Investigating the relationship between esophageal tumor length and TNM staging: A prospective study of 171 patients at a tertiary care hospital in Pakistan

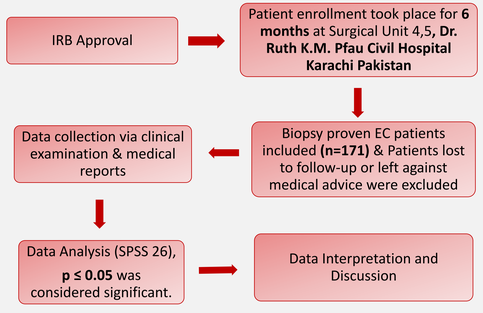
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Introduction

Esophageal carcinoma (EC) presents a global health challenge with high morbidity and mortality. In managing this malignancy, two key factor emerges: TNM staging and histological grading. Interestingly, historical consideration of tumor length, once crucial for staging, was abandoned long ago. Recent medical investigations have reignited interest in reassessing tumor length's relevance. This study aims to explore the relationship between esophageal tumor length and TNM staging.

Methodology



Results

Table 1: Patient's characteristics (n=171)

		n
Tumor length		
	< 5 cm	51 (29.8)
	5 to 10 cm	89 (52.1)
	> 10 cm	31 (18.1)
T stage		
	T1 & T2	19 (11.1)
	T3	74 (43.3)
	T4 a & b	78 (45.6)
Node stage		
	no regional lymph node	13 (7.6)
	1 to 2 positive nodes	54 (31.6)
	3 to 6 positive nodes	58 (33.9)
	7 or more positive nodes	46 (26.9)
M: Metastasis		
	No	114 (66.7)
	Yes	57 (33.3)

Table 2 : Patient's characteristics according to tumor length (n=171)

		Tumor length			p-value
		< 5 cm (n=51)	5 to 10 cm (n=89)	> 10 cm (n=31)	
T stage	T1 & T2	9 (17.6)	9 (10.1)	1 (3.2)	0.006*
	T3	27 (52.9)	39 (43.8)	8 (25.8)	
	T4 a & b	15 (29.5)	41 (46.1)	22 (71.0)	
Node stage	no regional lymph	5 (9.8)	7 (7.9)	1 (3.2)	0.816
	1 to 2 positive	17 (33.3)	29 (32.6)	8 (25.8)	
	3 to 6 positive	18 (35.3)	29 (32.5)	11 (35.5)	
	≥ 7positive	11 (21.6)	24 (27.0)	11 (35.5)	
Metastasis	No	39 (76.5)	61 (68.5)	14 (45.2)	0.011*
	Yes	12 (23.5)	28 (31.5)	17 (54.8)	
Clinical Stage	I & II	5 (9.8)	7 (7.9)	0 (0.0)	0.014*
	III	22 (43.1)	25 (28.1)	5 (16.1)	
	IV	24 (47.1)	57 (64.0)	26 (83.9)	

*p-value calculated by using One-way ANOVA, Chi-square and Fisher's exact tests

Table 3 : Univariate multinomial logistic regression analysis- relative risk ratio of higher tumor length ratio (compared to tumor length ratio < 5 cm)

		Tumor length ratio			
		5 cm to 10 cm	p-value	>10 cm	p-value
		Relative risk ratio (95% CI)		Relative risk ratio (95% CI)	
T stage	T1 & T2	1		1	
	T3	2.73 (0.91-8.18)	**0.072***	13.20 (1.51-115.34)	**0.020***
	T4 a & b	1.44 (0.51-4.11)	0.491	2.66 (0.29-24.34)	0.385
Metastasis	No	1		1	
	Yes	1.49 (0.67-3.27)	0.319	3.94 (1.51-10.29)	**0.005***

*Relative risk ratio presented of all independent covariates presented in the table

Table 4: Multivariate multinomial logistic regression analysis- relative risk ratio of higher tumor length ratio (compared to tumor length ratio < 5 cm)

		Tumor length ratio			
		5 cm to 10 cm	p-value	>10 cm	p-value
		Relative risk ratio (95% CI)		Relative risk ratio (95% CI)	
T stage	T1 & T2	1		1	
	T3	2.65 (0.82-8.55)	0.101	10.86 (1.13-104.14)	**0.039***
	T4 a & b	1.45 (0.50-4.20)	0.494	3.04 (0.31-29.47)	0.336

*Relative risk ratio presented after mutual adjustments of all the covariates presented in the table

Discussion

- Despite multiple reports yielding no unanimous conclusion, a systematic review of 41 studies, encompassing 28,973 EC patients, revealed that longer tumors significantly predict worse overall survival (OS) and disease-free survival (DFS) **(Wang et al., 2021)**
- Moreover, an association is suggested among tumor length, lymph node metastasis, and OS in EC patients **(Kelly et al., 2019).** Furthermore, in T1b esophageal adenocarcinoma, tumors larger than 3 cm emerge as a significant risk factor for metastasis **(Mehta et al., 2019).** Conversely, in our analysis, T3 stage showed a significant association with both 5-10 cm and >10 cm tumor length groups in univariate analysis, for which T3 stage remained significant in the multivariate analysis as well. Additionally, tumor length >10 cm was also associated with metastasis in the univariate analysis.

Conclusion

Our study highlights a noteworthy relationship between tumor length and TNM staging for esophageal tumors, particularly in T3 stage tumors and metastasis, where tumor length >10 cm showed significant findings. Tumor length is now emerging as a potential predictive marker for disease dissemination, and its integration into the staging framework could enhance risk stratification and treatment guidance for EC patients