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Original Article

A Radiology-pathological Correlation of Hepatocellular Carcinoma in a Tertiary Care Hospital - A Retrospective Study

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Abstract

Introduction: The study was conducted to understand the clinical algorithm of hepatocellular carcinoma (HCC). Correlation was done by clinical presentation with radiological features and histopathology of HCC. The stress on to understand the necessity for a team approach between clinician, radiologist, and pathologist and vice versa is emphasized.

Aim: To correlate histopathology of HCC with the radiological features.

Materials and Methods: The total number of liver tumors studied during the 8 years period was 38 cases among which 25 cases were diagnosed by histopathology as various types of HCC conclusively. This is a retrospective study of liver tumors, diagnosed by histopathology as various types of HCC. All the relevant clinical data of the patients were searched from the ward records. The various radiological features were collected.

Results: The total number of liver tumors studied during the 8 years period was 38 cases among which 25 cases were diagnosed by histopathology as various types of HCC conclusively. Magnetic resonance imaging (MRI) provides molecular information with regard to HCC and potentially aided in biopsy planning. The total cases reported in the department are 25 cases out of which 17 cases are attending follow-up after 3 years.

Conclusion: The Edmondson-Steiner grading system of HCC correlated the grading of HCC. Pre-operative radiological classification can be used as a supplement to the histopathological grading. HCC needs a correlation between radiologist, pathologist, and clinician. The total cases reported in the department are 25 cases out of which 17 cases are attending follow-up after 3 years.

Key words: Clear cell hepatocellular carcinoma, Computed tomography, Hepatocellular carcinoma, Magnetic resonance imaging, Node and metastasis, Treatment protocols, Tumor staging tumor

INRODUCTION

Hepatocellular carcinoma (HCC) has become the most common primary hepatic malignancy, with average survival rates between 6 and 20 months. HCC is typically a complication of cirrhosis, although it can rarely develop in the absence of cirrhosis.[1-4] Known underlying diseases at risk for HCC development are chronic viral hepatitis C and B, alcoholic hepatitis, non-alcoholic fatty liver disease, autoimmune hepatitis, hemochromatosis, alpha-1-antitrypsin deficiency, Wilson's disease, and Budd-Chiari syndrome (BCS). Diagnostic algorithm follows the same radiological criteria for HCC despite the different etiologies of underlying liver disease. Incidence increases with advancing age, with a median age at onset of about 70 years old in developed countries and there is a male preponderance, with a male to female ratio of about 2.4:1.[5,6] However, an exception is HCC developing in BCS. In fact, the radiological pattern of regenerative nodules in BCS is similar to that of HCC.[7] Moreover, as a consequence of the hindered hepatic venous outflow, radiological criteria for HCC can be altered.[8,9] The risk of procedure-related

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bleeding is probably increased,[10] generally diagnosis of HCC in BCS still needs histological confirmation.[8,9] Overall, the incidence of HCC is increasing, not only in the general population of patients with cirrhosis,[11,12] but also particularly in some subgroups of patients, like those with human immunodeficiency virus (HIV) infection or thalassemia. In fact, in both HIV and thalassemia, a recent significant outcome improvement due to, respectively, iron chelating drugs in the latter and highly active antiretroviral therapy in the former, has allowed the appearance of the complication of the underlying hepatic disease.[13-18] The landmark study the Milan Criteria (MC) was established. The MC includes three major points an isolated malignancy ≤5 cm, or 2-3 tumors each <3 cm, and that does not have any evidence of invasion into the vascular system or dissemination outside the liver. The MC became accepted for assessing individuals that have HCC as candidates for transplantation.[19] Given the high mortality associated with HCC, there has been a recent discussion on expanding the current criteria to include more patients as potential transplant candidates, and, therefore, increase overall survival. In the hopes of improving disease-free survival, there may be certain ways to help incorporate more candidates with HCC. While HCC of distinctly nodular type frequently showing a typical enhancement pattern with contrast CT, HCC of vaguely nodular type tend to show an atypical enhancement pattern such as a lack of arterial hyper enhancement or venous/delayed washout.[20] Three-dimensional gadolinium-enhanced GRE sequences are preferred to two-dimensional GRE sequences because of the thinner sections obtained, which improves lesion detection and permit multiplanar image reconstructions for presurgical planning.[21] Intrinsic high signal can also be demonstrated in successfully treated HCC.[22] Unenhanced images can be subtracted from arterial phase gadolinium-enhanced images to assess for arterial enhancement in nodules.[23] Diffusion weighted imaging increases the detection rate of HCC, particularly for small tumors.[24-26] HCC by capitalizing on evidence that poorly differentiated HCC do not contain functioning hepatocytes and bile ducts, and therefore demonstrate hypointense signal relative to the surrounding liver parenchyma.[27,28] Combining contrast-enhanced magnetic resonance imaging (MRI) features and hepatobiliary phase imaging has demonstrated sensitivities and specificities of >90%.[29] Computed tomography (CT) and MRI are useful in identifying tumor extent and extrahepatic spread. They also provide secondary evidence of portal hypertension, including the presence of splenomegaly and portosystemic collaterals. Imaging of the chest is also recommended as part of the initial workup, given that lung and bone are common sites for HCC metastasis. A bone scan can also be performed if there is a suspicion for osseous metastasis, or if the patient is being considered for liver transplantation.

Edmondson-Steiner Grading System of HCC

Histopathological grading system for HCC was first proposed in 1954. Grade I - minor differentiation between tumor cells and hyperplastic liver cells; diagnosis of carcinoma is made by more aggressive growth patterns elsewhere in the neoplasm. Grade II - tumor cells show close resemblance to normal hepatic cells, but nuclei are larger and more hyperchromatic. Cell characteristics show sharp, clear-cut borders and abundant, and acidophilic cytoplasm. Acini have variable size and are frequent. Protein precipitate or bile commonly fill lumina. Grade III - larger and more hyperchromatic nuclei are present with a higher proportion of nuclei to existing cytoplasm, which is granular and acidophilic. Single cell growth in vascular channels is more common than Grade II. Grade IV - cell volume is largely nuclei, which is intensely hyperchromatic. Cytoplasm has few granules. Rare acini are seen. Medullary growth pattern predominates with scant trabeculae. Tumor cells scattered in vascular channels are without cohesion.

Barcelona clinic liver cancer (BCLC) staging uses a set of criteria to guide management of patients with HCC. The classification takes the following variables into account.[30,31] Performance status, Child-Pugh score, tumor size, multiple tumors, vascular invasion, nodal spread, and extrahepatic metastases are the parameters adapted. Child-Pugh score is used to assess the prognosis of chronic liver disease, mainly cirrhosis. Although it was originally used to predict mortality during surgery, it is now used to determine the prognosis, as well as the required strength of treatment and the necessity of liver transplantation (Tables 1 and 2).

Surgical and Further Management for HCC

Current management of HCC includes surgical resection/hepatectomy, liver transplantation (deceased and living), thermal or chemical ablation, chemoembolization, and medical treatment.

Local Regional Therapy for HCC

Local treatment has been a mainstay to slow or arrest the advancement of the disease while patients are waiting for

Table 1: BCLC staging

Stage 0 (very early stage)	Asymptomatic early tumors resection
Stage A (early stage)	Asymptomatic early tumors resection, percutaneous ablation, transplantation
Stage B (intermediate stage)	Asymptomatic multinodular tumors intra-arterial therapies (chemoembolization and radioembolization)
Stage C (advanced stage)	Symptomatic tumors and/or invasive tumors resection, sorafenib, phase II trial agents, or palliative treatments
Stage D (end-stage disease)	Symptomatic treatment equivalent to Okuda stage III

BCLC: Barcelona clinic liver cancer

Table 2: TNM staging for hepatocellular carcinoma

Primary tumor (T)		Regional lymph nodes (N)		Distant metastasis (M)	
TX	Primary tumor cannot be assessed	NX	Regional lymph nodes cannot be assessed	M0	No distant metastasis
T0	No evidence of primary tumor	N0	No regional lymph node metastasis	M1	Distant metastasis
T1	Solitary tumor without vascular invasion	N1	Regional lymph node metastasis		
T2	Solitary tumor with vascular invasion or multiple tumors, none >5 cm				
T3a	Multiple tumors >5 cm				
T3b	Single tumor or multiple tumors of any size involving a major branch of the portal or hepatic vein				
T4	Tumor(s) with direct invasion of adjacent organs other than gallbladder or with visceral peritoneum				

Stage	T	N	M
I	T1	N0	M0
II	T2	N0	M0
IIIA	T3a	N0	M0
IIIB	T3b	N0	M0
IIIC	T4	N0	M0
IVA	Any T	N1	M0
IVB	Any T	Any N	M1

transplantation.[29] Transarterial chemoembolization (TACE) and radiofrequency ablation (RFA) have become prominent clinical tools of therapy.[32] TACE uses an infusion of a cytotoxic agent deployed inside the artery followed by the embolization of blood vessels that supply the tumor. This results in a cytotoxic and ischemic effect.[4] Injecting 95% ethanol into the tumor through a needle produces local coagulation necrosis and fibrosis, with thrombosis of tumor microvasculature and tissue ischemia.[33] The introduction of ethanol and RFA was found to be as efficient in lesions <2 cm in size.[34]

Resection

Hepatic resection is a possible curative therapy, considered ideal for individuals with maintained hepatic reserve.[35] Patients with single lesions and without any evidence of invasion of the vasculature can be offered resection. Individuals without any proof of cirrhosis or having preserved synthetic function with cirrhosis, standardized levels of bilirubin, and the pressure gradient of <10 mmHg in the hepatic vein (Grade II recommendation) are potential candidates.[4,36] In addition, it is also recommend platelet counts being over 1,00,000.[37]

Liver Transplantation for HCC

It was believed that this would get rid of the tumor and provides a cure for the primary liver disease.[38] The threshold MC is as follows: One lesion smaller than 5 cm; alternatively, up to 3 lesions, each smaller than 3 cm, no extrahepatic manifestations, and no evidence of gross vascular invasion. Selection of patients was a source of constant debate, given a worldwide organ shortage, controlling the amount of tumor present during the time till transplant, exploring live donors, and different immunosuppressive, or supplementary therapy. Individuals identified with minimal tumor load from HCC during surgery that was not seen through imaging because of the small size had excellent results similar to patients without malignant disease. The size of <5 cm was the cutoff.

Recurrence Post-transplantation

The presence of involvement into the vasculature, tumor diameter >5 cm, tumor status beyond Milan, and poor differentiation was felt as prominent variables for the risk for recurrence of HCC. The entire tumor size, defined as the total of all tumor diameters, was found to correlate with a four-fold increase in tumor recurrence if >10 cm. The diagnostic accuracy of MRI and CT has shown to be in the range of 45-60% and for cases with lesions under the stage, noted for 21-43%.

Living Donor Liver Transplant for HCC

The current benefits of living donor liver transplantation are an intensive donor evaluation, time available for optimization before transplantation, as well as a nominal time for cold ischemia.

Medical Treatment

Sorafenib, which is an oral tyrosine kinase inhibitor, was the original therapy that demonstrated any improvement in mortality for progressive HCC. Sorafenib 400 mg was given twice daily or placebo therapy, for a length of at most 4 years. The main endpoint included survival without recurrence of HCC documented by an independent

reviewer. Secondary goals were the time frame until HCC recurred and the overall survival.

Immunosuppression Post-transplant: MTOR Inhibitors

In many transplant centers, sirolimus has been used as monotherapy or in adjunct, for patients who have had adverse effects of calcineurin inhibitors. Furthermore, for patients who have developed non-hepatic malignancies post-transplant, some LT centers have switched patients to sirolimus, again, because of its antiangiogenic properties. Post-transplant, side effects of sirolimus include thrombosis of the hepatic artery, delayed wound healing, incisional hernias, hyperlipidemia, bone marrow suppression, mouth ulcers, skin rashes, albuminuria, and pneumonitis, among others.

Aim

The aim of the study was to correlate histopathology of HCC with the radiological features.

MATERIALS AND METHODS

The total number of liver tumors studied during the 8 years period was 38 cases among which 25 cases were diagnosed by histopathology as various types of HCC conclusively. This is a retrospective study of liver tumors, diagnosed by histopathology as various types of HCC. All the relevant clinical data of the patients were searched from the ward records. The various radiological features were collected. The clinical features examined included age, gender, smoking history, recent onset hypertension, performance status, and presenting symptoms. Laboratory studies should include a complete blood count, electrolytes, liver function tests, coagulation studies (e.g., international normalized ratio and partial thromboplastin time), and alpha-fetoprotein determination. A comprehensive health check up on general conditions were taken and stored in the computer server (Table 3).

RESULTS

Clear cell variant of HCC was the most common subtype reported followed by steatohepatic HCC and scirrhous HCC subtypes of HCC conclusively at Thoothukudi Medical College (Table 4).

Several patterns can be seen, depending on the subtype of HCC. Enhancement pattern is the key to the correct assessment of HCCs. Usually, the mass enhances vividly during late arterial (~35 s) and then washes out rapidly, becoming indistinct or hypo attenuating in the portal venous phase, compared to the rest of the liver. Grade I - minor differentiation between tumor cells and hyperplastic liver. Grade II - tumor cells show a close resemblance to normal hepatic cells, but nuclei are larger and more hyperchromatic. Grade III - larger and more hyperchromatic nuclei are present with a higher proportion of nuclei to the existing cytoplasm. Grade 4 - cell volume is largely nuclei, which is intensely hyperchromatic (Table 5).

HCC

HCC arise in equivocal nodular lesions, such as dysplastic nodules in the cirrhotic liver and are highly differentiated in the early stages. An additional characteristic feature of HCC is its frequent occurrence in the form of multiple nodules. In HCC, the simultaneous occurrence of multiple HCC may reflect either the dissemination of malignant cells from a single primary tumor to form satellite tumor nodules (intrahepatic metastasis), or the synchronous development of several independent tumors. The two possible mechanisms of development of multiple HCC reflect important differences in pathogenesis that appear to have an impact on treatment and prognosis. Differences in prognosis between these two categories probably result from the fact that multiple developing from intrahepatic metastasis are more aggressive and more

Table 3: Histopathological age, sex distribution and signs, symptoms, and history in the subtypes of hepatocellular carcinoma

Tumor type	Age group	M:F ratio	Signs and symptoms
Fibrolamellar HCC	One male aged 30 years	1:0	One patient had complaint of abdominal pain
Scirrhous HCC	Females range from 46 to 64 years of age old and the age involved in male was 54-65 years of age old	3:3	Three patients had complaints of pain, weight loss, and deep fatigue. Three patients had complaints of nausea, vomiting, and jaundice. Four patients had history of chronic alcoholism
Clear cell variant of HCC	Females range from 52 to 60 years of age old and the age involved in male was 55-64 years of age old	7:3	Seven patients had complaints of pain, weight loss, and deep fatigue. Three patients had complaints of nausea, vomiting, and jaundice. Seven patients had a history of chronic alcoholism. Three patients had history of hepatitis
Steatohepatic HCC	Females range from 44 to 54 years of age old and the age involved in male was 44-55 years of age old	6:2	Three patients had complaints of pain, weight loss, and deep fatigue. Five patients had complaints of nausea, vomiting, and jaundice. Four patients had history of chronic alcoholism. Four patients had history of hepatitis

HCC: Hepatocellular carcinoma

poorly differentiated than multiple HCC that is composed of several independent tumors that emerge more or less simultaneously. Molecular analysis of the HBV integration patterns and genetic changes has indicated the independent multicentric development of these nodules. During the histological assessment, small and early HCC should be distinguished from advanced disease.

The international consensus group for HCC and the WHO proposed the following classification: (1) Early HCC; a: Well differentiated; b: Small size (<2 cm); and c: Poorly defined margins, vaguely nodular type; and (2) progressed HCC: a: >2 cm; b: Small size (<2 cm), but moderately differentiated, distinctly nodular type. HCC of the vaguely nodular type occurs more often in cirrhosis, are usually smaller in size and less often show portal vein invasion than the distinctly nodular type. The distinctly nodular subtype has a discernible capsule and usually occurs in a cirrhotic liver. Progressed HCC can grossly be classified into the following macroscopic groups: Nodular, massive, and diffuse. The nodular type can either consist of a single or multiple nodules. Single nodules are usually encapsulated and may show extracapsular growth in the vicinity of the primary nodule. The multinodular type is an aggregation of a varying amount of small nodules. The massive type is defined as a large tumor with irregular demarcation. This morphologic appearance can also been seen in advanced stage nodular HCC. The diffuse type is described to have many small nodules in a liver lobe or the whole organ. Rarely, a pedunculated or protruded growth can be observed. If the HCC grows extrahepatically with a peduncle, this should be termed "pedunculated." If a peduncle is absent the term "protruding" is adequate.

Table 4: Factors that influence the prognosis of HCC

Factor	Good	Bad
Stage	Early	Late
Size	2-5 cm in diameter	>5 cm in diameter
Encapsulation	Good	-
Number	Single	Multiple
Portal vein involvement	-	Bad
Microscopic type	Fibrolamellar type	-
Mitotic activity	Low	High
Presence of cirrhosis	-	Bad
Serum AFP levels	-	High AFP levels
Viral antigenemia	Nil	-
Use of progestational hormones	Contraceptive pills	-
Sex	Females	Male

AFP: Alpha-fetoprotein, HCC: Hepatocellular carcinoma

Histopathology of HCC: The classical histopathologic features of HCC are the following: Well vascularized tumors with wide trabeculae (>3 cells), prominent acinar pattern, small cell changes, cytologic atypia, mitotic activity, vascular invasion, and absence of Kupffer cells and the loss of the reticulin network. The most common histologic growth patterns are trabecular pattern, pseudoglandular or acinar with possible bile or fibrin content and the compact or solid pattern. Bile production can frequently be observed. The well-differentiated lesion is usually replaced by tissue of the dedifferentiated component in advanced disease and therefore leads to a nodule in nodule appearance. In contrast, progressed HCC shows an expansive and infiltrative histologic growth pattern

Table 5: Correlation study of hepatocellular carcinoma

Tumor	Radiographic findings	Histopathological findings
Fibrolamellar HCC	CT scan shows a large heterogeneous mass in the left lobe of liver, with central necrosis. No synchronous lesion or regional lymphadenopathy	Section studied shows cords of large, polygonal tumor cells with large nuclei, prominent nucleoli, and abundant granular eosinophilic cytoplasm. Dense bands of lamellar fibrosis separating the tumor cell cords
Scirrhous HCC	CT scan shows typical cirrhotic changes are evident by enlarged left lobe, irregular nodular outer surface and widened fissures. There is malignant infiltration of the left hepatic lobe that enhances in the arterial phase and displays wash out on portal venous phase	Section studied shows bands of dense fibrosis separate cords and nests of large, pleomorphic neoplastic hepatocytes. The tumor cells tend to retain their polygonal shape, round vesicular nuclei, and prominent nucleoli. The cytoplasm is slightly more basophilic compared to non-neoplastic hepatocytes
Clear cell variant of HCC	CT scan shows a large hepatic mass with marked enhancement is seen at the right lobe. There is also several small mass with early enhancement at the both right and left lobes of the liver. On delayed phase, washout is detectable at the lesions. Right portal vein involved with tumor thrombosis	Section studied shows tumor cells arranged in a trabecular pattern cytoplasmic clearing may be due to fat, glycogen, or water
Steatohepatic HCC	CT scan shows a huge left lobe of liver mass is present with hypodense and hyperdense mixed areas	Section studied shows sheets and nests of large tumor cells with pleomorphic nuclei, prominent nucleoli, abundant granular eosinophilic cytoplasm, scattered Mallory bodies, distinct cell borders, and focal bile plugs. HCCs characteristically secrete bile, which is typically seen in spaces that recapitulate normal bile canaliculi

HCC: Hepatocellular carcinoma

with complete neovascularization with unpaired arteries and possible vascular infiltration. There are no portal tracts seen within the tumor and all the classical histologic patterns (trabecular/sinusoidal, pseudoglandular, solid, and undifferentiated) are usually present. The tumors are mostly encapsulated and septae are detected. Encapsulation is reported to be more frequent in tumor arising in a cirrhotic liver than in non-cirrhotic livers. Most of these tumors show satellite nodules within 2 cm of the primary tumor nodule as well as metastasis in the liver.

Histopathologic Variants

Fibrolamellar HCC

Fibrolamellar HCC is a rare subtype first described by Edmondson accounting for <1% of all tumors. This subtype is seen in young patients without liver cirrhosis and with no other known predisposing factors and has a better prognosis than classical HCC. Grossly, it shows many fibrous septae and may have a central scared zone with possible calcification. Histologically, the tumor cells grow in sheets and trabeculae that are separated by collagen fibers which are often hyalinized and show a characteristic lamellar pattern. One male aged 30 years reported with this subtype with a complaint of abdominal pain.

The histopathology and radiology correlation was perfect in all the cases (Figures 1 and 2).

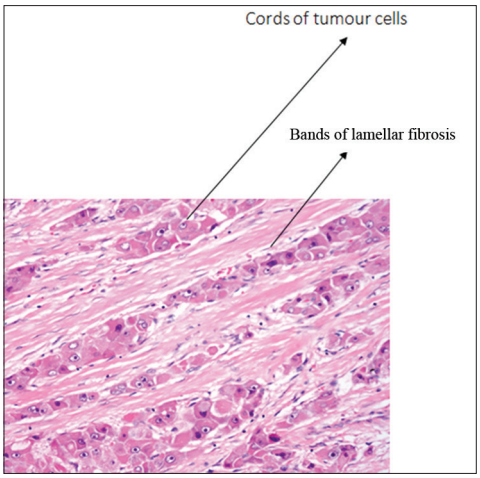

Figure 1: Section studied shows cords of large, polygonal tumor cells with large nuclei, prominent nucleoli, and abundant granular eosinophilic cytoplasm. Dense bands of lamellar fibrosis separate the tumor cell cords

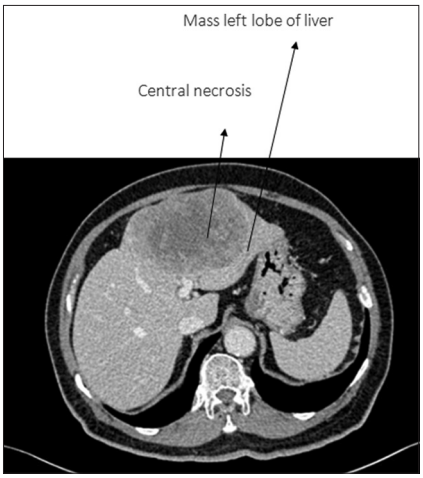

Figure 2: Computed tomography scan shows a large heterogeneous mass in the left lobe of the liver, with central necrosis. No synchronous lesion or regional lymphadenopathy

Scirrhous HCC

Scirrhous HCC shows diffuse fibrotic change which can occur after various antitumoral treatments and seldom in untreated tumors. This type of tumor histologically shows fibrosis along the sinusoid-like blood spaces, with atrophy of the trabeculae. A unique directly subcapsular location of most of these tumors which lead to a possible pedunculated macroscopy. Six patients reported with this subtype, female ranges from 46 to 64 years of age old and the age involved in male ranges from 54 to 65 years of age old. Three patients had complaints of pain, weight loss, and deep fatigue. Three patients had complaints of nausea, vomiting, and jaundice. Four patients had a history of chronic alcoholism.

The histopathology and radiology correlation was perfect in all the cases (Figures 3 and 4).

Clear cell Variant of HCC

The clear cell variant of HCC is usually arranged in a trabecular pattern and is characterized by clear cytoplasm that contains glycogen and a variable amount of fat vesicles. Mostly only parts of the tumor show these clear cell changes. A male predominance of variable degree is reported of this particular subtype of HCC. 10 patients reported with this subtype; seven patients had complaints of pain, weight loss, and deep fatigue. Three patients had complaints of nausea, vomiting, and jaundice. Seven patients had a history of chronic alcoholism. Three patients had a history of hepatitis. The age group in females range from 52 to 60 years of age old and the age group involved in male range from 55 to 64 years of age old.

The histopathology and radiology correlation was perfect in all the cases (Figures 5 and 6).

Steatohepatic HCC

Steatohepatic HCC is characterized by a steatotic appearance of >5% of the tumor, presence of Mallory-bodies, fibrosis, inflammation, and ballooning of the hepatocytes as in steatohepatitis. The inflammatory infiltrate usually consists of neutrophils, plasma cells,

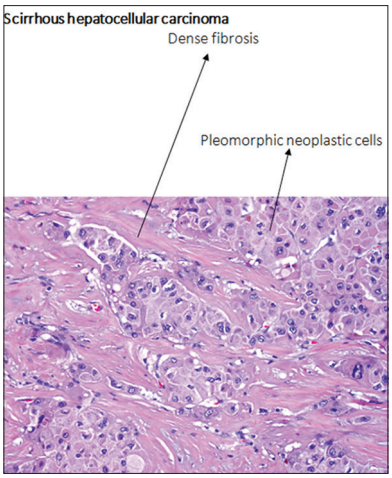

Figure 3: Section studied shows bands of dense fibrosis separate cords and nests of large, pleomorphic neoplastic hepatocytes. The tumor cells tend to retain their polygonal shape, round vesicular nuclei, and prominent nucleoli. The cytoplasm is slightly more basophilic compared to non-neoplastic hepatocytes

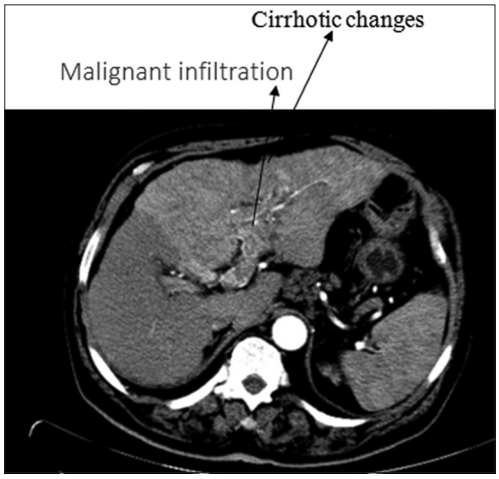

Figure 4: Computed tomography scan shows typical cirrhotic changes are evident by enlarged left lobe, irregular nodular outer surface and widened fissures. There is malignant infiltration of the left hepatic lobe that enhances in the arterial phase and displays wash out on portal venous phase

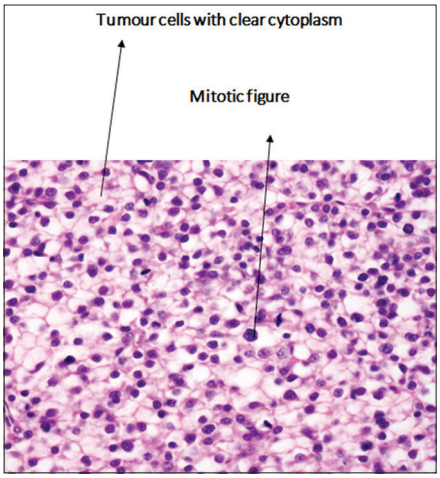

Figure 5: Section studied shows tumor cells arranged in a trabecular pattern with cytoplasmic clearing

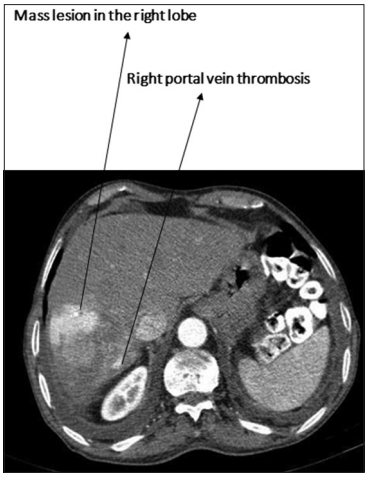

Figure 6: Computed tomography scan shows a large hepatic mass with marked enhancement is seen in the right lobe. There is also several small mass with early enhancement at the both right and left lobes of the liver. On delayed phase, washout is detectable at the lesions. Right portal vein involved with tumor thrombosis

and lymphocytes. Fibrosis usually appears in a pericellular and trabecular form. These patients often suffer from nonalcoholic steatohepatitis, but this phenotype of carcinoma is also seen in patients without steatohepatitic changes in the non-neoplastic liver tissue. Eight patients reported with this subtype, the age involved in females range from 44 to 54 years of age and the age involved in male range from 44 to 55 years of age old. Three patients had complaints of pain, weight loss, and deep fatigue. Five patients had complaints of nausea, vomiting, and jaundice. Four patients had a history of chronic alcoholism. Four patients had a history of hepatitis.

The histopathology and radiology correlation was perfect in all the cases (Figures 7 and 8).

Metastasis: The most common primary sites that metastasize into the liver are lung, colon, pancreas, and breast. The primary tumors resembling HCC include clear cell renal cell carcinoma, clear cell adenocarcinoma of the female genital organs, adrenal carcinoma, and hepatoid adenocarcinoma of the stomach. Sometimes metastatic neuroendocrine tumors of the gastrointestinal tract, especially with trabecular growth pattern can also be difficult to distinguish from HCC. The cells are gathered in stands, solid nests, or trabeculae. The cells are small and have scant cytoplasm with an increased nuclear/

cytoplasmatic ratio and are usually embedded within less stroma than the typical subtype.

The prognosis is influenced by several factors, including tumor size, degree of invasion and metastasis, histologic type, and nuclear grade. The fibrolamellar HCC, steatohepatic HCC, and Clear cell variant of HCC responded moderately to the treatment (Table 6).

Baseline abdominal CT or MRI within 3-6 months, then CT, MRI or US every 3-6 months for at least 3 years and then annually up to 5 years; baseline chest CT within 3-6 months after surgery with continued imaging (CT or chest X-ray) every 3-6 months for at least 3 years and then annually up to 5 years are done as the follow-up measure.

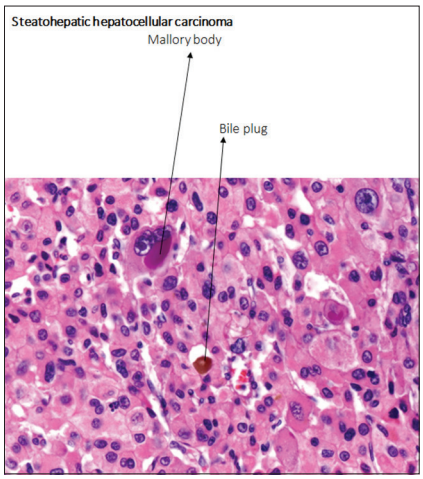

Figure 7: Section studied shows sheets and nests of large tumor cells with pleomorphic nuclei, prominent nucleoli, abundant granular eosinophilic cytoplasm, scattered Mallory bodies, distinct cell borders, and focal bile plugs. Hepatocellular carcinoma characteristically secrete bile, which is typically seen in spaces that recapitulate normal bile canaliculi

DISCUSSION

The prognosis is influenced by several factors, including tumor size, degree of invasion and metastasis, histologic type, and nuclear grade.The fibrolamellar HCC, steatohepatic HCC, and clear cell variant of HCC responded moderately to the treatment. The total cases reported in the department are 25 cases out of which 17 cases are attending follow-up after 3 years. HCC is not a single uniform entity but a group of related neoplasms

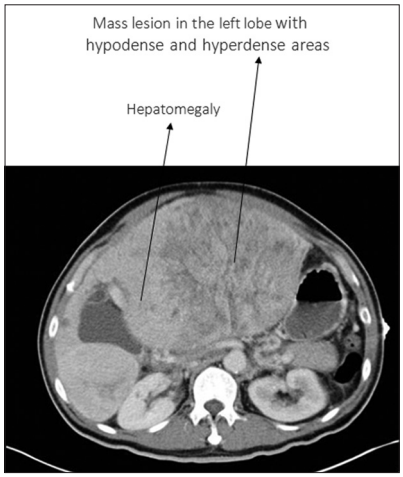

Figure 8: Computed tomography scan shows a huge left lobe of liver mass is present with hypodense and hyperdense areas

Table 6: Final outcome of the study

Tumor	Surgery done	Cure rate measured after 3 years	Follow-up
Fibrolamellar HCC	One patient underwent asymptomatic early tumor resection	100%	One patient attended follow-up
Scirrhous HCC	Three patients underwent asymptomatic early tumors resection. Three patients underwent symptomatic tumors and/or invasive tumors resection, sorafenib, phase II trial agents, or palliative treatments	50%	Three patients attended follow-up
Clear cell variant of HCC	Seven patients underwent asymptomatic early tumors resection. Three patients underwent symptomatic tumors and/or invasive tumors resection, sorafenib, phase II trial agents, or palliative treatments	70%	Seven patients attended follow-up
Steatohepatic HCC	Six patients underwent asymptomatic early tumors resection. Two patients underwent symptomatic tumors and/or invasive tumors resection, sorafenib, phase II trial agents, or palliative treatments	75%	Six patients attended follow-up

in which the histologic findings, cytogenetic abnormalities, biologic behavior, and imaging appearances of the tumors are subtype dependent. Based on the hypothesis, that the diffusion of water to and from the cells is highly dependent on the ratio of intracellular and extracellular space, DWI MRI Scan is used to differentiate the tumor grades. In India majority of patients present with advanced disease and up to 13% have extrahepatic metastasis at the time of presentation. The BCLC staging system is recommended for prognostic prediction and treatment allocation. While anatomical resections provide improved survival, the choice of non-anatomical versus anatomical resections should be individualized taking into account factors such as cirrhosis and function of the liver remnant. A clear margin of resection is essential in all surgically resected cases.

CONCLUSION

The accepted modality for HCC screening is ultrasound. Once HCC is suspected then CT or MRI may be used to confirm the diagnosis and establish the tumor burden for staging purposes. However, multidisciplinary meeting and planning is essential to ensure that the correct pathways are adopted within the context of each institution. Following surgical, locoregional, chemotherapeutic, or radiotherapeutic treatment, follow-up imaging, and regular multidisciplinary discussion are adopted. MRI can not only be used for non-invasive diagnosis and staging, but also for predicting tumor biology as an imaging biomarker in patients with HCC. Favorable findings of HCC on MRI include small size, presence of fibrous capsule/pseudocapsule, intralesional fat, high ADC value, and smooth margins or hyperintensity on hepatobiliary phase images, while unfavorable findings of HCC include large size, multifocality, low ADC value, non-smooth margins, or hypointensity on hepatobiliary phase images. HCC is a difficult to treat and extremely complex malignant disease. Since the landmark SHARP trial in 2007, sorafenib monotherapy remains the only widely accepted standard treatment for advanced HCC. Percutaneous local ablation, namely, RFA and ethanol injection (EI) is the standard of care for BCLC O-A not suitable for surgery. Transarterial chemoembolization (TACE) is the recommended treatment for BCLC stage B multinodular asymptomatic tumors without vascular invasion or extrahepatic spread. The study provides the importance of another medical faculty the Surgeon, Radiologist and Oncologist to work as a team for a successful outcome. We correlated the histopathological findings with radiological findings. This resulted in a perfect correlation between the histopathology study and radiology study.

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