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The Efficacy of Imaging in Diagnosing Carcinoma Pancreas and to Assess Resectability after Comparing Them with Per-Operative Findings

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Abstract **Original Research Article**

Background: Carcinoma pancreas is increasingly being identified by conventional imaging techniques such as ultrasonography (USG), computed tomography (CT) scans, and magnetic resonance imaging (MRI). Imaging also allows for the evaluation of resectability. MRI and CT scans are not generally available in our nation, and most pancreatic carcinomas are too advanced for curative surgical resection when discovered. These are unresectable pancreatic carcinomas (UCP). ***Objective:*** In this study our main goal is to evaluate the efficacy of imaging in diagnosing carcinoma pancreas and to assess respectability after comparing them with per-operative findings. ***Method:*** This prospective study was done at tertiary medical hospital from January 2021 to January 2022. Where Hospital records of all 150 pancreatic carcinoma patients admitted during the period were retrospectively analyzed. Pre-operatively labeled unresectable carcinoma pancreas patients that underwent laparotomy with histopathological proof during this period were included for the study. Total 150 patients were labeled as 'unresectable carcinoma. All patients were evaluated by USG and CT scan. MRI was done where USG /CT scan had failed to give any clue about the diagnosis in clinically suspected 8 carcinoma pancreas patients. ***Results:*** During the study, majority were belonging to >60 years age group, 65%. USG was able to diagnose 85% with pancreatic cancer followed by CT and MRI scan was able to diagnose 90% and 100% with pancreatic cancer. According to per-operative findings most of the lesions were found at the head of the pancreas, 75%, followed by 16% cases were in body and 9% cases were tail. However, the situation is quite different in USG and CT findings. Where in USG 80% cases were head and In CT it was 70%. Moreover, in MRI it was 78%. According to pre-operative findings ascites was seen in 25% cases, however according to USG it was 18% cases, in CT it was 23%, and in MRI it was 15% cases. USG was able to reveal local extension in 18%, involvement of liver in 13%, mesenteric vessel in 5%, portal vein invasion in 8%, hepatic hilar lymph node in 10% and celiac node in 4%. Where as Ct and MRI both cases It was able to comment about the local extension in 27% and 25%, which is significantly lower than laparotomy findings (34%). ***Conclusion:*** A CT scan should be used to evaluate pancreatic cancer and its unresectability. USG is an excellent option for diagnosing pancreatic cancer but not for determining resectability. MRI is a potential diagnostic technique for both diagnosis and assessing irresectibility, however it is not widely available. Multimodal imaging is superior than single-modal imaging.

Keywords: USG, MRI, CT scan, Pancreatic carcinoma.

INTRODUCTION

Worldwide, the gastrointestinal tract is the most prevalent location of malignancy and the second leading cause of cancer-related death [1]. Carcinoma oesophagus, carcinoma stomach, colorectal cancer, hepatocellular carcinoma, carcinoma pancreas, and cholangiocarcinoma are the most prevalent gastrointestinal malignancies. The incidence of these tumors varies greatly by geographic location and race. The age of presentation differs each nation as well. However, in Bangladesh pancreatic carcinoma is more common [2, 3].

Clinical presentation, laboratory tests, tumor markers, imaging studies, and various endoscopic procedures are used to diagnose pancreatic cancer. A cytological confirmation is required before the tumor is designated as carcinoma pancreatic. During the previous two decades, tremendous progress has been made in the imaging of the lethal illness.

Ultrasonography (USG), endoscopic ultrasound (EUS), surgeon-performed USG, computed tomography (CT) scan, contrast CT scan, magnetic resonance imaging (MRI), and magnetic resonance cholangio pancreatography (MRCP) are all imaging procedures that can aid with pancreatic cancer [4-6].

In this study our main goal is to evaluate the efficacy of imaging in diagnosing carcinoma pancreas and to assess respectability after comparing them with per-operative findings.

OBJECTIVE

To evaluate the efficacy of imaging in diagnosing carcinoma pancreas and to assess respectability after comparing them with per-operative findings.

METHODOLOGY

This prospective study was done at tertiary medical hospital from January 2021 to January 2022. Where hospital records of all 150 pancreatic carcinoma patients admitted during the period were retrospectively analyzed. Pre-operatively labeled unresectable carcinoma pancreas patients that underwent laparotomy with histopathological proof during this period were included for the study. Total 150 patients were labeled as 'unresectable carcinoma.

All patients were evaluated by USG and CT scan. MRI was done where USG /CT scan had failed to give any clue about the diagnosis in clinically suspected 8 carcinoma pancreas patients.

USG findings suggested to diagnose carcinoma pancreas was hypoechoic mass in pancreas and dilatation of both common bile duct and pancreatic duct. In CT scan ill defined hypodense pancreatic mass and dilatation of both common bile duct and pancreatic duct was accepted as carcinoma pancreas. MRI showing hypointense area in pancreas on T1 weighted image sequences was considered as carcinoma pancreas. Imaging findings accepted to label pancreatic carcinoma 'unresectable' were liver meatastasis, the mesenteric involvement, mesenteric vascular invasion, portal venous invasion, celiac lymph node involvement, peritoneal implant, ascites, gross invasion to transverse colon, stomach, duodenum, behind the pancreas and hepatic hilar lymph node involvement.

These findings were compared with per operative findings and summarized. Chi-square ($\alpha 2$) test was applied to show the significance in difference between imaging findings and per operative findings, p-value < 0.01 was taken as significant.

RESULTS

In Table-1 shows age distribution of the study group where majority were belonging to >60 years age group, 65%. Followed by 25% belong to 41-50 years group and 10% belong to 31-40 years age group. The following table is given below in detail:

Table-1: Age distribution of the patients

Age group	%
31-40 years	10%
41-50	25%
>60 years	65%

In Figure-1 shows gender distribution of the study group where majority were male, 69.44%. The following figure is given below in detail:

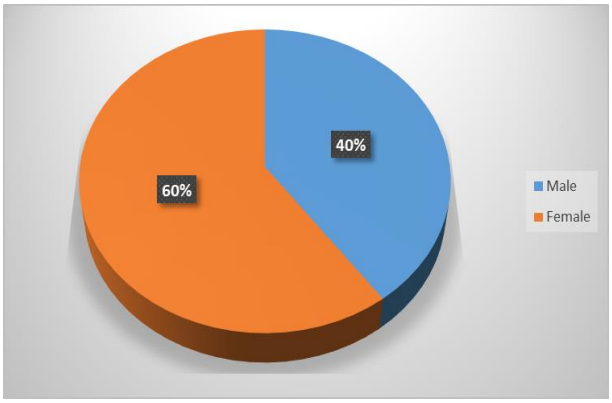

Figure-1: Gender distribution of the patients.

In Table-2 shows percentage diagnosis of pancreatic cancer where USG was able to diagnose 85% with pancreatic cancer followed by CT and MRI scan was able to diagnose 90% and 100% with pancreatic cancer. The following table is given below in detail:

Table-2: Percentage diagnosis of pancreatic cancer

Diagnosis of pancreatic cancer	USG, n=50	CT, n=50	MRI, n=50	Pre-operative findings
	85%	90%	100%	100%

In Table-3 shows distribution of the patients according to location of lesion where according to per-operative findings most of the lesions were found at the head of the pancreas, 75%, followed by 16% cases were in body and 9% cases were tail. However, the situation is quite different in USG and CT findings. Where in USG 80% cases were head and In CT it was 70%. Moreover, in MRI it was 78%. The following table is given below in detail:

Table-3: Distribution of the patients according to location of lesion

Location of lesion	USG, n=50	CT, n=50	MRI, n=50	Pre-operative findings
Head	80%	70%	78%	75%
Body	15%	20%	22%	16%
Tail	5%	10%		9%

In Figure-2 shows distribution of patients according to ascites where according to pre-operative findings ascites was seen in 25% cases, however according to USG it was 18% cases, in CT it was 23%, and in MRI it was 15% cases. The following figure is given below in detail:

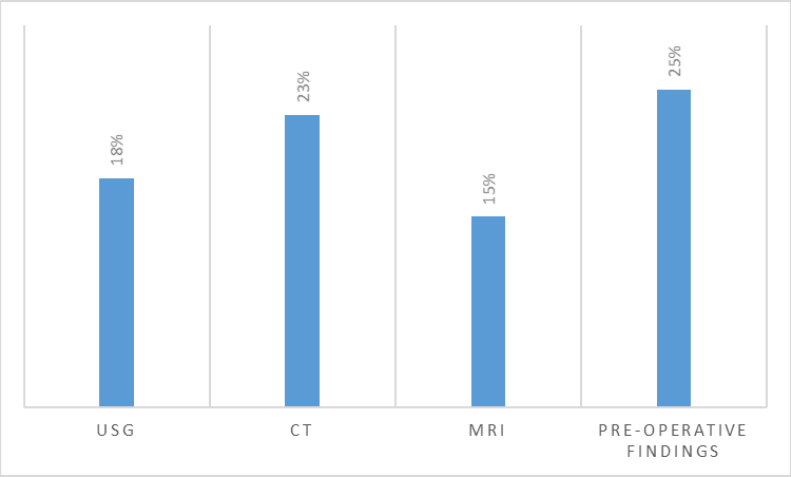

Figure-2: Distribution of patients according to ascites.

In Table-4 shows distribution patients according to involvement of tumor where USG was able to reveal local extension in 18%, involvement of liver in 13%, mesenteric vessel in 5%, portal vein invasion in 8%, hepatic hilar lymph node in 10% and celiac node in 4%. Whereas CT and MRI both cases it was able to comment about the local extension in 27% and 25%, which is significantly lower than laparotomy findings (34%). The following table is given below in detail:

Table-4: Distribution patients according to involvement of tumor

Local extension of tumor	USG	CT	MRI	Pre-operative findings
Behind the pancreases	10%	15%	20%	18%
Stomach	3%	7%	-	9%
Duodenum	5%	2%	5%	5%
Transverse colon	-	3%	-	2%
Involvement	**USG**	**CT**	**MRI**	**Pre-operative findings**
Liver	13%	14%	14%	14%
Mesenteric vessel	5%	12%	12%	12%
Portal vein	8%	20%	20%	20%
Hepatic hilar lymph node	10%	8%	8%	8%
Celiac node	4	12%	12%	12%
The mesentery	-	18%	-	18%
Peritoneum	-	8%	-	8%
Fixed lesion	-	-	-	89%
Mobile lesion	-	-	-	11%

DISCUSSION

Most of the pancreatic cancer patients are aged and the peak incidence is at 5th and 6th decade [8]. Which was supported by our study where majority were belonging to >60 years age group, 65%. Followed by 25% belong to 41-50 years group and 10% belong to 31-40 years age group.

On laparotomy, frequency of involvement of the region of the pancreas was, at the head of the pancreas, 75%, followed by 16% cases were in body and 9% cases were tail. Which was similar to other study where at the head of the pancreas, 74%, followed by 18% cases were in body and 10% cases were tail [9].

Whereas other study reported that, USG is 83% sensitive and 99% specific in diagnosing advanced pancreatic cancer [11]. USG is the first line diagnostic tool in patient having pancreatic tumor. It is 90% sensitive in diagnosing pancreatic cancer [12].

In our study, USG was able to diagnose 85% with pancreatic cancer and missed 15% patients which was confirmed in laparotomy. Regarding diagnosis, USG is moderately accurate (p value < 0.01). USG was able to reveal ascites in 18% patients, local extension in 18%, involvement of liver in 13%, mesenteric vessel in 5%, portal vein invasion in 8%, hepatic hilar lymph node in 10% and celiac node in 4%.

In comparison, laparotomy revealed ascites in 25% patients, local extension in 34%, involvement of liver in 14%, mesenteric vessel in 12%, portal vein invasion in 8%, hepatic hilar lymph node in 20% and celiac node in 8%, the mesentery in 6(12%) and peritoneal involvement in 9 (18%).

From these data, it is clear that USG has failed to detect local extension and involvement of liver, mesenteric vessels, portal vein, regional lymph nodes in significant percentage of patients (p value < 0.01).

To label pancreatic carcinoma as unresectable, the efficacy of USG was found poor Which was significantly lower than actual UCP (50 patients, 100%).

But high frequency USG can outline the pancreas easily and it is safe, easily available, non-invasive and brief; it can also detect dilated bile duct, hepatic metastasis, ascites or coexistent gall stone [13].

Whereas other study reported that, Surgeon performed USG provide rapid and accurate diagnosis of hepatobiliary pathology and may constitute to the management of hepatobiliary disease [14].

CT scan diagnosed 90% of pancreatic carcinoma and had missed 10%. Whereas MRI diagnosed all the 100% as pancreatic carcinoma and had not missed any patient. Which was similar to other study where it was reported that, CT scan diagnosed 89% of pancreatic carcinoma and MRI diagnosed all the 100% as pancreatic carcinoma and had not missed any patient [15].

As a diagnostic tool, CT scan is nearly accurate (p value < 0.01). CT was able to reveal 23% patients with ascites which is near to laparotomy findings 25%. However, MRI had revealed 15% patient with ascites.

In Ct and MRI both cases it was able to comment about the local extension in 27% and 25%, which is significantly lower than laparotomy findings (34%).

In CT scan cases organ involvement which is also significantly lower than actual.

Present study showed better delineation of pancreatic carcinoma than that of other study. Probably due to delay in referral which made it easily detectable. In this study, efficacy of CT scan in diagnosing UCP is lower than shown by other study [16].

Whereas, MRI was able to delineate the features of unresectibility in all (100%) of them. MRI findings are same as laparotomy findings regarding diagnosis or unresectability. MRI clearly displays pancreas and its duct system.

CONCLUSION

A CT scan should be used to evaluate pancreatic cancer and its unresectability. USG is an excellent option for diagnosing pancreatic cancer but not for determining resectability. MRI is a potential diagnostic technique for both diagnosis and assessing irresectibility, however it is not widely available. Multimodal imaging is superior than single-modal imaging.

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