Multidisciplinary Cancer Investigation Original Article

October 2018, Volume 2, Issue 4

Survival and Recurrence in Non-melanoma Skin Cancers of Scalp

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DOI: 10.30699/acadpub.mci.4.25

Submitted: 29 March 2018
Revised: 21 May 2018
Accepted: 18 September 2018
e-Published: 1 October 2018

Keywords:
Carcinoma, Basal Cell
Carcinoma, Squamous Cell
Survival
Recurrence
Invasive Tumor

Abstract

Introduction: Non-melanoma scalp skin cancers (NMSCs) including squamous cell carcinomas (SCCs) and basal cell carcinomas (BCCs) are common. To manage such cancers, especially SCCs, more attention should be paid to their invasive characteristics. Mortality surveillance of SCCs and BCCs of scalp helps to choose proper approaches.

Methods: The current retrospective, descriptive study was conducted on 723 patients with NMSCs of scalp according to their epidemiologic and clinical manifestations. Invasive extended tumor (IET) are defined as aggressive SCCs and BCCs, which affect survival of patients. Therapies categorized in patients, and all the gathered data were analyzed.

Results: The 723 patients including 228 SCCs and 495 BCCs were evaluated in two compatible groups. Lymphatic metastasis, IET, and higher stages in SCCs were significant (P<0.005). Mean and 95% confidence intervals (CI) for SCCs and BCCs survival were 6.97 years (6.7-7.25) and 7.6 years (7.46-7.73), respectively, with significant difference between the groups (P=0.001); risk of mortality enhanced 2.05 and 22.07 times in SCC and IET clinical manifestation, respectively. Mean and 95% CI for recurrence time among SCCs and BCCs were 1.74 (1.26-1.75) and 2.26 (1.63-2.37) respectively, and there was a significant difference between the groups (P=0.001).

Conclusions: The current retrospective study showed that BCC frequency was twice more than that of SCC without significant dominancy on gender or age in scalp area with significant number of IET cases in SCCs. Mortality risks enhanced 2.05 times in SCCs and risk of recurrence increased 1.85 times in BCCs. These knowledge can guide to employ a proper approach.

INTRODUCTION

Various cutaneous cancers have different natures, which can be a disturbing issue for researchers [1]. Among these neoplasms, basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) are the most common malignancies [2, 3], but involve less than 0.1% of deaths of cancer [4]. It is confirmed that

non-melanoma skin cancer (NMSC) mortality mostly resulted from metastatic SCCs accounting for up to 20% of all deaths of skin cancer, though, morbidity is mainly related to the clinical manifestation of the SCC and certain BCC subtypes, maybe due to lesions tendency to ward locating on the skin of the head and neck, and eventually disfigurements [5]. Head and neck cancers cause difficulties for patients such as pain, disfigurement to face, and eventually mortality [6]. However, it should be mentioned that in the head and neck, most of cancer deaths are related to these cancers, but they represent significant diagnostic and therapeutic challenges [7].

BCC, with raising incidence, represents 65% of all skin carcinomas and does not seem lethal, but local invasion leads to significant morbidities [8]. On the other hand, SCC, as one of the most frequent types of cancers of head and neck with metastasis, invades to cervical musculature, scalp, and parotid gland [9] and it seems that most deaths following NMSCs are related to SCCs and most of the primary sites are in the areas of maximum sun exposure (face, ears, hands, and scalp in males) [10]. Mortality in advanced non–melanoma scalp skin scalp cancers (especially BCCs and SCCs) has little known data in Iranian cancer population and the current study aimed at correlating death to the stage of cancer and outcome of treatments, in brief via retrospective evaluation.

METHODS

The current descriptive, retrospective study was designed according to pathologic reports on patients with scalp SCC and BCC admitted from 2008 to 2014 to Imam Khomeini Medical Centre. Among 6222 cancer cases, 723 cases with NMSCs were evaluated in the current study – 228 SCC vs 495 BCC. Local invasion, as penetration in primary site, is defined in six levels: dermis, periosteum, external skull table, internal skull table, durra matter, and brail tissue. Regional lymph node metastasis was recorded according to pathologic reports of lymph node involvement. Distant metastasis was defined as other organ involvement (lung, liver, etc.) during diagnosis era or follow-up period.

Invasive extended tumor (IET) cases included SCCs with local invasion, distant metastasis, or regional lymph node metastasis, and BCCs with local invasion involving skull bones, or penetrated bone that reached brain soft tissue. Rare lymph node metastasis in BCC excluded from the study. Every patient belonging to at least one of these groups was added to the IET list and assessed according to demographic variables, illness stage, treatment type, and prognosis. Theses evaluations went on by patient records and phone interviews for about 12 months. Missing data (83 cases) related to 11.4% of population were similar to those of non-IET cases, without any effect on the study results.

Treatment was categorized in surgery, radiotherapy, and pre-operative radiotherapy groups, and IET patients were evaluated separately (especially the ones in need of neurosurgery) and prognosis was assessed in contrast to these therapies. Staging evaluation was in line with standard SCC and BCC staging system, and most of IETs acquired higher stages. Stage 4 belonged to SCCs with simultaneous metastasis and skull bone involvement, and BCCs with local invasion.

RESULTS

The current study was conducted on 723 patients including 228 SCC (31.8%) and 495 BCC (68.5%). Demographic characteristics and clinical manifestations according to tumor type are illustrated in Table 1.

Table 1: Demographic Characteristics and Clinical Manifestations According to Tumor Type

	Tumor Type		P Value
	SCC (n=228)	BCC (n=495)	
Age, y, mean ± SD	68.28 ± 8.8	68.37 ± 6.85	0.89
Gender, No.			0.25
Female	200	448	
Male	28	47	
IET, No. (%)	44 (19.3)	55 (11.1)	0.003
Local Invasion, No. (%)	26 (11.4)	55 (11.1)	0.001
Regional Lymph Node Metastasis, No. (%)	43 (18.9)	N/A	N/A
Distant Metastasis, No. (%)	27 (11.8)	N/A	N/A
PNI, No. (%)	3 (1.3)	0 (0)	0.03
LVI, No. (%)	44 (19.3)	55 (11.1)	0.003
Cancer Stages, No. (%)			0.003
Stage 1	176 (77.2)	432 (87.3)	
Stage 2	7 (3.1)	6 (1.2)	
Stage 3	6 (2.6)	2 (0.4)	
Stage 4	39 (17.1)	55 (11.1)	

BCC, basal cell carcinomas; IET, invasive extended tumor; LVI, lymphatic invasion; N/A, not applicable; PNI, perineural invasion; SCC, squamous cell carcinoma

As demonstrated in Table 1, there was no significant difference between the two tumoral groups regarding age and gender, ratio of local invasion, and distant metastasis. Regional lymph node metastasis, IET, perineural invasion (PNI), and lymphatic invasion (LVI) were significantly higher in patients with SCC than the ones with BCCs (P<0.005). The stage of cancer in patients with SCC was significantly higher than that of the ones with BCC (P=0.003). Totally, 99 patients had IET manifestations, presented in Table 2. And as it is observed, these patients were older than non- IETs (P=0.001). Female to male ratio was higher in non-IETs (P=0.009). Multiple logistic regression model confirmed 1.78 times IET chance in patients with SCC by considering the effects of age, gender, LV I, and PNI (95% confidence interval (CI) = 1.14-2.79).

Table 2: Data of Invasive Extended Tumor

	Invasive Extended Tumor		P Value
	No (n=624)	Yes (n= 99)	
Age, y, mean ± SD	67.9 ± 6.9	71.14 ± 10.15	0.001
Gender, No.			0.09
Female	564	84	
Male	60	15	
Local Invasion, No. (%)	0 (0)	81 (81.8)	0.001
Distant Metastasis, No. (%)	0 (0)	43 (43.4)	0.001
Regional Lymph Node Metastasis, No. (%)	0 (0)	27 (27.2)	0.001
Tumor Type, No. (%)			0.003
SCC	184 (29.5)	44 (64.4)	
BCC	440 (70.5)	55 (55.6)	
PNI, No. (%)	0 (0)	3 (3)	0.001
LVI, No. (%)	1 (0.2)	98 (99)	0.001
Cancer Stages, No. (%)			0.001
Stage 1	607 (97.3)	0 (0)	
Stage 2	13 (2.1)	0 (0)	
Stage 3	0 (0)	5 (5)	
Stage 4	4 (0.6)	94 (94.9)	

BCC, basal cell carcinomas; LVI, lymphatic invasion; PNI, perineural invasion; SCC, squamous cell carcinoma

Survival Analysis

Death outcome

In the studied population, mean and 95% CI were 7.34 years and (7.25- 7.51), respectively. These rates for SCCs and BCCs were 6.97 years (6.7-7.25) and 7.6 years (7.46-7.73), respectively with significant difference between the groups for survival (P=0.001) (Figure 1). According to semiparametric multivariate Cox model in IET, it is illustrated that by controlling gender, LVI, PNI, surgical treatment, neurosurgery treatment, post-operative radiotherapy and chemotherapy, risk of mortality enhances 2.05 and 22.07 times in SCC and clinical manifestation as IET, respectively, and every one year increase in age causes 1.04 times increase in death risk.

Recurrence

Mean and 95% CI for recurrence time in the current study cases were 2.07 years and (1.89- 2.24) that belonged to SCCs and BCCs as 1.74 (1.26-1.75) and 2.26 (1.63-2.37) respectively with significant difference between the groups (P=0.001) (Figure 2). As shown in semiparametric multivariate Cox model in IET, it was observed that by controlling gender, LVI, PNI, surgical treatment, neurosurgery treatment, post-operative radiotherapy, and chemotherapy, risk of recurrence enhanced 1.85 (1.16-2.95) times in BCC; 64 patients out of 99 had not known relapse type and in the other 35 patients, local recurrence in SCC and BCC were 14 (58.3%) and 6 (54.5%) respectively, and metastatic recurrence was 2 (8.3%) in SCCs; there was no such case in BCC.

Demographic and recurrence and survival rates in IET are demonstrated in Table 3.

DISCUSSION

Population age shift – especially in recent decades- had incremental effects on NMSCs incidence, which was in line with previous documented age related prevalence studies [11]. Moreover, scalp inspection gained more considerations in cancer screenings [12]. To the authors` best knowledge, BCCs frequency is twice the frequency of SCCs, without significant dominancy on gender or age. Among the 723 patients, IET cases significantly involved SCCs (P=0.003). Grace et al., confirmed that BCC was the most common skin cancer in Caucasians, Hispanics, Chinese, and Japanese, but less in pigmented individuals, and even less in darker areas of patients- nipple, penis, groin, anus, etc., emphasizing photo protection [13], the subject that was confirmed by Dhir et al., indicating that BCC rarely occurred in dark persons [14]. On the other hand, it is observed that in skin scares of Chinese and Japanese, SCC developed mostly with high chance of recurrence and metastasis [13]. The current study also found

Table 3: Demographic, Survival and Relapse Rate in Invasive Extended Tumor

	Invasive Extended Tumor		P Value
	SCC (n=44)	BCC (n=55)	
Gender, No.			0.85
Female	7	8	
Male	37	47	
Local Invasion, No. (%)	26 (59)	55 (100)	0.19
Metastasis, No. (%)	27 (61.4)	N/A	N/A
Regional Lymph Node Metastasis, No. (%)	43 (97.7)	N/A	N/A
PNI, No. (%)	3 (6.8)	0 (0)	0.08
Cancer Stage, No. (%)			N/A
Stage 1	0 (0)	0 (0)	
Stage 2	0 (0)	0 (0)	
Stage 3	5 (11.3)	0 (0)	
Stage 4	39 (88.6)	55 (100)	
Neurosurgery, No. (%)	14 (31.8)	8 (14.5)	0.04
Surgery, No. (%)	44 (100)	53 (96.4)	0.5
Radiotherapy + Surgery, No. (%)	2 (4.7)	19 (34.5)	0.001
Radiotherapy, No. (%)	2 (4.7)	20 (36.4)	0.001
Chemotherapy, No. (%)	32 (74.4)	47 (85.5)	0.17
Survival, Mean (95% CI)	4.85 (4.24-5.46)	5.56 (4.92-6.2)	0.04
Relapse, Mean (95% CI)	1.71 (1.5-1.92)	2.96 (2.42-3.49)	0.001

BCC, basal cell carcinomas; N/A, not applicable; PNI, perineural invasion; SCC, squamous cell carcinoma

that SCCs had higher rates of local invasion, regional lymph node metastasis, systemic metastasis, and IET in contrast to BCCs (P<0.005). Even though Ouyang et al., represented factors related to increased local recurrence and metastasis in SCCs including: size greater than 2 cm, poor histologic differentiation, involvement sites such as lips or external ear, tumor arising from old scar, per neural invasion, and occurrence in immunosuppressed patients [15].

Among previous studies, female gender, rural community, and alcohol consumption, or male pattern baldness in scalp area were extracted as risk factors [16, 17], but Sadri et al., reported that low rate of metastatic SCCs in head and neck in their Iranian population maybe due to misdiagnosis and highly recommended biopsy in high-risk cases [9]. Girschik et al., reported nearly 400 deaths, annually, from NMSC in Australia that mostly belonged to SCCs [10].

According to the current study results, mean and 95%CI were 7.34 years and (7.25-7.51), respectively, and in SCCs they were 6.97 years and (6.7- 7.25) respectively, in contrast to BCCs (P=0.001) and with controlling effective factors, risk of mortality enhances 2.05 and 22.07 times in SCC and clinical manifestation as IET, respectively, and every one year increase in age caused 1.04 times increase in death risk. While, the five-year relative survival rate (RSR) of patients with SCC diagnosed from 1974 to 1981 was 87.7% in males and 84.0% in females. In patients with SCC, the worst prognosis was for lesions of the scalp and neck in males (80.2%) and for those of the ears in females (73.2%) [18]. At last, the current study demonstrated recurrence time in SCCs and BCCs and that the risk of recurrence increased 1.85 times in BCC. However, deficient knowledge about recurrence types was a significant limiting factor in final conclusion on recurrence courses and maybe prospective studies can strongly illustrate correlations and eventually provide better decision makings in NMSCs.

NMSCs, especially in scalp, attract attentions in cancer management, and higher incidence signifies twice, especially in the developing countries. The current retrospective study aimed at gathering data and concluding about survival and recurrence of SCC and BCC in the treated patients.

ACKNOWLEDGMENTS

N/A.

CONFLICT OF INTEREST

Authors declared no conflict of interest.

ETHICS APPROVAL

This article is based on a medical student thesis and was approved by TUMS ethics committee.

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