Oral Oncology 51 (2015) 105–111

Contents lists available at ScienceDirect

Oral Oncology

journal homepage: www.elsevier.com/locate/oraloncology

Beneficial impact of multidisciplinary team management on the survival in different stages of oral cavity cancer patients: Results of a nationwide cohort study in Taiwan

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ARTICLE INFO

Article history:
Received 17 June 2014
Received in revised form 23 October 2014
Accepted 11 November 2014
Available online 4 December 2014

Keywords:
Oral cavity cancer
Multidisciplinary team
Nationwide database
Survival analysis
Propensity score
Beneficial impact

SUMMARY

Objectives: The aim of this study was to investigate the association between multidisciplinary team (MDT) management and survival of oral cavity cancer patients using a nationwide database in Taiwan.
Materials and methods: A nationwide cohort study was conducted between 2005 and 2008. The follow-up end point was 2010. Claims data of oral cavity cancer patients were retrieved from the Taiwan Cancer Registry Database. Secondary data were obtained from the Taiwan's National Health Insurance Research Database. Among 19,766 newly diagnosed oral cavity cancer patients, we identified 16,991 patients who underwent treatment between 2004 and 2008 for further analyses.
Results: Overall survival was compared between patients who received MDT management (n = 3324) and those who did not (n = 13,367). Hazard ratios (HR) of death in patients with MDT management were also analyzed. Patients with MDT management had a lower risk of death when compared with that of patients without MDT management (HR: 0.94, 95% confidence intervals (CI): 0.89–1.00; P = 0.032). The effect of MDT management on survival was stronger for male patients than for female patients (HR: 0.94, 95% CI: 0.89–1.00; P = 0.040 versus HR: 0.98, 95% CI: 0.75–1.27; P = 0.866). In addition, the effect of MDT management was strong among patients with a Charlson Comorbidity Index between 4 and 6, in those without coexisting catastrophic illness/injury, and in patients with stage IV diseases.
Conclusion: Survival rates in oral cavity cancer patients with MDT management appeared to be marginally better than those of patients without MDT management.

Introduction

The incidence of oral cancer varies widely throughout the world. Oral cancer is reported to be the sixth most common cancer globally [1]. In developing countries, oral cancer is the third most common malignancy after cancer of the cervix and stomach [2]. In Taiwan, oral cancer has been among the top 10 causes of death from cancer since 1991. According to statistical data from the Ministry of Health and Welfare of the Executive Yuan, the annual death toll for oral cancer in males has increased rapidly in Taiwan [3]. Although better combinations of loco-regional therapeutic modalities, such as surgical extirpation after neoadjuvant chemotherapy plus postoperative radiotherapy or target therapy plus radiotherapy, have improved patients' quality of life after treatment, the overall 5-year survival has not improved much over the past few decades [4].

Multidisciplinary team (MDT) care improves upon conventional managements for oral cavity cancer by integrating surgeons, radiation oncologists, medical oncologists, psychologists, dietitians, speech therapists, and nursing staff to improve the quality of life of cancer patients [5,6]. In a randomized controlled trial, structured multidisciplinary intervention helped sustain or even improve

Abbreviations: MDT, multidisciplinary team; NHIRD, National Health Insurance Research Database; HR, hazard ratios; CI, confidence interval; CCI, Charlson Comorbidity Index; ICD-9, International Classification of Diseases, Ninth Revision; TCRD, Taiwan Cancer Registry Database; NTD, New Taiwan Dollars.

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http://dx.doi.org/10.1016/j.oraloncology.2014.11.006
1368-8375/

quality of life in advanced cancer patients receiving cancer therapy [7]. In Australia, multidisciplinary care reduced mortality and healthcare costs, and improved the quality of life in women with early-stage breast cancer [8]. In a review article, the best approach was found to involve the application of a multidisciplinary diagnostic and treatment philosophy in which optimum treatment plans that alleviate or avoid adverse treatment effects could be assured [9]. The National Health Insurance Administration of Ministry of Health and Welfare in Taiwan implemented "MDT management for cancer patients" in April 2003 to improve the quality of cancer diagnosis and management [5]. In Taiwan, medical centers that do not have a MDT for cancer management are not able to receive accreditation. In terms of oral cavity cancer, a MDT must include a head and neck surgeon, radiation oncologist, medical oncologist, pathologist, and radiologist. Routine combined conference is also necessary to discuss the management of newly diagnosed oral cavity cancer patients. In addition, hospitals can receive additional imbursement from the National Health Insurance Administration with proper documentation of such patients who are managed via a MDT. To date, few studies have addressed the impact of MDT on the survival of oral cavity cancer patients. Therefore, the aim of this study was to investigate the association between MDT and survival of oral cavity cancer patients included in a nationwide database in Taiwan. We also examined the various effects of MDT management on patients with oral cavity cancer.

Materials and methods

Study design

This study was conducted in accordance with the Helsinki Declaration and was approved by the Institutional Review Board of China Medical University (IRB number: CMUH102-REC3-076). In this nationwide retrospective longitudinal cohort study, we retrieved claims data of all patients diagnosed with oral cavity cancer from the Taiwan Cancer Registry Database, which is a subset of the National Health Insurance Research Database (NHIRD). The NHIRD includes detailed health care information of more than 23 million enrollees, representing 99.6% of Taiwan's entire population. The accuracy of diagnosis of major diseases in the NHIRD, such as ischemic stroke and acute coronary syndrome, has been validated in previous studies [10,11].

Selection of participants

We identified all patients diagnosed with oral cavity cancer from 2005 to 2008 (International Classification of Diseases, Ninth Revision [ICD-9] codes: 140, 141, 143-146, 149) as the parent group. Monitoring was continued until 2010. The accuracy of diagnosis of oral cavity cancer was confirmed by both ICD-9 Codes and inclusion in the Taiwan Cancer Registry Database (TCRD) published by the Health Promotion Administration. Those who died within

Table 1
Descriptive statistics of oral cavity cancer patients with or without multidisciplinary team management.

Variables	Total no. of patients (% in column)	No. of patients (%)		*P* value
		Without MDT (*n* = 13,367)	With MDT (*n* = 3324)	
Age, mean (SD), yr	16,691	53.8 (11.8)	52.9 (11.5)	0.003
Gender				0.059
Female	1225 (7.3%)	1007 (82.2%)	218 (17.8%)	
Male	15,466 (92.7%)	12,360 (79.9%)	3106 (20.1%)	
Age				0.003
⩽44 years	3750 (22.5%)	2953 (78.8%)	797 (21.3%)	
45–54 years	5877 (35.2%)	4663 (79.3%)	1214 (20.7%)	
55–64 years	3982 (23.9%)	3224 (81.0%)	758 (19.0%)	
65–74 years	2120 (12.7%)	1728 (81.5%)	392 (18.5%)	
⩾75 years	962 (5.8%)	799 (83.1%)	163 (16.9%)	
Other catastrophic illness/injury				0.137
No	16,116 (96.6%)	12,892 (80.0%)	3224 (20.0%)	
Yes	575 (3.4%)	475 (82.6%)	100 (17.4%)	
Stage				<0.001
I	2494 (14.9%)	2103 (84.3%)	391 (15.7%)	
II	2980 (17.9%)	2402 (80.6%)	578 (19.4%)	
III	2599 (15.6%)	2089 (80.4%)	510 (19.6%)	
IV	8618 (51.6%)	6773 (78.6%)	1845 (21.4%)	
Charlson comorbidity index				<0.001
0–3	10,212 (61.2%)	8074 (79.1%)	2138 (20.9%)	
4–6	5075 (30.4%)	4131 (81.4%)	944 (18.6%)	
7–9	1239 (7.4%)	1028 (83.0%)	211 (17.0%)	
⩾10	165 (1.0%)	134 (81.2%)	31 (18.8%)	
Level of hospital				<0.001
Medical center	12,951 (77.6%)	10,784 (83.3%)	2167 (16.7%)	
Regional hospital	3677 (22.0%)	2527 (68.7%)	1150 (31.3%)	
District hospital	63 (0.4%)	56 (88.9%)	7 (11.1%)	
Ownership of hospital				<0.001
Public	4595 (27.5%)	3948 (85.9%)	647 (14.1%)	
Private	12,096 (72.5%)	9419 (77.9%)	2677 (22.1%)	
Hospital's annual patient volumes of oral cavity cancer				0.975
Low service volume	325 (1.9%)	261 (80.3%)	64 (19.7%)	
High service volume	16,366 (98.1%)	13,106 (80.1%)	3260 (19.9%)	
Propensity score				
Mean (SD)		0.23 (0.08)	0.19 (0.07)	<0.001
Median (IQR)		0.20 (0.16–0.31)	0.18 (0.15–0.21)	<0.001
Follow up period (month)				
Mean (SD)		32.0 (19.7)	32.8 (19.4)	0.044
Median (IQR)		30.1 (13.5–47.0)	31.2 (14.5–46.6)	0.018

Abbreviations: MDT, multidisciplinary team; SD, standard deviation; IQR, interquartile range.