Diagnostic accuracy of CT scan in staging resectable esophageal cancer

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Abstract

Introduction: CT scan is an important tool in staging of esophageal cancer. Survival can be improved by providing neoadjuvant treatment which depends on stage of esophageal cancer. So it is very important to stage the disease accurately.

Methods: The objective of this study is to determine diagnostic accuracy of CT scan to stage esophageal cancer. Ct scans of 62 patients included in the study were reviewed by a Consultant radiologist who was blinded to the final stage of tumour. Diagnostic accuracy measured by comparing with histopathological staging.

Results: Accuracy, sensitivity and specificity of CT for T2 and T3 are 66%, 61%, 68% and 63%, 67%, 56% respectively. Accuracy, sensitivity and specificity of CT for presence of nodal disease are 65%, 59% and 75%.

Conclusion: Ct scan alone has low diagnostic accuracy for staging Esophageal Cancer.

Keywords: Diagnostic Accuracy, CT scan, Esophageal Cancer, Staging, TNM. (JPMA 66: 90; 2016)

Introduction

Esophageal cancer is the 6th most common cancer in the world[1] with worldwide incidence of 20/100,000 individuals. It is more prevalent in some parts of world like South Africa and China with incidence reaching up to 160/100,000 individuals. Either squamous or adenocarcinoma, its typical presentation is progressive dysphagia which is initially for solids and later on for liquids. Endoscopy is used for diagnosis and biopsy of the lesion. Staging of disease can be done by CT scan, PET-CT, Endoluminal Ultrasound, bronchoscopy and diagnostic laparoscopy with different diagnostic accuracies for Tumour site, nodal status and distant metastasis were used for each of these. For Cervical esophageal tumours, chemo radiation is the definitive treatment.[2] For mid and lower esophageal cancers, whether it is squamous or Adenocarcinoma, treatment is stage dependent. For early tumours upfront resection is advised as per NCCN guidelines.[2] For resectable tumours with nodal spread and involving Muscularis Propria, there is enough evidence[3] to support Neoadjuvant chemo radiation either with or without adjuvant treatment. Hence it is very important to determine the exact stage of disease to properly plan most effective treatment strategy. EUS which is most sensitive for tumour size and nodal evaluation needs expensive instruments, expertise and is not readily available at every center. CT scan which has low sensitivity for tumour size and nodal status is widely available, easy to report and high sensitivity for distant metastasis. This Study was conducted to find out the sensitivity and specificity of respectable mid and lower Esophageal cancers.

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Material and Methods

It was a retrospective Audit conducted at Aga Khan University Hospital Karachi . Exemption from an ethical review committee of the institute was obtained. All patients who underwent upfront surgery (Iwor Lewis' two stage esophagectomy with reconstruction with gastric tube) for resectable mid and lower esophageal cancers and CT scan done from Aga Khan University Hospital Karachi from January 2008 to July 2014 were included in the study. CT scans were done at 64 slice spiral CT scanner with IV contrast and slice thickness of 3mm. The patients with neoadjuvant treatment or Preoperative CT scan from outside Aga Khan University Hospital Karachi were excluded.

ICD coding 142.41 was used to obtain medical record numbers of patients who underwent two stage esophagectomy during the above mentioned time period. Files were reviewed by the Primary investigator for age, gender, days between preoperative CT scan and surgery, histopathology and histopathological TN stage of tumour. CT scans of patients were separately reviewed by a Consultant Radiologist to record radiological T&N stage of tumour who was blinded for histopathological stage of disease. Data was entered on SPSS19. Continuous variables were expressed in Means ± SD and categorical variables were expressed in proportions. Accuracy, specificity and sensitivity of tumour and nodal status were measured by comparing a radiological TN stage with

histopathological TN stage using 2X2 tables.

Results

Total number of files obtained were 155, 93 patients were excluded on the basis of exclusion criteria. 62 patients were included in the study. Mean age of patients was 52.6±11.8 years and 39 (62.9%) patients were males. Time lag between Preoperative CT scan and surgery was 15.3 ± 11.5 days. 44 (71%) patients had squamous cell carcinoma, while 18 (29%) patients had adenocarcinoma. According to the histopathological stage of disease, 1 patient had T1 disease, 21 (33.9%) patients had T2 disease, 37 (59.7%) patients had T3 disease and 3 (4.8%) patients had T4 disease. While 42 (67.7%) patients had nodal involvement.

Accuracy, Sensitivity and Specificity of CT for correctly diagnosing T2 tumours were 66% (13+28/62), 61% (13/13+8) and 68% (28/28+13) as shown in Table-1. Accuracy, Sensitivity and Specificity of CT for correctly diagnosing T3 tumours were 63% (25+14/62), 67% (25/25+12) and 56% (14/14+11) as shown in Table-2.

Accuracy, Sensitivity and Specificity of CT for correctly detecting nodal disease were 65% (25+15/62), 59% (25/25+17) and 75% (15/15+5) as shown in Table-3.

Table-1: Accuracy, Sensitivity and specificity of CT scan for T2.

Histopathology	Diagnosis on CT scan		Total
	T2 Yes	T2 No	
T2	13	8	21
Others	13	28	41
	26	36	62

Table-2: Accuracy, Sensitivity and specificity of CT scan for T3.

Histopathology	Diagnosis on CT scan		Total
	T3 Yes	T3 No	
T3	25	12	37
Others	11	14	25
	36	26	62

Table-3: Accuracy, Sensitivity and specificity of CT scan for the presence of Nodal disease.

Histopathology	Diagnosis on CT scan		Total
	Nodal disease absent	Nodal disease present	
Nodal disease absent	15	5	20
Nodal disease present	17	25	42
	32	30	62

Discussion

According to our data Accuracy, sensitivity and specificity of CT for T2 are 66%, 61% and 68%. Accuracy, sensitivity and specificity of CT for T3 are 63%, 67% and 56%. Accuracy, sensitivity and specificity of CT for nodal disease are 65%, 59% and 75%.

Similar studies were done recently by Jeongmin et al.[4] with sample size of 109 and he calculated Accuracy, sensitivity and specificity of CT scan for Nodal status of disease which was found to be 63%, 35%, and 93%. Moschetta et al.[5] calculated Accuracy, sensitivity and specificity of CT scan for tumour status of disease which was reported to be 79%, 67% and 64% in a sample of 31 patients. Chengg et al.[6] reported sensitivity of CT scan to be 100% for tumour size and 80% for nodal status of disease in 50 patients. EPM van vliet[7] reviewed 943 patients to find 50% sensitivity and 83% specificity of CT scan for nodal disease.

NCCN guidelines now recommend using adjunct imaging modalities along with CT scan to stage esophageal cancers accurately. These modalities include Endoscopic US and PET-CT. But the issue with these modalities is cost and availability. EUS costs about £1800 and PET-CT costs about £1000 in the UK, and in countries where the patient has to bear the cost of his/her treatment, finances are a major concern. In order to solve the issue, there are some other techniques to increase the sensitivity and specificity of CT scan. One of these is a vessel probe CT scans in which after giving a small amount of oral contrast, effervescent granules are swallowed, which produce gas in the esophagus, causing distension of strictured esophagus resulting in an increase in sensitivity and specificity of CT scan from 68% to 89% when compared with final histology.[8]

To make the study more significant separate calculation of sensitivity and specificity for different stages of tumour was done and the CT staging was performed by a consultant radiologist who was blinded for the histopathological stage of the disease. Weakness included small sample size.

Conclusion

From this data, we can conclude that routine CT scans alone have a low diagnostic accuracy for staging of esophageal cancer and we should include another staging tool with CT scan to properly stage tumours and direct further treatment towards the right direction.

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