

Original Article

Efficiency of CT & MRI in Diagnosis of Cholangiocarcinoma and Its Histopathological Correlation

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Abstract: Cholangiocarcinoma is the most common primary malignancy of the biliary tract. It is first suspected based on the signs of biliary obstruction, abnormal liver function test and either in ultrasonography or CT done for any other purpose or due to patient signs and symptoms. The diagnosis of Cholangiocarcinoma is very challenging despite various diagnostic methods. Apart from histopathological examination, CT, MRI and MRCP plays an integral role in the diagnosis. This study had involved patient's records including imaging records such as CT plain and enhanced, MRI (T1WI, T2WI and T1+ C, MRCP), histopathological records, and detailed history from patient. The study showed that majority of the patients were of the age group between 47 years and 80 years with mean age 63 years and it was found that there is slight female preponderance which was 60%. Hypertension, diabetes and heart disease are major previously associated disease found. Hilary region was mostly common location of the tumor which was found to be in about 38% of patients. The Contrast enhanced CT was found to be statistically significant in determining the exact enhancement pattern in the diagnosis of Cholangiocarcinoma (P- Value=0.03). MRI pulse sequences Low T1WI and High T2WI signal intensities are frequently associated in the diagnosis of Cholangiocarcinoma (sensitivity 70%) (P- Value < 0.05). Bile ducts are found to be dilated peripheral to the tumor in 70% of the patients. MRCP was found to best in localizing the obstruction in the bile duct and visualization the biliary structures accurately, which aids in the diagnosis of intrahepatic Cholangiocarcinoma. MRI pulse sequences along with MRCP increases the sensitivity in the diagnosis of Cholangiocarcinoma (P- Value <0.005).

Keywords: cholangiocarcinoma, computed tomography, magnetic resonance imaging

1. INTRODUCTION

Cholangiocarcinoma is the most common primary malignancy of the biliary track, Most Cholangiocarcinoma's are well-moderately, or poorly differentiated adenocarcinomas with abundant fibrous stromal [1]. Cholangiocarcinoma with typical imaging features can easily be diagnosed; however, not all the tumors show typical imaging findings, and the tumors may mimic a variety of tumorous and non-tumorous lesions. Understanding the pathologic characteristics of each type of tumor can be helpful in developing a differential diagnosis and in treatment planning. Cholangiocarcinoma is considered to be an incurable and rapidly lethal cancer unless both the primary tumor and any metastases can be fully removed by surgery [2]. While surgical resection remains the only curative treatment, most patients are far advanced

at presentation which leads to high mortality rates. Radiotherapy and systemic chemotherapy have been evaluated in unrespectable Cholangiocarcinoma, but have failed to show satisfactory result several studies had shown that the incidence and mortality of the disease are rising worldwide. Cholangiocarcinoma is a relatively rare form of cancer; the prevalence of CC shows geographic variations, with the highest prevalence being found in Southeast Asia. In the US, the incidence of CC has been steadily increasing over the past decades, varying from 0.72 to 0.88 per 100,000 [3]. There is a higher prevalence of Cholangiocarcinoma in Asia, which has been attributed to endemic chronic parasitic infestation. Cholangiocarcinoma rarely occurs before the age of 40; the typical age at presentation is the seventh decade of life [4]. Men have a higher incidence of CC than women with ratios of 1:1.2–1.5. The prevalence of Cholangiocarcinoma in patients with primary sclerosing cholangitis may be as high as 30%, based on autopsy studies [5]. Multiple studies have documented a steady increase in the incidence of intrahepatic Cholangiocarcinoma over the past several decades; increases have been seen in North America, Europe, Asia, and Australia [6]. The reasons for the increasing occurrence of Cholangiocarcinoma are unclear; improved diagnostic methods may be partially responsible, but the prevalence of potential risk factors for Cholangiocarcinoma, such as HIV infection, has also been increasing during this time frame [7]. Cholangiocarcinoma is classified as either intra hepatic or extra hepatic, with the second-order bile ducts acting as the separation point [8]. Classically, extra hepatic Cholangiocarcinoma has been divided in peripheral and distal extra hepatic Cholangiocarcinoma at the level of the cystic duct The Liver Cancer Study Group of Japan distinguishes three macroscopic growth types for intrahepatic Cholangiocarcinoma: mass-forming type per ductal-infiltrating type; and intraductal-growth type .Cholangiocarcinoma can affect any area of the bile ducts, either within or outside the liver [9]. Tumors occurring in the bile ducts within the liver are referred to as intrahepatic, those occurring in the ducts outside the liver are extra hepatic, and tumors occurring at the site where the bile ducts exit the liver may be referred to as peripheral [10]. A Cholangiocarcinoma occurring at the junction where the left and right hepatic ducts meet to form the common hepatic duct may be referred to eponymously as a Calfskin tumor Although Cholangiocarcinoma is known to have the histological and molecular features of an adenocarcinoma of epithelial cells lining the biliary tract, the actual cell of origin is unknown [11]. Recent evidence has suggested that the initial transformed cell that generates the primary tumor that may arise or originates from a pluripotent hepatic stem cell [12]. Cholangiocarcinoma is thought to develop through a series of stages - from early hyperplasia and metaplasia, through dysplasia, to the development of frank carcinoma - in a process similar to that seen in the development of colon cancer Chronic inflammation and obstruction of the bile ducts, and the resulting impaired bile flow, are thought to play a role in this progression. Histologically, Cholangiocarcinoma's may vary from undifferentiated to well-differentiated. They are often surrounded by a brisk fibrotic or desmoplastic tissue response; in the presence of extensive fibrosis, it can be difficult to distinguish well-differentiated Cholangiocarcinoma from normal reactive epithelium [13]. There is no any particular entirely specific immune histochemical stain developed till date that can distinguish malignant from benign biliary ductal tissue, although staining for cytokeratin, carcinoembryonic antigen, and mucus may aid in diagnosis [14]. Most tumors (>90%) are Cholangiocarcinoma, which is endemic in certain geographic regions, shows a strong association with liver fluke infection and hepatolithiasis, with recurrent inflammation and the high consumption of nitrates, nitrites, dimethyl nitrosamines and N-nitropyrolidines as probable mutagenic cofactors [15]. Three macroscopic types of Cholangiocarcinoma have been characterized and implicated to be of prognostic relevance, but their behavior might be a function of their anatomical location rather than biological characteristic [16]. Per ductal-infiltrating tumors present at an advanced stage with infiltration of the portal pedicle. They arise closer to the hepatic hilum than mass-

forming tumors, which tend to be peripherally located and show portal invasion and intrahepatic recurrence. The intraductal tumor shows the best prognosis, and long-term survival has been reported. Poor prognostic factors include large tumor size, multimodality, lymph vascular, per neural and serosa invasion, lymph node metastases and involvement of resection margins. Survival following surgical resection, the mainstay of treatment, is generally very poor. Differences in geographical rates, gender, race, and risk factors suggest diverse mechanisms are likely to be involved in the multi-step development of Chemically associated carcinogenesis may involve the induction of promutagenic DNA adducts, which occur more commonly in CC tissue compared to controls [17]. The main hepatobiliary risk factors all tend to cause chronic inflammation and/or cholestasis in the bile duct [18]. At the molecular level, Cholangiocarcinogenesis is probably triggered by changes in the bile duct microenvironment secondary to these events The most common physical indications of Cholangiocarcinoma are abnormal liver function tests, jaundice (yellowing of the eyes and skin occurring when bile ducts are blocked by tumor), abdominal pain (30%–50%), generalized itching (66%), weight loss (30%–50%), fever (up to 20%), and changes in the color of stool or urine. To some extent, the symptoms depend upon the location of the tumor: patients with Cholangiocarcinoma in the extra hepatic bile ducts (outside the liver) are more likely to have jaundice, while those with tumors of the bile ducts within the liver more often have pain without jaundice .Blood tests of liver function in patients with Cholangiocarcinoma often reveal a so-called "obstructive picture," with elevated bilirubin, alkaline phosphatase and gamma glut amyl transferees levels, and relatively normal transaminase levels [19]. Such laboratory findings suggest obstruction of the bile ducts, rather than inflammation or infection of the liver parenchyma as the primary cause of the jaundice [20]. There are no specific blood tests that can diagnose Cholangiocarcinoma by themselves. Serum levels of carcinoembryonic antigen (CEA) and CA19-9 are often elevated, but are not sensitive or specific enough to be used as a general screening tool [21]. However, they may be useful in conjunction with imaging methods in supporting a suspected diagnosis of Cholangiocarcinoma Ultrasound of the liver and biliary tree is often used as the initial imaging modality in patients with suspend obstructive jaundice [22]. Ultrasound can identify obstruction and ductal dilatation and, in some cases, may be sufficient to diagnose Cholangiocarcinoma [23]. Computed tomography (CT) scanning and MRI may also play an important role in the diagnosis of Cholangiocarcinoma While abdominal imaging can be useful in the diagnosis of Cholangiocarcinoma, direct imaging of the bile ducts is often necessary. Endoscopic retrograde cholangiopancreatography (ERCP), an endoscopic procedure performed by a gastroenterologist or specially trained surgeon, has been widely used for this purpose [24]. Some authors have suggested that MRCP should supplant ERCP in the diagnosis of biliary cancers, as it may more accurately define the tumor and avoids the risks of ERCP. Latest developed and employed hepatobiliary contrast agent, Geodetic acid has been reported for its usefulness by many authors in their papers for the identification and characterization of focal liver lesions [25]. As approximately 50% of the administered dose of this agent is absorbed up by functional hepatocytes, focal liver lesions without functional hepatocytes are hypo intense (no uptake) on hepatobiliary phase (about 20 minutes after injection), in which contrast washout phenomenon is not seen with hepatobiliary agents. Thus, even though some HCC can show the uptake of geodetic acid [26], both mass forming ICC and poorly differentiated hepatocellular carcinoma are likely to show hypo intense lesions in the hepatobiliary phase, making them indistinguishable from each other. Furthermore, the presence of a fibrous capsule, a characteristic finding of classic HCC [27], cannot be evaluated on hepatobiliary phase [28]. On the other hand, geodetic acid also works as an extracellular contrast agent for the first few minutes. However, it has reported significant success treating early bile duct cancer with liver transplantation using a protocol zed approach and strict selection criteria [29]. Adjuvant therapy followed by liver transplantation

may have a role in treatment of certain unrespectable If the mass (tumor) detected which can be removed surgically, patients may receive adjuvant chemotherapy or radiation therapy after the operation to improve the chances of cure. If the tissue margins are negative (i.e. the tumor has been totally excised), adjuvant therapy is of uncertain benefit. Both positive and negative results have been reported with adjuvant radiation therapy in this setting, and no prospective randomized controlled trials have been conducted as of March 2007. Adjuvant chemotherapy appears to be ineffective in patients with completely resected tumors. The role of combined chemo radiotherapy in this setting is unclear. However, if the tumor tissue margins are positive, indicating that the tumor was not completely removed via surgery, then adjuvant therapy with radiation and possibly chemotherapy is generally recommended based on the available data [30].

2. MATERIALS & METHOD

This study was conducted prospectively at the Tahir Hospital, Prospective cross-sectional descriptive study and had involve records of patient's details including imaging records (CT, MRI, MRCP), histopathological records, detailed history from patient, physical examinations and investigations. The CT images were obtained from computed tomography Model Optima CT 660 manufactured by GE Healthcare Japan corporation. MRI images were obtained from model GE- MRI discovery 750w. Axial T1W spin echo MR images were produced with a TR/TE range of 600/20–25 msec. T2W spin-echo images were obtained with a TR/TE range of 2000/60–80. Multiple sections were simultaneously obtained in all patients. Section thickness was 5–8 mm with a gap of 2–5 mm. The image matrix was 256 × 192–256, and the field of view was 26–32 cm The single-slice technique was used, and the appropriate axial slice level across the largest diameter of the main tumor was determined on the basis of T1- or T2- weighted spin-echo images. After the injection of a bolus of 0.1 mole/kg of gadopentetate dimeglumine (Magnetism) at a rate of 1–2 mL/sec, dynamic MR images were obtained immediately and then every 1 min for 5 min. Contrast enhanced T1-weighted images were obtained 6–20 min after the administration of gadopentetate dimeglumine. The study was approved by ethical committee of Hubei University of Medicine and Tahir hospital Informed consent was taken from all patients. N=30 patients were prospectively sampled and were included in the study as they qualify inclusion criteria. The data of clinical examination, CT plain and enhanced, MRI images and post processing for enhanced images were stored. For further evaluation, reports of histopathological examination of the tissue sample during surgery were obtained and recorded. All the cancer patients enrolled were without any treatment prior to surgery and without any surgical intervention in the past. To assess the statistical parameters, SPSS 24.0 version software was used. Statistical differences in the imaging features and its correlation with Histopathological findings of Cholangiocarcinoma were analyzed using specific test. For descriptive data frequency and percentage was used. Mean, median and SD was used for the parametric data. For the comparison of two categorical variables Pearson's chi-square test and for the comparison of two normally distributed data T- test and one-way ANOVA (analysis of variance) was used. For all tests, a P- Value < 0.05 was considered significant.

3. RESULTS & DISCUSSION

Based on the CT, MRI imaging features and demographic information and histopathological reports of the total 30 cases which were diagnosed and operated and conformed by histological examination were studied. I had illustrated my findings of my study and interpreted the following results described below in this section.

Table 01: Demographics and baseline characteristics of tumor; Significance value was put < 0.05 (p – value < 0.05)

PARAMETERS	RESULTS		P- Value
Age	47-80 years, Mean 63 ± 8.196 years		0.20
Gender	Male	12(40%)	0.361
	Female	18(60%)	
Presence of risk factors/ any previous disease	HTN	7(23.33%)	0.52
	DM	5(16.66%)	
	Heart disease	3(10%)	
	Abdi. Pain	3(10%)	
	Previous liver disease	3(10%)	
	Jaundice	2(6.66%)	
	Gall stone	2(6.66%)	
	H/O Gastric carcinoma	1(3.33%)	
	No any present	4(13.33%)	
Location	Hilary	11(36.7%)	0.023
	Porte hepatic	10(33.3%)	
	Right lobe	3(10%)	
	Left lobe	3(10%)	
	Other place	3(10%)	
Tumor Size	1-15cm, Mean (5.41 ± 3.627)		0.9
Boundary	Irregular	18(60%)	0.361
	Regular	12(40%)	
Bile duct dilation	Yes	21(70%)	0.045
	NO	9(30%)	
Lymph node invasion	Yes	9(30%)	0.201
	No	21(70%)	
Portal vein invasion	Yes	6(20%)	0.02
	No	24(80%)	

The age distribution among the patients is between 47 years and 80 years with mean age 63 years and standard deviation 8.196. It was found that age of the patients is not found statistically significant. Age is not a determinant for the occurrence of Cholangiocarcinoma (P- Value =0.20). Among these patients

12(40%) of the patients were Male and 18(60%) of the patients were female. It was statistically found that Cholangiocarcinoma can occur in any gender. Gender is not statistically significant (P- Value=0.361).

Table 02: Age distribution in diagnosis of Cholangiocarcinoma

Number	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
30 patients	33	47	80	63	8.196	67.172

It was found that most patients had the previous diseases. Among them Hypertension, Diabetes, heart diseases predominate the most. 7 patients are found to have Hypertension and 5 patients are found to have diabetes and 3 patients are found to have both hypertension and diabetes. Patients who reported to have previous heart diseases are 3 in number, 3 patients present with abdominal pain while first reported, 3 patients are previously diagnosed liver disease, 2 patients present with jaundice at presentation and 2 patients are found to have stone in gallbladder (Cholelithiasis) and 1 patient mention of history of gastric carcinoma before. 4 patients among them did not disclose or reported any previous illness or any associated risk factors. Previous diseases and risk factors may vary among them. Any risk factors or previous diseases reported can be some cause. No any specific type has significance relation among others (P-Value=0.52)

Table 03: Previous diseases and risk factors present among study population in this study

History of any previous illness and risk factors		
Previous Diseases	No. of patients	Percentage of patients
Hypertension	7	23.33%
Diabetes Mellitus	5	16.66%
Heart disease	3	10%
Abdominal pain	3	10%
Previous Liver disease	3	10%
Jaundice at presentation	2	6.66%
Gallbladder Stone	2	6.66%
History of Gastric Carcinoma	1	3.33%
No Any Reported history	4	13.33%

The location of Cholangiocarcinoma among the studied patients is variable, Carcinoma are located at hila region in 11 patients which is 36.7%, at portahepatis in 10(33.3%) patients, at the right lobe in 3(10%), at the left lobe in 3(10%) and at other places in 3(10%) of patients. It is found that the categories of location do not occur with equal profanities. (P- Value=0.023).

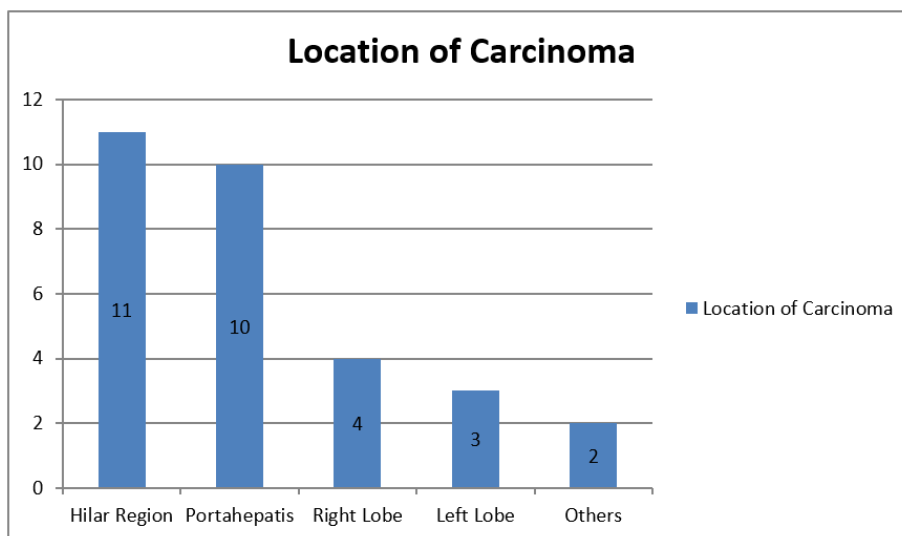


Figure 01: Location of carcinoma in hepatobiliary region

The size of the tumor varies greatly with the minimum size being 1cm and largest size is 15cm. The mean and standard deviation was found (5.41 ± 3.627). The different size of tumor can occur with equal profanities. The size of the tumor was not statistically significant (P- Value=0.9).

Table 04: Tumor Size distribution among the patients

Number	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
30 patients	14	1	15	5.41	3.627	13.158

The Boundary of the tumor shows two different characteristics that is either irregular or regular. The tumor border with irregular boundary are 18(60%) and with clear regular boundary are 12(40%). Here tumor with irregular boundary predominates a little but also there is no any statistical significance. (P- Value=0.361)

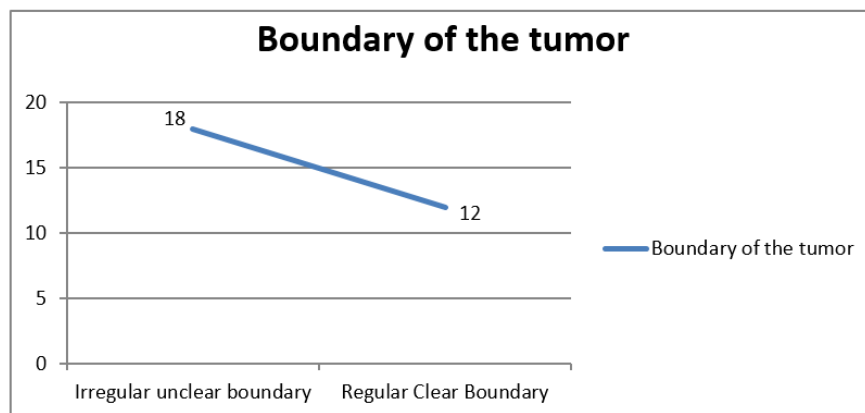


Figure 02: Figure illustrating the boundary of the tumor distribution in patients Bile ducts are found to be dilated in and around the tumor in 21(70%) of patients and not clearly visualized or not dilated in 9 (30%)

of patients. In some patients CT and MRI cannot exactly visualize the status of the bile duct. MRCP helps to correctly define the status of the bile ducts; that they are dilated or not. There is statistical significance that bile duct dilation predominates. (P- Value=0.045).

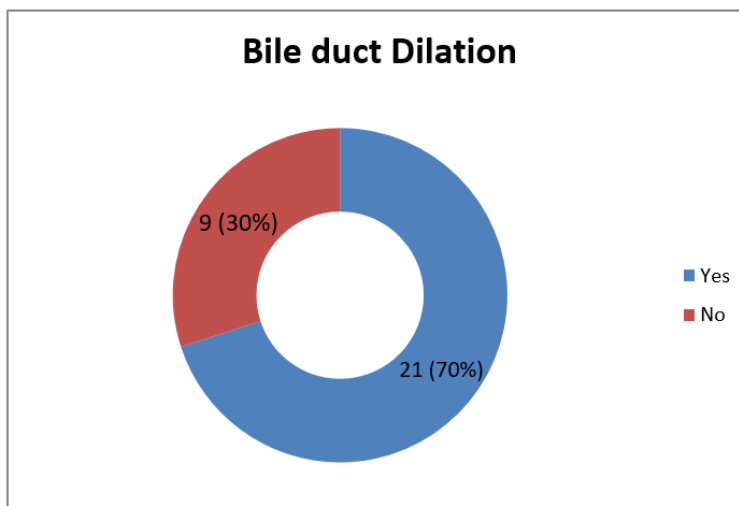


Figure 03: Frequency of bile duct dilation among patients

It was found that among my study patients Lymph node invasion is not really a good feature of Cholangiocarcinoma. As 21(70%) of the patients are found not invading any of the Lymph nodes and only 9(30%) of the patients are found to invading a lymph node. Hilary and portahepatis lymph nodes are found to be greatly involved among these patients. The categories defined by lymph node invasion can occur at equal profanities. There is no statistical significance. (P- Value=0.201).

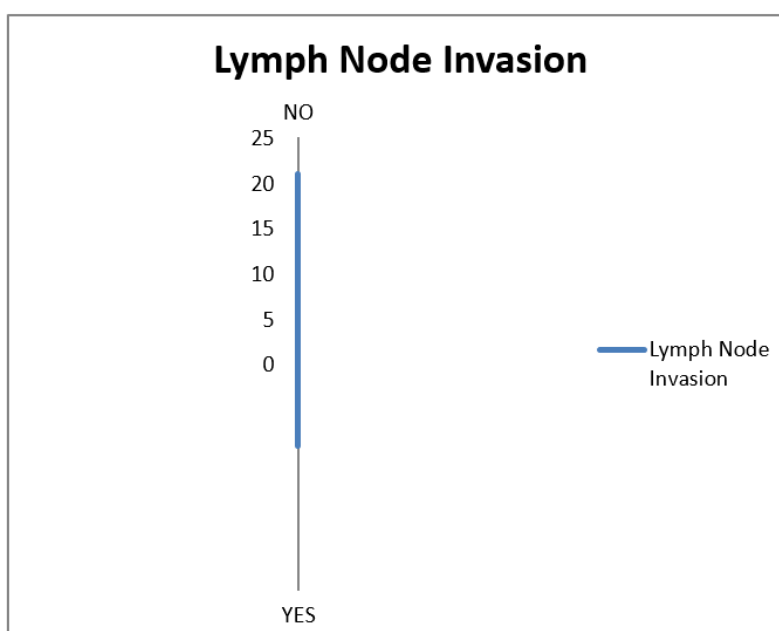


Figure 04: Figure illustrating the Lymph Node invasion by the tumor distribution in patients

It was found that portal vein invasion is not a specific feature of Cholangiocarcinoma. Only 6(20%) out of 30 patients had portal vein invasion. The two categories of portal vein invasion do not occur with equal profanities. There will be no any portal vein invasion, which is statistically significant. (P- Value=0.02)

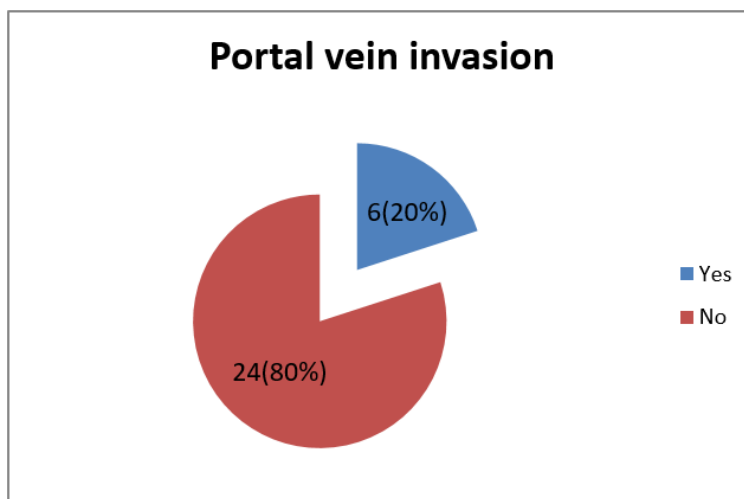


Figure 05: Figure illustrating the Portal vein invasion by the tumor in patients

Table 05: MRI Pulse sequences and CECT features. Significance level was put less than 0.05 (P < 0.05)

Parameters	Result		P- value
CECT	Peripheral enhancement	19(63.3%)	0.03
	Progressive mild enhancement	8(26.7%)	
	From centre to periphery	2(6.7%)	
	No any enhancement	1(3.3%)	
T1WI	Low signal intensity	24(80%)	<0.05
	Iso- signal Intensity	6(20%)	
T2WI	Marked High signal intensity	21(70%)	<0.05
	Moderate high signal intensity	5(17%)	
	Mild High signal intensity	4(13%)	

3.1 Computed Tomography (CT) Findings

The most typical findings of the examination were a single mass. The mass most commonly displayed the wide difference in heterogeneity low density with most of with irregular unclear boundaries. There was the arterial phase enhancement with persistence of enhancement even in portal and delayed phase, which justifies the presence of fibrosis in the tumor. The enhancement was shown as peripheral enhancement, progressive mild enhancement, and enhancement from center to the periphery. In most patients delayed phase enhancement was shown in the majority of the cases. 19 patients out of 30 demonstrate stable peripheral enhancement, 8 patients demonstrate progressive mild enhancement, 2 patients demonstrate

enhancement from center to periphery. 1 patient cannot show any enhancement at all. There is statistical significance in the enhancement patterns in CECT of Cholangiocarcinoma (P- Value=0.03).

Table 06: Enhancement Patterns seen in contrast CT

Enhancement patterns	No of cases	Frequency
Peripheral enhancement	19	63.3%
Progressive mild enhancement	8	26.7%
From center to periphery	2	6.7%
No any enhancement seen	1	3.3%

In majority of cases we found that mass is ill-defined with irregular border. There is peripheral rim like enhancement in the arterial phase. There is the persistent of enhancement in the portal phase and delayed phase. There is the presence of bile duct dilation.

3.2 MRI Findings

The intensity of signal on T1WI was almost low in majority of cases; 24(80%) out of 30 patients who had T1WI had low signal intensity and 6(20%) patients had shown Isa- signal intensity. We found the signal intensity of T1WI is statistically significant. Low signal intensity in T1WI is significant in the diagnosis of Cholangiocarcinoma. (P- Value<0.05). 21(70%) out of 30 patients had marked high signal intensity on T2WI; 5(~17%) patient shows moderate high signal intensity and 4 (~13%) with mild high signal intensity on T2WI pulse sequence. The signal intensity of T2WI was also statistically significant in defining Cholangiocarcinoma. High signal intensity is very significant than other signal. (P- Value<0.05). The intensity of signal was homogenous in 19(~64%) out of 30 patients in T1WI. In T2WI homogeneity of signal was only present at 10(~34%) patients. It was found that sensitivity of MRI pulse sequences was 70%.

Table 07: Signal intensities in MRI pulse sequences

Signal Intensity	Pulse Sequence	
	T1WI	T2WI
Isa	6	0
Low	24	0
Mild high	0	4
Moderate High	0	5
Marked High	0	21

Contrast enhanced T1-Weighted images revealed three types of enhancement patterns. 21(70%) patient's images show Early peripheral enhancement with centripetal fill, 6(20%) showed early peripheral enhancement but not centripetal filling and 3(10%) shows progressive and complete enhancement. Contrast enhanced T1Weighted images has great role in differentiating Cholangiocarcinoma from others. The contrast enhancement pattern of Early peripheral enhancement with centripetal fill is statistically very significant in the correct diagnosis of Cholangiocarcinoma (P- Value=0.02). Bile ducts dilations are found in majority of patients

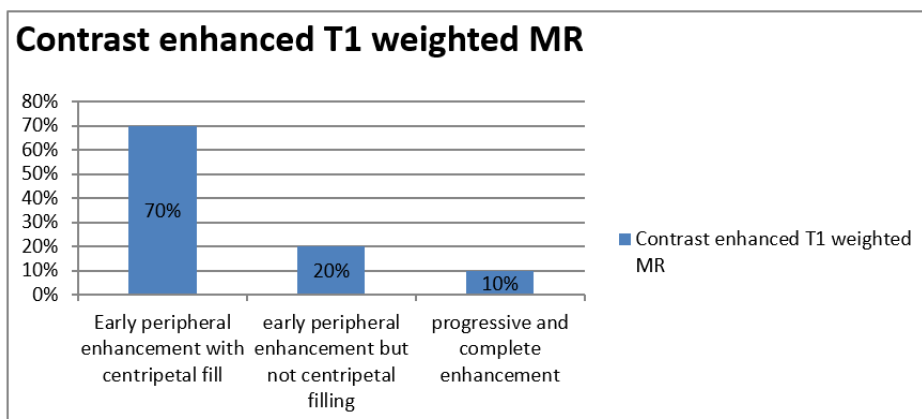


Figure 06: Bar chart showing the distribution of enhancement pattern in T1C

Table 08: Correlation of MRI pulse sequences with Histopathological findings

Chi-Square Tests of Independence						
	Value	Ds	Asymptotic Significance (2-sided)	Significance	Monte Carlo Sig. (2-sided)	
					99% Confidence Interval	
					Lower Bound	Upper Bound
Pearson Chi-Square	.443 ^a	2	.801	1.000 ^b	.858	1.000
Ratio	.728	2	.695	1.000 ^b	.858	1.000
Fisher's Exact Test	1.374			1.000 ^b	.858	1.000
N of Valid CA's	30					

Table 09: Correlation of Enhanced CT with Histopathological findings

Chi-Square Tests of Independence						
	Value	Ds	Asymptotic Significance (2-sided)	Significance	Monte Carlo Sig. (2-sided)	
					99% Confidence Interval	
					Lower Bound	Upper Bound
Pearson Chi-Square	.599 ^a	3	.897	1.000 ^b	.858	1.000
Likelihood Ratio	.933	3	.817	1.000 ^b	.858	1.000
Fisher's Exact Test	3.389			1.000 ^b	.858	1.000
N of Valid Cases	30					

Magnetic resonance cholangio-pancreatography (MRCP) is a heavily T2-weighted sequence particularly employed for the visualization of biliary channels. In our study we found that MRCP helps a lot in

visualization of the biliary tract. It exactly identifies the location of the obstruction of the biliary structures as well as the cystic and pancreatic duct. On MRCP, the lesions call for asymmetric constriction of the bile ducts, with or without obstruction, irregular luminal narrowing, sudden luminal narrowing and as intraluminal filling defects. Here in this study MRCP had exactly characterize the position and the condition of the bile duct, cystic duct and pancreatic duct, in those cases where CT and MRI fails to locate. Out of 30 cases it had identified the bile duct dilation and the level of obstruction in 21 cases (70%). It is statistically significant that it can clearly identify the features and locate the position and the level of obstruction of bile duct. (P- Value<0.05)

3.3 Histopathological Results

All lesions found are heterogeneous rather than homogenous. Lesions try to shows alike histological criterion. Coagulate necrosis and fibrosis was observed. Cell debris and cummin production was seen. At the tumor edge, many malignant cells and various degrees of fibrosis were found. Feasible tumor cells in the tumoral center were generally scanty. The area of fibrosis was more prominent in the center and was mixed with various levels of coagulate necrosis. A single tumor displayed a large amount of cummin within which feasible tumor cell nests were suspended. Iron deposition and fatty infiltration were not noted.

3.4 DISCUSSION

The radiological appearances of Cholangiocarcinoma and its radiological correlation has been largely discussed in many reports of the radiological literature [31]. Earlier studies highlighted the difficulties in recognizing the majority of cholangiocarcinomas due to the fact that their imaging findings are distinct from those of other hepatic tumors, which can be considered misleading, and the absence of contemporary diagnostic tools [32]. On the other hand, subsequent reports have observed a considerable number of advancements in radiological imaging, which can propose a great deal more characteristics that can serve as a reliable indicator of cholangiocarcinoma's presence. During the course of my current research, I discovered that the age group that is most frequently affected by cholangiocarcinoma is between the ages of 47 and 80 years old, with 63 years being the mean age. This finding lends credence to the notion that cholangiocarcinoma is uncommon before the age of 40, and that the normal age at presentation is the seventh decade of life. When I looked at the gender distribution of cholangiocarcinoma in my current study, I discovered that there is a slight female dominance to male that does not go along [33]. In this study, the author indicated that the incidence of cholangiocarcinoma is higher in males than in females, with ratios ranging from 1:1.2 to 1.5. Hypertension, diabetes, heart disease, and to a lesser extent abdominal pain, jaundice, and cholelithiasis were found to be the most common risk factors for cholangiocarcinoma and previous diseases associated with patients with cholangiocarcinoma. This is in accordance with the findings of an article that was published by Grainger MJ, West J, and Solaymani-Dodaran M, who stated that diabetes and obesity are the most significant risk factors of cholangiocarcinoma [34]. In our study where other risk factors and previous diseases except diabetes do not goes well with other literatures. Some papers published that in china that hypertension may also can contribute in development of Cholangiocarcinoma [35].

4. CONCLUSIONS

Cholangiocarcinoma is the most frequent primary cancer of the biliary tract, the majority of cholangiocarcinoma's are well-moderately differentiated or poorly differentiated adenocarcinomas with numerous fibrous stromal cells. The diagnosis of cholangiocarcinoma is straightforward when the tumor exhibits conventional imaging characteristics. However, not all cancers exhibit typical imaging findings, and the tumors may mimic a wide range of tumorous and non-tumorous lesions. When creating a differential diagnosis and beginning treatment planning, it might be helpful to have a thorough understanding of the pathologic characteristics that are associated with each type of tumor. Unless the primary tumor and any metastases can be completely removed through surgical means, cholangiocarcinoma is regarded to be an incurable and swiftly fatal form of cancer. The results of our research led us to the conclusion that CT, MRI, and MRCP are able to have a strong correlation with the histological findings of cholangiocarcinoma. Together with bile duct dilatation, the contrast CT enhancement pattern or signal intensities of T1WI and T2WI provide an explanation for the positive link with pathological findings. A good radiologist who is also proficient in contemporary imaging techniques is able to explain the diagnosis of cholangiocarcinoma through the combined study of various imaging processes. This is the case despite the difficulties that are associated with the diagnosis of cholangiocarcinoma. The findings of our investigation, which included a relatively small number of participants, lead us to the conclusion that there are a number of patterns and combinations of CT and MR imaging features that have a strong correlation with the pathologic characteristics of intrahepatic Cholangiocarcinoma.

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