Is Detection of Oral and Oropharyngeal Squamous Cancer by a Dental Health Care Provider Associated With a Lower Stage at Diagnosis?

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Purpose: Stage at diagnosis is the most important prognostic indictor for oral and oropharyngeal squamous cell cancers (SCCs). Unfortunately, approximately 50% of these cancers are identified late (stage III or IV). We set out to examinationine the detection patterns of oral and oropharyngeal SCCs and to determine whether detection of these cancers by various health care providers was associated with a lower stage.

Patients and Methods: Data were gathered on 51 patients with newly diagnosed oral or oropharyngeal SCC through patient interview and chart audit. In addition to demographic data, specific inquiry was made regarding the circumstances surrounding the identification of the lesion. The main outcome measure was tumor stage grouping based on detection source.

Results: Health care providers detecting oral and oropharyngeal SCCs during non-symptom-driven (screening) examinations were dentists, hygienists, oral and maxillofacial surgeons, and, in 1 case, a denturist. All lesions detected by physicians occurred during a symptom-driven examination. Lesions detected during a non-symptom-driven examination were of a statistically significant lower average clinical and pathologic stage (1.7 and 1.6, respectively) than lesions detected during a symptom-directed examination (2.6 and 2.5, respectively). Additionally, a dental office is the most likely source of detection of a lesion during a screening examination (Fisher exact test, $P = .0006$). Overall, patients referred from a dental office were of significantly lower stage than those referred from a medical office. Finally, patients who initially saw a regional specialist (dentist, oral and maxillofacial surgeon, or otolaryngologist) with symptoms related to their lesion were more likely to have appropriate treatment initiated than those who initially sought care from their primary care provider.

Conclusion: Overall, detection of oral and oropharyngeal SCCs during a non-symptom-driven examination is associated with a lower stage at diagnosis, and this is most likely to occur in a dental office. A regional specialist was more likely than a primary care provider to detect an oral or oropharyngeal SCC and initiate the appropriate treatment during the first visit for symptoms related to the lesion.

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Oral and oropharyngeal squamous cell carcinomas account for 4% of cancers in men and 2% of cancers in women, and stage at diagnosis remains the most important prognostic indicator.[1,2] Unfortunately, almost half of these cancers are diagnosed late (stage III or IV), with 5-year survival rates ranging from 20% to 50% depending on site. This is in contrast to the prognosis of patients treated at an early stage (stage I or stage II), whose 5-year survival ranges from 60% to 80%.[3-6] Regional node status has been shown to be the single most important independent predictor of survival in oral and oropharyngeal squamous cancers.[7-9] Size has also been shown to have prognostic significance.[7]

Regardless of advances in diagnosis and treatment during the past 40 years, the overall 5-year survival for oral and oropharyngeal squamous cancers has only slightly improved and remains around 50%.[2,4,6] Early detection remains the single most important factor in favorable outcome for these cancers,[4] yet only 14% of US adults reported ever having an oral cancer examination, and of these only 7% who were 40 years of age or older had the examination during the past year.[10] For secondary prevention to be successful, oral and oropharyngeal squamous cancers must be detected and treated at an early stage.

Screening is defined as the search for disease in either a person who does not have symptoms or a person that does not recognize the symptoms as being related to a disease. *Detection* is defined as finding the disease in an asymptomatic or symptomatic patient.[11,12] The American Cancer Society recommends screening asymptomatic patients for cancers of the head and neck, including oral cancers, every 3 years between the ages of 20 and 40 and yearly after age 40. The US Preventive Services Task Force has recommended that an examination for cancerous and precancerous lesions of the oral cavity be included in the periodic health examination of persons with exposure to tobacco and excessive amounts of alcohol, particularly geriatric patients.[12-14] Screening a high-risk, asymptomatic population has been shown to result in earlier detection of oral cancers.[15] Community practices vary widely, however, and in a recent survey only 18% of physicians provided oral cancer examinations on 50% or more of their patients.[16]

Recently, Epstein et al[17] showed that detection of cutaneous melanoma by a physician was associated with a thinner lesion and therefore a lower stage at diagnosis.

In this study, we examined the patterns of detection associated with oral and oropharyngeal squamous cancers and determined whether detection of these cancers by various health care providers was associated with a lower stage at diagnosis.

Methods

Data were collected through patient interview and chart audit on 51 consecutive patients with newly diagnosed oral or oropharyngeal squamous cancers. In an effort to maintain a more homogeneous population, only patients with squamous cell cancers of the oral cavity or oropharynx were included. Patients with second primaries or recurrences were excluded because these patients were more likely to be under follow-up or increased surveillance. Additionally, patients with lesions discovered during the evaluation of a neck mass were excluded.

The main outcome variable of this study was tumor stage at diagnosis. Additionally, symptom-driven versus non-symptom-driven detection was evaluated.

Patients were interviewed and specific inquiry was made regarding the circumstances surrounding the identification of their cancer. Specifically, patients were asked who first detected a lesion and whether it was symptomatic at that time. Because patients frequently recall symptoms after a lesion is brought to their attention, notation was also made as to whether the lesion was identified during a routine office visit (non-symptom-driven detection) or during an appointment made for symptoms related to the lesion (symptom-driven detection). Additional information relating to the time between onset of symptoms and presentation and the time between presentation and biopsy was gathered. *Patient delay* was defined as the time from the patient's first awareness of symptom or sign to the first consultation with a health care professional, and *professional delay* was defined as the time from first consultation with a health care provider to biopsy.[18] Also, time from the first identification of a lesion to biopsy was recorded. In addition to routine demographic data, patients were also interviewed on personal characteristics, including age, smoking history, alcohol use, and family history of head and neck cancers.

All information gathered during the interview was cross-referenced with the information contained in the patients initial history and physical examination, which was performed by a separate physician.

Clinical staging was performed on all patients by the same examiner. Pathologic staging was available on 40 patients who underwent surgery without neoadjunctive chemotherapy or radiation therapy. Cancers were staged clinically using the TMN staging system based on the guidelines of the American Joint Committee on Cancer.[19] Pathologic staging was done on patients treated initially with surgery. Independent parameters such as lesion size and node status were also examined. In addition, groupings of early stage (stage I and II) and late stage (stage III and IV) were compared. Categorical variables were compared us-

ing the Fisher exact test, and means were compared using a t test.

Results

A total of 51 patients with squamous cancer of the oral cavity (n = 36) and oropharynx (n = 15) were analyzed, including 28 men (56%) and 23 women (44%). The mean age of the study population was 62.2 years (range, 29 to 88 years). Seventy-six percent of patients had a smoking history, and 67% admitted to occasional or heavy use of alcohol. Three patients had a family history of squamous cancer of the mouth or throat. Twenty percent of patients were completely edentulous.

Sixty-three percent of patients presented with early clinical and pathologic stage (I or II) disease. The average clinical size of the lesions was 2.7 cm (SD, 1.2 cm), and the average pathologic size was 2.1 cm (SD, 1.3 cm). The average clinical stage at diagnosis was 2.3 (SD, 1.1), and the average pathologic stage was 2.15 (SD, 1.3).

Health care providers who detected lesions included primary care physicians, general dentists, hygienists, otolaryngologists, oral and maxillofacial surgeons, and, in 1 case, a denturist.

NON-SYMPTOM-DRIVEN VERSUS SYMPTOM-DRIVEN DETECTION

Detection of a lesion during an office visit for an unrelated reason or routine office visit (non-symptom-driven detection) occurred in 18 cases. Detection during these non-symptom-driven examinations took place in dental offices (n = 15), a denturist's office (n = 1), and in oral and maxillofacial surgeons' offices (n = 2) (Fig 1). Two patients who had their lesions discovered in a dental office during routine appointments had previously sought care form their primary care providers with symptoms related to their lesions without detection. Detection during an appointment made by the patient for symptoms related to the lesion (symptom-driven detection) occurred in 33 cases. Detection during these symptom-driven examinations took place in dental offices (n = 18), primary care offices (n = 7), oral and maxillofacial surgeons' offices (n = 4), and otolaryngologists' offices (n = 4). Detection of a lesion during a non-symptom-driven examination was associated with a significantly smaller lesion clinically (2.2; SD, 1.1 cm) and lower clinical stage (average, 1.7; SD, 1.0) than a lesion detected during a symptom-directed examination (3.0; SD, 1.2 cm, and 2.6; SD, 1, respectively) (t = −2.2, 47 df, P = .033 and t = −2.8, 49 df, P = .007). Pathologic stage was also lower in those patients with lesions detected during a routine office visit as opposed to during a symptom-driven examinations (1.0; SD, 1.2, and 2.5; SD, 1.3, respectively) (t = −2.4, 38 df, P = .02) (Fig 2). Differences in pathologic size were not statistically significant.

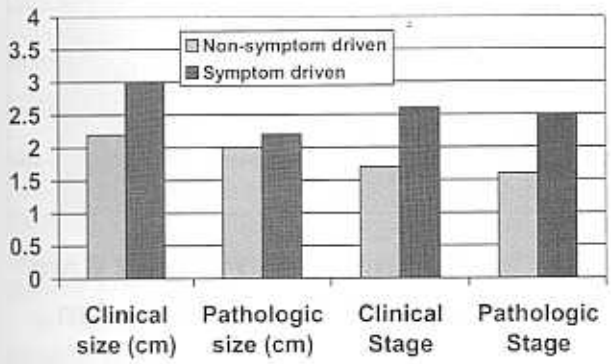


FIGURE 1. Symptom-driven versus non-symptom-driven detection.

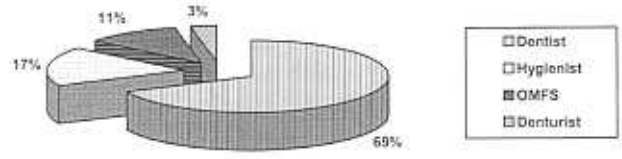


FIGURE 2. Sources of non-symptom-driven detection. OMFS, oral and maxillofacial surgeon.

Of 32 lesions detected in general dentists' offices, 15 (47%) were discovered during a non-symptom-driven visit and 13 (41%) patients could not recall any symptoms even after the lesion was brought to their attention. Lesions discovered during non-symptom-driven visits to a dental office had an average clinical stage of 2.0 (SD, 1.0) and an average pathologic stage of 1.9 (SD, 1.2.). Seven lesions were discovered in general medical offices, all were detected during symptom-driven appointments, and this was associated with a higher average clinical stage (3.00; SD, 0.82) and pathologic stage (3.25; SD, 0.96). There were no asymptomatic oral or oropharyngeal SCCs detected at a physician's office, and none were discovered during a routine medical office visit.

FROM WHOM DID THE SYMPTOMATIC PATIENT SEEK CARE?

Thirty-three patients sought care for symptoms related to their lesion (Fig 3). Initially, 19 of these patients sought care from a regional specialist (dentist, oral and maxillofacial surgeon, or otolaryngologist); of these 19 patients seen initially by a regional specialist, 18 patients (95%) had their symptoms related to a possible malignancy, a biopsy performed, or referral for further workup made (Fig 4). Fourteen symptomatic patients sought care from their primary care physician. Of these 14 patients, 7 (50%) had their symptoms related to a possible malignancy and a referral was made for further workup (Fig 5).

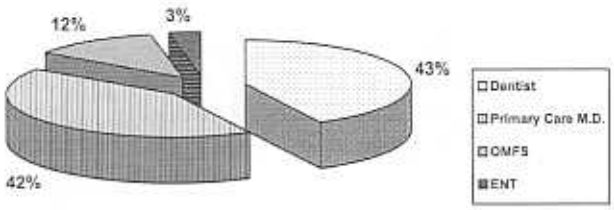


FIGURE 3. Professional from whom the symptomatic patient sought care. OMFS, oral and maxillofacial surgeon; ENT, ear/nose/throat.

REFERRAL SOURCE

Overall, the average clinical stage of an oral or oropharyngeal cancers referred for treatment from a dental office was 1.94 (SD, 1.05), and the average clinical stage referred from a physician office was 3.00 (SD, 0.82). The average pathologic stages were 1.72 (SD, 1.19) and 3.25 (SD, 0.96), respectively (Fig 6). Patients referred from dental offices had early stage (stage I or II) disease in 79% of cases. In contrast, only 28% of patients referred from primary care physician offices were early stage (Fig 7). Overall, dentists and dental hygienists detected and referred smaller oral and oropharyngeal squamous cancers that were at a lower clinical and pathologic stage than physicians, oral and maxillofacial surgeons, ear/nose/throat specialists, and denturists (Fig 8). Detection in a dental office was also associated with a higher likelihood of no cervical metastases at diagnosis (Fisher exact test, $P = .0067$).

SIZE AND SITE OF PRIMARY

Site (oral versus oropharyngeal) was clearly associated with tumor stage when all sources of detection were pooled together. The mean pathologic stage from oral sites was 1.9 (SD, 1.2), and this was statistically distinguishable from the mean of 2.9 (SD, 1.4) found for oropharyngeal sites ($t = -2.5$, 38 *df*, $P = .019$). Clinical stages were also distinguishable. Oral sites had a mean clinical stage of 2.00 (SD, 0.98) and oropharyngeal primaries had a mean clinical stage of 2.7 (SD, 1.2). These were statistically distinguishable ($t = -3.7$, 49 *df*, $P = .0006$). Tumor size, however, was not statistically distinguishable by site.

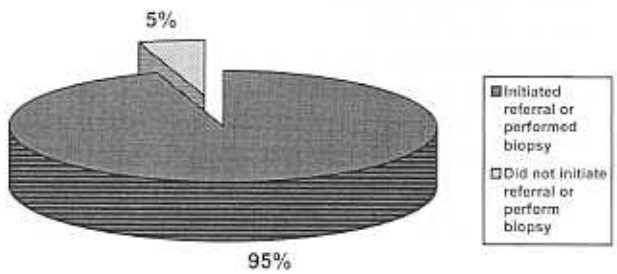


FIGURE 4. Care received by symptomatic patients who sought care from a regional specialist (ear/nose/throat [ENT], oral and maxillofacial surgeon [OMFS], or dentist).

FIGURE 5. Care received by symptomatic patients who sought care from their primary care physician.

DELAY IN DIAGNOSIS

Questions regarding symptoms and symptom onset varied widely. Data on patient delay were available on 42 patients with an average of 4.8 months (range, 0.5 to 36 months). Data on professional delay were available on 49 patients with an average of 2.2 weeks (range, 1 day to 5 months).

Discussion

We examined detection patterns of oral and oropharyngeal squamous cancers to determine whether detection by various health care providers was associated with smaller tumors and lower stage. Demographics for the studied population fit the standard risk profile for head and neck cancer. Asymptomatic cancers were more likely to be detected in a dental office, and a dental care provider was more likely to detect a lesion during a routine appointment than a medical provider. Both of these situations were associated with smaller lesions and a lower stage at diagnosis. In addition, we found that symptomatic patients were more likely to have their symptoms related to a possible malignancy if they saw a regional specialist initially.

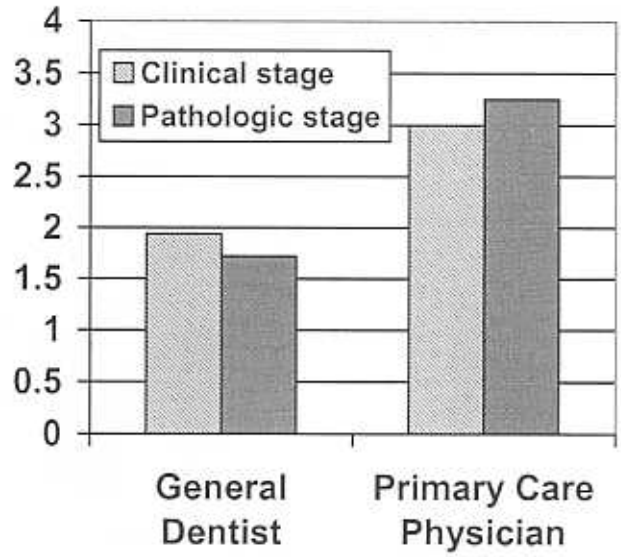


FIGURE 6. Average stage based on referral from general dentist and primary care physician.

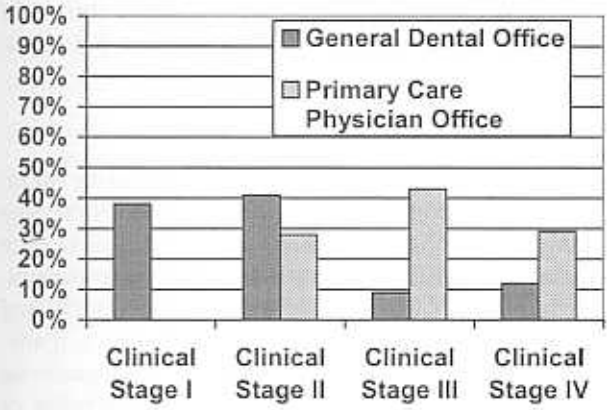


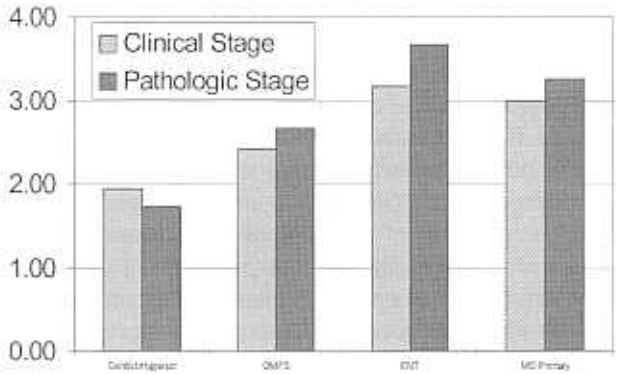
FIGURE 7. Percentage of patients in each clinical stage based on detection in a general dental office or a primary care physician office.

Oral and oropharyngeal squamous cancers are amenable to early detection because of identifiable risk factors, detectable preclinical (asymptomatic) phase, and accessible examination. It has been suggested that early detection is hampered by a failure to focus on high-risk groups.[3,4] Guggenheimer et al[20] proposed 3 reasons for delay in diagnosis of oral cancer: patients at risk do not avail themselves of examination, oral examinations are not being performed, or the lesions are overlooked. They suggested that the medical care provider was more likely to encounter the patient at risk than the dentist because of coexisting medical conditions. This finding was supported by studies that showed that patients at risk for oral or oropharyngeal cancers, such as those who use tobacco and alcohol, are 4 to 6 times more likely to seek physician services than dental services.[21,22] For these reasons, Guggenheimer et al concluded, "The medical practitioner becomes the most likely resource for accomplishing oral cancer screening and contributing to its earlier detection."[20] Yet 47% of physicians believed that their knowledge about oral cancer was not current, and only 18% of physicians provided oral cancer examinations on 50% or more of their patients.[16] The findings of the current study also suggest that work remains to be done in educating primary care physicians about oral and oropharyngeal cancers. Meskin suggested dentists develop educational material to assist physicians in conducting oral cancer examinationinations.[16]

To date, no randomized trial has shown that screening results in differences on mortality, but evidence exists that identification of smaller lesions allows less aggressive and debilitating treatments. There is also indirect evidence exists that screening results in improved survival.[11]

In the current study, dentists (excluding dental specialists) contributed to the diagnosis in 32 (65%) patients, and almost half (n = 15) of these patients had their cancer detected during a routine dental office visit. This is in contrast to previous studies, which have found that dentists contribute to the diagnosis of oral cancer 40% of the time but this occurred only after some oral symptoms developed.[23,24] Assuming that edentulous patients are less likely to visit a dentist, this discrepancy could be related to the lower rate of edentulism in the current study (20%) compared with previous studies (59%).[20] Also, the study population was drawn from the practice of 2 surgeons who have training in oral and maxillofacial surgery as well as otolaryngology. This unique background may lead to an increased proportion of referrals from dentists and dental specialists.

In an editorial directed at dentists, Hayes Martin suggested, "If the possibility of a serious disease is realized at the first visit, the major difficulty has been overcome and the problem is well on its way to being solved. . .if the individual dentist or physician who first sees a patient with mouth cancer has a sound basic knowledge of this disease and suspects a diagnosis."[25] Previous studies found that 40% to 43% of patients seek care from dentists with symptoms related to their oral or oropharyngeal cancer.[23,24] Kowalski et al[20] also suggested that symptomatic patients were more likely to see physicians. In the current study, 43% of symptomatic patients sought care from a general dentist, and 42% sought care from their primary care physician. Of the remaining patients who sought relief from some symptom related to their cancer, 5 sought care from a surgical specialist (oral and maxillofacial surgeon or otolaryngologist). Symptomatic patients who saw a regional specialist (dentist, oral and maxillofacial surgeon, or otolaryngologist) first were much more likely to have their problem identified at the initial appointment. One patient was treated symptomatically by his dentist for a week before biopsy. This is in contrast to older studies by Guggenheimer et al,[24] who found that delay by dentists was almost as common as phy-



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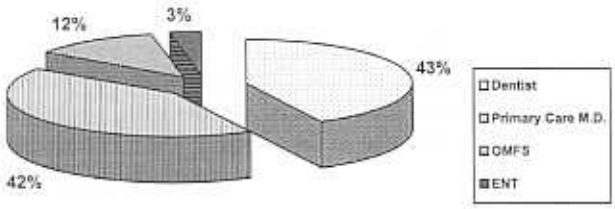

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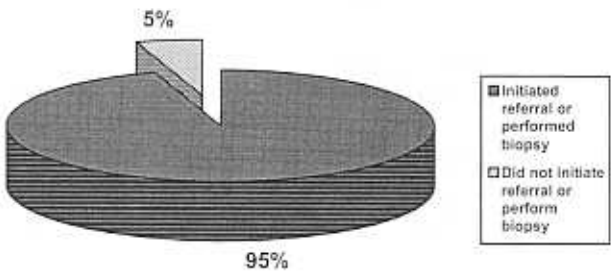

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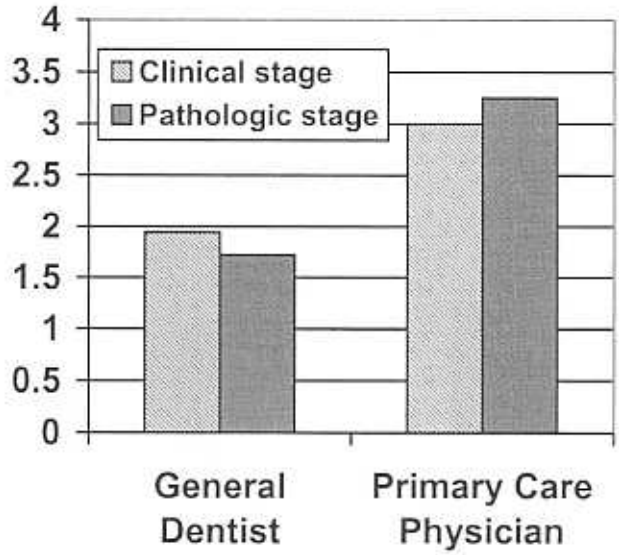

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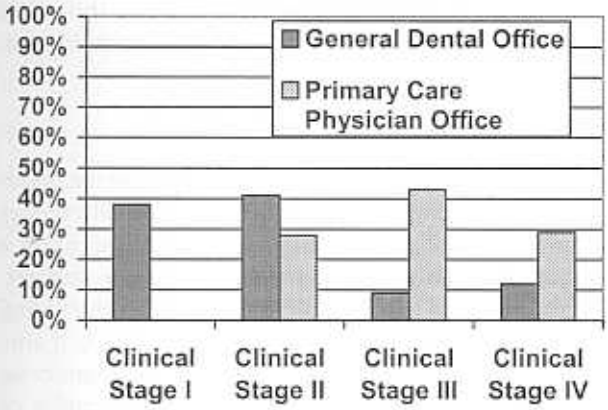

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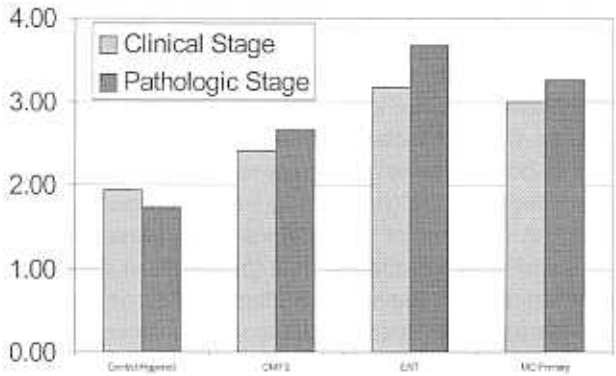

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sician delay, and a previous report by Bruun, which found that dentists delayed referral longer than physicians.[27] In findings similar to our own, however, Kowalski et al[26] found that nonspecialist physicians delayed the diagnosis of oral cancers more frequently than dentists and suggested that health campaigns must bear in mind professional training and not just public education.

Previous studies have examined delay in the diagnosis of oral and oropharyngeal cancers and attempted to correlate delay with stage at diagnosis. Several of these reports have failed to find an association between professional delay and stage at diagnosis.[24] Others, however, have found that tumor size correlated significantly with professional delay but not patient delay.[18] As with previous studies, we found that patient and professional delay varied widely, and often patients had difficulty recalling when they were first aware of symptoms. In the current study, patient delay averaged 4.8 months, which is consistent with previous studies.[24,26] Interestingly, when the time between detection of a lesion and biopsy was examined, there was a trend toward shorter times in patients with lesions detected in the dental office, although it was not statistically significant.

Previous reports have used survey type questionnaires to evaluate physicians' and dentists' ability to diagnose and make proper referral for treatment of oral and oropharyngeal cancers. Recent reports using this method have questioned dentists' knowledge and ability to diagnose oral and oropharyngeal cancers.[28-30] Although they provide data on dentists' perceptions and knowledge regarding oral and oropharyngeal cancer, we are unsure if the survey type study offers a realistic picture of how effectively dentists or other health care professionals are screening and detecting these cancers. To our knowledge this is the first report that examines the detection patterns of oral and oropharyngeal cancers and compares the stage at diagnosis by different health care providers. An attempt to evaluate the effect of primary site on the detection pattern is hampered by the small sample size. Previous investigators have suggested that squamous cancers of the oropharynx metastasize earlier in their clinical course,[31] leading to a higher stage at diagnosis. In the current study, oropharyngeal primaries were associated with a higher stage. There were, however, no statistical differences in clinical size based on site (oral versus oropharyngeal). Given that the majority of oral lesions were found by dentists and dental hygienist, interpretation of the effect that site has on the stage at diagnosis is confounded. We continue to accrue patients for a more detailed analysis of the effect of primary site on detection patterns. Additionally, to evaluate for regional differences, we are in the process of replicating this study in a metropolitan area in a different geographic area.

Conclusions

The results of this investigation should be interpreted with caution due to the inherent differences between the physician-patient interaction between a dental office visit and a routine medical appointment. Further studies that include outcome data, including survival, are needed to investigate the impact, if any, of these differences. Should further work identify an outcome difference; then the routine screening of asymptomatic patient populations may be undertaken with greater enthusiasm. This study also suggests that improved training in the evaluation of symptomatic patients may be beneficial for primary care providers.

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