Retrospective Analyses of the Clinicopathological and Prognostic Features of Esophageal Squamous Cell Carcinoma in a Grade A Tertiary Hospital in Xinjiang, China

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Abstract

Background: The aim of this invesigation was to retrospectively analyze and summarize the clinicopathological and prognostic features of patients with esophageal squamous cell carcinoma (ESCC) at the Cancer Hospital Affiliated of the Xinjiang Medical University , a Grade A tertiary hospital in Xinjiang.

Methods: The clinicopathological data and follow-up data were collected from 419 ESCC patients . The overall survival (OS) and the related factors affecting survival were analyzed.

Results: Among the patients , 265 (63.2%) did not receive any postoperative treatment. The 1-, 3-, and 5-year overall survival (OS) rates were 84.8%, 47.5%, and 37.3%, respectively, and the median survival time (MST) was 29.0 months . Multivariate analysis showed that sources of patients, tumor stage, lymph node metastasis and stage of the disease were the independent predictors of OS. The finding in subgroup analysis indicated that there was a positive relationship between area and overall survival.

Conclusions: Postoperative treatments of these patients with ESCC were shown to be inadequent. Postadjuvant therapies of patients need to be strengthened. Targeted treatment regimes of different regions should be carried out by health department to alleviate the cancer burden.

Background

In developing countries, esophageal cancer (EC) is associated with high mortality [1]. Accounting for more than 50% of the global morbidity and mortality, incidence rate of ESCC in China are in the top 5 regions worldwide [2]. The two major subtypes of EC are ESCC and adenocarcinoma (EAC). They are epidemiologically and histopathologically distinctive. In the world, ESCC accounts for 70% of cases of EC globally, and is particularly common in northern China with annual incidence rates being 100 per 100,000 population [3, 4]. The incidence rate of ESCC in northern China is much higher than the average rate in China with 18.85 per 100,000 and also the average global rate of ESCC with 3.2 per 100,000 [1]. High incidence rates of ESCC have been reported in Xinjiang Province, especially in the Kazakh population [2]. It has been reported that tobacco, alcohol[5], and genetic background[6] increases the risk to develop EC. Despite this, pre-identifying individuals at poor prognosis for ESCC remains a major public health problem.

Although the epidemiological investigation of Chen et al.[7] on cancer incidence and mortality rates for ESCC utilized the cancer registries of Xinyuan county in Xinjiang, their study failed to analyze the prognostic risk factors of ESCC in Xinjiang. In addition, large-scale studies on the prognosis of ESCC patients in Xinjiang are insufficient. Furthermore, according to epidemiological data, the incidence of EC declined from 2001 to 2011. Whether the changes of prognosis of ESCC were similarly changed is unknown.

Currently, the main treatments for ESCC include surgery, chemotherapy and radiotherapy [8, 9]. The indications for radiotherapy in ESCC were less strict than surgical treatment; however, local recurrence is the main reason of failure for ESCC treated by chemoradiotherapy alone[10]. Although Zhang et al. explored the differences in the curative and side effects of chemoradiotherapy on EC among Xinjiang Han, Uygur and Kazakh patients. But their sample size was not large enough, totaling 170 [11]. A piece of study has reported that 5-year OS of ESCC patients undergoing radiotherapy was about10% [8]. Chemotherapy in ESCC is mainly used for advanced disease and distant metastasis, or used with surgery for combined therapy as auxiliary or palliative treatment. Surgery is still the primary treatment modality in most patients with ESCC.

Therefore, understanding the prognostic factors of patients undergoing surgery is of great significance for prevention and treatment of EC.Till now, few studies focused on the pathogenesis and epidemiology of EC and OS of surgery among Xinjiang. So it is necessary to make a large-scale epidemiological study of ESCC in Xinjiang. This study aimed to explore the clinical features and prognostic factors of surgical treatment in patients with ESCC at the Cancer Hospital Affiliated of Xinjiang Medical University.

Methods

This study was approved by the medical ethics committee of Affiliated Tumor Hospital of Xinjiang Medical University. A waiver of informed consent was granted because of the retrospective nature of the research. From January 2010 to December 2019, 419 patients with ESCC, who were hospitalized in the Cancer Hospital Affiliated of Xinjiang Medical University were enrolled in this study. All subjects were treated with surgical dissection and had complete clinical and follow-up data. All cases were pathologically confirmed with ESCC. Routine hematological, liver and renal function tests, lung functions, electrocardiogram, gastroendoscopy, and chest and abdominal computed tomography (CT) were routinely carried out preoperatively to rule out surgical contraindications and distant metastasis. Internal medicine diseases were treated before operation actively. Data including age , gender , history of alcohol use , history of smoking , sources of patients , postoperative pathological information and follow-up data were collected. Tumor staging was based on the 8th edition of TNM staging published in 2017. All methods were carried out in accordance with relevant guidelines and regulations from the medical ethics committee of Affiliated Tumor Hospital of Xinjiang Medical University.

Statistics

The qualitative data were expressed as percentages. The differences between the groups were assessed using Chi-square test (X2) or Fisher’s Least Significant Difference test. Survival rates were analyzed using the Kaplan-Meier method. Univariate analyses were performed to identify prognostic variables related to OS. Univariate variables with probability values <0.05 were selected for inclusion in the multivariate Cox proportional hazard The STATA statistical software package version15.0 (STATA Corp., College Station,

Texas, USA) was used for all statistical analyses. A p value of 0.05 or less was defined as statistically significant.

Results

Patient baseline characteristics

The baseline characteristics of these 419 patients were presented in Table 1. 253 patients (60.38%) were more than 60 years old; and 68.26% of the patients were men. 151 and 98 subjects had smoking history and alcohol history, respectively. The tumor was located in the upper chest in 40 cases, in the middle chest in 217 cases, and in the lower
chest in 162 cases. The most proportion of patients grade and TNM stage of tumors were moderate and III, respectively.

Table 1
Clinicopathologic features of 419 patients of ESCC

Characteristics	No.（%）
Age	
≤60	166（39.62%）
＞60	253（60.38%）
Gender	
Male	286（68.26%）
Female	133（31.74%）
History of smoking	
Yes	151(36.04%)
No	268(63.96%)
History of alcohol use	
Yes	98(23.39%)
No	321(76.61%)
Family history	
Yes	60(14.32%)
No	359(85.68%)
Tumor location	
Upper	40(9.55%)
Middle	217(51.79%)
Lower	162(38.66%)
Tumor length	
＜3cm	103(24.58%)
≥3cm	316(75.42%)
Nerve invasion	
Yes	91(21.72%)
No	328(78.28%)
Vascular cancer embolus	

Yes	82(19.57%)
No	337(80.43%)
Thoracoscopy	
Yes	314(74.94%)
No	105(25.06%)
Adjuvant therapy	
Yes	154□36.75%□
No	265□63.25%□
Sources of patients	
Urban	247(58.95%)
Rural	172(41.05%)
Nationality	
Kazakh	84□20.05%□
Others	335□79.95%□
Histologic grade	
Well	21(5.01%)
Moderate	279(66.59%)
Poor	119(28.40%)
pT category	
pTis-pT1	63(15.04%)
pT2	60(14.32%)
pT3	254(60.62%)
pT4	42(10.02%)
pN category	
pN0	186(44.39%)
pN1	114(27.21%)
pN2	82(19.57%)
pN3	37(8.83%)
pTNM stage	

0-I	55(13.13%)
II	136(32.46%)
III	224(53.46%)
IV	4(0.95%)
Gross classification	
Ulcerative type	148(35.32%)
Protrude type	64(15.27%)
Modullary type	186(44.40%)
Fungating type	21(5.01%)

Treatment after operation

Among the 419 patients, 265 patients (63.2%) did not receive any postoperative treatment. In 154 patients who received adjuvant therapy; 60 subjects (14.3%) received adjuvant chemotherapy, 43 subjects (10.3%) underwent adjuvant radiotherapy, and 51 patients (12.2%) were exposed to chemotherapy and radiotherapy (Fig.1a). Chemotherapy regimens included in all treatments were counted. The primary regimen of chemotherapy was paclitaxel-platinum combined chemotherapy. Fluorouracil (5-FU)-based regimens was the next most common. A minority of patients received oral chemotherapeutic agents (Fig.1b).

Survival and prognostic factors for ESCC

Patients were followed until March 2020 or until death, if earlier. The 1-, 3-, and 5-year overall survival (OS) rates were 84.8%, 47.5%, and 37.3%, respectively, and the median survival time (MST) was 29.0 months (Fig.2). Univariate analysis showed that tumor length, nerve invasion, vascular cancer embolus, sources of patients, nationality, tumor differentiation, tumor stage, lymph node metastasis, stage of disease and pathological type were the factors affecting the OS (Table 2). Multivariate analysis showed that sources of patients, tumor stage, lymph node metastasis and stage of the disease were the independent predictors of OS (Table 3).

Table 2
Univariate analysis of the overall survival of the 419 patients with esophageal squamous cell carcinoma

Variable	No.patients (%)	1-year OS(%)	3-year OS(%)	5-year OS (%)	*P* value
Age					0.816
≤60	166（39.62%）	87.33%	47.75%	36.01%	
＞60	253（60.38%）	83.03%	47.31%	38.36%	
Gender					0.140
Male	286（68.26%）	84.45%	45.50%	34.48%	
Female	133（31.74%）	85.52%	51.84%	43.44%	
Smoking history					0.391
Yes	151(36.04%)	85.97%	44.92%	36.51%	
No	268(63.96%)	84.11%	48.83%	38.03%	
Alcohol history					0.059
Yes	98(23.39%)	87.72%	37.25%	31.85%	
No	321(76.61%)	83.87%	50.52%	39.04%	
Family history					0.050
Yes	60(14.32%)	88.21%	58.06%	58.06%	
No	359(85.68%)	84.21%	45.89%	34.47%	
Tumor location					0.253
Upper third	40(9.55%)	82.50%	32.60%	28.98%	
Middle third	217(51.79%)	85.50%	49.35%	38.71%	
Lower third	162(38.66%)	84.41%	48.61%	37.22%	
Tumor length					0.001
＜3cm	103(24.58%)	90.21%	63.08%	48.98%	
≥3cm	316(75.42%)	82.94%	42.37%	33.20%	
Nerve invasion					0.001
Yes	91(21.72%)	76.73%	26.74%	21.39	
No	328(78.28%)	87.04%	53.36%	40.42%	
Vascular cancer embolus					0.001

Yes	82(19.57%)	75.45%	28.66%	19.67%	
No	337(80.43%)	87.08%	52.06%	41.54%	
Thoracoscopy					0.943
Yes	314(74.94%)	84.81%	45.83%	37.44%	
No	105(25.06%)	84.76%	51.11%	37.28%	
Adjuvant therapy					0.340
Yes	154□36.75%□	85.40%	43.33%	34.40%	
No	265□63.25%□	84.41%	50.05%	39.30%	
Sources of patients					0.001
Urban	247(58.95%)	91.00%	55.30%	45.60%	
Rural	172(41.05%)	75.90%	36.10%	23.20%	
Nationality					0.002
Kazakh	84□20.05%□	80.7%	36.5%	19.2%	
Others	335□79.95%□	88.60%	51.30%	40.3%	
Histologic grade					0.003
Carcinoma in situ	7(1.67%)	100%	100%	-	
Well	14(3.43%)	85.71%	33.33%	33.33%	
Moderate	279(66.59%)	87.28%	48.97%	40.17%	
Poor	119(28.40%)	77.75%	41.23%	27.40%	
pT category					0.001
Tis	4(0.95%)	100%	100%	-	
T1	59□14.09%□	95.00%	85.21%	66.46%	
T2	60(14.32%)	93.33%	67.87%	60.86%	
T3	254(60.62%)	82.41%	36.84%	27.80%	
T4	42(10.02%)	71.02%	26.94%	21.21%	
pN category					0.001
pN0	186(44.39%)	93.00%	70.77%	55.94%	
pN1	114(27.21%)	81.91%	39.21%	30.97%	
pN2	82(19.57%)	76.40%	21.77%	16.63%	

pN3	37(8.83%)	70.27%	4.94%	3.63%	
pTNM stage					0.001
0	4(0.96%)	100%	100%	-	
I	51(22.64%)	94.21%	89.64%	65.61%	
II	136(32.54%)	94.84%	67.41%	56.17%	
III	223(53.35%)	76.42%	24.67%	19.03%	
IV	4(0.96%)	75.00%	75.00%	75%	
Gross classification					0.004
Ulcerative type	148(35.32%)	84.85%	43.23%	31.62%	
Protrude type	64(15.27%)	90.63%	69.94%	51,41%	
Modullary type	186(44.40%)	82.57%	42.46%	35.98%	
Fungating type	21(5.01%)	85.71%	51.95%	40.40%	

Table 3
Multivariate Cox proportional hazards regression models were used to evaluate the overall survival in subgroup analyses based on different clinicopathological features.

Variable	**Multivariable**	
	Odds ratio(95%CI)	***P* value**
Tumor length	0.763 (0.525-1.110)	0.158
Nerve invasion	1.228（0.903-1.670）	0.190
Vascular cancer embolus	1.078（0.785-1.479）	0.641
Source of patients	1.747（1.349-2.263）	0.001
Nationality	1.176（0.863-1.602）	0.303
Histologic grade	1.093 (0.845-1.415)	0.495
Gross classification	1.039（0.911-1.185）	0.563
T stage	1.389 (1.118-1.276)	0.003
N stage	1.363(1.154-1.612)	0.001
TNM stage	1.585 (1.151-2.183)	0.005
Histologic grade	1.093 (0.845-1.415)	0.495

Subgroup analyses of sources of patients on different clinicopathological features and OS

Considering sources of patients was the dominating independent prognostic factors, a further analysis assessed the clinicopathological significance of sources of patients was performed. Compared with the urban subjects, the rural patients were older (X^2=4.006，*p*=0.045, Table 4). The rural patients using thoracoscope were present in low proportions (X^2=14.976，*p*＜0.001, Table 4). Furthermore, the proportion of Kazakh patients in rural areas was significantly higher than that in urban areas (X^2=8.163，*p*=0.004, Table 4). Finally, we assessed the influence of sources of patients on OS. No significant difference in OS was found in most subgroups, except for the nationality in patients from rural area (Table 5). In patients from urban area, history of drinking, tumor length, nerve invasion and vascular tumor thrombus were all the independent predictors of OS (Table 6).

Table 4
Comparison of the clinicopathologic features between patients from urban area and patients from rural area

		Source of patients			
Variable	**No.patients (%)**	**Urban**	**Rural**	χ^2	***P* value**
Age					
≤60	166（39.62%）	88	78	4.006	0.045
＞60	253（60.38%）	159	94		
Gender					
Male	286（68.26%）	168	118	0.016	0.899
Female	133（31.74%）	79	54		
Smoking history					
Yes	151(36.04%)	95	56	1.533	0.216
No	268(63.96%)	152	116		
Alcohol history					
Yes	98（23.39%）	62	36	0.984	0.321
No	321(76.61%)	185	136		
Family history					
Yes	60(14.32%)	37	23	0.214	0.644
No	359(85.68%)	210	149		
Tumor lacation					
Upper	40(9.55%)	21	19	1.062	0.588
Middle	217(51.79%)	132	85		
Lower	162(38.66%)	94	68		
Tumor length					
＜3cm	103(24.58%)	73	30	1.183	0.277
≥3cm	316(75.42%)	174	141		
Nerve invasion					
Yes	91(21.72%)	52	39	0.157	0.692
No	328(78.28%)	195	133		

Vascular cancer embolus					
Yes	82(19.57%)	46	36	0.343	0.588
No	337(80.43%)	201	136		
Thoracoscopy					
Yes	314(74.94%)	202	112	14.976	<0.001
No	105(25.06%)	44	59		
Adjuvant therapy					
Yes	154(36.75%)	82	72	3.273	0.07
No	265(63.25%)	165	100		
Nationality					
Kazakh	84(20.05%)	38	46	8.163	0.004
Others	335(79.95%)	209	126		
Histologic grade					
Carcinoma in situ	7(1.67%)	4	3	0.224	0.974
Well	14(3.43%)	9	5		
Moderate	279(66.59%)	165	114		
Poor	119(28.40%)	69	50		
pT category					
Tis-T1	63(15.04%)	42	21	3.237	0.357
T2	60(14.32%)	37	23		
T3	254(60.62%)	147	107		
T4	42(10.02%)	21	21		
pN category					
pN0	186(44.39%)	119	67	4.344	0.227
pN1	114(27.21%)	62	50		
pN2	82(19.57%)	42	40		
pN3	37(8.83%)	22	15		
pTNM stage					
0	4(0.96%)	3	1	0.224	0.823

I	51(12.17%)	38	13		
II	136(32.45%)	81	55		
III	225(53.70%)	123	102		
IV	3(0.72%)	2	1		
Gross classification					
Ulcerative type	148(35.32%)	88	60	5.253	0.154
Protrude type	64(15.27%)	45	19		
Modullary type	186(44.39%)	104	82		
Fungating type	21(5.01%)	10	11		

Table 5
Univariate analysis of the overall survival of the 172 patients with esophageal squamous cell carcinoma from rural area

Variable	No.patients (%)	1-year OS(%)	3-year OS(%)	5-year OS (%)	*P* value
Age					0.592
≤60	78（45.35%）	84.60%	39.60%	21.90%	
＞60	94（54.65%）	77.30%	33.00%	26.30%	
Gender					0.931
Male	78(45.35%)	79.40%	39.60%	21.90%	
Female	94(54.65%)	77.30%	33.30%	26.30%	
Smoking history					0.882
Yes	56(32.56%)	76.50%	35.30%	14.40%	
No	116(67.44%)	75.50%	35.20%	21.30%	
Alcohol history					0.923
Yes	36(20.93%)	75.00%	31.50%	31.50%	
No	136(79.07%)	76.10%	36.30%	21.50%	
Family history					0.390
Yes	23(13.37%)	78.00%	43.20%	43.20%	
No	149(86.63%)	79.00%	35.20%	20.80%	
Tumor lacation					0.801
Upper third	19(11.05%)	78.90%	21.40%	21.40%	
Middle third	85(49.42%)	72.40%	35.30%	16.00%	
Lower third	68(39.53%)	79.30%	25.60%	25.60%	
Tumor length					0.079
＜3cm	31(18.02%)	80.00%	52.40%	26.20%	
≥3cm	141(81.98%)	77.00%	32.60%	21.60%	
Nerve invasion					0.191
Yes	39(22.67%)	71.40%	23.10%	23.10%	
No	133(77.33%)	77.20%	39.80%	23.10%	
Vascular cancer embolus					0.137

Yes	36 (20.93%)	66.70%	25.50%	21.20%	
No	136(79.07%)	78.40%	38.80%	24.10%	
Thoracoscopy					0.503
Yes	112(65.12%)	76.40%	35.70%	29.60%	
No	60(34.88%)	76.30%	34.80%	20.40%	
Adjuvant therapy					0.450
Yes	72□41.86%□	84.40%	38.50%	28.30%	
No	100□58.14%□	72.80%	32.60%	19.20%	
Nationality					0.01
Kazakh	46□20.05%□	64.30%	19.40%	11.70%	
Others	126□79.95%□	80.00%	41.90%	27.50%	

Table 6
Univariate analysis of the overall survival of the 247 patients with esophageal squamous cell carcinoma from urban area

Variable	No.patients (%)	1-year OS(%)	3-year OS(%)	5-year OS (%)	*P* value
Age					0.986
≤60	88（35.63%）	94.30%	54.70%	52.50%	
＞60	159（64.37%）	88.80%	55.20%	44.30%	
Gender					0.056
Male	168(68.02%)	89.2%	52.10%	54.00%	
Female	79(31.98%)	94.80%	62.30%	26.30%	
Smoking history					0.148
Yes	95(38.46%)	91.80%	50.60%	30.70%	
No	152(61.54%)	90.70%	81.00%	48.80%	
Alcohol history					0.005
Yes	62(25.10%)	75.00%	40.70%	23.90%	
No	185(74.90%)	89.60%	60.00%	50.01%	
Family history					0.088
Yes	37(14.98%)	91.70%	67.30%	53.90%	
No	210(85.02%)	90.40%	53.40%	42.40%	
Tumor lacation					0.278
Upper third	21(8.50%)	85.70%	36.40%	36.40%	
Middle third	132(53.44%)	93.90%	58.30%	47.40%	
Lower third	94(38.06%)	88.10%	55.70%	45.90%	
Tumor length					0.008
＜3cm	73(29.55%)	94.40%	67.50%	56.80%	
≥3cm	174(70.45%)	89.50%	50.10%	40.60%	
Nerve invasion					＜0.001
Yes	52(21.05%)	80.70%	29.10%	19.40%	
No	195(78.95%)	93.80%	62.60%	50.40%	
Vascular cancer embolus					＜0.001

Yes	46 (18.62%)	82.40%	31.60%	20.70%	
No	201(81.38%)	92.90%	60.90%	51.70%	
Thoracoscopy					0.065
Yes	203(82.19%)	89.40%	51.40%	42.40%	
No	44(17.81%)	97.70%	70.50%	56.50%	
Adjuvant therapy					0.154
Yes	82（33.20%）	90.00%	47.50%	35.40%	
No	165（66.80%）	91.40%	59.50%	49.10%	
Nationality					0.344
Kazakh	38（15.38%）	92.00%	46.50%	31.0%	
Others	209（84.62%）	90.80%	57.00%	46.40%	

Discussion

In this study, we retrospectively analyzed the data of 419 patients with ESCC at a single cancer center in Xinjiang area, which is one of the high-risk regions for esophageal cancer in China. The results showed that the adjuvant therapy for majority of patients were insufficiency by conducting postoperative therapy analyses. In addition to tumor stage, the regions of patients and nationality were also an independent prognostic factor. In further subgroup analysis, we confirmed that nationality was the main factor affecting the prognosis of patients from rural areas.

Our finding that ESCC patients had poor survival and our statistics indicating a lack of postoperative treatment revealed that multidisciplinary treatments, especially adjuvant therapy were essential for patients. Our results also revealed that the future management of these patients from rural area needed to be enhanced with further long-term follow-up data to support clinical decisions and interventional strategies. All of these will have a significant impact on the prognosis of patients by influencing the doctor's follow-up strategy.

In our study, most of them were male and over 60 years old. This is consistent with the results of epidemiological investigations that carcinomas of the esophagus in China occur mainly in people aged 60–74 years and the incidence of EC in men was twice as many as that in women’ [7]. In our study, only about 23.6% of the patients were diagnosed with early stage 0 or 1 ESCC, and most of the patients were in middle or late stage. Our stage results are also consistent with the findings from other studies [12, 13]. It has been acknowledged that morbidity of ESCC in the Kazakh population in Xinjiang was far higher

than other ethnic minorities [14]. In our study, a worser prognosis was observed in Kazakh patients with ESCC. This is consistent with other study[14].

Additionally, in our multivariate analysis, we found that the source of patients is an important factor affecting the prognosis. This is in agreement with the previously reported data [7, 15, 16]. Kou et al. analyzed the possible reason for this discrepancy in their finding may lie in the difference of socioeconomic status (SES) disparities in the populations. Our results of subgroup analysis suggested that Kazakh patients from rural area even had a shorter prognosis than other populations living in the same area. This suggest that more attention should be paid to the sources of patients during clinical treatment.

In addition, our results suggested that the adjuvant therapy for majority of patients were insufficiency. The treatment of ESCC depends on the characteristics of the patient including health status and TNM stage. Current guidelines suggest additional treatment of patients with ≥ T2 tumors, although the risk of node-negative T2 lesions is low [17]. The characteristics of esophageal resection alone can be considered (< 2 cm and well-differentiated), but most subjects with esophageal cancer was locally advanced (> T2 and / or N+) when they were diagnosed [17]. For these patients, to reduce primary tumor bulk chemotherapy, radiotherapy or chemo-radiotherapy isessential. Since about 87% of our patients were in middle or late stage, adjuvant therapy was recommended for most of them according to EC guidelines [18]; however, only 165 subjects received post-surgery treatments. Noticeably, we found that several patients did not receive complete postoperative treatment either for that they lived far from the hospital or for the side effects of the treatment. Our follow-up results revealed that postoperative management of patients with esophageal squamous cell carcinoma needs to be strengthened.

Our results showed that the 1-, 3-, and 5-year OS rates of this patients with ESCC were 84.8%, 47.5%, and 37.3%, which was worse than that was reported in a previous study [19]. In our univariate analysis of the overall survival of the 419 patients, tumor length, nerve invasion, vascular cancer embolus, sources of patients, nationality, tumor differentiation, tumor stage, lymph node metastasis, stage of disease and pathological type were related to OS. The association with tumor length, pT category, pN category, and TNM stage were consistent with the results of other studies [20–22]. It is accepted that smoking and drinking alcohol can increase the risk of ESCC from the results of a meta-analysis [23]. However, in our study, age, history of smoking, using thoracoscopy and region of patients were unrelated to their OS. Insufficient adjuvant therapy, diet or environmental factors may lead to lower OS. Therefore, they interferes with other prognostic factors. Some studies showed that older age was a prognostic factor [12, 13]. In our univariate analysis, age was not related to OS. Owing to improvements in surgical safety, age is less of a risk factor for the prognosis of ESCC. What's more, one of our findings disaccorded with others was that the OS of patients with a family history of cancer was longer than the OS of those with no history. This may be due to more active screening and treatments are conducted by patients with a family history of cancer.

This study has some limitations. It is a single institution, retrospective study. The retrospective nature of this study may undermine its power. However, our cancer center is the largest in Xinjiang, which is one of the high-risk regions for esophageal cancer in China. So we believe that our data may provide a better understanding of ESCC in Xinjiang. Until now, few large cohort studies focused on postoperative adjuvant therapy of ESCC in Xinjiang, our results will be useful for the whole management of esophageal cancer. Of course, further follow-up studies are required to confirm our findings and develop new therapeutic strategies for these patients.

Conclusion

Adjuvant therapy of these patients with ESCC was shown to be insufficient. Enhanced treatment after surgery needs further improvement. Health sector should implement targeted treatment regime for different areas to alleviate the burden of cancer.

Declarations

Ethics approval

This study was approved by the medical ethics committee of Affiliated Tumor Hospital of Xinjiang Medical University.

Consent to Participate

A waiver for informed consent was granted by the medical ethics committee of Affiliated Tumor Hospital of Xinjiang Medical University.

Consent for publication

Not Applicable.

Data Availability Statement

The data that support the findings of this study can be available from the corresponding author upon reasonable request.

Authors’ contributions

we confirmed that all authors have contriubted to and agreed on the content of the manuscript, YLF drafted the manuscript and contributed all tables and figures shown. LT helped analyze the data. ZST

and LQ provided suggestions in the discussion. ZQQ, HXJ and TA offered some help in the preparation of manuscript. LXM conceived and took charge of the whole study.

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Figures

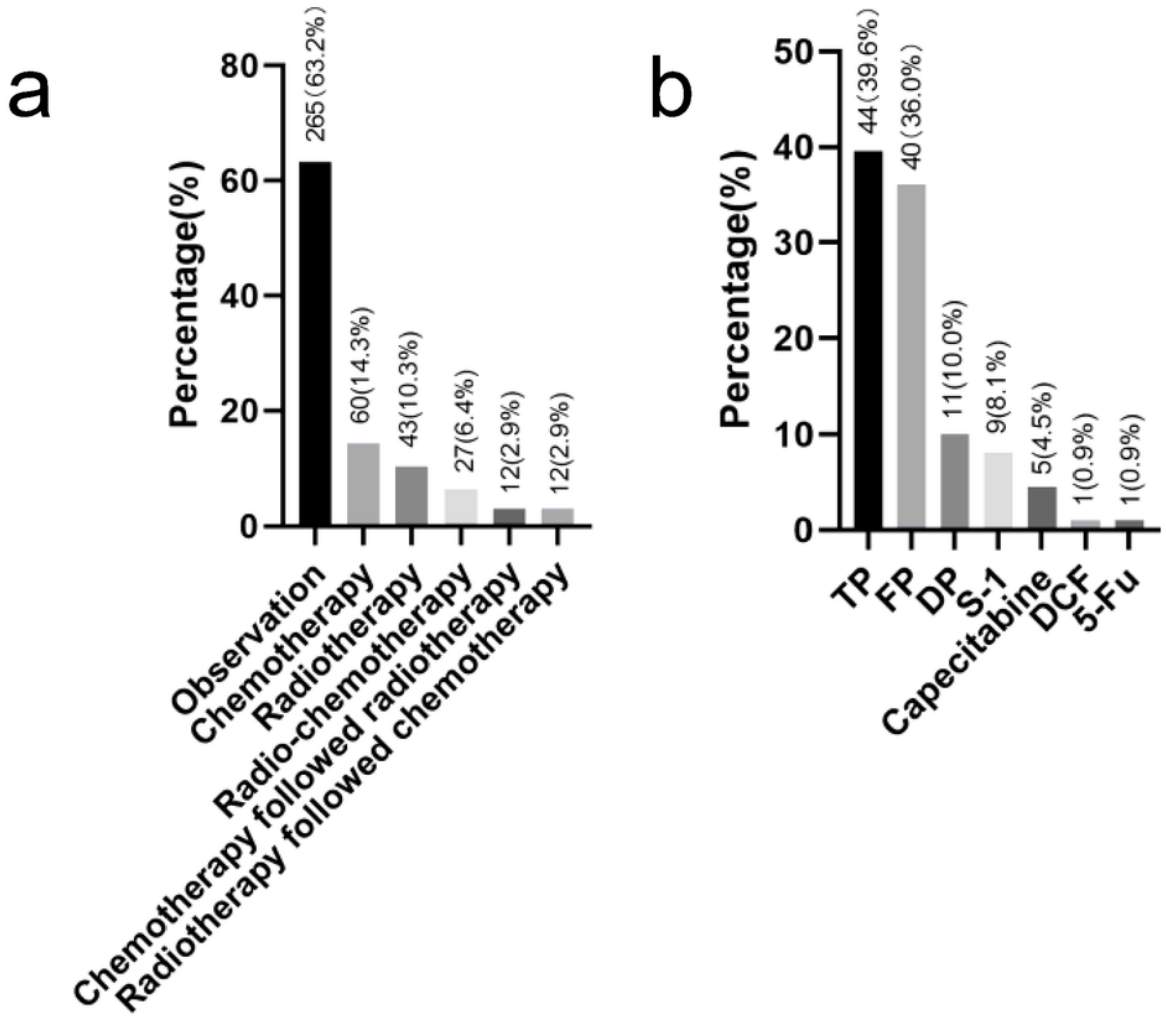

Figure 1

(a) Treatment after operation of 419 patients with ESCC. (b) Adjuvant chemotherapy regimens of 111 patients. DCF: Docetaxel , cisplatin and 5-fluorouracil ; TP: Paclitaxel and cisplatin ; DP：Docetaxel and cispaltin; FP: 5-fluorouracil and cisplatin; P: Cispaltin; S-1: Tegafur.

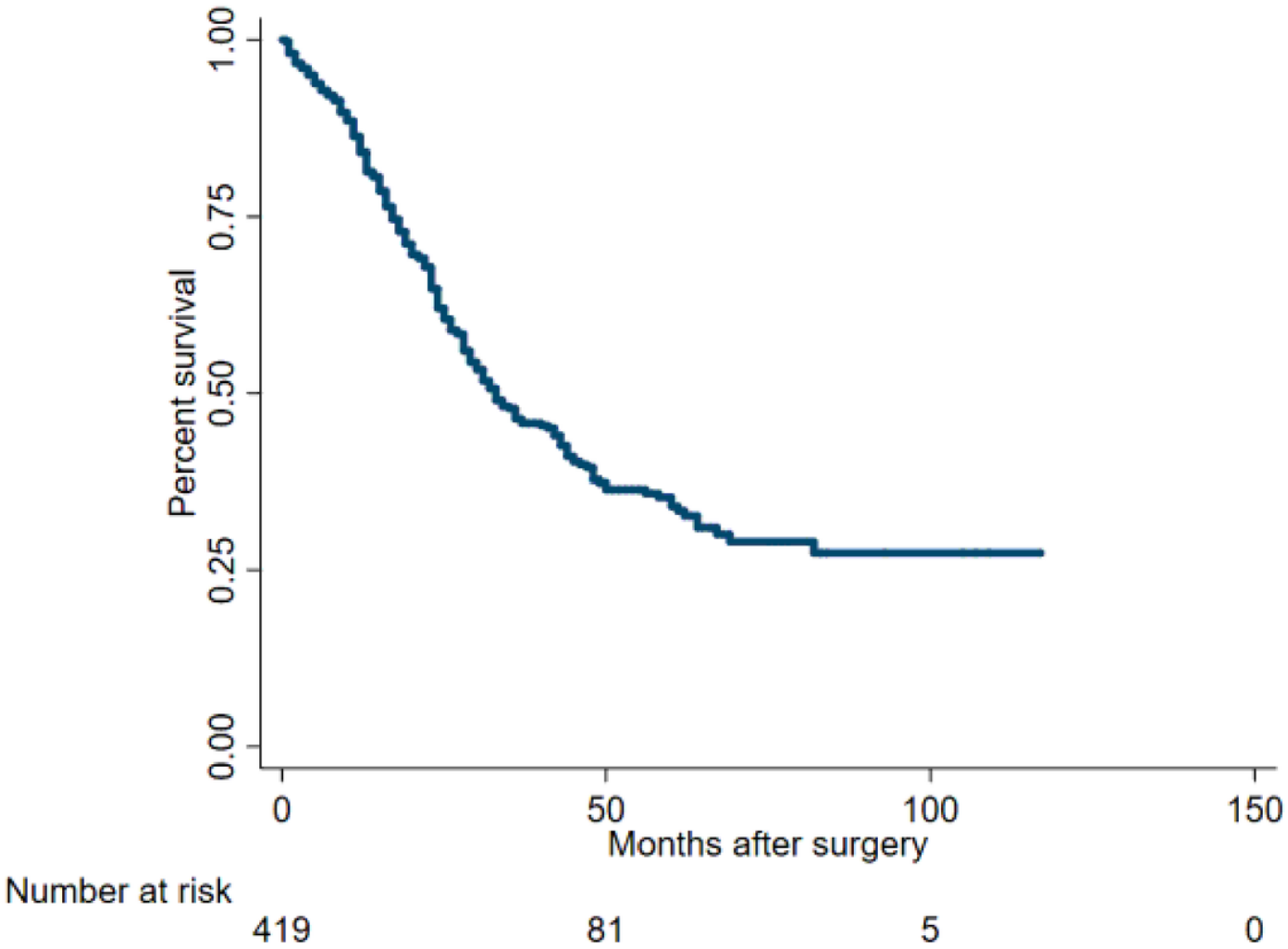

Figure 2

The overall survival (OS) of 419 patients of ESCC.