

Oral cancer at a Tasmanian tertiary referral clinic, The Royal Hobart Hospital 1996-2002

LC Hogan,* GM Hall,† IG Chambers‡

Abstract

Background: The Holman Clinic at the Royal Hobart Hospital includes a multi-disciplinary head and neck clinic which functions as a tertiary referral centre for Southern Tasmania and involves Ear Nose and Throat surgeons, Oral and Maxillofacial Surgeons, Plastic and Reconstructive Surgeons, Radiation Oncologists and Medical Oncologists.

Methods: The aim of this study was to examine retrospectively the number, gender distribution, age, site of lesion, histology, mortality and treatment modalities of the oral cancers referred to the Holman clinic at the Royal Hobart Hospital. The medical histories and a database of the Holman clinic were used as the sources of data for this study. A total of 101 patients were treated for oral cancer in the Holman clinic at the Royal Hobart Hospital from 1996 to 2002. There were 64 males and 37 females.

Results: The distribution of anatomical sites of the oral cancers in this study was as follows: 36 oral tongue lesions, 17 floor of mouth, 13 lip, five retromolar trigone, five mandibular alveolus, six buccal mucosa, nine palatal and 10 minor and major salivary gland cancers. The most common site of oral cancer was the tongue (35.6 per cent), followed by the floor of mouth (16.8 per cent) and lip (12.9 per cent).

Conclusions: The majority of oral cancers were squamous cell carcinoma, except for the salivary gland cancers. The incidence of squamous cell carcinoma was between 67 and 100 per cent, depending upon the site involved. The trends found in this study are similar to those previously documented over the past 20 years.

Key words: Oral cancer, Tasmania.

Abbreviations and acronyms: TNM = tumour nodes-metastases; WHO = World Health Organization classification of diseases.

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INTRODUCTION

Of all patients diagnosed with cancer in Australia, 2-4 per cent have oral cancer. New South Wales, South Australia and Victoria report similar incidences of oral cancer.¹⁻³ In Tasmania during the year 2000 a total of 2263 people were diagnosed with cancer, of which 79 (3.5 per cent) had oral cancer.⁴ In Australia the incidence of oral cancer is relatively low compared with other cancers such as prostate, breast and lung, but the disease can be severely debilitating.⁵ The clinical course and treatment of oral cancer can result in impairments in speech, mastication, swallowing and aesthetics.

It has been long established that consumption of alcohol and tobacco smoking are aetiological factors in the development of oral cancer. Up to 75 per cent of intraoral cancers in Western countries have been attributed to those habits.⁵ A synergistic effect of smoking and alcohol consumption in the development of oral cancer has been suggested in a number of reports.³

Recent studies of the incidence of oral cancer have used the World Health Organization International classification of diseases (WHO),⁶ which defines oral cancer as any malignancy involving the following anatomical regions: lips, tongue, major salivary glands, gingivae, floor of mouth and other mouth. Other mouth includes: buccal mucosa, hard palate, soft palate, uvula, retromolar area and maxilla and mandible in unspecified oral sites. The WHO definition of oral cancer has been used in this present study.

The aim of this study was to retrospectively investigate the demographics, aetiological factors and treatment modalities of the patients who underwent treatment for their oral cancer in the Holman Clinic at the Royal Hobart Hospital between 1996 and 2002.

MATERIALS AND METHODS

Between January 1996 and December 2002 a total of 101 patients diagnosed with oral cancer were seen in the Holman Clinic at the Royal Hobart Hospital. The Holman Clinic includes a multidisciplinary tertiary referral head and neck cancer centre for Southern Tasmania, for which a specific patient database is

*Oral and Maxillofacial Surgery Registrar 2003, The Royal Hobart Hospital, Tasmania.

†Head of Oral and Maxillofacial Surgery Unit and Consultant Oral and Maxillofacial Surgeon, The Royal Hobart Hospital, Tasmania.

‡Consultant Oral and Maxillofacial Surgeon, The Royal Hobart Hospital, Tasmania.



Fig 1. Squamous cell carcinoma of right side of tongue.

maintained. This database, along with the patient medical records, formed the basis for data collection in this retrospective study.

For the purposes of this study, oral cancer included the following anatomical regions: tongue (ICD 01-02), floor of mouth (ICD 04), lip (ICD 00), retromolar trigone (ICD 6.2), alveolus (ICD 03), buccal mucosa (ICD 06), major and minor salivary glands (ICD 07-08) as well as hard and soft palate (ICD 05). Figure 1 and 2 are photographs of patients with oral cancer of the tongue and floor of mouth. The histopathology of the cancers was recorded.

The demographic data collected for each patient included: age at diagnosis, gender, age at death, time between diagnosis and death, and the cause of death. Only patients who died as a result of their oral cancer were included in any calculations.

Patient treatment was recorded, with the three treatment modalities being surgery, radiotherapy and chemotherapy. Two patients received only conservative management. Smoking and alcohol consumption were recorded. Smoking history was subdivided into the following categories: smoker at diagnosis, non-smoker, ex-smoker and unknown smoking status. Alcohol consumption history was subdivided into the following categories: occasional consumption of alcohol (“Social



Fig 2. Squamous cell carcinoma of the left floor of mouth.

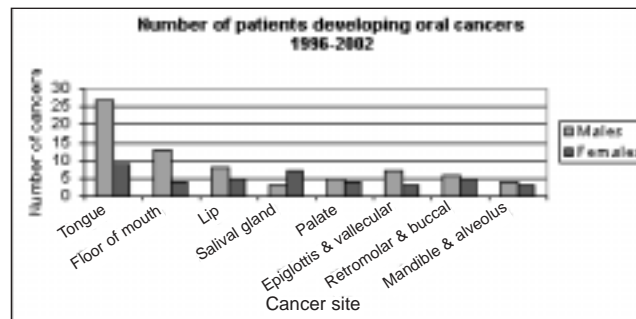


Fig 3. Number of patients developing oral cancers according to site.

intake”), regular consumption, non-drinker (Non-consumption), ex-drinker (No longer consumes) and unknown.

RESULTS

Between January 1996 and December 2002 a total of 101 patients were diagnosed with oral cancer. There were 64 males (63.4 per cent) and 37 females (36.6 per cent). The site distribution was as follows: 36 oral tongue (35.6 per cent), 17 floor of mouth (16.8 per cent), 13 lip (12.9 per cent), five retromolar trigone (5 per cent), five mandibular alveolus (5 per cent), six buccal mucosa (5.9 per cent), 10 minor and major salivary gland (9.9 per cent) and nine palatal cancers (8.9 per cent).

The lip cancers included nine of the lower lip and four of the upper lip. The salivary gland tumours included three involving minor salivary glands and seven involving the parotid gland. The palatal cancers included four of the hard palate and five of the soft palate. Figure 3 shows the number of oral cancers by site and subdivides the patients according to gender. Refer to Fig 4 for representation of the number of patients developing oral cancer according to year of diagnosis and gender.

Age

The mean age of the patients developing oral cancer at diagnosis was calculated. The overall mean age was 64 years. The mean age of males was 64 years, and females 67 years. See Fig 5 for the mean age of patients developing oral cancer, overall and according to gender.

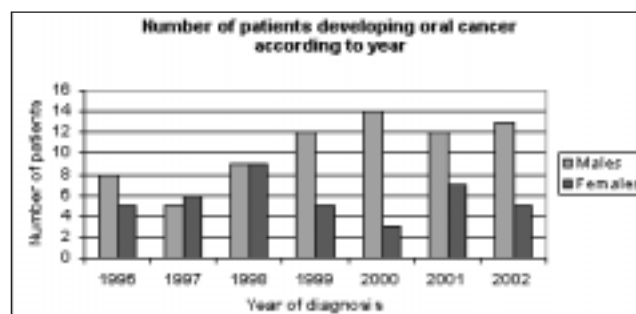


Fig 4. Number of patients developing oral cancer according to year at diagnosis.

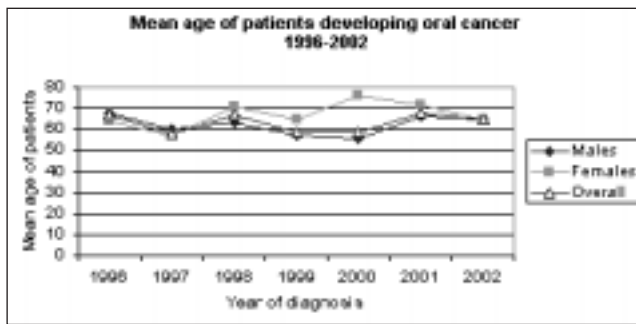


Fig 5. Mean age of patients developing oral cancer according to year at diagnosis.

The mean age of the patients developing for each oral cancer site was calculated. These data are represented in Table 1.

Histopathology

The histology of the oral cancers was recorded. Table 1 shows the incidence of each type of histopathology for the oral sites.

Aetiological factors

Smoking

The number of patients who were smokers at diagnosis was recorded. The total number of current smokers was 46 (45.5 per cent). The total number of ex-smokers was 17 (16.8 per cent). The number who had never smoked was 10 (9.9 per cent). The number of patients with an unknown smoking status was 28 (27.7 per cent). Table 2 presents the smoking status of patients for selected oral cancer sites including tongue, floor of mouth, lip and palate.

Alcohol consumption

The number of patients who reported that they drank alcohol regularly was 41 (40.6 per cent). The number of patients who drank alcohol socially or were occasional drinkers was 22 (21.8 per cent). The number of patients who did not drink alcohol was 10 (9.9 per cent). The number of patients who previously consumed alcohol regularly was four (4 per cent). The number of patients with an unknown drinking status was 24 (23.8 per cent). Table 2 represents the alcohol consumption of patients for selected oral cancer sites including tongue, floor of mouth, lip and palate.

Treatment modalities

In the treatment of the tongue cancers, 13 patients (36.1 per cent) underwent both chemotherapy and radiotherapy, nine patients (25 per cent) were treated surgically and with radiotherapy, five patients (13.9 per cent) underwent chemotherapy, radiotherapy as well as surgery, five patients (13.9 per cent) were treated purely surgically and four patients (11.1 per cent) had purely radiotherapy. The surgical techniques used depended upon the severity of the cancer. The surgical techniques included excision with local closure, hemi-glossectomy with radial forearm free flap repair, and neck dissection with pectoralis major flap repair.

In the treatment of the floor of mouth sites, nine patients (52.9 per cent) were treated with surgery and radiotherapy, five patients (29.4 per cent) were treated purely surgically, two patients (11.8 per cent) underwent chemotherapy, radiotherapy as well as surgery and one patient (5.9 per cent) had chemotherapy and radiotherapy. The surgical

Table 1. Histology of oral cancer by site and mean age of patients

Cancer site	Histology and percentage of patients	Mean age of patients in years
Tongue (36)	Squamous cell carcinoma 94% Basaloid/Adenoid 6%	Male: 59.6 Female: 64.2 Total: 60 (Range 30-86)
Floor of mouth (17)	Squamous cell carcinoma 100%	Male: 64.9 Female: 65 Total: 65 (Range 40-86)
Lip (13)	Squamous cell carcinoma 69% Basal cell carcinoma 23% Adenocarcinoma 7.7%	Male: 68.3 Female: 75.2 Total: 71 (Range 21-87)
Retromolar trigone (5)	Squamous cell carcinoma 100%	Male: 60.5 Female: 63 Total: 61 (Range 45-70)
Alveolus (5)	Squamous cell carcinoma 100%	Male: 68 Female: 69 Total: 68.6 (Range 54-85)
Buccal mucosa (6)	Squamous cell carcinoma 83% Lentiginous melanoma 17%	Male: 75 Female: 69.3 Total: 71.2 (Range 53-84)
Salivary gland (10)	Squamous cell carcinoma 20% Adenocarcinoma 20% Basaloid carcinoma 10% Adenoid cystic carcinoma 20% Acinic cell carcinoma 20% Mucoepidermoid 10%	Male: 49.7 Female: 62.6 Total: 58.7 (Range 24-87)
Palate (9)	Squamous cell carcinoma 67% Mucoepidermoid 22% Verrucous carcinoma 11%	Male: 60 Female: 68.5 Total: 63.7 (Range 50-80)

Table 2. Selected cancer sites and the patient's smoking and alcohol consumption status

Oral cancer site	Smoking status and number of patients and percent	Alcohol consumption and the number of patients and percentage
Tongue	Smoker: 20 (56%) Ex-smoker: 7 (19.4%) Never smoker: 5 (13.9%) Unknown: 4 (11.1%)	Regular consumption: 19 (52.8%) Occasional consumption: 7 (19.4%) No longer consumes: 2 (5.6%) Unknown consumption status: 4 (11.1%)
Floor of mouth	Smoker: 11 (64.7%) Ex-smoker: 2 (11.8%) Never smoker: 0 Unknown: 4 (23.5%)	Regular consumption: 10 (58.8%) Occasional consumption: 1 (5.9%) No longer consumes: 1 (5.9%) Non-consumption: 1 (5.9%) Unknown consumption status: 4 (23.5%)
Lip	Smoker: 2 (15.4%) Ex-smoker: 3 (23.1%) Never smoker: 1 (7.7%) Unknown: 7 (53.8%)	Regular consumption: 3 (23.1%) Occasional consumption: 4 (30.8%) No longer consumes: 0 Non-consumption: 0 Unknown consumption status: 6 (46.2%)
Palate	Smoker: 6 (66.7%) Ex-smoker: 1 (11.1%) Never smoker: 0 Unknown: 2 (22.2%)	Regular consumption: 3 (33.3%) Occasional consumption: 3 (33.3%) No longer consumes: 0 Non-consumption: 1 (11.1%) Unknown consumption status: 2 (22.2%)

techniques included: excision and primary closure, excision and nasolabial flap or split skin graft and marginal mandibulectomy with radial forearm flap or hip graft.

In the treatment of lip sites, nine patients (69.2 per cent) were treated with surgery and with radiotherapy, two patients (15.4 per cent) were treated purely surgically and two patients (15.4 per cent) were treated purely with radiotherapy. All the patients undergoing surgery had local excision and primary closure.

In the treatment of the retromolar trigone region, two patients (40 per cent) were treated with chemotherapy and radiotherapy, one patient (20 per cent) was treated with radiotherapy, one patient (20 per cent) was treated with surgery and radiotherapy and one patient (20 per cent) was treated surgically as well as with chemotherapy and radiotherapy. The patient treated surgically had a split skin graft from the thigh and radical neck dissection with a pectoralis major flap.

In the treatment of the alveolar sites, three patients (60 per cent) were treated surgically, one patient (20 per cent) underwent surgical treatment and radiotherapy and one patient (20 per cent) was treated surgically as well as with chemotherapy and radiotherapy. The patients that underwent surgical treatment had surgical excision and local closure, hemimandibulectomies and pectoralis myocutaneous flaps.

In the treatment of salivary glands, six patients (60 per cent) underwent surgery and radiotherapy, two patients (20 per cent) had radiotherapy alone and two patients (20 per cent) were treated surgically. The patients that were treated surgically had local excision and one patient had a free vascular hip flap.

In the treatment of palatal sites, four patients (44.4 per cent) had radiotherapy, three patients (33.3 per cent) were treated surgically as well as with chemotherapy and radiotherapy, one patient (11.1 per cent) was treated with surgery and with radiotherapy and one patient (11.1 per cent) had chemotherapy and radiotherapy. The patients treated surgically had local

excision and closure and one patient had a radical neck dissection with pectoralis major flap.

In the treatment of buccal mucosa, two patients (33.3 per cent) had radiotherapy and surgical treatment, two patients (33.3 per cent) were treated surgically, one patient (16.7 per cent) had radiotherapy and one patient (16.7 per cent) had no treatment. The patients treated surgically had local excision and closure, split skin graft from the thigh.

Mortality

The cause of death of patients in relation to the cancer included: metastatic spread and complications, local invasion and complications, or inability to sustain adequate nutrition after treatment. The mortality figures below relate to patient deaths between January 1996 and December 2002.

Of the nine patients with lip cancer, four died but none of these deaths were due to cancer.

Of the 36 patients with tongue carcinoma, 17 died. Fourteen patients (38.9 per cent) died as a result of the cancer. The mean age of the patients at death was 66 years, with a mean of two years elapsed since diagnosis.

Of the 17 patients with floor of mouth carcinoma, seven had died. Four patients (23.5 per cent) died as a result of the cancer. The mean age of the patients at death was 66.5 years, with a mean of 0.8 years since diagnosis.

Of the five patients who had cancer of the retromolar trigone, three had died (60 per cent), all as a result of the cancer. The mean age of patients at death was 58 years with a mean of 0.7 years after diagnosis.

Of the five patients with cancer of the mandibular alveolus, three had died (60 per cent), all as a result of the cancer. The mean age of patients at death was 68.3 years and a mean of 0.3 years after diagnosis.

Of the 10 patients with cancer of the salivary glands, one patient died (10 per cent). This patient died as a result of the cancer at an age of 87 years and 0.6 years after diagnosis.

Of the nine patients with cancer of the palate six died (66.7 per cent), all as a result of the cancer. The mean age at death was 63.2 years and a mean of 1.8 years after diagnosis.

Of the six patients with cancer of the buccal mucosa two have died. One patient (16.7 per cent) died as a result of the cancer at an age of 77 years and 0.9 years after diagnosis.

DISCUSSION

Of the patients presenting to the Holman Head and Neck Clinic at the Royal Hobart Hospital, 63.4 per cent were male and 36.6 per cent were female. This is comparable to other Australian studies. Fowler *et al.*⁷ reported 65.1 per cent males in a Victorian-based study of oral cancer. In a New South Wales study, Cox⁸ found that 69.9 per cent of oral cancer patients were male.

The age at diagnosis was on average 67 years for females and 64 years for males. This is comparable to a Victorian study, which found females to be on average seven years older than males. Rich³ stated that the mean age of the patients developing oral cancer was 60 years. The majority of patients in this current study were older than 55 years (74.3 per cent). Studies by Macfarlane *et al.*¹ and Sugarman and Savage⁹ found that the majority of their patients were 60 years and older and Cox⁸ found that 93 per cent of their patients were aged 45 years and older.

Cox⁸ and Sugarman and Savage^{5,9} found that squamous cell carcinoma accounted for 90 per cent or more cases of oral cancer. However, other studies have found that 70-85 per cent of cases were squamous cell carcinomas.^{2,3,10} In the current study, the histopathology of the tongue, floor of mouth, lip, retromolar trigone, alveolus, buccal mucosa and palate was squamous cell carcinoma in 67 to 100 per cent of patients. The incidence of squamous cell carcinoma in salivary glands was 20 per cent.

The majority of cancers in this study involved the tongue (35.6 per cent), floor of mouth (16.8 per cent) and the lip (12.9 per cent). A study reported by Cox⁸ found that the majority of cancers involved the lower lip and tongue. Sugarman and Savage⁵ and Fowler *et al.*⁷ found that the majority of cases involved the tongue. However, Tan¹⁰ reported that cancers involved the lip in 62.1 per cent of cases and the tongue in 12.3 per cent of cases. Roder² found the majority of cases involved the lip (56.3 per cent), the tongue (15.6 per cent) and floor of mouth (7.9 per cent). However, data from the South Australian cancer registry for 2001 showed that the majority of oral cancers involved the buccal cavity (50 per cent), the lip (34.9 per cent) and tongue (6.9 per cent).¹¹ These apparent discrepancies in the sites of oral cancer may be explained by the small numbers in the studies, whether the figures are part of a central database for an entire state, as well as differences in exposure to aetiological factors, the genetic background of the patients and the definitions used for inclusion in the studies. The referral bases of

the hospitals and clinics involved can also contribute to discrepancies in incidence of oral cancer.

Retrospective studies rely on previous data collection, which may be incomplete. This current study found unrecorded smoking and drinking habits for nearly one quarter of patients. Of the patients for whom a smoking history was recorded (73 patients), 46 (63 per cent) were current smokers, 17 (23.3 per cent) were ex-smokers and 10 (13.7 per cent) were non-smokers. The total number of patients who consumed alcohol regularly was 41 (40.6 per cent) and those who consumed alcohol occasionally was 22 (21.8 per cent). Rich³ and Cox⁸ found that 73 per cent of the patients who developed oral cancer had a history of smoking. Rich³ found that 63 per cent of their patients consumed alcohol at a high level. To gain a greater understanding of the risk of developing oral cancer from smoking tobacco the number of pack-years needs to be calculated for both continuing smokers and ex-smokers. With regards to the effect of alcohol consumption in the development of oral cancer, the number of years as well as the average number of grams of alcohol consumed per week needs to be calculated. However, this information could be more readily collected prospectively than retrospectively.

The Holman Clinic offers various treatment combinations of radiotherapy, chemotherapy and surgery, individualized for patients. The predominant treatment used elsewhere has been reported to be a combination of surgery and radiotherapy.^{7,10,12} In the current study the treatment of lip cancers (69.2 per cent) and floor of mouth cancers (52.9 per cent) was by surgery and radiotherapy, whereas for tongue cancers the predominant treatment was chemotherapy and radiotherapy (36.1 per cent). This possibly reflects the severity of disease present in the patients of this tertiary referral clinic.

The mortality of the patients with oral cancer is significantly influenced by the severity of the disease at diagnosis. In this study the greatest number of deaths was associated with cancer of the tongue, with 14 of the 36 patients (38.9 per cent) having died and within a mean of two years after diagnosis. Of the patients with cancer involving the floor of mouth, four of the 17 patients (23.5 per cent) died, within a mean of 0.8 years after diagnosis. Cox⁸ found 50 per cent of the patients with tongue cancer died within five years of diagnosis, whereas Fowler *et al.*⁷ found that 18 per cent of males and 13 per cent of females died as a result of tongue cancer within five years. Roder² found that 69 per cent of the patients suffering from oral cancer survived four years after diagnosis. The high mortality of patients with tongue carcinoma in this study has been clinically attributed to the advanced state of the disease at presentation in the majority of cases.

It was unfortunate that the tumour-nodes-metastases (TNM) score was not recorded consistently for each patient at the Holman Clinic and for that reason has not been presented. The TNM score prove useful in

comparing the severity of the disease between patients and between different populations as well as predicting mortality of patients. If this study were to be repeated prospectively then the TNM score should be recorded.

CONCLUSION

For the patients who presented with oral cancer to the Holman clinic at the Royal Hobart Hospital (1996-2002) the general trends were in agreement with previous studies, with females being older than males when developing oral cancer, squamous cell carcinoma being the most common pathology and the sites most likely to be affected being the tongue and floor of mouth. This study also illustrates the limitations of retrospective studies in relation to the inconsistent recording of aetiological factors for oral cancer.

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REFERENCES

1. MacFarlane GJ, McCredie M, Coates M. Patterns of oral and pharyngeal cancer incidence in New South Wales, Australia. *J Oral Pathol Med* 1994;23:241-245.
2. Roder D, Wilson D. Oral cancer in South Australia – incidence and case survival. *Aust Dent J* 1983;28:312-315.
3. Rich AM, Radden BG. Squamous cell carcinoma of the oral mucosa: a review of 244 cases in Australia. *J Oral Pathol* 1984;13:459-471.

4. Pavlides S, Venn A, Blizzard L, eds. *Cancer in Tasmania Incidence and Mortality 2000*. Hobart: Menzies Centre for Population Health Research, 2002.
5. Sugerman PB, Savage NW. Current concepts in oral cancer. *Aust Dent J* 1999;44:147-156.
6. World Health Organization. *International Statistical Classification of Diseases and Related Health Problems*. 10th revision. Geneva: World Health Organization, 1992.
7. Fowler G, Reade PC, Radden BG. Intraoral cancer in Victoria. *Med J Aust* 1980;2:20-22.
8. Cox S. Oral cancer in Australia – risk factors and disease distribution. *Ann R Australas Coll Dent Surg* 2000;15:261-263.
9. Sugerman PB, Savage NW. Oral cancer in Australia: 1983-1996. *Aust Dent J* 2002;47:45-56.
10. Tan KN. Oral cancer in Australia. *Aust Dent J* 1969;14:50-56.
11. Department of human services South Australian cancer registry. *Epidemiology of cancer in South Australia: twenty-five years of data*. Adelaide: South Australian Cancer Registry.
12. McCombe D, MacGill K, Ainslie J, Beresford J, Matthews J. Squamous cell carcinoma of the lip: a retrospective review of the Peter MacCallum Cancer Institute experience 1979-88. *Aust N Z J Surg* 2000;70:358-361.

Address for correspondence/reprints:

Dr Lucinda C Hogan
PO Box 4462
Ringwood
Victoria 3134

Email: lucinda.hogan@bigpond.com