

1. Fellow Head and Neck Oncosurgery, Department of Surgical Oncology, NIMS, Hyderabad, Telangana, India.
2. Associate Professor, Department of Surgical Oncology, NIMS, Hyderabad, Telangana, India.
3. Fellow Head and Neck Oncosurgery, Department of Surgical Oncology, NIMS, Hyderabad, Telangana, India.
4. Resident, Department of Surgical Oncology, NIMS, Hyderabad, Telangana, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Shubranshu Jena,
Room No. 404, Department of Surgical Oncology, Speciality Block, Nizams Institute of Medical Sciences, Punjagutta, Hyderabad-500082, Telangana, India.
E-mail: sjena678@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Mar 31, 2023
- Manual Googling: Oct 23, 2023
- iThenticate Software: Oct 25, 2023 (7%)

ETYMOLOGY: Author Origin**EMENDATIONS:** 6Date of Submission: **Mar 24, 2023**Date of Peer Review: **May 24, 2023**Date of Acceptance: **Oct 27, 2023**Date of Publishing: **Dec 01, 2023**