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ROLE OF CT IMAGING AND STAGING OF ESOPHAGUS CARCINOMA

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Abstract:
In worldwide carcinoma esophagus is eight most commonly occurring carcinoma. It is a common cause of cancer deaths in developing countries. Among all cancers carcinoma of esophagus is also one of the most lethal cancers. In India especially Jammu and Kashmir is one of the states where there is high incidence of esophageal cancer of the "CentralAsian esophageal cancer belt". Esophagus is well seen on CT images throughout its course. The last decade, computerized tomography (CT) technology has led to an early detection of cancers which helps for decreasing mortality rate. Due to introduction of multi detector computerized tomography (MDCT) scanner is a blessing to clinical imaging practice. Due to latest applications demand for better technology use of CT has continuously increased. **Aims:** the main objective is to evaluate the role of computerized tomography scan (CT scan) in detecting staging of esophageal cancer. **Material and methods:** The is a prospective study which was carried out in the Department of Radio diagnosis, Shri Vinoba Bhave Civil Hospital, Silvassa DNH India during a period of 1 year. Total 100 patients presenting with clinical symptoms and signs pertaining to carcinoma of esophagus were included in this study. For all these patients, on the basis of histopathological examination (HPE) report i.e. those patients in which HPE report confirmed presence of carcinoma of esophagus were include in this study and CT findings were confirmed by biopsy report, postoperative study or follow up CT scan. **Result:** Patients of age group between 20 to 80 years were included in this study. The most age prevalence in study was between 41-60 yrs. Out of 50 patients 54% male and 46% female was affected. There is a significant of male among the patients studied, which furthermore corresponds favorably with similar studies worldwide. It shows that the middle and lower third of esophagus is more affected by esophagus carcinoma than upper third esophagus as shown in above table. According to studies till date, there is no mortality had been reported in esophagus carcinoma staging. However, staging was maximum in T3 stage patients 28 (56%) followed by 13(26%) patients with T1 and T2 staging and least 9 (18%) accounted for T4 staging. The most common asymmetrical wall thickening was observed in maximum number of patients 32 (64%) and Symmetrical wall thickening was observed 18 (36%) of patients. **Conclusion:** CT scan plays significant role in preoperative staging of esophageal cancer. CT scan is only modality which has established improvement of esophageal cancer and operation resection rate in treatment. Therefore it is rapid and noninvasive modality to evaluate local extension of the tumor and to detect distant metastases and lymphadenopathies.

Keywords: Esophagus carcinoma, CT scan, staging, Multidetector computerized tomography

INTRODUCTION

Among all cancers carcinoma of esophagus is also one of the most lethal cancers. Because of its extramural disease spread and late presentation which lead to poor long term projection with a 5 year survival rate of less than 10%. In worldwide carcinoma esophagus is eight most commonly occurring carcinoma. It is a common cause of cancer deaths in developing countries. In India especially Jammu and Kashmir is one of the

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states where there is high incidence of esophageal cancer of the "CentralAsian esophageal cancer belt"[i]. Esophagus is muscle of hollow tube which is about 25-30 cm long beginning at C6 vertebra, cricoid cartilage level and ending at T11 level then enters the diaphragm and joins the cardia of stomach. Esophagus lies anterior to vertebral column and posterior to trachea. Esophagus is well seen on CT images throughout its course. Esophageal tumors consist of carcinomas approximately 90% with 40-60% of squamous cell type (SCC) and 30-50% for adenocarcinoma of the gastro-esophageal junction (GEJ), with representing 80% of tumors arising from Barrett's esophagus[ii&iii].

The last decade, computerized tomography (CT) technology has led to an early detection of cancers which helps for decreasing mortality rate. Due to introduction of multi detector computerized tomography (MDCT) scanner is a blessing to clinical imaging practice. Due to latest applications demand for better technology use of CT has continuously increased[iv]. For the last few years, development of rapid technological advances in cross-sectional imaging modalities. This combined with increased number of scanners to enable multiple new modes of imaging the esophageal carcinoma. Hence, viability to conclude possible of the fair results revealing axial imaging using MDCT equipped with slice thickness of 16mm cannot be ruled out[v]. For evaluating the Esophagus in both the outpatient and emergency room settings Computed tomography (CT) has become an indispensable tool[vi]. During the sixth and seventh decade of life comparatively esophageal cancer occur in men than in women. It becomes more common with advancing age and about 20 times more common in persons after attaining the age of 65 years. Multi detector computerized tomography (MDCT) is used for diagnosing Esophagus carcinoma which is more useful technique of radio imaging modality for staging and management. It is also give the picture about the severity of the esophageal cancer which is helpful for the clinicians to plan and conceive appropriate treatment. It can also used to detect distant metastasis[vii]. In this study the main objective is to evaluate the role of computerized tomography scan (CT scan) in detecting staging of esophageal cancer.

Material and methods:

The is a prospective study which was carried out in the Department of Radio diagnosis, Shri Vinoba Bhave Civil Hospital, Silvassa DNH India during a period of 1 year. Total 100 patients presenting with clinical symptoms and signs pertaining to carcinoma of esophagus were included in this study. For all these patients, on the basis of histopathological examination (HPE) report i.e. those patients in which HPE report confirmed presence of carcinoma of esophagus were include in this study and CT findings were confirmed by biopsy report, postoperative study or follow up CT scan.

In this study included criteria in diagnosing the lesion were age of the patients, site of involvement, length of the involved segment, degree of wall thickening, homogeneous or heterogeneous enhancement , symmetric or asymmetric thickening and associated findings like soft tissue mass, lymph nodal and distant metastases. All patients were randomly selected for study. All examinations were done on 16 slice Toshiba Activion MDCT. The patient was made to lie supine on CT table with comfortable arms positioned above the head in the head-arm rest and lower legs supported. Patient was asked to hold the breath when topogram was taken. The patient was administering to spiral CT scan. Non-contrast 8mm contiguous axial sections were also taken from the level of domes of diaphragm up to the level of third lumbar vertebra.

Result:

Patients of age group between 20 to 80 years were included in this study. The most age prevalence in study was between 41-60 yrs. Out of 100 patients 67% male and 33% female was affected. There is a significant of male among the patients studied, which furthermore corresponds favorably with similar studies worldwide.

Table1: Number of cases distribution age wise.

Age group	No. of patients	Percentage (%)
20-30	4	8
31-40	6	12
41-50	14	28
51-60	10	20
61-70	7	14
71-80	9	18

Total 50 patients were include in which 15 patients with less than 55 years of age and 26 patients were equal to or greater than 60 years of age. There were 14 patients between 41-50 years of age as shown in above table.

Table 2: Gender wise distribution of cases

Gender	No. of patients	Percentage (%)
Male	27	54
Female	23	46

In the study group, out of total 50 patients- 27 males and 23 females. Male patients 27(54%) were more in number as compared to female patients 23 (46%).

Table 3: Location of the oesophageal cancer lesion.

Location	No. of patients	Percentage (%)
Lower 3rd	23	46
Middle 3rd	21	42
Upper 3rd	6	12

Out of 50 patients lesions with location of esophagus, 23(46%) in the lower third, 21(42%) in the middle third of esophagus where as 6(46%) in the upper third of esophagus. Therefore it shows that the middle and lower third of esophagus is more affected by esophagus carcinoma than upper third esophagus as shown in above table.

Table 4: Wall attenuation of all lesions on MDCT scan

Wall attenuation	No. of patients	Percentage (%)
Homogeneous	28	56
Heterogeneous	22	44

Most common type of wall attenuation was observed to be homogeneous in 28(56%) followed by heterogeneous 22 (44%) patients.

Table 5: Esophageal wall thickening of the involved portion

Wall thickening	No. of patients	Percentage (%)
Symmetrical	18	36
Asymmetrical	32	64

In this study out of 50 total patients, two different types of wall thickenings of the involved portion have been reported. The most common asymmetrical wall thickening was observed in maximum number of patients 32 (64%) and Symmetrical wall thickening was observed 18 (36%) of patients.

Table 6: Carcinoma esophagus staging

Staging	No. of patients	Percentage (%)
T1 and T2	13	26
T3	28	56
T4	9	18

According to studies till date, there is no mortality had been reported in esophagus carcinoma staging. However, staging was maximum in T3 stage patients 28 (56%) followed by 13(26%) patients with T1 and T2 staging and least 9 (18%) accounted for T4 staging.

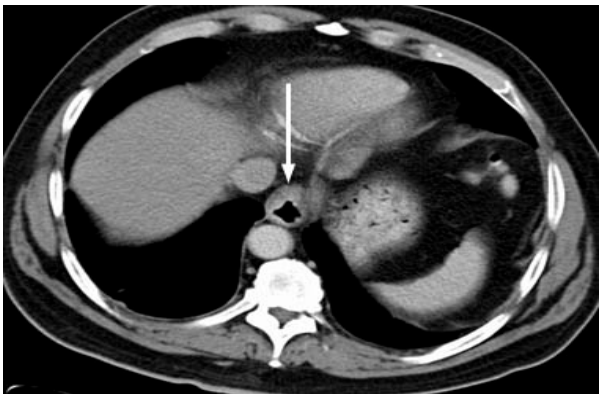

Fig. 1: CT showed circumferential thickening at the GE-junction (shown by arrow) consistent with the site of tumor. There were gastrohepatic ligament (shown by arrow), lymph nodes seen at the right hilum (shown by arrow) and celiac axis (shown by arrow).

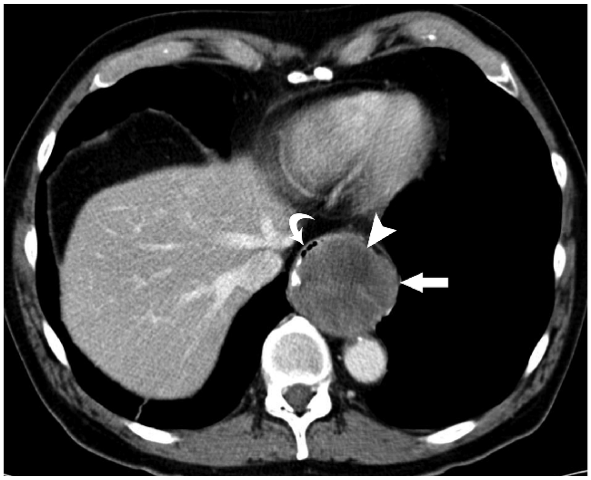

Fig. 2: Axial image from a contrast-enhanced CT scan showed hypoattenuating well-circumscribed mildly enhancing intraluminal mass in the lower esophagus (arrow). Subtle low attenuation area of necrosis within the mass (arrowhead) is showed. Compressed lumen of the esophagus containing small amount of oral contract is seen in CT scan (curved arrow).

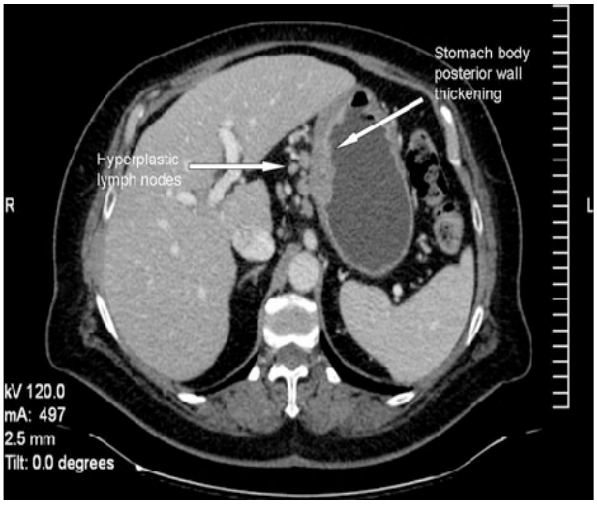

Fig. 3: CT scan showed of irregular thickening of the posterior wall of the stomach body, associated with hyperplastic lymph nodes along with the lesser curvature of the stomach, liver hilum and celiac, portacaval and inter-aorto-caval regions, as well as splenomegaly

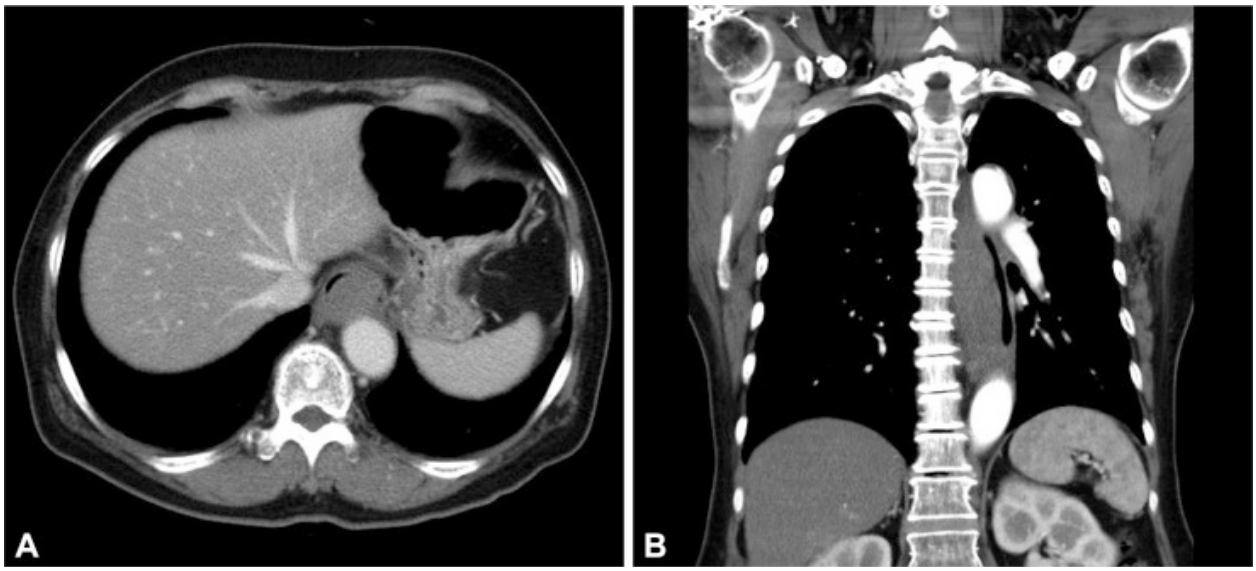

Fig. 4: Chest computed tomography (CT) images on admission. (A) Transverse view of contrast enhanced CT showed a non-enhancing mass involving the posterior wall of the esophagus. (B) Coronal view of contrast enhanced CT showed an elongated non-enhancing mass involving the entire esophagus.

Discussion:

According to anatomical position of the body, Esophagus is a part of gastrointestinal tract. Its main function is to transport food boluses from the pharynx to the stomach through peristaltic movement. Carcinoma Esophagus is the fifth common cause of deaths outstanding to concerned disorder. It is also eighth leading cause of cancer mortality in worldwide. In addition, due to eruption of appropriate tumors which have not been detected at the initial stage relative survival rate has been showing declining

trends. Therefore, early accurate pre-treatment staging of esophageal cancer become an integral part for assessing operability and determining a suitable treatment plan. Although anatomic classifications have been devised as under, yet it is a matter of great concern to check the carcinoma accordingly[viii].

In present study carcinoma esophageal staging had been carried out revealing. Most of the patients (56%) were categorized under T3 stage followed by (26%) under T1 and T2 stages and (18%) under T4 stage. In India esophageal cancer is one of the common malignant tumors. For qualitative diagnosis, position, morphology and size of the esophageal lumen can be visualized on CT scan.

In general, cancer of esophageal is quite poor, because most patients present with advanced disease. By the time going symptoms such as dysphagia start manifesting cancer which has already well progressed. Approximately 15% is the overall five-year survival rate, with life expectancy of less than one year[ix].

Americans- African five more times likely to develop squamous cell carcinoma than other socioeconomic group. Risk factors for squamous cell carcinoma of the esophagus are well known as e.g. as Alcohol, tobacco, diet. Risk factors for the esophageal adenocarcinoma are less clear[x].

Males are 4-6 times more susceptible to develop carcinoma than females which is similar to this study. In the 1990s, North America and Europe the incidence of adenocarcinoma was 100%. it had a strong correlation with reflux and resultant Barrett's esophagus due to the dietary factors and chronic irritation of the mucosal lining[xi].

Although other techniques are used MDCT currently the most commonly examination used in preoperative esophageal cancer staging. It gives information concerning the local extension of the mass and to detect distant metastases and lymphadenopathies rapidly and noninvasively, with overall diagnostic accuracy values of 59-82%[xii,xiii,xiv,xv,xvi&xvii]. Most frequently in diagnosis CT scan is used, while it clearly shows the presence of tumor. It is only 49% to 60% accurate in staging depth of tumor according to published reports[xviii&xix].

According to study of Triantafillidis et al it expressed views that one of the most useful and widely used modern methods for pre-operative staging of patients with esophageal carcinoma is computed tomography (CT)[xx].

Study done by Rice et al has established that because the diagnosis was rarely made carcinoma of the esophagus had a poor prognosis. However, often invasive pre-operative examinations, surgical exploration has proven to be the only accurate method to determine actual tumor extent[xxi].

Conclusion:

For carcinoma esophagus MDCT has been found to be the most valuable and preferential technique for planning operational strategy commonly used diagnostic technique though various diagnostic techniques are available which revealed as CT images are very clear and distinct with high density resolution in human tissue. CT scan plays significant role in preoperative staging of esophageal cancer. CT scan is only modality which has established improvement of esophageal cancer and operation resection rate in treatment. Therefore it is rapid and noninvasive modality to evaluate local extension of the tumor and to detect distant metastases and lymphadenopathies.

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