



Impact of age on elderly patients with oral cancer

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Abstract

Introduction In this study we have tried to analyze the impact of age on various clinico-pathological parameters, treatment completion and subsequent survival in older patients.

Materials and methods This is a retrospective analysis of 140 elderly (> 65 years) patients of oral cancer operated between January 2012 and December 2013. The patients were divided into two groups based upon their age that ≤ 70 years and > 70 years. Association of distribution of various clinico-pathological factors between different groups was assessed by using Chi-square test. Survival analysis was done using Kaplan Meir analysis. Univariate and multivariate analysis were performed.

Results The two groups had similar distribution of various clinico-pathological factors. Disease free survival for the group ≤ 70 and > 70 years was 37.6 months and 36.4 months ($p < 0.594$). 13.5% and 7.8% patients > 70 years and ≤ 70 years were either advised or received sub-optimal adjuvant therapy ($p < 0.002$).

Conclusion There is no difference distribution of various clinico-pathological factors and survival in patients of oral cancer ≤ 70 and > 70 years of age. Age did not affect survival. Majority of patients could complete the adjuvant therapy advised. Still, significantly more number of patients > 70 years could not receive/complete appropriate adjuvant therapy. Thus treatment needs to be tailored keeping in mind the individual's performance status and the co-morbidities.

Keywords Oral cancer · Geriatric patients · Survival · Age · Adjuvant therapy

Introduction

Oral cancers are one of the commonest cancers in South-East Asia. In this region tobacco usage is widely prevalent resulting in higher incidence of oral cancers (1). The appropriate treatment for these cancers is surgery followed by adjuvant radiotherapy/ chemo-radiotherapy. Older patients are a unique sub-group as with aging these patients have altered physiology, and treating such patients with oral cancers is a big challenge. The poor performance status, the altered physiology and the added comorbidities might affect the choice of surgical procedure or even completion of

adjuvant treatment in these patients. The change in treatment might affect the survival amongst this group of patients. In this study we have tried to analyze the impact of age on various clinico-pathological parameters, treatment completion and subsequent survival in older patients.

Methodology

This study is a retrospective analysis of a prospectively collected data at a tertiary care cancer centre. It included 140 older (> 65 years) patients with oral squamous cell carcinoma operated between January 2012 and December 2013. All patients were treatment naïve with performance status less than Eastern Cooperative Oncology Group (ECOG) scale 2 and were treated with surgery followed by appropriate adjuvant therapy. We excluded all patients with recurrences or second primaries or non-squamous histology and those with follow up duration of less than 6 months. All clinical details as well as histopathology reports were recorded from the electronic medical records. Details of

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the histopathology report (pathological TNM stage, microscopic spread, tumor size, grade, depth of invasion, perineural invasion, lympho-vascular emboli and extra capsular spread) were documented for each patient. Patients were staged according to AJCC 7th edition TNM staging. Adjuvant therapy was planned as per the NCCN guidelines. Adjuvant radiotherapy was administered for stage III and IV tumors, depth of invasion more than 10 mm and associated adverse prognostic factors like peri-neural invasion (PNI) and lympho-vascular emboli (LVE). Adjuvant chemo radiotherapy was administered to patients with involved margins and/or extra capsular spread (ECS). Details about completion of adjuvant therapy and treatment breaks were recorded. All patients were evaluated by a medical oncologist and a radiation oncologist for feasibility of adjuvant treatment. Reasons for not advising or taking or interrupting adjuvant therapy were also recorded. Treatment was said to be sub-optimal if adequate adjuvant therapy merited as per the histopathology report was not advised or not received or received incompletely. The follow up details of all the patients were recorded till March 2017. If details were not available on the electronic medical records then the patients were contacted telephonically and asked to review in the out-patient department where their disease status was evaluated. The status of the patients at the time of last follow up was considered as the final status. The status of the disease was noted as loco regionally controlled or as having recurrence/metastases. In patients diagnosed to have recurrence the date of performing the investigation to confirm the recurrence was considered as the date of recurrence. The patients were divided into two groups based upon their age that is ≤ 70 years and more than 70 years. The cut-off of 70 years was taken as many patients above this age are not considered for adjuvant therapy. Overall survival was calculated from date of registration to the date of last follow up or the date of the death of the patient. As the study involved only retrospective analysis of the prospectively collected data with no intervention upon the patients, IRB approval was taken and consent waiver was obtained. The study was in compliance with Helsinki declaration. All statistical analyses were performed using SPSS version 21. Association of distribution of various clinico-pathological factors between different groups was assessed by using Chi-square test. Survival analysis was done using Kaplan Meir analysis. Univariate and multivariate analysis were performed to look for impact of various clinico-pathological factors upon survival.

Results

1227 patients underwent surgery for oral cavity cancer in 2012 and 2013 at our institute. Out of these 140 patients were found to eligible for the analysis. The median follow

up was of 48 months. Demographic details are mentioned in Table 1. Majority of patients were males, with a male to female ratio of 2:1. 24% of the patients had hypertension, 12% had diabetes mellitus and 17% had both hypertension and diabetes. Buccal mucosa and lower alveolus cancers were most common (60.7%). Reconstruction for the primary tumor defect was required in 56.4% (79) patients. Out of these, pedicle and local flap were done in 34.3% cases while micro-vascular free flap was done in 17.1% cases.

On the final histopathological reports, majority of tumors were moderately differentiated (65%). They were 17.9% well-differentiated and 17.1% were poorly differentiated tumors. 57.9% patients had early stage tumors (T1 and T2) while 42.1% were advanced stage tumors. 62.9% were node negative. 92.1% had free margin ($> \text{or} = 5$ mm) while close and positive margins (< 5 mm) were seen in 7.9% patients. Only 48.6% patients had depth of invasion more than 1 cm. 37.1% patients were detected to have positive nodes. Of these, extracapsular spread was seen in 27.1% of patients. Perineural spread was present in 19.3% cases. 100 (71.4%) patients required adjuvant therapy. Of these in 28 (28%) patients, a change in adjuvant therapy was advised during post-operative multi-disciplinary meeting. 26 patients who merited adjuvant chemo-radiation were not advised it due to poor performance status of the patient in the post-operative period. Of these 23 were advised radiotherapy alone and three were advised no further adjuvant therapy. Two patients who merited adjuvant radiotherapy were advised observation. Of 95 patients who were advised adjuvant therapy, 86 (91.5%) completed it. 9.5% patients did not receive adjuvant therapy. 6.3% could not complete the therapy due to treatment related complications/toxicities and 3.2% could not start the adjuvant therapy because of poor general condition. Of the 6.3% patients, four patients developed grade 3/4 mucositis and two patients acute skin toxicity with moist desquamation due to which they could not proceed with the therapy. In all, 78.6% patients received and completed the therapy they merited.

We divided the patients into two groups depending upon whether they were aged less than or more than 70 years. 60.7% patients were less than 70 years of age where as 39.3% were more than 70 years. We used chi square test to assess the distribution of various clinico-pathological between the two groups and found that there was no significant difference for most of the factors between the two groups (Table 1)—gender ($p < 0.265$), co-morbidities ($p < 0.140$), site ($p < 0.381$), reconstruction ($p < 0.482$), final margin status ($p < 0.341$), pN stage ($p < 0.595$), pT stage ($p < 0.382$), grade of the tumor ($p < 0.258$), depth of invasion ($p < 0.490$), microscopic spread ($p < 1$), ECS ($p < 0.232$), and PNI ($p = 0.830$). 13.5% patients > 70 years were either advised or received sub-optimal adjuvant therapy whereas this figure in < 70 years group was 7.8 ($p = 0.002$).

Table 1 Distribution of various clinico-pathological factors

| Factor | Total number of patients | Age < 70 years (% age) | Age > 70 years (% age) | p value |
|---------------------------------------|--------------------------|------------------------|------------------------|---------|
| Gender | | | | |
| Male | 97 | 62 (44.3) | 35 (25) | 0.265 |
| Female | 43 | 23 (16.4) | 20 (14.3) | |
| Co-morbidities | | | | |
| Diabetes | 12 | 10 (7.1) | 2 (1.4) | 0.140 |
| Hypertension | 34 | 19 (13.5) | 15 (10.7) | |
| Both | 17 | 11 (7.8) | 6 (4.2) | |
| None | 46 | 28 (20) | 18 (12.8) | |
| Others | 5 | 1 (0.7) | 4 (2.8) | |
| Multiple | 10 | 4 (2.8) | 6 (4.2) | |
| Not known | 16 | 12 (8.5) | 4 (2.8) | |
| Site | | | | |
| Buccal mucosa/ Lower Alveolus | 85 | 49 (35) | 36 (25.7) | 0.381 |
| Tongue/ Floor of mouth | 55 | 36 (25.7) | 19 (13.6) | |
| cT stage | | | | |
| T1 | 24 | 16 (11.4) | 8 (5.7) | 0.499 |
| T2 | 42 | 28 (20) | 14 (10) | |
| T3 | 9 | 4 (2.8) | 5 (3.5) | |
| T4a | 65 | 37 (26.4) | 28 (20) | |
| cN stage | | | | |
| N0 | 93 | 59 (42.1) | 34 (24.28) | 0.390 |
| N1 | 19 | 10 (7.1) | 9 (6.4) | |
| N2a | 9 | 3 (2.1) | 6 (4.2) | |
| N2b | 16 | 11 (7.8) | 5 (3.5) | |
| N2c | 3 | 2 (1.4) | 1 (0.7) | |
| Reconstruction | | | | |
| No reconstruction | 61 | 42 (30) | 19 (13.6) | 0.213 |
| Locoregional reconstruction | 54 | 30 (21.4) | 24 (17.1) | |
| Free flap | 25 | 13 (9.2) | 12 (8.5) | |
| Lymphovascular emboli | | | | |
| Yes | 1 | 0 (0) | 1 (0.7) | 0.393 |
| No | 139 | 85 (60.7) | 54 (38.6) | |
| Extra-capsular spread | | | | |
| Yes | 39 | 19 (13.5) | 20 (14.3) | 0.071 |
| No | 101 | 66 (47.1) | 35 (25) | |
| Peri-neural invasion | | | | |
| Yes | 27 | 17 (12.1) | 10 (7.1) | 0.830 |
| No | 113 | 68 (48.5) | 45 (32.1) | |
| Grade of tumor | | | | |
| Well differentiated | 25 | 19 (13.5) | 6 (4.2) | 0.269 |
| Moderately differentiated | 91 | 54 (38.5) | 37 (26.4) | |
| Poorly differentiated | 24 | 12 (8.5) | 12 (8.5) | |
| Margin status | | | | |
| Free | 129 | 80 (57.1) | 49 (35) | 0.341 |
| Close and involved | 11 | 5 (3.5) | 6 (4.2) | |
| Final stage | | | | |
| I–II | 57 | 39 (27.8) | 18 (12.8) | 0.122 |
| III–IV | 83 | 46 (32.8) | 37 (26.4) | |
| Depth of invasion (> 10 mm) | | | | |
| < 10 mm | 72 | 46 (32.8) | 26 (18.5) | 0.490 |

Table 1 (continued)

| Factor | Total number of patients | Age < 70 years (%) | Age > 70 years (%) | <i>p</i> value |
|-------------|--------------------------|--------------------|--------------------|----------------|
| > 10 mm | 68 | 39 (27.8) | 29 (20.7) | |
| Treatment | | | | |
| Optimal | 110 | 74 (52.8) | 36 (25.7) | 0.002 |
| Sub-optimal | 30 | 11 (7.8) | 19 (13.5) | |

At the time of analysis, 69 patients (49.3%) were alive without disease, one was alive with disease (0.7%), 60 patients (42.9%) had died due to disease and 10 patients (7.1%) had died due to other causes. 45% of the study population were reported to have recurrence. Of these recurrences, 36.5% were local, 28.6% were regional while 34.9% were distant.

Mean overall survival (OS) of the cohort was 40 months. Mean disease free survival (DFS) of the cohort was 37.9 months. OS for the group < 70 and > 70 years was 40.2 months and 38.6 months respectively. DFS for the group < 70 and > 70 years was 37.6 months and 36.4 months respectively. There was no significant difference in survival (OS and DFS) between the two groups ($p < 0.641$ and 0.594). (Fig. 1a, b) Mean disease-specific survival of the entire cohort was 42.7 months. Disease specific survival for the group < 70 and > 70 years was 43.6 months and 40.4 months respectively. No significant difference between the two groups was seen ($p < 0.34$).

Univariate analysis was done to find the factors affecting the DFS. ECS ($p < 0.000$), pN + nodes ($p < 0.00$), depth of invasion greater than 10 mm ($p < 0.006$) and optimal complete adjuvant therapy ($p < 0.000$) significantly affected DFS (Table 2). Factors which affected OS significantly were pN + nodes ($p < 0.00$), depth of invasion greater than 10 mm

($p < 0.002$), extracapsular spread ($p < 0.00$) and optimal complete adjuvant therapy ($p < 0.000$) (Table 3). Age and the presence of co-morbidities was not found to affect either OS or DFS on univariate analysis. Multivariate analysis revealed only depth of invasion to be affecting survival significantly ($p < 0.014$).

Discussion

World Health Organization has defined elderly patients as being over 65 years of age. These patients presently constitute 8% of the world's population. This number is expected to double to be about 16% by 2050 (2). Oral squamous cell carcinoma in this sub-group of the population presents a unique challenge. Older patients have decreased hormone dysfunction, decreased protein synthesis resulting in an increase in the body fat and decreased total body water and muscle mass, loss of sweat glands, decreased gastrointestinal (GI) motility and absorption, and decreased hepatic and renal function. There is also immunologic deregulation and compromised marrow reserve in the older individuals (3). Altered physiology, decreased renal function, delayed wound healing and poor general condition with associated morbidities makes this population vulnerable

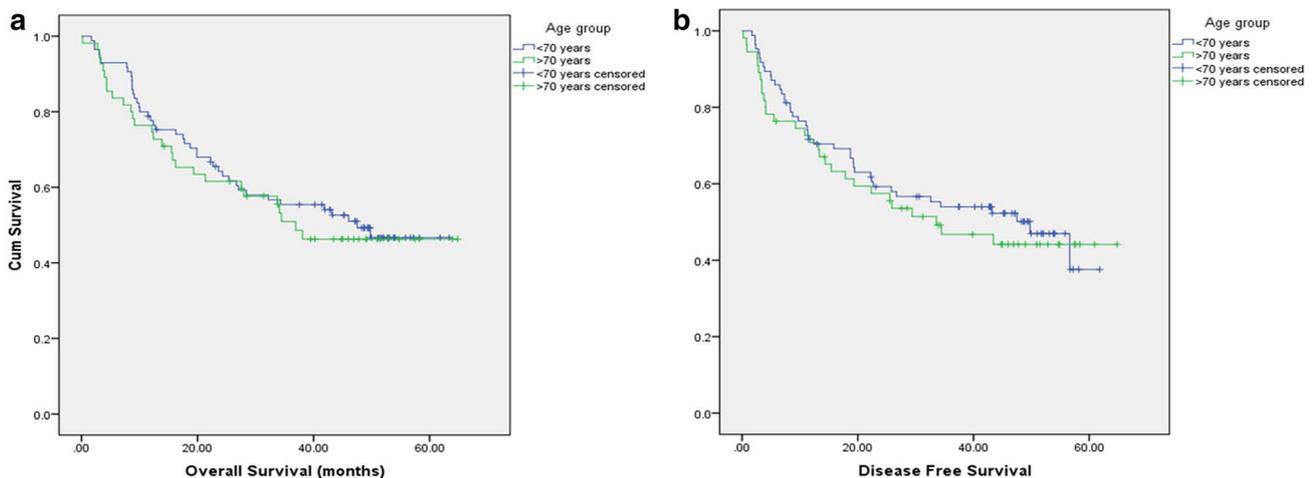


Fig. 1 **a** Comparison of overall survival between the age group < 70 years and > 70 years. **b** Comparison of disease free survival between the age group < 70 years and > 70 years

Table 2 Factors affecting disease free survival on univariate analysis

| Factor | Disease free survival (months) | Confidence interval (95%) | <i>p</i> value |
|---------------------------------|--------------------------------|---------------------------|----------------|
| Gender | | | |
| Male | 37.8 | 32.4–43.2 | 0.96 |
| Female | 36.1 | 28.4–43.8 | |
| Age | | | |
| < 70 years | 37.6 | 32.2–42.9 | 0.59 |
| > 70 years | 36.4 | 29.2–43.7 | |
| Co-morbidities | | | |
| Present | 43.1 | 37.2–49 | 0.21 |
| Absent | 36.3 | 29.7–42.9 | |
| Site | | | |
| Buccal mucosa /Lower Alveolus | 40.5 | 34.9–48.2 | 0.12 |
| Tongue/Floor of mouth | 35.5 | 25.7–39.4 | |
| Microscopic spread | | | |
| Yes | 27.1 | 12.4–41.8 | 0.55 |
| No | 38.2 | 33.6–42.8 | |
| Grade | | | |
| Well differentiated | 43.4 | 34.7–52.0 | 0.17 |
| Moderately differentiated | 36.0 | 31.1–42.1 | |
| Poorly differentiated | 31.6 | 21.9–41.2 | |
| Depth of invasion | | | |
| < 10 mm | 42.7 | 37.1–48.3 | 0.006 |
| > 10 mm | 31.3 | 24.9–37.6 | |
| Margin | | | |
| Free | 38.6 | 33.9–43.2 | 0.30 |
| Close and involved | 28.1 | 14.7–41.5 | |
| Extra capsular spread | | | |
| Yes | 22.2 | 15.6–28.7 | 0.00 |
| No | 43.4 | 38.3–48.4 | |
| Peri-neural invasion | | | |
| Yes | 34.4 | 25.0–43.8 | 0.65 |
| No | 38.4 | 33.4–43.4 | |
| pN | | | |
| Node negative | 44.2 | 38.8–48.6 | 0.00 |
| Node positive | 26.6 | 20.0–33.3 | |
| pT | | | |
| T1–T2 | 40.7 | 34.8–46.5 | 0.17 |
| T3–T4 | 33.0 | 26.6–39.4 | |
| Optimal adjuvant therapy | | | |
| Optimal | 42.0 | 37.1–46.9 | 0.00 |
| Sub-optimal | 21.4 | 33.4–42.4 | |

to a myriad of complications. Traditionally, older population groups are not aggressively treated with the mindset that such a group of population may not be able to tolerate the full array of treatment. Most of the older patients have either one or more co-morbidities like ischemic heart disease, hypertension, diabetes mellitus and cerebrovascular disease. With increasing age their performance status also declines and they may not respond to the treatment same

way as a youth may do. With a paucity of data to make evidence-based decisions in this population, clinicians extrapolate from studies done on a much younger cohort. However, treating patients in their 70s is not the same as treating patients in their 30s or 40s. The compliance of these patients to the treatment may also be erratic. Thus it becomes all the more important to generate evidence for this special group of population.

Table 3 Factors affecting overall survival on univariate analysis

| Factor | Overall Survival (months) | Confidence Interval (95%) | P value |
|-------------------------------|---------------------------|---------------------------|---------|
| Gender | | | |
| Male | 40.3 | 35.2–45.3 | 0.86 |
| Female | 39.0 | 31.4–46.6 | |
| Age | | | |
| < 70 years | 40.2 | 35.0–45.4 | 0.64 |
| > 70 years | 38.6 | 31.6–45.6 | |
| Co-morbidities | | | |
| Present | 42.8 | 29.2–41.5 | 0.17 |
| Absent | 35.4 | 35.8–44.3 | |
| Site | | | |
| Buccal mucosa /Lower Alveolus | 42.6 | 37.2–48.0 | 0.15 |
| Tongue/Floor of mouth | 34.9 | 29.5–42.4 | |
| Microscopic spread | | | |
| Yes | 28.4 | 14.3–42.6 | 0.48 |
| No | 40.4 | 36.0–44.7 | |
| Grade | | | |
| Well differentiated | 44.4 | 36.3–52.5 | 0.17 |
| Moderately differentiated | 38.9 | 33.6–44.1 | |
| Poorly differentiated | 32.4 | 23.7–41.6 | |
| Depth of invasion | | | |
| < 10 mm | 45.7 | 40.3–51.1 | 0.002 |
| > 10 mm | 33.1 | 27.0–39.1 | |
| Margin | | | 0.21 |
| Free | 40.8 | 36.3–45.2 | |
| Close and involved | 29.2 | 16.4–42.0 | |
| Extra capsular Spread | | | |
| Yes | 23.98 | 17.7–38.2 | 0.00 |
| No | 45.51 | 4.7–50.2 | |
| Peri-neural invasion | | | |
| Yes | 36.1 | 27.2–44.9 | 0.51 |
| No | 40.7 | 40.7–35.9 | |
| pN | | | |
| Node negative | 46.5 | 41.4–51.5 | 0.006 |
| Node positive | 28.3 | 22.1–34.7 | |
| pT | | | |
| T1–T2 | 42.7 | 37.2–48.3 | 0.49 |
| T3–T4 | 35.9 | 29.5–42.4 | |
| Optimal adjuvant therapy | | | |
| Optimal | 43.9 | 39.3–48.5 | 0.00 |
| Sub-optimal | 23.9 | 16.4–31.5 | |

Oral cancers are much more often seen in males due to higher rates of addiction to chewable forms of tobacco in them, though a few studies have shown that amongst older female's number may be more. In fact a study found an unusual male to female ratio of 1:6 for older patient with head and neck cancers (4). Few other studies have shown a more

equalized ratio, such as 5:4. Contrary to them we have found that even amongst the older patients, males still outnumber the female patients (2:1).

Functional performance status and comorbidity are key factors during treatment decision making in geriatric patients. According to a recent review, the prevalence of comorbidity in cohort of patients with head and neck cancer was 60% (5). In a study conducted among 310 patients with head neck squamous cell cancer aged over 70 years, 75.1% had at least one comorbid illness. In 13.9% of these patients this co-morbidity was found to be severe in nature (6). In our study, we found that 55.7% patients had one or more co-morbidities. On dividing the incidence of comorbidities amongst patients age less than and more than 70 years, co-morbidities were present in 52.9% and 60% of patients respectively. This difference was not statistically significant.

Oral cavity cancers are treated via surgery. The post-operative course may be complicated by surgical complications, surgical site infections (SSI's) and mortality. The ability of older patients to tolerate the surgical procedure and the post-operative period has been analyzed in a few studies. It has been observed that even though the older patients had a higher prevalence of co-morbidities, the complication rates were comparable with the younger population – 23.2% vs. 20.2% for major complication and 27.7% vs. 22.6% for minor complications (7). Another study found that postoperative infection rate for older patients reached up to 33.7%, out of which the exclusive surgical site infection were 23.1% and pneumonia was seen in 14.9% of patients (5). A large retrospective analysis on patients with head and neck cancer found that though the complication rates between the groups were not significantly different, still the older group had significantly higher peri-operative mortality (3–5%) as compared to the younger group (0.8%) (8).

In a study conducted to evaluate the toxicity of radiotherapy with increasing age in patients enrolled on EORTC trials they analyzed patients between the ages of 50 to 75 years with 5 years interval between each group. They concluded that age should not be a limiting factor in making therapeutic decision. They did not find any difference in survival or acute toxicities between different age groups (9). A meta-analysis has shown that role of chemotherapy decreases with increasing age (10). Pignon and colleagues found a decreasing benefit of concomitant chemotherapy on survival with increasing age ($p < 0.003$). Of the patients assessed, only 7.5% were aged 71 years or older, restricting the applicability of these findings to a broader older population (11). In a recent retrospective study based on national cancer data base, the authors analyzed three group of patient: < 70 years, 70–79, >80 years. They aimed at assessing the pattern of care and barriers to accessing care for older in adjuvant setting. In their multivariate analyses controlling for comorbidity and demographic characteristics, they found

that age was independently associated with lower odds of receiving adjuvant radiation therapy (12) thus concluding that older patients with longer life expectancies were still less likely to receive adjuvant radiotherapy or chemoradiotherapy than younger counterpart. In our study population, as mentioned earlier both the groups had similar co-morbidity distribution. We found amongst that of those who were advised adjuvant therapy 91.5% patients could complete the adjuvant therapy. On evaluating the age groups separately we found that 94.7% of patients in <70 years group and 84.2% of patients in >70 years group (of those who were advised adjuvant therapy) could finish the adjuvant therapy. So, in spite of assessing and shortlisting patients for adjuvant therapy during the post-operative multi-disciplinary meet, 15.8% of patients more than 70 years of age and 5.3% patients less than 70 years could not take/complete adjuvant therapy. Of these patients, 33% could not start the adjuvant therapy and 67% could initiate but not finish the adjuvant therapy. 11.1% of these had been advised chemoradiotherapy and 88.9% were advised radiotherapy alone. In all these patients, poor performance status was the reason for defaulting the adjuvant therapy. Significantly more number of patients >70 years of age did not receive appropriate adjuvant therapy (34.5% vs 12.9%) ($p < 0.002$). This includes patients who were either not advised adjuvant therapy in view of their performance status and also those who could not start or complete their adjuvant therapy adequately.

A recent retrospective study assessed the effect of age on overall survival, cancer-specific survival, and non-cancer-related death in older patients (aged ≥ 70 years) with head and neck squamous cell carcinoma (HNSCC) treated by definitive radiation therapy. The results were compared with those of younger patients. They concluded that older patients with HNSCC have worse survival outcomes than young HNSCC patients. Age is an independent prognostic factor for OS, mainly due to an increase in non-cancer-related mortality and comorbid diseases (13). Another study matched 115 patients with head and neck cancers ≥ 70 years of age by tumour type and stage with the 115 patients of <70 years of age and found no difference in 5-year overall survival rate (14). Few other studies have also shown similar results (15). Differences in outcomes (locoregional control and survival) for older patients compared with younger patients are mainly based on retrospective series and case-control studies. In most of the studies patient cohorts have been too small to provide any meaningful statistical comparisons. Perioperative and postoperative complications, surgical mortality, and control rates for older patients are conflicting and appear to be highly dependent on patient selection (6, 16). In our study we analyzed survival in the older patients after dividing them into two age groups (65–70 years and >70 years). The two groups were comparable with respect to various clinico-pathological factors. We found no difference

in overall survival or disease free survival or disease specific survival between the two groups. This was in spite of the fact that significantly more number of patients in the >70 years age group did not finish appropriate adjuvant therapy. 84.2% of these patients who were advised adjuvant therapy could complete it fully. This gives us a clear sign that patients >70 years can tolerate intensified treatment and we should not de-intensify the treatment strategy solely based on patient's age as a criterion.

Older patients are often under-represented in clinical trials and even when these patients are included the trials are often biased toward the fitter-old group, restricting the applicability of their results. The void is more apparent for patients having intermediate fitness/performance status. There is always confusion about how this group of patients has to be treated. It is important to understand that more than the chronological age it is the physiological age of the patient which is more important. In order to differentiate amongst patients of the same age, it may be useful to determine if a patient is fit or frail. Fit older adults have few comorbidities, no functional deficits, few geriatric syndromes, and generally are considered appropriate for the same therapies used in younger adults. Main clinical features of frailty include decreased functional reserve, impairment or dysregulation in multiple physiological systems, reduced ability to regain physiological homeostasis after a stressful and destabilizing event (17).

There are various geriatric assessment indices which are commonly used to assess the ability of the older patient to withstand the surgery and chemo-radiotherapy toxicity. Most common element of assessment is the frailty of the individual rather than age. In a systematic review, it was observed that functional status, co-morbidities and frailty were assessed most frequently during geriatric assessment. Out of these, only frailty seemed to be the most important predictor, which underpins the importance of an integrated approach (18). Different tools have been developed to identify frail adults like the frailty phenotype and the frailty index. The frailty phenotype includes five criteria: weight loss, low physical activity, weak grip strength, slow gait speed, and exhaustion (19). These factors increased the risk for adverse outcomes following treatment and should be analyzed in the pre-treatment course. The frailty index (FI) is used to measure the health status of older individuals—as a proxy measure of aging and vulnerability to poor outcomes. It is defined as the proportion of deficits present in an individual out of the total number of age-related health variables considered. These indices may assess overall individual or they maybe even site specific. ACE-27 (adult comorbidity index) and Charlson Comorbidity Index (20) have been validated in head and neck cancer. There are diseases specific comorbidity index like the Washington University Head and Neck Index and the Head and Neck Cancer Index which are proposed only for patients with head and neck

cancer. Studies have shown that at times these disease specific indices may be futile in predicting survival (21). However in a recent pilot study assessing the impact of geriatric assessment on management of older adults on head and neck cancer concluded that specific indices are better equipped to identify vulnerable older patients as compared to general geriatric assessment (22). A recent review which gave considerations for various geriatric indices as well as performance status scales has provided an algorithm to help in making treatment decisions in older patients with head and neck cancer (23). One of the drawbacks of these indices is that they cannot be accurately applied in retrospective studies. Thus, we could not use them for patients in our study.

Though awareness about these scales or indices exists but their actual utilization is very less. A survey of surgical oncologists from the United States and Europe showed that only 48% of the surgeons consider frailty screening as mandatory. Only 6.4% of the responders utilized a proper geriatric assessment tool. This was inspite of 44.6% responders being from academic institutions (24). Though data is not available for developing countries and resource constrained settings, we expect that there would be even lesser utilization of the triaging system (based upon frailty and not upon the age). This highlights the importance and applicability of our present study.

Our study followed a pragmatic approach and has the advantage of tracing the actual scenario in treatment of older patients with oral cancer. The patients included in the study were having performance status good enough (< ECOG2) to undergo surgery initially. Post-surgery, the adjuvant therapy was down staged as per the patient's performance status and general condition in 28% patients. Of those who were advised adjuvant therapy, 91.5% could finish it. Due to poor performance status, 13.5% of patients > 70 years and 7.8% patients < 70 years of age did not receive/complete adjuvant therapy. There was no difference in tumor biology, association with different clinico-pathological factors and survival in patients of oral cancer ≤ 70 and > 70 years of age. More than the age, it is the performance status and the associated co-morbidities of the patient which is important. The study had disadvantage of being retrospective in nature and due to which we could not use the geriatric assessment scales/frailty indices in the assessment. Despite being a retrospective analysis, we had a good follow up evaluation system and compliance of patients to the treatment advised was also good.

Conclusion

There is no difference in tumor biology, association with different clinico-pathological factors and survival in patients with oral cancer ≤ 70 and > 70 years of age. Majority of

patients could complete the adjuvant therapy advised to them. Still, significantly more number of patients > 70 years could not receive/complete appropriate adjuvant therapy. Thus treatment in older patients should not be based upon age alone; they require tailoring of treatment on a case to case basis keeping in mind the individual's performance status and the co-morbidities.

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Compliance with ethical standards

Conflict of interest The authors declare that there is no conflict of interest.

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