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Original Research Article

Prognostic evaluation in head and neck cancer patients: a clinicoimaging tertiary care center study

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ABSTRACT

Background: The occurrence of the head and neck cancers (HNC) is increasing day by day. These have been associated with multiple etiological factors, and early diagnosis has a prime role in the patient's prognosis and overall survival. Prognostic evaluation in head and neck cancer patients utilizing clinical incidence and imaging outcomes.
Methods: The study sample included 217 confirmed HNC patients' data obtained from the tertiary cancer care centre were analysed to assess the prognosis and be subjected to statistical analysis.
Results: Out of all HNC, cancer pertaining to the lip and oral cavity was the most common variety with 65.89% and most of the HNC occurred in men of about 97%, suggesting a strong association with adverse oral habits.
Conclusions: We conclude that the current scenario of HNC's progression and treatment modalities in Andhra Pradesh were in comparison to the World Health Organization (WHO) data suggests an increase in the awareness of the etiological factors and the disease progression. Though various advanced imaging and treatment modalities are available, the patients' prognosis is untethered due to low socio-economic status in this region.

Keywords: Etiological factors, Head and neck cancer, PET, Prognosis, Tertiary care, Treatment modalities

INTRODUCTION

Head and neck cancers (HNC) include cancer of upper aero-digestive track with the majority, including the cancer of oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx. According to the union for international cancer control data, the annual incidence of HNC worldwide was more than 5, 55, 000 cases with a high mortality rate, i.e. around 3, 00, 000 deaths each year.[1,2] It accounts to the 6th most common cancer worldwide.

The etiology for HNC is multi-factorial, including tobacco consumption, pan, gutkha, alcohol, human papillomavirus (HPV) infection and so on. The pattern of risk factors for HNC have drastically changed in the past 15 years.[4]

Among various HNC, oral cancer is the most common presentation to occur with a maximum of 5 years survival rate due to less awareness and late detection of cancer, i.e. at advanced stages.[3,4] Various imaging modalities such as computed tomography (CT), contrast enhanced CT (CECT), magnetic resonance imaging (MRI), positron emission tomography (PET) scan, and nuclear imaging are available to determine the extent, spread of cancer, assessment of nodal involvement and metastasis.

The prognosis and patient survival affected by oral cancer mainly depends on the cervical lymph node metastasis.[5] It plays a vital role in the establishment of the best treatment strategy. Although surgical therapy remains a gold standard treatment regimen in most cases; radiotherapy alone or concurrent chemoradiotherapy is being recommended to improve the survival rate by eliminating nodal metastasis.[6] Hence, the present study aims to assess the prognosis in head and neck cancer patients utilizing clinical incidence and imaging outcomes.

METHODS

The present study was a retrospective, single-blinded study, conducted in the tertiary care centre in Andhra Pradesh for about 1 year (2018-2019) to assess the associated pattern of risk factor, nodal involvement by imaging modalities; best treatments to opt and the prognostic trends in HNC patient.

Initially, 238 patients' data were identified with HNC, and 21 patients were excluded from the study because of recurrence, metastatic lesions and sudden death. Thus, the final sample included in the study was 217. Patient's demographic data, clinical characteristics with tumor/node/metastasis (TNM) staging, histopathological confirmation, imaging modality for nodal assessment, the modality of treatment including surgery, radiotherapy, and chemotherapy were obtained from the patient's medical record.

Statistical analysis

Using Microsoft excel statistical package for the social sciences (SPSS) V21 version data was subjected to analysis. Descriptive statistics was represented in percentages, and Chi-square test was applied to find significance. P<0.05 was considered as statistically significant.

RESULTS

Out of 238 confirmed HNC cases for the 2018-2019 period in the tertiary care hospital, data of 21 patients were excluded from the study because of recurrence, metastasis and sudden death. Thus, a total of 217 samples were included in the final study.

At the time of reporting to the tertiary care centre, the patient's age ranged from 26-87 years with a male predominance of 97% (212 patients). Most of the patients presented with HNC's were associated with various risk factors such as smoking, smokeless forms including pan, gutkha, khaini, betel quid and alcohol consumption. The most common site of involvement for HNC included the lip, oral cavity and oropharynx which accounts for 73% (Table 1).

Table 1: Various sites of head and neck cancer and their relative percentage.

Site	Frequency	Percentage
Lip, oral cavity and oropharynx	159	73
Salivary glands	6	3
Nasopharynx	15	7
Hypopharynx	28	13
Larynx	9	4
Total	217	100.0

All the individuals were subjected to essential imaging methods according to the patients need and affordability for the assessment of tumour extension, depth of invasion and metastatic spread. The most practised imaging was CT with the frequency of 114 out of 217 (Table 2).

Table 2: Various imaging methods for diagnosing HNC.

Imaging	Frequency	Percent
CECT	89	41
CECT+PET	1	0.5
CT	114	52.5
PET	11	5
USG	2	1
Total	217	100.0

Evaluation of 217 patients with positive clinical symptoms, confirmed that 114 patients had positive clinical nodal involvement which was determined using the various imaging modalities (Table 3).

Table 3: Nodal involvement in the HNC.

Lymph nodes	Frequency	Percent
Yes	114	53
No	103	47
Total	217	100.0

The biopsy was performed for all the patients, and squamous cell carcinoma was found to be the most common histological variant with 96% of all total cases (Table 4). Other histological variants include adenoid cystic carcinoma, ameloblastic carcinoma, mucoepidermoid carcinoma, carcinoma ex pleomorphic adenoma and adenosquamous carcinoma.

Table 4: Histological variants of HNC.

Histological variants	No. of patients	Percent
Squamous cell carcinoma	208	96
Ameloblastic carcinoma	2	1
Adenoid cystic carcinoma	4	2
Mucoepidermoid carcinoma	1	0.3
Carcinoma ex pleomorphic adenoma	1	0.3
Adenosquamous carcinoma	1	0.3
Total	217	100

Histopathology grading of the specimens was done, and most of the cases were graded as well-differentiated (Table 5).

Based on the clinical cancer extent, nodal involvement using various imaging modalities and histopathological grading, all the HNC were categorized using TNM staging

according to American joint committee on cancer (AJCC), 8th edition.

Table 5: Histopathological grading of HNC.

Histopathology grading	No. of patients	Percent
Well-differentiated	93	43
Moderately differentiated	66	30
Poorly differentiated	58	27
Total	217	100

Table 6: TNM staging of HNC.

TNM staging	Frequency	Percent
I	2	1
II	61	28
III	118	54
IV A	26	12
IV B	10	5
Total	217	100.0

Table 7: Various treatment modalities for various HNC.

Treatment modality	No. of patients	Percent
Only surgical therapy	0	0
Only radiotherapy	50	23
Only chemotherapy	4	2
Surgical + radiotherapy	13	6
Surgical + chemotherapy	0	0
Radiotherapy + chemotherapy	118	54
Surgical + radiotherapy + chemotherapy	32	15
Total	217	100

Best suited treatment modalities which include surgical therapy (hemi-mandibulectomy, hemi-glossectomy, hemi-maxillectomy), radiotherapy (conventional radiotherapy, 3D-CRT, IGRT, IMRT), chemotherapy (cisplatin, carboplatin, docetaxel, adriamycin, and hydrocortisone) opted for the patient and commonly employed treatment modality as chemoradiotherapy with 54% (Table 8).

Table 8: Comparison of prognosis among various TNM stages.

Prognosis	TNM staging				
	I	**II**	**III**	**IVA**	**IVB**
Good	01	27	33	05	02
Fair	00	13	22	02	02
Poor	01	18	45	13	05
Questionable	00	03	18	06	01
Total	02	61	118	26	10
P value	0.2	0.04	0.82	0.11	0.82

The study sample was analyzed for the association of prognosis with various TNM stages to assess treatment outcome. P value was calculated (Table 9).

Table 9: Comparison of prognosis with histopathological grading.

Prognosis	Histopathological grading		
	Well differentia-ting	**Moderately differentia-ting**	**Poorly different iating**
Good	64	07	01
Fair	23	10	03
Poor	04	28	48
Question-able	02	21	06
Total	93	66	58

P value – non-significant (NS)

Retrospective analysis of the data included prognosis and histopathological grading performed for understanding their association.

DISCUSSION

Head and neck cancers comprise cancers that occur in the oral cavity and oropharyngeal region and account for the world's 6th most common cancers. According to GLOBOCAN 2018 report, worldwide HNC statistics indicate 834, 860 cases of HNC per year, resulting in approximately 431, 131 deaths per year. High incidence rates have been reported from developing countries including India, Pakistan, Bangladesh, Taiwan, and Sri Lanka. HNCs account for approximately 30–40% of all cancer sites, in India.[8]

According to recent data issued by ICMR, cancers associated with tobacco use account for about 30 per cent of all cancers in males and females in India.[9] The possible reasons for the higher incidence of HNCs include extensive use of tobacco, alcohol consumption, pan masala (which include betel quid, areca nuts, and slaked lime), and gutkha.[8-11] According to Anil et al there was a strong association of smoking and alcohol intake noted which was in accordance with the present study.[9]

HNC have various topographic presentations with lip, oral cavity and oropharynx as major presenting sites seen in the present study with 66%, and was in agreement with the study done by Poddar et al and Gilyoma et al.[4,12] However, a study conducted by Bhattacharjee et al revealed oropharynx as the most common site of HNCs.[13] Alam et al and Koch et al described oral cavity as the common site followed by oropharynx, larynx.

On contrary, in the present study hypopharynx was common followed by nasopharynx.[17,18] It was in accordance to the retrospective descriptive study conducted by Tshering et al to assess epidemiological and

histopathological characteristics of head and neck cancers.[35]

Various imaging techniques such as ultrasonography, CT, MRI, CECT, and PET are of greater magnitude to assess the tumor size, extension, perineural invasion, extracapsular spread, locoregional spread & distant metastasis. These, in turn, aid in planning the treatment and evaluating the prognosis of HNCs.[14,15]

In the present study, CT was the most preferred imaging technique with 52.5%, followed by CECT with 41%, PET with 5%. Martino et al conducted a comparative study to evaluate various imaging techniques for the diagnosis of head and neck cancers, and concluded that PET was more reliable imaging technique followed by CT and color-coded ultrasonography (USG).[20] Paleri et al concluded CT or MRI as the mandatory imaging modality for staging the malignancy particular to head and neck.[25] On contrary, a study conducted by Kallalli et al and Mehta et al. USG was superior to both clinical and CT examinations.[5,19]

Assessment of perineural invasion, extracapsular spread, locoregional spread and distant metastasis involving cervical lymph node are the significant factors that play a major role in the treatment outcome and overall prognosis, reducing the overall survival rate by 50% with poor prognosis.[16,25] Nodal involvement in the present study was seen in the 114 out of 217 patients.

The histopathological variants of these HNC include squamous cell carcinoma, adenoid cystic carcinoma, mucoepidermoid carcinoma, seen in the present study. Squamous cell carcinoma was the most common histological variant of HNC of about 208 out of 217 cases and in agreement to the studies conducted by Siddiqui et al and Dhull et al.[26,27]

Histopathological grading was performed and 43% were well differentiated, 30% were moderately differentiated and 27% were poorly variants of HNC affected the prognosis and overall survival rate of the individuals and these were near equal to the study done by Lohit et al.[32]

TNM staging was performed according to AJCC 8th edition and most of the noted cases were categorized under stage III with 54%. Copious studies concluded most of the HNC cases reported in stage III and IV (locally advanced head and neck cancers). Even in the 21st century, most of the HNC's were detected in stage III and IV which could be due to lack of awareness, knowledge of the condition, resource limitation.

Management of various HNC's is an intriguing errand which was contingent with lesion site, size, extent, presence of bone involvement, locoregional spread, perineural invasion, adequate surgical margins and so on. Surgical and radiation therapy are used with curative intent while chemotherapy as an adjunct to the principal therapeutic modalities and considered as standard combined therapy in management of advanced disease.[22,23] T1 and T2 lesions can be cured with either surgery or radiotherapy, whereas chemoradiotherapy with or without surgery are opted for advanced stages of the diseases.[28,29]

In the present study, most of the cases were in the advanced stages of HNC's, chemoradiotherapy was opted as treatment of choice for 54% of cases and this was in accordance to the study conducted by Nigro et al and the guidelines.[20] Gilyoma et al conducted a retrospective study to evaluate clinicopathological profile and management challenges in a resource limited setting and only 4% patients underwent surgical resection with curative intent. Srinivasalu et al concluded concurrent chemoradiotherapy provides better treatment outcomes as it prevents organ damage and destruction and in agreement to the present study.[30]

In the present study, conventional radiotherapy (radical) was being mostly opted due to cost affordability compared to the newer radiotherapy modalities. Chemotherapeutic agent used as an adjunct to main therapy was mainly cisplatin weekly dose as most of the cases fall under advanced stages and in accordance to the study conducted by Srinivasalu et al and Bartelink et al.[30,31]

Assessment of prognosis impacts the treatment plan and assists in the estimation of overall survival chances of patients effected by HNC. It in turn depends on the clinical data i.e. age, associated factors, co-morbidities, radiographic assessment (tumor size, nodal volume, perineural invasion, extracapsular spread and distant metastases) and histopathological grading. Radiographic assessment aids in clinical TNM staging, choosing an appropriate treatment modality which in turn effect the prognosis. Thus, clinical staging is an important prognostic factor. In the present study, TNM stage I and II were having a better prognosis while stage III, IVA, and IVB have poor prognosis as most of the cases were diagnosed in the advanced stages which can affect the overall survival of the patient. These were in accordance to the study conducted by Lohit et al.[32]

Histological grading was done according to the WHO as well, moderate or poorly differentiated. In the present study most of the HNC were well differentiated variety of about 42.85%. This histological grading plays a key role in the treatment outcome and prognosis of the condition.

Costa et al correlated TNM staging and histopathological staging according to Bryne in squamous cell carcinoma and concluded that histologically invasive areas were primarily responsible for clinical behaviour and response to the treatment chosen.[34,35]

4 stages according to Byrne namely stage 1, 2, 3, 4 based on degree of keratinisation, nuclear polymorphism, pattern of invasion, lymphoplasmacytic infiltration, thus a clear outline of prognosis can be obtained.

CONCLUSION

Developing countries like India pose multiple adversities for appropriate oral health care delivery. HNC belong to this category of utmost challenging conditions to manage and declines the overall life span of an individual. Early identification and approaching the oral physician, in turn aid in TNM staging and histopathological grading subsequently affecting prognosis of the disease. In the present study, most cases had poor treatment outcome due to the clinical advancement and histopathologic well differentiation of the disease owing to lack of awareness regarding oral health care and approaching clinician at a later stage.

Prognosis of HNC in the present study is undermined due to application of conventional approach rather than advanced treatment modalities as of unfavourable economic status of the patient, leading to adverse events impacting the quality of life.

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