

Surgical audit of Head and Neck cancers in rural India

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Abstract

Introduction:

Head & Neck cancer is the most common cancer in India with around seventy percent presenting in advanced stage. We present our surgical audit of Head & Neck cancer patients and compare it with other centres with the goal of improving overall patient care.

Materials and methods:

A retrospective analysis of prospectively collected data was done in the Department of Head & Neck Surgery, Kailash Cancer Hospital and Research Centre. The demographic details, primary tumor site, tumor stage, surgical procedure, type of reconstruction offered, and complications of 1615 patients operated from January 2018 to December 2020 were analyzed.

Results:

Total number of patients analyzed were 1615, 1247 males and 368 females. Oral cavity was the most common site (1495) followed by lip (33), thyroid (18), PNS (13) and others. The distribution of patients as per AJCC 8th edition of TNM staging was pT1:160(9.9%), T2:366(22.66%), pT3:475(29.41%), pT4:563(34.86%), pN0:793(49.10%), N1:181(11.20%), N2a:85(5.26%), N2b:104(6.43%), N2c:11(0.68%) & N3b:313(19.38%). The overall complication rate was 13.49% (n=218).

Conclusion:

The key focus of this audit was to review our actual surgical performance, including outcomes. The surgical experience of our team was compared with accepted standards. This helped us to identify ways of improving and maintaining the quality of care for patients, to assist in the continuing education of junior surgeons and to help make the most of resources available in the Head & Neck surgical services.

Key Words: surgical audit; head and neck cancer; oral cavity cancer; complications; oral cavity reconstruction.

Introduction:

Head and neck cancers are malignant tumors of the upper aerodigestive tract which includes oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx [1,2]. Squamous cell carcinoma constitutes for more than 90% of Head and Neck cancers. According to GLOBOCAN 2018, there are 834,860 cases of Head and neck cancers reported worldwide per annum which resulted in approximately 431,131 deaths per annum [3]. Higher incidence rate of Head and Neck cancers have been reported from Asian countries like India, Bangladesh, Taiwan, Pakistan and Sri Lanka [4]. Oral squamous cell carcinoma comprises more than 30% of the total cancer burden in India. Age standardized incidence rate in India is 7.5 per lakh population while in USA and Western Europe is 3.8 and 4.6 per lakh population respectively [5]. The possible reasons for the higher incidence of Head and neck cancers in India is due to extensive use of tobacco, gutkha and pan masala which include betel quid, areca nuts, and slaked lime [3].

In India Oral cancer is most common cancer in males and second most common in females and, hence posing a major health burden. 70% of these patients present in



advanced stage. Gingivobuccal Sulcus complex cancers form the major bulk of oral cavity cancer in India. Oral cancer is usually treated by surgery and or radiation/chemotherapy. Early stage oral cavity cancers are treated by single modality and advanced stages by multimodality treatment. We present surgical audit of Head and neck cancers treated at Kailash Cancer Hospital and Research Centre, a tertiary care Comprehensive Cancer Centre in rural India. Surgical audit is a systematic, critical analysis of the quality of surgical care that is reviewed by peers against explicit criteria or recognized standards, to improve surgical practice with the ultimate goal of improving the quality of care for patients [6]. It is conducted by clinicians on weekly, monthly or yearly basis to evaluate the outcomes and take necessary measures in a health system.

Aims and Objectives:

We present our surgical audit of Head & Neck cancers and compare it with the other centres with the goal of improving overall patient care.

Materials and Methods:

A retrospective analysis of prospectively collected data was done in the Department of Head and Neck Surgery, Kailash Cancer Hospital and Research Centre. Total 1615 patients of Head and Neck cancers were operated from January 2018 to December 2020. This study was approved by the Institutional Review Board (IRB) and all participants signed an informed consent agreement. All patients were managed by a multidisciplinary head and neck team, and standard protocol-based treatment was offered as per prevailing international management guidelines. Patient’s demographic details, primary tumor site, tumor stage, surgical procedure, type of reconstruction offered, and complications were analysed. The post-operative complications were divided into major and minor. A major complication was defined to be the one which required an additional surgical procedure and minor complication was the one that resolves of its own with conservative treatment or minimal intervention.

Results:

Total number of patients in our study were 1615 of which 1247 were male and 368 females. The age ranged from 5 to 96 years with a mean age of 47 years. Age wise distribution of patients is presented in Table 1. Among the sites of head and neck cancers, oral cavity cancer was the most common (1495) followed by lip (33), thyroid (18), Paranasal Sinus PNS (13), Salivary glands, larynx, Hypopharynx, Oropharynx and 5 patients of skin malignancy. Among subsites of oral cavity malignancies, buccal mucosa was the most common (n= 762) followed by tongue (n=439), alveolus (n=195), gingivo-buccal sulcus, retromolar trigone, and floor of mouth, shown in table 2.

Primary site	Age range (years)	Median age (years)	Male	Female	Total
Lip	30-70	47	24	9	33
Oral cavity	19-96	47	1169	326	1495

Oropharynx	55-57	56	2	0	2
Hypopharynx	47-80	55	5	0	5
Larynx	57-75	65	7	0	7
Pns	34-80	52	8	5	13
Salivary glands	5-84	51	5	4	9
Thyroid	20-73	44	6	12	18
Skin	44-70	54	5	0	5
Orbit	5	5	0	1	1
Ear	60	60	0	1	1
Total	5-96	47	1231	358	1589

Table 1: Patient Characteristics

Parameters (n=1615)	Values, n (%)
Subsites of oral cavity (1495....92.5%)	762 (47.18%)
Buccal Mucosa	195 (12.07%)
Alveolus	439 (27.18%)
Tongue	37 (2.29%)
Lower Gingivobuccal Sulcus	16(0.99%)
Retromolar Trigone	11 (0.68%)
Upper Gingivobuccal Sulcus	12 (0.74%)
Floor of mouth	23 (1.42%)
Palate	
Lip	33 (2.04%)
Maxilla/PNS	13 (0.80%)
Salivary gland (parotid:6, Submandibular gland:3)	9 (0.55%)
Skin Cancer	5 (0.30%)
Ear	1 (0.061%)
Orbital Cavity	1 (0.061%)
Thyroid	18 (1.11%)
Oropharynx	2 (0.12%)
Hypopharynx	5 (0.30%)
Larynx	7 (0.43%)
Salvage neck	14 (0.86%)
MUO	12 (0.74%)
TOTAL	1615(100%)

Table 2: Distribution of different subsites of head and neck malignancies

The distribution of patients as per AJCC 8th edition of TNM staging of different subsites of head and neck cancer cases was pT1:160(9.9%), T2:366 (22.66%), pT3:475(29.41%) and pT4:563(34.86%), with nodal staging pN0:793(49.10%), N1:181(11.20%), N2a:85(5.26%), N2b:104(6.43%), N2c:11(0.68%) & N3b:313(19.38%), is shown in table 3. The type of surgical procedures offered for different subsites of head and neck cancers is shown in table 4.



PT stage	NO	N1	N2a	N2b	N2c	N3b	NX	TOTAL
PT0	2							2
TX	10	1	2	4	0	15	1	33
T1	105	14	3	3	0	5	25	155
T2	220	39	15	21	1	40	19	355
T3	214	63	27	38	4	97	4	447
T4	234	55	30	26	5	156	7	513
TOTAL	785	172	77	92	10	313	56	1505

Table 3: Patient Distribution by T and N Staging

Procedures (1615)	Values, n (%)
Wide local excision	730 (45.21%)
Composite resection (wide local excision + segmental mandibulectomy)	680 (42.10%)
Bite resection	121 (7.49%)
Maxillectomy	22 (1.36%)
Parotidectomy	6 (0.36%)
Thyroidectomy	18 (1.11%)
Total laryngectomy	12 (0.74%)
Only neck dissection (salvage neck dissection=14, muo (12)	26 (1.60%)
Total	1615 (100%)

Table 4: Surgical Procedures Performed

Neoadjuvant chemotherapy (NACT) was given in 105 patients with buccal mucosa (n=57), tongue (n=31), RMT (n=3), lower GBS-alveolus (n=7), upper GBS (n=3), MUO (n=4). Patients were given a minimum of two and maximum of 4 cycles. 3 drug regimens were given to all patients. The pTNM staging of these patients is shown in table 5.

PT stage	NO	N1	N2a	N2b	N2c	N3b	NX	TOTAL
YPT0	4	0	1	1	0	1	0	7
YTX	2	0	1	0	0	1	0	4
YT1	4	0	0	0	0	1	0	5
YT2	4	3	0	0	0	4	0	11

YT3	11	3	3	6	0	5	0	28
YT4	10	3	3	5	1	27	1	50
TOTAL	35	9	8	12	1	39	1	105

Table 5: Pathological tn staging post induction chemotherapy Salvage surgery was offered to 112 patients, of which buccal mucosa (n=57) was the commonest subsite followed by tongue (n=31), Gingivobuccal sulcus-alveolus (n=21) and lower lip (n=2). Salvage neck dissection was performed in 8 cases for neck recurrences with primary controlled. Of these 3 were tongue, 2 buccal mucosa and 3 oropharynx primaries.

The reconstruction offered with the type of flap is mentioned in table 6. The type of flaps used were local flaps (n=13), pedicled flaps (n=756) and microvascular free flaps (n=196). The pedicled flaps used were Pectoralis Major Myocutaneous (PMMC) flap with single paddle (n= 584), PMMC flap with double paddle (n= 116), Deltopectoral flap (DP) (n= 4) and PMMC+DP (n=52). The types of microvascular free flaps used were Free Radial Artery Forearm Flap (FRAFF): n= 79, Anterolateral Thigh (ALT): n= 73, Free Fibula Osteocutaneous flap (FFOC): n= 39, Medial Sural Artery Perforator flap (MSAP): n= 4 and Thoracodorsal artery perforator flap (TDAP):1

Distribution of flaps	Values, n (%)
Local flaps (n=13..0.80%)	
Estlander flap	7 (0.43)
Forehead flap	5 (0.30)
Rotational flap	1 (0.061)
Pedicled Flaps (n=756 ..46.81%)	
PMMC	700 (43.34)
PMMC+DP	52 (3.21)
DP	4 (0.24)
Microvascular Free Flaps (n=196..12.13%)	
ALT	73 (4.52)
FRAFF	79 (4.89)
FFOC	39 (2.41)
MSAP	4 (0.24)
TDAP	1 (0.061)

Table 6: Types and distribution of flaps used for reconstruction of oral cavity cancer defects.

Abbreviations: PMMC=Pectoralis Major Myocutaneous Flap; DP=Deltopectoral Flap; FRAFF= Free Radial Artery Forearm Flap; ALT=Anterolateral Thigh; FFOC= Free Fibula Osteocutaneous flaps; MSAP = Medial Sural Artery Perforator Flap; TDAP = Thoracodorsal artery perforator flap.

Average Hospital stay of patients in our analysis ranges from 5 to 8 days.

The complications arising from different subsites of head and neck cancer is mentioned in table 7. The overall rate of complications in our study was 13.49% (n=218). The common minor complications seen in our patients were wound dehiscence (n= 53) followed by sialocele (n=47), wound infection (n=25), partial flap loss (n=20), bleeding or haematoma (n=15). The major complication was total flap loss seen in 10 patients reconstructed with microvascular free flaps. There were no complications seen in other subsites of head and neck cancers.



Complications	Total patients (n=1615)
Minor	
Wound dehiscence, n (%)	53(3.28%)
Sialocele	47(2.91%)
Partial flap loss, n (%)	20 (1.23%)
Wound infection, n (%)	25(1.54%)
Bleeding/hematoma, n (%)	15(0.92%)
Orocutaneous fistula, n (%)	10(0.61%)
Reconstruction plate exposure, n (%)	7 (0.43%)
Chyle leak	3(0.18%)
Donor site complication, n (%)	20(1.23%)
Major	
Venous Congestion, n (%)	18
Arterial Insufficiency n (%)	6
Bleeding/Haematoma	4
Total flap loss, n (%)	18(1.11%)
Total, n (%)	218(13.49%)

Table 7: Complications

Discussion:

Most of the patients in our study were in 5th decade of their life with the age ranged between 5 to 96 years with around one third of the patients in age group below 40 years. Gupta A et al, Bhanja A et al has shown in their studies that middle age group was the commonly affected followed by younger age group (7,8). 70% of our patients presented in advanced stage which is also seen in other studies. Chakrabarti S et al has seen in his study that most of the Oral cancer patients operated in India are in advanced stage [9].

Oral cavity is the most common subsite of head and neck cancers involved in our population and the most common surgical procedure offered was composite resection for oral cavity subsites, commonest being the Gingivobuccal complex. In our study mandibular resection was done in 801 (49.59%) patients. Chakrabarti et al in his study has also shown the mandibulectomy as the common surgical procedure offered to oral cancer patients in India due to advanced disease on presentation [9].

Head and Neck cancers have higher propensity for lymphatic dissemination which strongly influences survival and prognosis. There is a paradigm shift in surgical management of neck nodes in oral cavity cancers from traditional radical neck dissection, to more conservative, functional, and less morbid procedures like modified neck dissection and supra-omohyoid neck dissection [10]. Neck dissection was done in almost all cases except for cases with very superficial lesions. Supra-omohyoid neck dissection (SOHND) was the most common type of neck dissection performed 855(52.94%) followed by modified neck dissection in 836(51.76%) patients. Bilateral neck dissection was done in 120 (7.43%) of the patients. Node negativity on final histopathology report was seen in 820 (50.77%) and positivity in 790 (48.91%) patients. Neck dissection was not performed in 43 patients. Lymph node stations level I and II were most commonly involved in node positive patients. Gauri et al in her study on 583 neck dissections in oral cancer concluded that levels I-III is the most commonly involved lymph node levels in node positive patients [11].

Neoadjuvant chemotherapy was given in locally advanced oral cancer to downstage the disease, an attempt to make unresectable

and technically or borderline cases resectable. In our analysis, NACT was given in patients with anterior 2/3rd tongue lesions with the tumor extending up to the level of the hyoid bone or posterior extension close to base of tongue and buccal mucosa primary for peritumoral edema going up to or above the level of the zygomatic arch, extensive skin infiltration impacting the achievement of negative margins. 2 cycles of 3 drug regimen NACT was given to most of the patients. Patil et al in his study analysed 123 patients and concluded to have better survival outcomes in technically unresectable oral cancer patients when treated with NACT followed by surgery than patients treated with non-surgical treatment. Resectability was achieved in 68% of patients who received three drug regimen and 37.89% patients after the two-drug regimen. The response rates with the three and two drug regimens were 32% and 27.37%, respectively [12].

Local and regional recurrence remains the most frequent cause of failure in patients treated with Squamous cell carcinoma of the oral cavity and the incidence primarily depends on the site of the tumour, clinical stage, and histopathological characteristics [13]. In our study, 112 patients were surgically salvaged for recurrence with oral cavity being the most common site. Of 112 patients, buccal mucosa (n=57) was the commonest subsite followed by tongue (n=31), Gingivobuccal sulcus-alveolus (n=21) and lower lip (n=2). Salvage neck dissection was performed in 8 cases with primary controlled. Of these 3 were tongue, 2 buccal mucosa and 3 oropharynx primaries. In a large population data review of 4839 patients with recurrent head and neck squamous cell carcinoma (HNSCC) by Chang et al., oral cavity was the common subsite. Age above 65 years, Advanced clinical stage at primary diagnosis, disease-free interval of < 1 year and Charlson comorbidity index (CCI) score >6 were significant independent factors of poor prognosis and overall survival [14]. Borsetto et al. in his study concluded that the initial stage of the primary tumour, the stage of salvage surgery, close or positive margins at the initial surgery and history of moderate alcohol consumption were four independent predictors of overall survival [15].

Primary reconstruction of complex oral cavity defects following resection of advanced oral squamous cell carcinoma is of prime importance to achieve acceptable functional and cosmetic results for a better quality of life in these patients. With the increase in the number of advanced cases the options for reconstruction from commonly used pedicled flaps to micro-vascular free flaps has also increased considerably. Currently, micro-vascular free flaps are considered to be the first option for reconstruction of complex oral cavity defects. Pedicled flaps for reconstruction of oral cavity cancer defects are still used and is an invaluable option to treat those patients that are not deemed good candidates for microvascular reconstruction due to advanced age or poor general conditions or associated comorbidities. The type of reconstruction offered to our patients was pedicled flaps (n=756) and microvascular free flaps (n=196). In spite of good infrastructure and available resources pedicled flaps is still the choice of primary reconstruction of oral cavity cancer defects in our population because of higher patient load and long waiting period for microvascular reconstruction. Pectoralis major myocutaneous flap has been widely used for reconstruction of oral cavity cancer defects. The advantages being easy harvest, short learning curve for trainees, abundant soft tissue volume, large skin paddle, short operating time, good versatility and reliability [16]. In our centre



Bipaddle pectoralis major myocutaneous flap is commonly used for buccal mucosa cancer patients with skin involvement with satisfactory post-operative functional and cosmetic results. The most frequently used microvascular free flap used in our patients was Free Radial Artery Forearm flap (FRAFF) followed by Anterolateral Thigh flap (ALT), Free Fibula Osteocutaneous flap (FFOC). Radial Artery Forearm flap was commonly used for reconstruction of intraoral defects of tongue, floor of mouth and buccal mucosa as it is thin and pliable, highly vascular with a constant vascular anatomy and its ease in harvesting [17]. In our patients Free Fibula Osteocutaneous flap was the flap used for bony reconstruction of the mandible. The advantages include harvesting of bicortical bone upto 25 cms, double barreling of bone which can help in placement of endosseous implants, coverage of through and through defects with chimeric flap and minimal donor site morbidity.

As per our institutional protocol all patient is kept in SICU for 12 hours with overnight endotracheal tube for better postoperative care and monitoring. Patients in whom microvascular free flap reconstruction is done are kept for 48 hours for better flap monitoring. The frequency of monitoring is every hourly for the first 24 hours followed by 2 hourly for next 24 hours and every 3-4 hourly then onwards. Clinical assessment is the commonly used method for flap monitoring and Hand-held Doppler is not used in our institute for flap monitoring. In post-operative period all patients receive antibiotics, amoxicillin-clavulanic acid 1.2g and amikacin 500 mg intravenous 12 hourly for 5-7 days. All patients are discharged in 5-8 days.

In our study the overall rate of complications was 13.49%. McGurk et al. in his study on 182 patients who underwent surgery for oral cancer had complications in 85 patients (47%) with wound dehiscence being the most common which also found in our study [18]. Melo et al. in his study had an overall complication rate of 50% in 110 patients surgically treated for oral cancer [19].

Conclusion:

The key focus of this audit was to review our actual surgical performance, including outcomes. The surgical experience of our team was compared with accepted standards. This helped us to identify ways of improving and maintaining the quality of care for patients, to assist in the continuing education of junior surgeons and to help make the most of resources available in the Head & Neck surgical services.

Declaration:

- **Ethical approval:** this study was approved by the institutional review board (irb) of kailash cancer hospital and research centre and all participants signed an informed consent agreement.
 - **Consent:** patients have signed an informed consent form for research purposes and for publication in the journals.
 - **Funding:** the authors have no relevant financial or non-financial interests to disclose.
 - **Conflict of interest statement:** no conflict of interest to
11. Pantvaidya GH, Pal P, Vaidya AD, Pai PS, D'Cruz AK (2014)

disclose

• Author contribution

Conceptualization: R Kantharia, Z Ahmad. Data curation: R Kantharia, Z Ahmad, SM Vyas. Formal analysis: R Kantharia, Z Ahmad, S Kantharia. Methodology: R Kantharia, Z Ahmad, SM Vyas. Project administration: R Kantharia, Z Ahmad, S Kantharia. Visualization: R Kantharia, Z Ahmad, S Kantharia. Writing - original draft: R Kantharia, Z Ahmad, S Kantharia. Writing - review & editing: All authors.

- **Data:** All data and materials related to the study is available to review

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