



Positron emission tomography-CT (PET-CT) scan was done showing hypodense lesion in segment V of the liver measuring 6.5 cm × 6.6 cm with minimal uptake. Mild adjacent capsular retraction was noted suggestive of primary hepatic mass. Few subcentimeter nodes were identified in mid and lower para-aortic region and in mesentery with minimal uptake. There was no abnormal increased uptake at the rest of the nodal stations, lung, liver, skeletal system, or elsewhere in the body scanned (Figure 2a and b).

Resection of mass was advised in view of solitary lesion and good performance status of patient, as per the oncologist's opinion. Segmental liver resection was done with cholecystectomy. On cutting serially, circumscribed tumor was identified measuring 7 cm in the greatest dimension. Cut surface was gray-white to brownish with variable sized cystic cavities filled with brownish fluid (Figure 3). Hepatic capsule and base of resection were grossly unremarkable. The gall bladder was unremarkable.

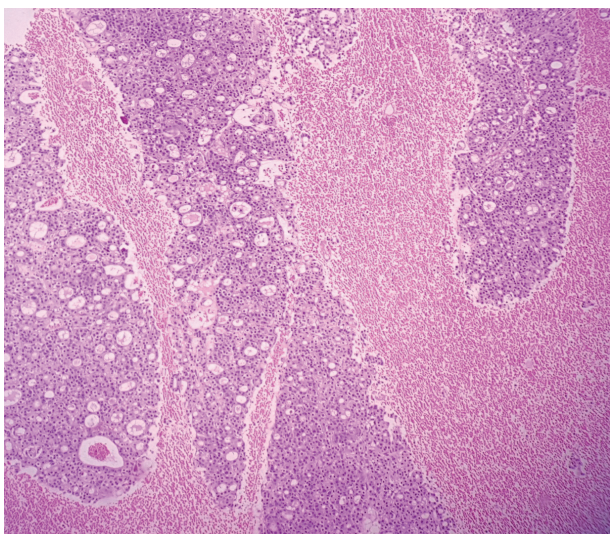
Microscopic examination revealed tumor cells arranged in a follicular pattern, similar of thyroid

follicles. Follicles were of varying size and lined by low cuboidal type epithelial cells with pale eosinophilic colloid-like material in the follicles (Figure 4a). Cuboidal cells had round-to-oval nucleus with fine chromatin and inconspicuous nucleoli, resembling follicular neoplasm of the thyroid gland (Figure 4b). No definite desmoplastic stroma or calcification was evident. Lymphovascular emboli were not evident. Surgical resection margins were free of tumor, and adjacent hepatic parenchyma was unremarkable (Figure 5).

IHC results were like biopsy specimen, showing CK 7 and CK 19 positivity with negative TTF-1, PAX8, HepPar1, CK20, CDX2, and synaptophysin (Figure 6a-d).

The final diagnosis of ICC with thyroid-like follicular pattern was offered in view of a single hepatic mass with no other source of primary lesion on PET-CT scan and negative TTF 1 and PAX8 on IHC. The post-operative period was uneventful.

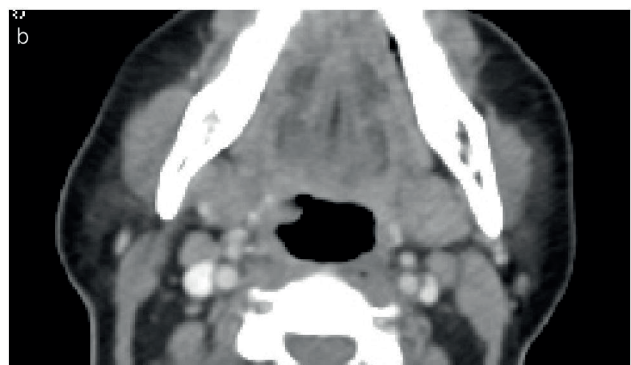
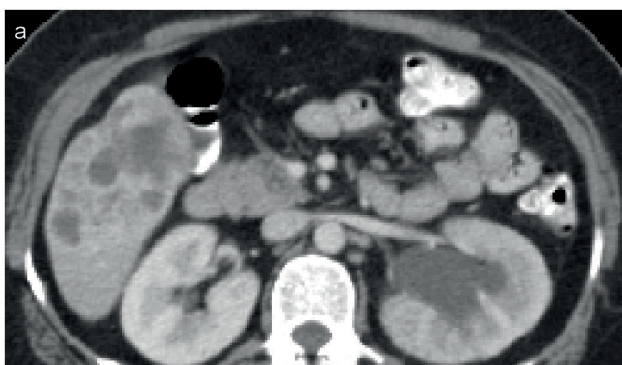
Twelve cycles of adjuvant chemotherapy (injection Gemcitabine) was given after surgery for 6 months. CT



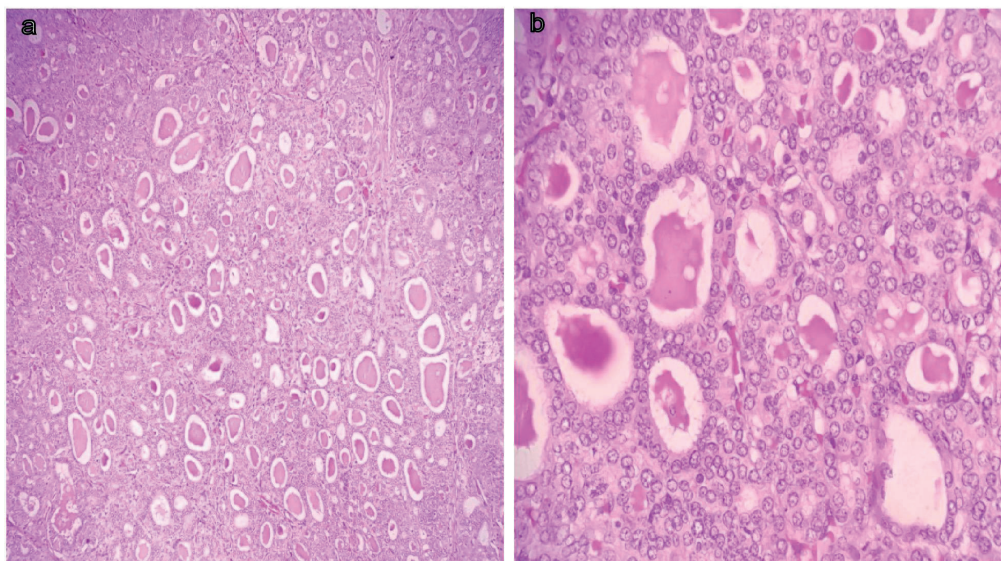
**Figure 1.** USG guided biopsy showing glandular and follicular pattern. (H & E-100x).



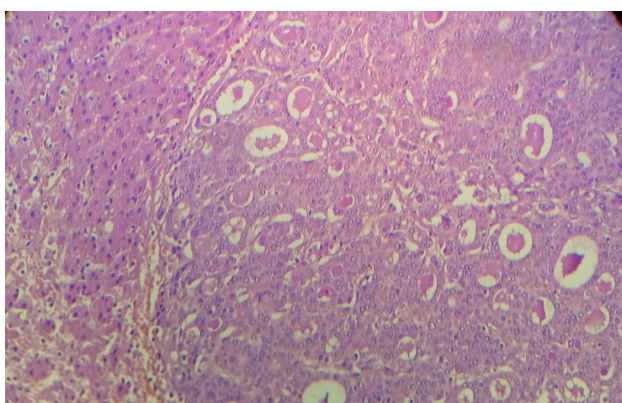
**Figure 3.** Circumscribed tumor with solid cystic cut surface.



**Figure 2.** PET-CT scan showing hypodense lesion in liver (a) and normal thyroid gland (b).



**Figure 4.** Segmental resection specimen revealed varying size follicles with colloid like material (H & E-100x), 4b- Follicles lined by cuboidal cells having fine chromatin and inconspicuous nucleus resembling thyroid follicular neoplasm (H & E-400x).



**Figure 5.** Normal liver parenchyma on left side with tumor focus on right side (H & E- 100x).

scan of the abdomen and pelvis was done at the end of 6 months, showing no evidence of any abnormal enhancing lesion at the operated site or any metastatic lesion elsewhere in the body. After 12 months, during the follow-up period, CA 19-9 was done which was within the normal range (31.73 U/ml). The last follow-up was after 20 months during which CT scan of the abdomen was done suggesting no abnormal enhancing lesion. Clinically patient was doing well at the time of last follow-up.

### Discussion

Cholangiocarcinoma is the second most common malignant neoplasm of the liver. On the contrary to hepatocellular carcinoma, cholangiocarcinoma is usually not associated with cirrhosis.

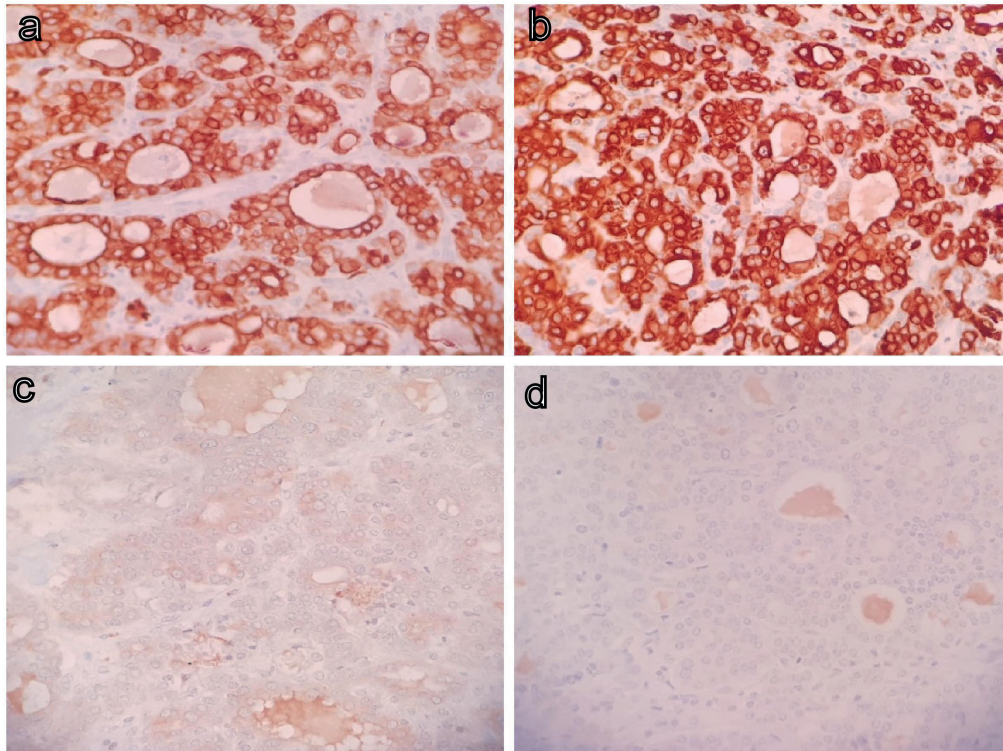
In this case, the microscopic features were closely resembled thyroid follicular neoplasm. It had a

predominant follicular pattern. Metastasis to the liver from follicular carcinomas of the thyroid is a well-known although rare phenomenon [9]. Initially, the morphological differential diagnosis of metastatic well-differentiated thyroid carcinoma was considered, but it was ruled out by the absence of a primary thyroid tumor and lack of immunoreactivity for TTF-1 and PAX8. Other tumors included in the differential diagnosis were hepatocellular carcinoma with acinar or pseudoglandular pattern. However, the lack of reactivity for HepPar-1 and AFP ruled out a hepatocellular carcinoma [10].

Thyroid-like ICC was initially described in 2010 by Fornelli et al. [6]. Another case was subsequently reported by Chable-Montero et al. [7] and Shao-hua Chen et al. [8]. To the best of authors' knowledge, this case is the first reported in India and second reported in Asia. The clinicopathological findings of all four cases are shown in Table 1.

Malignant tumors having thyroid-like morphological features have been reported in the breast and kidney [11,12]. ICC having thyroid-like follicular pattern is an extremely rare morphological variant that resembles thyroid malignancy. It is not included in the World Health Organization (WHO) classification of ICC [13].

A comprehensive evaluation of case including careful clinical history, physical examination, imaging studies, serum tumor markers, microscopic examination, and IHC workup is warranted to avoid misdiagnosis. Due to the rarity of this morphological variant of ICC, its biologic behavior had to be established, and more cases are required for the study.



**Figure 6.** Immunostain positivity for CK 7 (a), CK 19 (b) and negative for TTF 1 (c), PAX8 (d) – 400x.

**Table 1.** Clinicopathological findings of four cases having thyroid-like ICC.

	FORNELLI ET AL. [6]	CHABLE-MONTERO ET AL. [7]	SHAO-HUA CHEN ET AL. [8]	CURRENT CASE
Age/gender	52/male	26/female	59/male	42/female
Size	18 cm	19 cm	3 cm	9 cm
Gross	Well-circumscribed lesion with cystic cavities	Gray white lesion with cystic and hemorrhagic areas	Gray white solid lesion	Gray white brownish circumscribed lesion with cystic cavities
Histology	Follicular pattern of papillary thyroid carcinoma	Mainly follicular with solid, trabecular, and insular pattern	Follicular, papillary, and insular patterns	Follicular pattern
Immune phenotype	Positive: CK7, CK19, CAM5.2, CK AE1; Negative: thyroglobulin, TTF-1, CEA, CK20, CD56, synaptophysin, chromogranin, hepatic specific antigen	Positive: CK7, CK19, CD138; Negative: thyroglobulin, TTF-1, HepPar 1, glypican-3, AFP, CD56, synaptophysin, chromogranin	Positive: CK7, CK18, CK19, EMA, MUC1, CD10, glypican-3, p53, Ki67, S-100; Negative: thyroglobulin, TTF-1, CD56, synaptophysin, chromogranin, PAX8, CK20, CDX-2, AFP, HepPar 1, CD34	Positive: CK7, CK19 Negative: HepPar1, AFP, CEA, CK20, CDX2, PAX8, TTF1, Synaptophysin
Treatment	Surgery	Surgery and chemotherapy	Surgery	Surgery and chemotherapy
Follow-up	13 months without recurrence or metastasis	18 months died with metastasis and recurrence	16 months without recurrence or metastasis	20 months without recurrence or metastasis

### Conclusion

As thyroid-like morphological patterns are seen in the kidney and breast tumors, the same morphology can occur in ICC. The pathologists need to be aware of this variant to avoid erroneous diagnostic interpretation.

### What is new?

This case of ICC was showing thyroid-like follicular pattern. Only three such cases have been published all over the world literature till date.

## List of Abbreviations

AFP	Alpha-feto protein
CA 19-9	Carbohydrate Antigen 19-9
CDX2	Caudal related homeobox gene 2
CEA	Carcinoembryonic Antigen
CK 7	Cytokeratin 7
CK 19	Cytokeratin 19
CK 20	Cytokeratin 20
CT Scan	Computed Tomography scan
HepPar1	Hepatocyte Paraffin 1
ICC	Intrahepatic Cholangiocarcinoma
IHC	Immunohistochemistry
PAX8	Paired box gene 8
PET-CT Scan	Positron Emission Tomography – Computed Tomography scan
TTF-1	Thyroid transcription factor 1
WHO	World Health Organization

## Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this case report.

## Funding

None.

## Consent for publication

Written informed consent was taken from the patient.

## Ethical approval

Ethical approval is not required at the institution for publishing an anonymous case report.

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## Summary of the case

1	<b>Patient (gender, age)</b>	42 years, female
2	<b>Final diagnosis</b>	Intrahepatic cholangiocarcinoma
3	<b>Symptoms</b>	Pain in the right flank region
4	<b>Medications</b>	Post-operative chemotherapy injection Gemcitabine
5	<b>Clinical procedure</b>	
6	<b>Specialty</b>	Surgical resection of mass