PJCTS 2006;V:273-277

USE OF CT THORAX / UPPER ABDOMEN FOR PREOPERATIVE STAGING OF CARCINOMA OESOPHAGUS PESHAWAR EXPERIENCE OF 359 CASES

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ABSTRACT

OBJECTIVE: To assess use of CT scan as a preoperative staging tool for carcinoma oesophagus.

MATERIAL & METHODS: This observational descriptive study was conducted at Department of Cardiothoracic surgery, Lady Reading Hospital, Peshawar from June 2002 to June 2006.Computerized clinical data of 359 cases of carcinoma oesophagus was retrospectively analyzed. All patient had apart from routine investigations, barium studies, endoscopy and biopsy, CT Thorax / Upper abdomen with oral and I/V contrast, abdominal ultrasound. Irresectable lesions had their scans reviewed independently by another radiologist, who was not aware of the operative findings.

RESULTS: Out of 359 cases, 210 were males and 149 were females with a mean age of 51.6 years. The age range was 17 – 80 years. 103 (28.69%) cases were found to be inoperable on preoperative staging and 239 cases were deemed operable for oesophagectomy. Out of these 239(66.57%) cases despite being reported operable on preoperative CT scan, 20 (8.36%) cases were found to be irresectable on the operative table. Out of 20 irresectable carcinoma oesophagus, pancreatic involvement was found in 10(50%) cases, aorta was involed in 4(20%) cases, trachea 2(10%) cases, pulmonary hilum 2(10%) cases, liver mets 1(5%) case and malingnant ascites/pleural effusion 1(5%) case, all of which had been missed by preoperative CT Thorax / upper and abdominal ultrasound. These 20 patients had their CT scans reviewed by another radiologist, who was not informed of the preoperative findings. Review revealed 3(15%) cases where previous report had missed out advanced disease like involvement of trachea in 2(10%) cases and aorta in 1(5%) case. In 6(30%) cases she agreed with preoperative reports. In 11(55%) cases she refused to commit as the scans were substandard and correct protocols for CT scan had not been followed.

CONCLUSION: Following recommended protocols religiously would greatly increases the accuracy of CT Thorax/Upper abdomen in preoperative staging of carcinoma oesophagus.20/239 (8.36%) irresectable in what were preoperatively operable could have been reduced to 6/239 (2.51%)if correct protocols had been followed.

INTRODUCTION

Carcinoma of the esophagus comprises the vast majority of malignant tumours and represents the seventh most common malignancy world wide, with its incidence reaching endemic proportions in specific geographic locations in Asia and Africa.[1]

One of the major development in the surgical therapy of the oesophageal cancer has been the marked reduction in surgical morbidity and mortality as a result of staging technique, patient selection and support system.[2,3,4]

The modern staging of carcinoma of the oesophagus is based on the tumor/ node/ metastasis (TNM) classification developed by the American joint committee on cancer.[5] Imaging modalities used in esophageal cancer staging include computed tomography (CT), endoscopic ultrasonography (US), fluorine 18 fluorodeoxyglucose (FDG) positron emission tomography (PET), and techniques that involve minimally invasive surgery, such as laparoscopy and thoracoscopy.[6,7,8]

The accuracy of endoscopic US for estimat-

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ing the depth of penetration of the primary tumor has been validated, but endoscopic US has been shown to be inaccurate in the evaluation of nodal status.[7,8,9] Recently, a combination of thoracoscopy and laparoscopy has been introduced for detection of regional and distant metastases, and high accuracy rates (93% for thoracoscopy and 94% for laparoscopy) have been achieved. However, these procedures are invasive.[9,10]

FDG PET has been reported to be more sensitive than CT in the detection of primary tumor and distant metastases.[11,12,13] The functional images of FDG PET are not only complementary to the images obtained with more traditional modalities but may be more sensitive because alterations in tissue metabolism generally precede an anatomic change.[14] There have been several clinical reports regarding the efficacy of FDG PET in the preoperative evaluation of esophageal cancer.[13,15,16] However, the role of PET in the detection of nodal metastasis is still controversial.[13,16,17]

PET / CT is now the favored modality along with preoperative laparoscopy during which feeding jejunostomy is also placed. However, we do not have accessed to these modalities and the main stay of our preoperative staging remains CT Thorax / upper abdomen. Experience with this was audited to identify pitfalls.

MATERIALS & METHODS

From June 2002 to June 2006, a retrospective descriptive analysis was done of 359 patients (210 were males and 149 were females with a mean age of 51.6 years. The age range was 17 – 80 years) admitted as a case of carcinoma esophagus in Department of Cardiothoracic Surgery, Lady Reading Hospital, Peshawar.

The data base included data regarding all age, sex and preoperatively staged patient. All those with inoperable tumours on preoperative assessment (clinical examination, general fitness, barium, Endoscopy & histology, CT Thorax/Upper Abdomen, Abdominal Ultrasound) and unfit for surgery were excluded from the study. All patients had apart from routine investigations, barium studies, endoscopy and biopsy, C T Thorax/upper abdomen with oral and I/V contrast, abdominal ultrasound. Protocols for CT Thorax / upper abdomen for preoperative staging of carcinoma oesophagus were discussed with radiologists and consensus was built on giving oral and I/V contrast, with fine cuts at the level of tumour, and again at the level of pancreas but in the prone position to better visualize the pancreas.

All those considered resectable were than referred for anesthetic opinion and those who were finally declared fit were booked for surgery. Those found irresectable peroperatively had their scans reviewed independently by another radiologist who was not informed of operative findings.

RESULTS

Out of 359 cases, 186 were males and 134 were females with a mean age of 51.6 years. The age range was 10-80 years. Majority of our patients (135) hailed from Afghanistan. Among these 51 patients were from Mazar Sharif, 33 from Kabul, 27 from Jalalabad, 9 each from Harat and Paktia while 3 each was from Uzbekistan and Turkmenistan. 103(28.69%) cases were found irresectable and 239 cases were found operable for oesophagectomy. Out of 239(66.57%) cases 20 (8.36%) cases were found to be irresectable on the operative table. Out of 20 irresectable cases the causes of irresectability were pancreatic involvement 10 (50%), aortic involvement in 4(20%), trachea 2(10%) cases, pulmonary hilum was involved in 2(10%) cases, liver mets in 1(5%) case and malignant ascites/pleural effusion in 1(5%)case. Retrospective review of scans of these patients by another radiologist was able to detect aortic involvement in two cases, tracheal in one case. In six cases review radiologist did not differ from the original reporting radiologist. In eleven cases she refused to commit as preoperative protocols of CT had not been followed i.e. (1) Liver had no precontrast scans, (2) Pancreas was not properly visualized i.e. fine cuts in the prone position had not been taken; so out of 20, 11(55%) had unsatisfactory CT scans, 3(15%) had been misreported previously while in 6(30%) cases the opinions of the two radiologists did not differ.

DISCUSSION

Carcinoma of the oesophagus originates in the epithelial lining and spreads into and through the wall of the esophagus and throughout the draining lymphatics to lymph nodes. Oesophageal carcinoma readily disseminates hematogenously to distant site.

The presence of lymph node metastases is an important prognostic predictor and is a marker for systemic spread of the disease.[18,19] The depth of penetration of the primary tumor in to the oesophageal wall predicts the presence or absence of lymphnode metastases, with approximately 85% of T3 tumors being associated with lymphatic spread.[1] Accurate imaging of the primary tumor in patients who have esophageal carcinoma is therefore important, not only for determining resectability in patients who have locally advanced disease but also predicting prognosis in patients who have disease that appears to be limited to the oesophagus.

Surgical resection is still the only curative treatment in patients with esophageal cancer, but is associated with a considerable morbidity and even mortality.[20,21] In esophageal cancer preoperative staging and risk analysis are necessary to reduce the postoperative complication and to select those patients who will benefit from surgery.[21,22]

Preoperative tumour staging is done with a combination of tests, which should include CT, FDG PET, EUS and FDG PET/CT for best noninvasive staging and more invasive technique used on an individual basis.[23,24,25,26,27]

Intravenous and oral contrast-enhanced CT Thorax/UpperAbdomen remains the workhorse for imaging patients who have carcinoma of the oesophagus to rule out distant metastatic lesions because it allows assessment of the three most common sites of distant metastases (liver, bone, adrenal glands). Scan should be obtained from the base of the neck (thoracic inlet) through the liver and adrenal glands in the upper abdomen metastatic deposits in the liver usually appear as hypodense, ill defined lesion on pre contrast CT scans.[28,29]

EUS great strength lies in its ability to visualize the oesophageal wall in greater detail than any other imaging modality. The oesophageal wall is seen as four distinct layers using EUS: mucosa, muscularis mucosa, submucosa and muscularis propia. A fifth layer corresponding to perioesophageal fat is also readily discernable using EUS. Large review series place the accuracy of EUS in determining the depth of invasion of oesophageal carcinoma at approximately 85% with the identification of T2 tumors being the least accurate.[24,30]

In recent years the role of FDG – PET has been evaluated for the detection of lymph node metastases in patient who have oesophageal cancer. FDG – PET is physiologic examination that has poor anatomic definitions, which severely affects its ability to predict N1 disease accurately in the peritumoural location. In this regard, most oeosphageal tumours are intensely FDG avid, further inhibiting the resolution of the study and making it easy to miss metastatic nodes that are adjacent to the primary tumour. In contrast, when metastatic lymph nodes are located more remotely, the accuracy of FDG – PET increases. The differentiation of FDG-avid peritumoral nodes from the primary tumour might be aided by the development of CT/PET fusion scanners, in which the anatomic detail of CT is combined with the physiologic nature of FDG – PET, but this scenario remains to be seen.[31,32]

The staging of the esophageal cancer is done with the help of TNM classification after performing these tests.[33]

In our setup we do not have the facility of EUS and FDG PET SCAN, so we rely on the barium study, endoscopy with biopsy, CT Thorax/Upper Abdomen and abdominal ultrasound. After doing the barium study we come to know the level of the oesophageal tumour. With the help of endoscopy we confirm the diagnosis of barium studies and also biopsy is taken to know the nature of the tumour. Along with CT Thorax / upper abdomen and abdominal ultrasound also advised to rule out the distant metastasis. CT scans were reported by radiology consultants and also assessed by the operating surgeon. In our study of 359 cases 103(28.69%) were reported inoperable and 239(66.57%) were reported operable. Out of 239 cases 20(8.36%) cases were found irresectable on the operating table. Retrospective review of scans of these patients by another radiologist was able to detect aortic involvement in two cases, tracheal in one case. In six cases of review radiologist did not differ from the original reporting radiologist. In eleven cases she refused to commit as preoperative protocols of CT had not been followed i.e. (1) Liver had no precontrast scans. (2) Pancreas was not properly visualized i.e. fine cuts in the prone position had not been taken. So out of 20, 11(55%) had unsatisfactory CT scans, 3(15%) had been misreported previously while in 6(30%) cases the opinions of the two radiologists did not differ.

There are limitations of CT scan as well CT has been described as not being accurate enough for evaluation of metastases to lymph nodes in esophageal carcinoma; widely variable ranges of sensitivity, specificity, and accuracy have been reported for this modality. The sensitivity, specificity, and accuracy, respectively of CT have been reported to range from 8% to 75%, 60% to 99%, and 45% to 96%.[9,10,11,15,14,23,29,34] Because nodal metastasis detection is based on the size of lymph nodes, CT has been no sensitive for depicting metastatic spread to regional lymph nodes, in which tumor cells tend to involve nodes of normal size.

In our study most of the irresectable cases involved the pancreas i.e.10 cases(50%), this is because of the fact that the metastatic lesion may be <1cm and the sensitivity drops precipitously for metastatic deposits <1 cm in diameter or if the scan is performed without the intravenous contrast and fine cuts in prone positions.[30,31,32]

Irresectability rate of 8.36%(20/239 cases) is quite high. However, if you take out 3 cases which were misreported and the 11 cases where quality and technique of CT was poor, this reduces to 6/239(2.51%),[23,34,35,36] which is quite acceptable.

CONCLUSION

In the absence of EUS, PET/CT we are handicapped to rely only on CT Thorax / upper abdomen for preoperative staging. However, if this is done properly with due regards to standard guidelines, especially those pertaining to contrast, fine cuts and varying position of the patient can still be the main workhorse for staging carcinoma oesophagus. Adherence to these protocols can reduce irresectability rate considerably.

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