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不同中医证型原发性肝癌的临床特征及多模态定量影像学特征分析

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摘要: **目的** 分析原发性肝癌(PLC)中医证型与临床特征及计算机体层成像(CT)、磁共振成像(MRI)多模态定量影像特征之间的关联,为中医辨证的客观化与精准诊疗提供参考依据。**方法** 回顾性分析2020年3月—2025年6月在湖南中医药大学第一附属医院确诊为PLC的312例患者临床资料,分为肝气郁结证($n=40$)、肝郁脾虚证($n=109$)、气滞血瘀证($n=62$)、湿热毒蕴证($n=81$)及肝肾阴虚证($n=20$)。比较不同中医证型间临床特征及多模态影像特征的差异。正态分布的计量资料多组间比较采用单因素方差分析,进一步两两比较采用LSD- t 检验;非正态分布的计量资料多组间比较采用Kruskal-Wallis H 秩和检验,进一步两两比较采用Dunn检验。计数资料组间比较采用 χ^2 检验,进一步两两比较采用Bonferroni校正法。**结果** 中国肝癌临床分期、蔡尔德-皮尤分级、丙氨酸氨基转移酶、天冬氨酸氨基转移酶、白蛋白、直接胆红素、总胆红素、凝血酶原时间、中性粒细胞和白蛋白-胆红素评分在不同中医证型间的差异均有统计学意义(P 值均 <0.05);肝气郁结证患者蔡尔德-皮尤分级以A级(75.00%)为主;肝气郁结证(60.00%)和气滞血瘀证(59.68%)多见于中国肝癌临床分期I期,而湿热毒蕴证(27.16%)和肝肾阴虚证(30.00%)在IV期的分布比例显著高于肝气郁结证(2.50%)(P 值均 <0.05)。影像学结果显示,肿瘤数目、腹水、静脉癌栓、肿瘤最长径、肝内转移及肝门区、腹膜后淋巴结转移在不同证型间的差异均有统计学意义(P 值均 <0.05);与肝气郁结证相比,肝郁脾虚证和肝肾阴虚证更易发生肝内转移,肝郁脾虚证、湿热毒蕴证及肝肾阴虚证更易发生肝门区、腹膜后淋巴结转移,肝肾阴虚证更易出现肿瘤多发,且肝郁脾虚证和湿热毒蕴证更易出现腹水(P 值均 <0.05)。与气滞血瘀证相比,肝郁脾虚证肿瘤最长径更长且静脉癌栓占比更高(P 值均 <0.05)。此外,在184例具有MRI弥散加权成像序列的患者中,湿热毒蕴证和气滞血瘀证的表现扩散系数及相对表现扩散系数显著高于肝气郁结证(P 值均 <0.05)。**结论** 不同中医证型的PLC患者在CT与MRI影像特征及临床表现方面存在显著差异,其中肝郁脾虚证、湿热毒蕴证及肝肾阴虚证更易呈现肿瘤进展性影像学特征,湿热毒蕴证与气滞血瘀证表现扩散系数较高,为PLC中医辨证分型提供了客观依据。

关键词: 肝肿瘤; 辨证分型; 计算机体层成像; 磁共振成像

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Clinical features and multimodal quantitative radiological features of primary liver cancer patients with different traditional Chinese medicine syndrome types

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Abstract: Objective To investigate the association of the traditional Chinese medicine (TCM) syndrome types of primary liver cancer (PLC) with clinical features and multimodal quantitative radiological features on computed tomography (CT) and magnetic resonance imaging (MRI), and to provide a reference for the objectification of TCM syndrome differentiation and precise diagnosis and treatment. **Methods** A retrospective analysis was performed for the clinical data of 312 patients who were diagnosed with PLC in The First Affiliated Hospital of Hunan University of Chinese Medicine from March 2020 to June 2025, and according to the TCM syndrome type, they were divided into stagnation of liver Qi group with 40 patients, stagnation of liver Qi and spleen deficiency group with 109 patients, Qi stagnation and blood stasis group with 62 patients, dampness-heat toxin amassment group with 81 patients, and liver-kidney Yin deficiency group with 20 patients. Clinical features and multimodal quantitative radiological features were compared between the patients with different TCM syndrome types. A one-way analysis of variance was used for comparison of normally distributed continuous data between multiple groups, and the least significant difference *t*-test was used for further comparison between two groups; the Kruskal-Wallis *H* test was used for comparison of non-normally distributed continuous data between multiple groups, and the Dunn's multiple test was used for further comparison between two groups; the chi-square test was used for comparison of categorical data between groups, and the Bonferroni method was used for further comparison between two groups. **Results** There were significant differences between the patients with different TCM syndrome types in China liver cancer staging (CNLC), Child-Pugh class, alanine aminotransferase, aspartate aminotransferase, albumin, direct bilirubin, total bilirubin, prothrombin time, neutrophil, and albumin-bilirubin score (all $P < 0.05$). In the stagnation of liver Qi group, the patients with Child-Pugh class A accounted for 75.00%; among the patients with CNLC stage I PLC, the patients with stagnation of liver Qi accounted for 60.00%, and those with Qi stagnation and blood stasis syndrome accounted for 59.68%, while among the patients with CNLC stage IV PLC, the distribution proportion of dampness-heat toxin amassment (27.16%) and liver-kidney Yin deficiency (30.00%) was significantly higher than that of stagnation of liver Qi (2.50%) (all $P < 0.05$). Radiological examination showed that there were significant differences between the patients with different TCM syndrome types in the number of tumors, ascites, venous tumor thrombus, maximum tumor diameter, intrahepatic metastasis, and lymph node metastasis in the hepatic hilar and retroperitoneal regions (all $P < 0.05$). Compared with the patients with stagnation of liver Qi, the patients with liver depression and spleen deficiency or liver-kidney Yin deficiency were more likely to develop intrahepatic metastasis; the patients with liver depression and spleen deficiency, dampness-heat toxin amassment, or liver-kidney Yin deficiency were more likely to develop lymph node metastasis in the hepatic hilar and retroperitoneal regions; the patients with liver-kidney Yin deficiency were more likely to experience multiple tumors; the patients with liver depression and spleen deficiency or dampness-heat toxin amassment were more likely to develop ascites (all $P < 0.05$). Compared with the patients with Qi stagnation and blood stasis syndrome, the patients with liver depression and spleen deficiency had a significantly longer maximum tumor diameter and a significantly higher proportion of patients with venous tumor thrombus (both $P < 0.05$). Furthermore, among the 184 patients with MRI diffusion-weighted imaging sequences, the patients with dampness-heat toxin amassment or Qi stagnation and blood stasis syndrome had significantly higher ADC values and relative ADC values than those with stagnation of liver Qi (all $P < 0.05$). **Conclusion** There are significant differences in CT/MRI radiological features and clinical features between PLC patients with different TCM syndrome types, among whom the patients with liver depression and spleen deficiency, dampness-heat toxin amassment, and liver-kidney Yin deficiency tend to exhibit progressive radiological features, and those with dampness-heat toxin amassment or Qi stagnation and blood stasis syndrome tend to have higher ADC values. These findings provide an objective basis for TCM syndrome differentiation in PLC.

Key words: Liver Neoplasms; Syndrome Differentiation Classification; Computed Tomography; Magnetic Resonance Imaging

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原发性肝癌(primary liver cancer, PLC)是一种临床常见的恶性肿瘤。2022年全球癌症中心统计数据显示,肝癌在全球癌症中发病率位居第6,死亡率位居第3^[1]。国家癌症中心数据显示,我国2022年肝癌发病率位居第5,死亡率位居第2^[2]。PLC早期症状隐匿,患者在确诊时多已进展至中晚期,错过最佳治疗时机,导致预后不良及高病死率^[3-5]。中医药在PLC的治疗中具有独特优势,可改善临床症状,减轻放化疗毒副作用,延长生存期^[6-7]。辨证论治是中医诊疗的核心,准确的分型能够指导个体化治疗,并提高疗效。然而,传统辨证主要依赖望、闻、问和切四诊,高度依赖临床经验,缺乏客观指标^[8]。随着现代影像学技术的发展,计算机断层成像(computed tomography, CT)、磁共振成像(magnetic resonance imaging, MRI)等现代影像学手段已成为“望诊”的重要补充,在PLC的诊断、分期和疗效监测中发挥关键作用^[9-10]。通过分析肿瘤大小、多发性、扩散受限等影像学指标,可为中医辨证提供可视化和客观化的数据支撑,从而实现传统辨证的现代化与量化。因此,本研究旨在分析PLC不同中医证型与其CT、MRI影像及临床特征的关联,以期为中医辨证提供客观、可量化依据。

1 资料与方法

1.1 研究对象 选取2020年3月—2025年6月在湖南中医药大学第一附属医院确诊为PLC的312例患者为研究对象。纳入标准:(1)符合PLC的临床诊断标准;(2)未接受过抗肿瘤治疗;(3)四诊资料完整;(4)CT和/或MRI平扫+增强影像学检查资料完整。排除标准:(1)转移性肝癌患者;(2)图像质量不达标者;(3)合并严重慢性基础性疾病,影响证型准确者。

1.2 西医诊断标准 PLC诊断和中国肝癌临床分期(China clinic liver cancer staging, CNLC)标准参照《原发性肝癌诊疗指南(2024年版)》^[11]。

1.3 中医分型标准 由2名具有5年以上工作经验的中医医师,按照《原发性肝癌中医诊疗指南》^[12]将PLC分为肝气郁结证、肝郁脾虚证、气滞血瘀证、湿热毒蕴证和肝肾阴虚证。意见不一致者,共同讨论后决定分型。

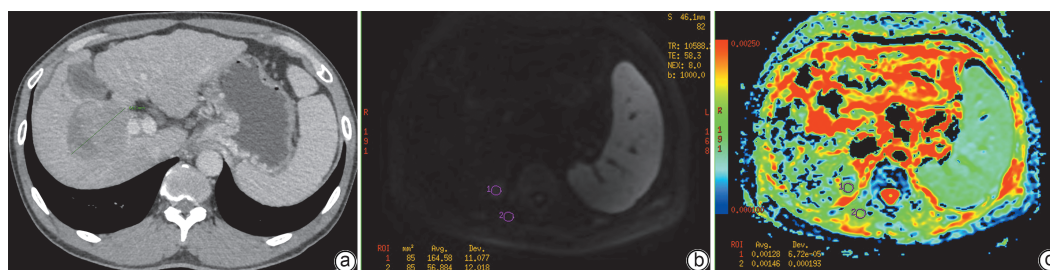
1.4 CT扫描参数 采用GE Revolution CT进行检查。扫描参数:管电压120 kV,自动管电流(100~500 mA),

螺距0.992:1,层厚5 mm。在注射碘海醇注射液后30 s、60 s行动脉期、静脉期扫描。

1.5 MRI扫描参数 采用GE 3.0 T Signa HDxt超导MRI扫描仪及体部相控阵线圈进行检查。扫描前禁饮禁食8 h。扫描范围从膈顶至肾下缘。主要序列参数: T_1 加权成像(T_1 weighted imaging, T_1WI):重复时间(repetition time, TR)3.91 ms,回波时间(echo time, TE)1.6 ms; T_2 加权成像(T_2 weighted imaging, T_2WI):TR 10 000 ms, TE 88.5 ms;弥散加权成像(diffusion weighted imaging, DWI):TR 10 588.2 ms, TE 58 ms,层厚5 mm。采用钆贝葡胺或钆塞酸二钠注射液作为对比剂,分别于注射后90 min、20 min采集肝胆特异期图像。

1.6 观察指标 收集患者的性别、年龄、蔡尔德-皮尤分级(Child-Pugh分级)、CNLC分期、血常规、凝血常规和肝功能。影像特征的提取基于本院存档的正式影像报告,由2名经验丰富的影像诊断医生(分别为6年及10年以上工作经验)独立阅片,意见不一致则经讨论达成共识。分析内容包括肿瘤数目、边界、门静脉增宽、脾大、腹水、侧支循环开放、静脉癌栓、肝内转移、肝门区及腹膜后淋巴结转移、远处转移、瘤内出血、卫星结节和肿瘤最长径^[13-14]。此外,将完成DWI检查的患者纳入亚组分析,将其图像传输至GE AW 4.6工作站,测量肿瘤部位的表现扩散系数(apparent diffusion coefficient, ADC)值,由2名研究者(工作年限分别为7年和6年)在不知晓分型结果的情况下独立勾画感兴趣区,面积设定为50~150 mm²,并尽量避开出血、坏死及血管区域,采用较高年资影像医师所得结果进行后续分析。相对ADC值为肿瘤区域与同层面竖脊肌ADC值的比值。定量特征提取示意图见图1。

1.7 统计学方法 采用SPSS 27.0软件进行数据分析,符合正态分布的计量资料以 $\bar{x} \pm s$ 表示,多组间比较采用单因素方差分析,进一步两两比较采用LSD- t 检验;非正态分布的计量资料以 $M(P_{25} \sim P_{75})$ 的形式表示,多组间比较采用Kruskal-Wallis H 秩和检验,进一步两两比较采用Dunn检验。计数资料组间比较采用 χ^2 检验,进一步两两比较采用Bonferroni校正法。一致性检验采用Kappa检验或组内相关系数。 $P < 0.05$ 为差异有统计学意义。



注:a,CT静脉期,测量肿瘤最长径;b,DWI图,勾画感兴趣区;c,ADC图。CT,计算机断层成像;DWI,弥散加权成像;ADC,表现扩散系数。

图1 定量特征提取示意图

Figure 1 Schematic diagram of quantitative feature extraction

2 结果

2.1 不同中医证型患者基线特征比较 312例PLC患者中,男253例(81.09%),女59例(18.91%);年龄29~88岁,平均年龄(60.83 ± 11.61)岁。中医辨证分型分别为肝气郁结证($n=40$)、肝郁脾虚证($n=109$)、气滞血瘀证($n=62$)、湿热毒蕴证($n=81$)和肝肾阴虚证($n=20$);2名中医医师辨证分型结果的Kappa值为0.81,一致性较高。Child-Pugh分级、CNLC分期、丙氨酸氨基转移酶、天冬氨酸氨基转移酶、白蛋白、直接胆红素、总胆红素、凝血酶原时间、中性粒细胞和白蛋白-胆红素评分在不同中医证型间的差异均有统计学意义(P 值均 <0.05)(表1)。

2.2 不同中医证型影像特征比较 312例PLC患者中,肿瘤数目、腹水、静脉癌栓、肝内转移、肿瘤最长径和肝门区、腹膜后淋巴结转移在不同中医证型间的差异均有统计学意义(P 值均 <0.05)。此外,184例患者具有DWI图像,其中肝气郁结证25例,肝郁脾虚证60例,气滞血瘀证36例,湿热毒蕴证52例,肝肾阴虚证11例,ADC值及相对ADC值的组内相关系数分别为0.80、0.78;两者在各中医证型间差异均有统计学意义(P 值均 <0.05)(表2)。不同中医证型患者的CT及MRI图像见图2。

3 讨论

本研究通过分析PLC患者的CT与MRI多模态影像及临床特征发现,不同中医证型在影像学表现上存在显著差异。肝郁脾虚证、湿热毒蕴证及肝肾阴虚证更易表现为进展性影像学特征,如肿瘤多发、肿瘤体积较大、出现腹水、静脉癌栓或肝门区和腹膜后淋巴结转移,而湿热毒蕴证与气滞血瘀证的ADC值及相对ADC值较高。

PLC在中医理论中属“积聚”“癥瘕”“胁痛”等范畴,核心病机为正气亏虚、脏腑失和,致气滞、血瘀、热毒等蕴结于肝,日久成“癥积”^[15]。虽病位在肝,但与脾、肾等密切相关。脾虚则运化失司、水湿内停,聚而成痰,或气

血生化不足;肾亏则精血亏耗、肝体失养,阴阳失衡,致病势加剧^[16]。本研究纳入的病例中,肝郁脾虚证(34.94%)和湿热毒蕴证(25.96%)占比高,气滞血瘀证(19.87%)和肝气郁结证(12.82%)次之,肝肾阴虚证(6.41%)最少,分布规律与既往研究基本一致^[17-18]。进一步分析发现,肝气郁结证和气滞血瘀证多见于CNLC I期患者,符合“初病在气,由气及血”的早期病机特点,提示疾病早期以实证为主;肝郁脾虚证在各分期中均占比较高,印证了柴可群教授^[19]提出的“脾虚贯穿肝癌全程”的学术观点;湿热毒蕴证和肝肾阴虚证在IV期的分布比例显著高于肝气郁结证,与中晚期病势亢盛、正虚邪实的病机特点及临床多在晚期确诊的现象相符。总体来看,PLC各中医证型并非孤立存在,而是在病程中相互转化、动态演变,体现了“由气及血、由实转虚、终致阴阳两亏”的演变规律,为进一步探讨证候演变与影像学特征及生物学基础的关联提供了理论依据。

肝主疏泄,喜条达而恶抑郁,情志不畅易致肝气郁结,为疾病初始。本研究显示,肝气郁结证患者Child-Pugh分级以A级为主,实验室指标提示其肝功能损伤较轻。随着病情进展,气病及血,气滞则血行不畅,凝滞成瘀,可转为气滞血瘀证。既往研究表明,DWI可无创性检测组织内水分子的布朗运动,其定量参数ADC值则反映水分子弥散受限程度^[20-21]。通常,肿瘤细胞增殖旺盛、排列紧密,导致水分子弥散受限,DWI呈高信号而ADC值降低。刘新爱等^[22]研究表明,血瘀证及湿热证患者的ADC值相对较高。本研究中,气滞血瘀证与湿热毒蕴证患者的ADC值及相对ADC值较肝气郁结证升高,可能与瘀血内结引发缺血坏死或热毒累及肝组织,导致局部灌注障碍和细胞结构松散相关。此外,湿热毒蕴证邪气壅盛、热毒伤津,在影像上更易表现为腹水增加及肝门区、腹膜后淋巴结转移。肝气横逆犯脾,加之湿热困阻,久则脾虚失运,气血生化乏源,形成肝郁脾虚证,标志着疾病进入虚实夹杂阶段。多项研究表明,脾

表1 不同中医证型基线特征比较

Table 1 Comparison of baseline characteristics among different TCM syndrome types

基线特征	肝气郁结证 (n=40)	肝郁脾虚证 (n=109)	气滞血瘀证 (n=62)	湿热毒蕴证 (n=81)	肝肾阴虚证 (n=20)	统计值	P值
男[例(%)]	29(72.50)	91(83.49)	50(80.65)	68(83.95)	15(75.00)	$\chi^2=3.257$	0.516
年龄(岁)	57.13±12.46	62.12±11.18	60.71±11.46	60.35±12.33	63.60±8.17	$F=1.691$	0.152
Child-Pugh 分级 [例(%)]						$\chi^2=31.569$	<0.001
A	30(75.00)	41(37.61) ¹⁾	24(38.71) ¹⁾	26(32.10) ¹⁾	5(25.00) ¹⁾		
B	9(22.50)	45(41.28)	31(50.00)	35(43.21)	8(40.00)		
C	1(2.50)	23(21.10)	7(11.29)	20(24.69) ¹⁾	7(35.00) ¹⁾²⁾		
CNLC 分期 [例(%)]						$\chi^2=34.304$	<0.001
I	24(60.00)	37(33.94) ¹⁾²⁾	37(59.68)	38(46.91)	3(15.00) ¹⁾²⁾		
II	9(22.50)	19(17.43)	7(11.29)	9(11.11)	6(30.00)		
III	6(15.00)	30(27.52)	10(16.13)	12(14.81)	5(25.00)		
IV	1(2.50)	23(21.10)	8(12.90)	22(27.16) ¹⁾	6(30.00) ¹⁾		
AFP[例(%)]						$\chi^2=6.099$	0.192
≥400 ug/L	13(32.50)	45(41.28)	17(27.42)	20(24.69)	7(35.00)		
<400 ug/L	27(67.50)	64(58.72)	45(72.58)	61(75.31)	13(65.00)		
AST(U/L)	41.82 (33.64~50.00)	116.95 (77.50~156.40) ¹⁾	68.61 (50.79~86.43)	76.20 (63.54~88.86) ¹⁾	132.49 (56.08~208.89) ¹⁾	$H=31.227$	<0.001
ALT(U/L)	30.96 (25.34~36.57)	68.11 (43.62~92.59)	44.98 (31.54~58.43)	51.05 (37.47~64.64)	68.31 (21.10~115.52)	$H=12.969$	0.011
Alb(g/L)	40.75 (38.43~43.07)	37.10 (34.18~40.03)	36.32 (34.78~37.85)	34.86 (33.30~36.42) ¹⁾	32.87 (30.35~35.40) ¹⁾	$H=23.967$	<0.001
DBil(μmol/L)	7.28 (6.06~8.49)	21.58 (15.73~27.42) ¹⁾	15.37 (10.84~19.91) ¹⁾	27.01 (16.68~37.34) ¹⁾	20.83 (10.22~31.43) ¹⁾	$H=25.092$	<0.001
IBil(μmol/L)	10.34 (8.23~12.45)	12.77 (11.04~14.51)	14.20 (10.51~17.89)	14.51 (11.97~17.04)	10.84 (7.78~13.90)	$H=3.563$	0.468
TBil(μmol/L)	17.61 (14.52~20.70)	34.35 (27.21~41.48) ¹⁾	29.57 (22.72~36.43) ¹⁾	41.34 (29.21~53.46) ¹⁾	31.67 (20.33~43.00)	$H=14.340$	0.006
PT(s)	14.09 (13.53~14.65)	15.30 (14.73~15.87)	15.43 (14.55~16.31)	15.96 (15.21~16.72) ¹⁾	15.54 (14.32~16.76)	$H=12.828$	0.012
PLT(×10 ⁹ /L)	102.38 (85.03~119.72)	113.68 (99.73~127.62)	107.15 (81.69~132.60)	116.20 (102.93~129.47)	123.05 (90.65~155.45)	$H=7.245$	0.124
NEUT(×10 ⁹ /L)	2.98 (2.44~3.52)	3.50 (3.10~3.89)	3.22 (2.73~3.72)	3.69 (3.17~4.22)	4.22 (3.50~4.94) ¹⁾	$H=10.882$	0.028
LYM(×10 ⁹ /L)	0.98 (0.85~1.11)	0.94 (0.86~1.03)	0.98 (0.81~1.14)	1.06 (0.93~1.19)	1.03 (0.79~1.28)	$H=3.143$	0.534
ALBI评分(分)	-2.68 (-2.89~-2.47)	-2.23 (-2.48~-1.97) ¹⁾	-2.19 (-2.34~-2.03) ¹⁾	-2.04 (-2.20~-1.87) ¹⁾	-1.87 (-2.16~-1.59) ¹⁾	$H=26.470$	<0.001
NLR	3.46 (2.78~4.14)	4.58 (3.73~5.43)	4.28 (3.28~5.28)	3.98 (3.42~4.54)	4.95 (3.76~6.13)	$H=5.496$	0.240

注:与肝气郁结证比较,1) $P<0.05$;与气滞血瘀证比较,2) $P<0.05$ 。Child-Pugh 分级,蔡尔德-皮尤分级;CNLC 分期,中国肝癌临床分期;AFP,甲胎蛋白;AST,天冬氨酸氨基转移酶;ALT,丙氨酸氨基转移酶;Alb,白蛋白;DBil,直接胆红素;IBil,间接胆红素;TBil,总胆红素;PT,凝血酶原时间;PLT,血小板;NEUT,中性粒细胞;LYM,淋巴细胞;ALBI,白蛋白-胆红素评分;NLR,中性粒细胞/淋巴细胞比值。

虚可促进肝癌的发生发展、侵袭与转移^[23-25]。本研究结果显示,肝郁脾虚证更易产生腹水,肝内转移和肝门区、腹膜后淋巴结转移,以及静脉癌栓,且肿瘤最长径更长,提示该证型可能标志着肝癌由局部实证向系统进展转

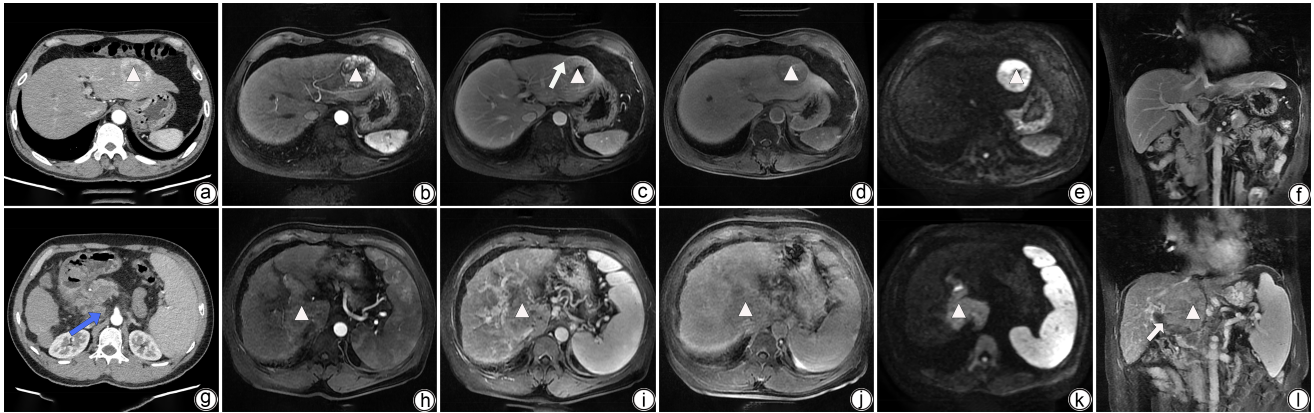
变。随着病程迁延,肝郁化火,灼伤肝阴,日久累及肾阴,则发展为肝肾阴虚证。既往研究表明,肝肾阴虚证肿瘤最长径最长^[26],与本研究结果基本一致。

值得注意的是,本研究发现不同证型在甲胎蛋白、

表2 不同中医证型影像特征比较
Table 2 Comparison of imaging features of different TCM syndrome types

影像征象	肝气郁结证 (n=40)	肝郁脾虚证 (n=109)	气滞血瘀证 (n=62)	湿热毒蕴证 (n=81)	肝肾阴虚证 (n=20)	统计值	P值
肿瘤数目[例(%)]						$\chi^2=16.470$	0.002
单发	27(67.50)	51(46.79)	41(66.13)	48(59.26)	5(25.00) ¹⁾		
多发	13(32.50)	58(53.21)	21(33.87)	33(40.74)	15(75.00) ¹⁾		
肿瘤边界[例(%)]						$\chi^2=7.612$	0.107
清晰	30(75.00)	63(57.80)	45(72.58)	52(64.20)	10(50.00)		
模糊	10(25.00)	46(42.20)	17(27.42)	29(35.80)	10(50.00)		
假包膜[例(%)]						$\chi^2=6.315$	0.612
无假包膜	4(10.00)	15(13.76)	9(14.52)	12(14.81)	3(15.00)		
不完全假包膜	19(47.50)	66(60.55)	32(51.61)	50(61.73)	11(55.00)		
完全假包膜	17(42.50)	28(25.69)	21(33.87)	19(23.46)	6(30.00)		
门静脉增宽[例(%)]	31(77.50)	86(78.90)	48(77.42)	61(75.31)	13(65.00)	$\chi^2=1.940$	0.747
脾大[例(%)]	33(82.50)	98(89.91)	57(91.94)	69(85.19)	17(85.00)	$\chi^2=3.159$	0.532
腹水[例(%)]	15(37.50)	72(66.06) ¹⁾	32(51.61)	53(65.43) ¹⁾	13(65.00)	$\chi^2=12.986$	0.011
侧支循环开放[例(%)]	26(65.00)	74(67.89)	47(75.81)	54(66.67)	16(80.00)	$\chi^2=3.028$	0.553
静脉癌栓[例(%)]	6(15.00)	35(32.11) ²⁾	6(9.68)	23(28.40)	7(35.00)	$\chi^2=14.508$	0.006
肝内转移[例(%)]	4(10.00)	38(34.86) ¹⁾	11(17.74)	25(30.86)	9(45.00) ¹⁾	$\chi^2=15.445$	0.004
肝门区、腹膜后淋巴结转移[例(%)]	0(0.00)	24(22.02) ¹⁾	9(14.52)	18(22.22) ¹⁾	5(25.00) ¹⁾	$\chi^2=12.152$	0.016
远处转移[例(%)]	2(5.00)	7(6.42)	6(9.68)	9(11.11)	2(10.00)	$\chi^2=2.141$	0.710
肿瘤出血[例(%)]	4(10.00)	13(11.93)	3(4.84)	14(17.28)	4(20.00)	$\chi^2=6.424$	0.170
卫星结节[例(%)]	8(20.00)	33(30.28)	9(14.52)	20(24.69)	6(30.00)	$\chi^2=6.093$	0.192
肿瘤最长径(mm)	49.33 (39.85 ~ 58.80)	67.25 (59.66 ~ 74.84) ²⁾	50.47 (41.81 ~ 59.12)	64.44 (54.91 ~ 73.98)	71.00 (53.16 ~ 88.84)	H=13.082	0.011
ADC值($\times 10^{-3} \text{ mm}^2/\text{s}$)	1.13 (1.07 ~ 1.19)	1.23 (1.18 ~ 1.27)	1.33 (1.23 ~ 1.44) ¹⁾	1.35 (1.27 ~ 1.44) ¹⁾	1.26 (1.15 ~ 1.36)	H=20.940	<0.001
相对ADC值	0.81 (0.76 ~ 0.86)	0.89 (0.85 ~ 0.93)	0.98 (0.90 ~ 1.07) ¹⁾	0.96 (0.89 ~ 1.02) ¹⁾	0.92 (0.82 ~ 1.01)	H=16.774	0.002

注:与肝气郁结证比较,1)P<0.05;与气滞血瘀证比较,2)P<0.05。ADC,表观扩散系数。



注:a、b、g、h,动脉期;c、i,静脉期;d、j,肝胆期;e、k,弥散加权成像;f、l,冠状位。a~f,男性患者,肝气郁结证,肝左外叶结节(白色三角形),完全假包膜(长白色箭头),无腹水、静脉癌栓、肝内转移、肝门区及腹膜后淋巴结转移;g~l,男性患者,肝郁脾虚证,肝尾状叶结节(白色三角形),静脉癌栓(短白色箭头),腹膜后淋巴结转移(蓝色箭头)。CT,计算机断层成像;MRI,磁共振成像。

图2 不同中医证型患者CT、MRI表现
Figure 2 CT and MRI manifestations of patients with different TCM syndromes

血小板等常规临床指标及部分影像学特征方面差异不显著,提示这些指标可能与中医证型关系有限。这与既往部分研究结论一致^[27],进一步说明单一指标难以反映中医证候的复杂性。

本研究尚存在一定局限性:首先,本研究为单中心回顾性分析,样本量相对有限,尤其肝肾阴虚证病例相对较少,且并非所有入组患者均具备完整的DWI序列,可能存在一定的选择偏倚,该结果仍需在前瞻性、多中心研究中进一步验证。其次,中医辨证虽然严格遵循诊疗指南^[11],但未采用舌诊仪、脉诊仪等四诊仪器设备,仍不可避免地存在一定主观性。最后,本研究虽结合了多模态影像及临床指标,但未纳入肿瘤分子学或病理学指标,可能限制对不同证型影像学机制的深层阐释。

综上所述,肝郁脾虚证、湿热毒蕴证及肝肾阴虚证患者更易表现为肿瘤进展性影像学特征,而湿热毒蕴证与气滞血瘀证患者的ADC值升高,提示肿瘤细胞密度降低、坏死增加。这些影像学差异反映了不同中医证型的现代病理生理特征,不仅为PLC中医辨证提供了客观依据,也为临床精准辨证及个体化治疗提供了参考。

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