

ORIGINAL ARTICLE

Role of CT Imaging and Staging of Esophagus Carcinoma

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ABSTRACT

Background and Aim: Esophageal carcinoma is the 8thmost common type of cancer worldwide and is considered a leading cause of cancer mortality. Cancer of the esophagus is one of the most lethal of all cancers. The esophagus is clearly visible on CT images. Over the last decade, computerized tomography (CT) tools have qualified the carcinoma early finding, thereby lowering mortality rates. The advent of multidetector computerized tomography (MDCT) scanners has been a boon to clinical imaging practice. The aim of the present study was to assess the role of computed tomography imaging in esophagus carcinoma staging and detection.

Materials and Methods: This prospective study was conducted on 82 esophagus carcinoma patients in the department of Radiology, Sir Ganga Ram Hospital Lahore from July 2020 to June 2021. Individuals who presented with esophagus carcinoma signs and symptoms were enrolled in this study. Esophagus carcinoma was confirmed based on histopathological examination (HPE) reports and postoperative biopsy confirmed the CT findings. Data analysis was done with SPSS version 20.

Results: Of the total 82 esophagus carcinoma patients, 44 (54%) were male and 38 (46%) were female. The overall mean age was 45.53±7.3 years with an age range from 18 years to 80 years. The incidence of esophagus carcinoma was more prevalent in the age group of 40 to 60 years. Male patients are more prone to esophagus carcinoma compared to females. The carcinoma in most cases affected the esophagus lower third and middle compared to the upper third. The prevalence of stage patients was as follows; T1 and T2 had 22 (26.8%) stage patients, T3 had 46 (56.1%) stage patients, and T4 had 14 (17.1%). About 52 (64%) patients had asymmetrical wall thickness while 30 (36%) had symmetrical wall thickness.

Conclusion: Preoperative esophageal carcinoma staging is significantly aided by computed tomography. Imaging modality CT scans have improved esophageal carcinoma treatment and operative resection rate. As a result, CT is a non-invasive and quick imaging tool for detecting lymphadenopathies, distant metastases, and tumors.

Keywords: Esophagus carcinoma; Staging; CT scan; Multidetector computerized tomography

INTRODUCTION

Esophageal carcinoma is the 8thmost common type of cancer worldwide and is considered a leading cause of cancer mortality. Cancer of the esophagus is one of the most lethal of all cancers [1, 2]. The esophagus is clearly visible on CT images. Over the last decade, computerized tomography (CT) tools have qualified the carcinoma early finding, thereby lowering mortality rates [3]. The advent of multidetector computerized tomography (MDCT) scanners has been a boon to clinical imaging practice [4]. In the USA, about 17,000 esophagus carcinoma cases per year are diagnosed and are the 6th leading cause of worldwide mortality rate [5]. Based on histology, esophagus carcinoma had two subtypes namely; adenocarcinoma and squamous cell carcinoma. Adenocarcinoma usually develops in the esophagus lower third from columnar epithelium [6] whereas squamous cell carcinoma develops in the middle and lower third. The probability of squamous cell carcinoma in the upper segment varies from 10% to 15% [7].

The esophagus carcinoma patient's survival rate inversely affects the distant disease, nodal, and invasiveness tumors. After treatment, patients with early-stage disease have a 5-year overall survival (OS) rate of more than 90%, whereas patients with the advanced-stage disease have a 5-year OS rate of less than 40% [8]. As a result, earlier detection leads to a better prognosis. Yet, neoadjuvant chemo radiotherapy (nCRT) 60-70%

accepters do not optimally retort. Treatment outcomes can be intensely enhanced with imaging as biomarkers and stratification of risk [9]. Over the last decade, imaging modality like computed tomography (CT) has enabled early cancer detection, thereby lowering mortality rates. The advent of multidetector computerized tomography (MDCT) scanners has been a boon to clinical imaging practice. Because of new applications, the use of CT has been steadily increased. Rapid technological advances in cross-sectional imaging modalities have occurred in recent years [10]. Esophagus carcinoma can be diagnosed and detected by a variety of imaging modalities as scanners increased with technological advancement. Computed tomography (CT) becomes an essential tool for esophagus evaluation in both emergency and outpatient settings. Men are more likely than women to develop esophageal cancer in their sixth and seventh decades of life. It becomes more common as one gets older, and it is about 20 times more common in people over the age of 65 years [12]. Esophagus carcinoma staging and management can be effectively diagnosed with radio imaging modality like MDCT (multidetector computed tomography) which offers esophagus carcinoma severity with clear demonstration. It is also capable of identifying distant metastasis provides aids to clinicians for conceiving proper treatment and planning [13]. The present study aims was to assess the computerized tomography scan (CT scan) role in distinguishing esophageal cancer staging.

MATERIALS AND METHODS

This prospective study was conducted on 82 esophagus carcinoma patients in the department of Radiology, Sir Ganga Ram Hospital Lahore from July 2020 to June 2021. Individuals who presented with esophagus carcinoma signs and symptoms were enrolled in this study. Esophagus carcinoma was confirmed based on histopathological examination (HPE) reports and postoperative biopsy confirmed the CT findings. The following criteria were used to diagnose the lesion: patient age, involved segment length, enhancement (homogeneous or heterogeneous), wall thickening degree, site of involvement, thickening (asymmetric or symmetric), and accompanying outcomes such as lymph nodal, soft tissue mass, and distant metastases. Randomized control trials were used for patient selection. All examinations were performed on a Toshiba Activion MDCT with 16 slices. The patient was positioned supine on the CT table, with comfortable arms above the head in the head-arm rest and lower legs supported. When the topogram was taken, the patient was asked to hold his breath. The patient was undergoing a spiral CT scan. Noncontrast 8mm contiguous axial sections were also taken from the diaphragm domes to the third lumbar vertebra. SPSS version 20 was used for data

analysis. The quantitative variables like age, gender distribution, and esophageal carcinoma parameters were expressed in terms of frequencies and percentages.

RESULTS

Of the total 82 esophagus carcinoma patients, 44 (54%) were male and 38 (46%) were female. The overall mean age was 45.53±7.3 years with an age range from 18 years to 80 years. The incidence of esophagus carcinoma was more prevalent in the age group of 40 to 60 years. Male patients are more prone to esophagus carcinoma compared to females. The carcinoma in most cases affected the esophagus lower third and middle compared to the upper third. The prevalence of stage patients was as follows; T1 and T2 had 22 (26.8%) stage patients, T3 had 46 (56.1%) stage patients, and T4 had 14 (17.1%). About 52 (64%) patients had asymmetrical wall thickness while 30 (36%) had symmetrical wall thickness. Figure-1 and 2 illustrates the age and gender wise distribution of patients. Table 1 shows the esophagus carcinoma lesion's location and wall thickness attenuation. Esophagus wall thickness and staging are demonstrated in Table-2 and Table-3 respectively.

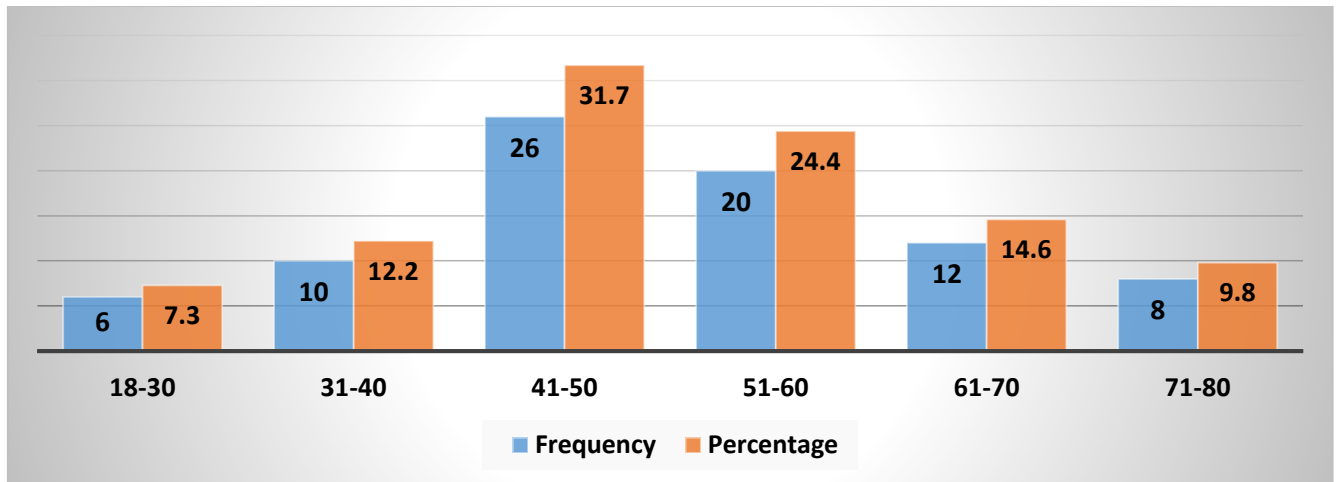
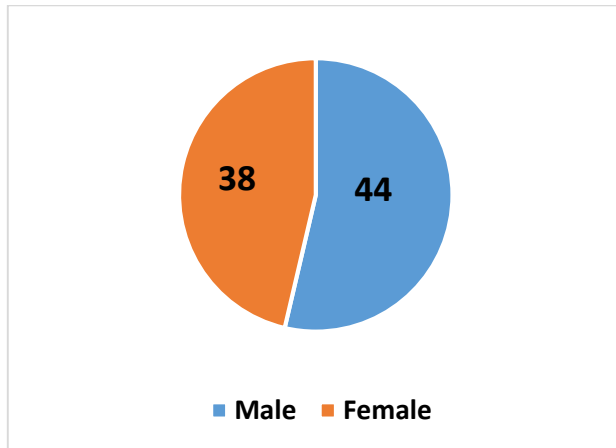


Figure-1 Age wise distribution of Esophagus Carcinoma patients (n=82)



Figur-2 Gender distribution (n=82)

Table-1 the esophagus carcinoma lesion's location and wall thickness attenuation

Locations	Frequency (N)	Percentage (%)
Upper Third	12	14.7
Middle Third	33	40.2
Lower Third	37	45.1
Wall Attenuation		
Homogenous	46	56.1
Heterogeneous	36	43.9

Table-2 Wall thickness in esophagus carcinoma (n=82)

Wall Thickness	Frequency (n)	Percentage (%)
Asymmetrical	52	64
Symmetrical	30	36
Total	82	100

Table-3 Staging of esophagus carcinoma (n=82)

Stages	Frequency (n)	Percentage (%)
T1 and T2	22	26.8
T3	46	56.1
T4	14	17.1
Total	82	100

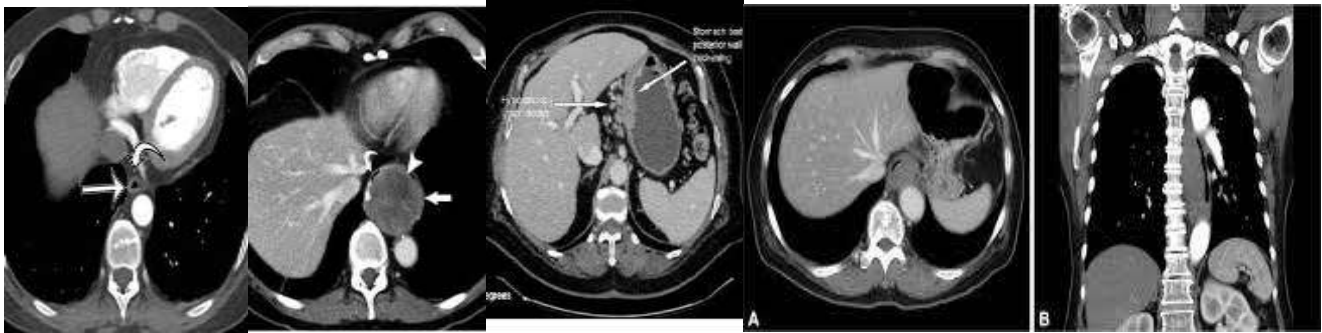


Figure-3 a) showed gastrohepatic ligament (arrow), celiac axis (arrow), and right hilar lymph nodes (arrow) on circumferential thickening, b) hypoattenuating lower esophagus intraluminal mass (arrow) and esophagus compressed lumen contract (curved arrows), c) posterior wall irregular thickness correlated with lymph nodes, stomach curvature, necrosis with mass, portacaval, celiac and hilar, splenomegaly, and d) transverse view of chest showing a mass in esophagus posterior wall and elongated mass on the entire esophagus.

DISCUSSION

The esophagus is the gastrointestinal tract part as per body anatomical position. Its primary function is to passage food boluses via peristaltic movement to the stomach from the pharynx [14]. Carcinoma Esophagus is the disorder leading to the fifth common cause of mortality. It is also the world's eighth leading cause of cancer mortality. Furthermore, due to the emergence of appropriate tumors that were not detected at the initial stage, the relative survival rate has been declining trend. As a result, esophageal cancer early specific pre-treatment staging has become an essential part of determining operability and a suitable treatment plan. Despite the fact that anatomic classifications have been devised as follows, it is critical to check the carcinoma accordingly [15].

In the current study, carcinoma esophageal staging was performed, which showed that the majority of patients (56.1%) were classified as being in the T3 stage, followed by (26.8%) in the T1 and T2 stages and (17.1%) in the T4 stage. Esophageal cancer is one of the most common malignant tumors in Pakistan. The morphology, position, and esophageal lumen size can be envisaged on a CT scan for qualitative diagnosis. The prognosis for esophageal cancer is generally poor because the majority of patients present with advanced disease. As time passes, symptoms such as dysphagia appear, indicating that cancer has already progressed. The overall five-year survival rate is around 15%, with a life expectancy of less than one year [16].

Americans-Africans are more susceptible to developing squamous cell carcinoma account for five times more likely than other socioeconomic groups. Risk factors for esophageal squamous cell carcinoma are well known, such as alcohol, diet, and tobacco. The esophageal adenocarcinoma risk factors are less obvious [17]. Males are 4-6 times more likely than females to develop carcinoma, according to this study [18]. In the 1990s, the incidence of adenocarcinoma was 100% in North America and Europe. Due to dietary factors and chronic irritation of the mucosal lining, it had a strong correlation with reflux and the resulting Barrett's esophagus [18].

Although other methods are employed, MDCT is the most commonly used examination in preoperative esophageal cancer staging. It provides information about

the mass local extension as well as the distant metastases detection and noninvasively lymphadenopathies quickly, with an overall diagnostic accuracy of 59.82% [19-23]. CT scans are most commonly used in diagnosis because they clearly show the presence of a tumor. According to published reports, it is only 49 % to 60% accurate in staging tumor depth [24, 25].

Lee G et al. [26] reported that computed tomography (CT) is one of the most valuable and extensively used recent procedures for the pre-operative staging of esophageal carcinoma patients. Qiu B et al. [27] discovered that because of the rare diagnosis and poor prognosis of esophagus carcinoma were made. Despite the fact that pre-operative examinations are frequently invasive, surgical exploration has proven to be the only accurate method of determining actual tumor extent. The esophageal carcinoma patients' five years survival was relatively insignificant varies from 34% to 47% as treated with curative intent [28]. Esophageal adenocarcinoma had a 47% rate of five years survival better than 37% of squamous cell carcinoma [29]. Esophageal carcinoma with GFR genetic mutations is related to tumors' large size and invasive small depth. Squamous cell carcinoma patients could be prognosis with clinical biomarker GFR genetic mutation.

CONCLUSION

Imaging is crucial in staging, therapeutic strategy selection, and risk stratification. In the esophageal cancer staging, the imaging modalities CT, EUS, PET/CT, and MRI are usually complementary. Preoperative esophageal carcinoma staging is significantly aided by computed tomography. Imaging modality CT scans have improved esophageal carcinoma treatment and operative resection rate. As a result, CT is a non-invasive and quick imaging tool for detecting lymphadenopathies, distant metastases, and tumors.

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