

## 恶性血液系统疾病患者肝脏真菌感染的CT表现

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**【摘要】目的:**分析恶性血液系统疾病患者肝脏真菌感染的CT表现。**方法:**回顾性分析23例确诊肝脏真菌感染患者的临床及影像学资料,所有患者均采用SOMATOM Definition AS 64层螺旋CT机对上腹部进行平扫及三期增强扫描,分析其CT表现。**结果:**23例患者中,12例(52.17%)出现肝脏肿大;23例均为多发性病灶,共发现285个病灶;病灶呈圆形或类圆形,直径均小于20 mm;病灶呈散在或弥漫分布,无特殊好发部位;病灶CT表现可以分为5种类型:①单纯低密度影,病灶小,平扫及动脉期均为低密度,门脉期及延迟期为等密度,该型共2例(8.70%);②环形,平扫为中央低密度影,动脉期周围出现强化环,门脉期及延迟期等密度,该型共10例(43.48%);③靶形,平扫病灶为边界较为清晰的低密度影;动脉期中央为小结节状强化,周围低密度环状,外周为一薄厚不均的环状强化带;门脉期及延迟期周围低密度环状区域不同程度强化,外周强化带消失,该型共8例(34.78%);④牛眼形,三期均为中央低密度,周边为强化环,该型共1例(4.35%);⑤病灶呈现多个结节融合的不规则肿块,有2个及以上上述类型的病灶聚集在一起,该型共2例(8.70%)。**结论:**肝脏真菌感染的CT表现具有一定的特征性,CT检查对于其诊断具有积极意义,值得在临床推广。

**【关键词】**肝脏;真菌感染;CT;恶性血液系统疾病

**【中图分类号】**R814.42

**【文献标志码】**A

**【文章编号】**1005-202X(2018)05-0549-04

## CT characteristics of hepatic fungal infections in patients with malignant hematological diseases

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**Abstract: Objective** To analyze computed tomography (CT) findings of hepatic fungal infections in patients suffering from malignant hematological diseases. **Methods** The clinical and imaging data of 23 patients with confirmed hepatic fungal infections were retrospectively analyzed. All patients underwent the plain and three-phase enhanced scans of the upper abdomen with a SOMATOM Definition AS 64-slice CT scanner, and the obtained CT findings were analyzed. **Results** Of all 23 patients, 12 (52.17%) developed liver enlargement. All patients had multiple lesions, and a total of 285 lesions were found in 23 cases. Lesions were round or round-like, with a diameter less than 20 mm. The lesions distributed in scatter or diffusely, without developing in predilection sites. The focal CT findings were able to be divided into 5 types. (1) Lesions appeared simple low density shadows, and the foci were small. Both plain scan and arterial phase showed low density, but portal phase and delayed phase showed equal density. These CT features were observed in 2 cases (8.70%). (2) A total of 10 patients (43.48%) developed annular lesions. Plain scan showed low density shadows in central region. Peripheral enhancement ring was observed in arterial phase, but portal phase and delayed phase showed equal density. (3) Lesion appeared target shape. Plain scan demonstrated low density shadows with relatively clear boundary. Arterial phase revealed a small nodular enhancement in central region, surrounded by low density ring, with an uneven thickness of annular enhancement zone in peripheral region. The low density annular region around the portal and delayed phases had various enhancements, and the peripheral enhancement zone disappears. There were 8 cases (34.78%) of this type. (4) Only 1 case (4.35%) developed lesions which appeared bullous shape. All the 3 phases showed low density in central region, surrounded by enhancement ring. (5) In the last 2 cases, lesions present as irregular mass of multiple nodular fusions, with two or more types of lesions gathering together. **Conclusion** CT findings of hepatic fungal infection have certain characteristics. Therefore, CT examination has a positive meaning for the diagnosis of hepatic fungal infection, worthy of clinical promotion.

**Keywords:** liver; fungal infection; computed tomography; malignant hematological disease

**【收稿日期】**2018-02-21

**【基金项目】**国家自然科学基金(81470349)

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## 前言

肝脏的真菌感染在临床上较为少见,常常发生于血液系统恶性肿瘤患者进行化疗之后,此时患者的外周血液中白细胞数目减少而功能下降,导致免疫功能降低,从而导致真菌感染更易发生<sup>[1]</sup>。在临床上真菌感染最常累及的内脏器官为肺,但肝脏也可被累及<sup>[2]</sup>。由于临床上真菌感染肝脏的病例较为少见,且无特异性的临床症状及体征,极易造成误诊、漏诊等现象,因此肝脏真菌感染的诊断手段的研究显得尤为重要。CT具有扫描速度快、图像清晰度高等优点,在肝脏疾病的诊断中具有重要的意义<sup>[3]</sup>。但有关CT扫描对肝脏真菌感染进行诊断方面的研究较少,且缺乏系统性分析,无法为临床医师提供准确的临床诊断依据<sup>[4]</sup>。本研究通过对23例肝脏真菌感染的患者影像学资料进行分析,总结了此类患者CT扫描的表现特点,旨在提高对该病的临床诊断能力及认识,以利于对患者实施更加及时有效的治疗,现将研究结果报道如下。

## 1 材料与方法

### 1.1 一般资料

选择2014年3月~2017年3月被诊断为肝脏真菌感染患者23例,其中男性14例,女性9例,年龄4~56岁,平均 $(25.48 \pm 5.9)$ 岁。23例患者均经影像学及病理学检查确定肝脏真菌感染病灶发生,且经抗真菌治疗后均明显好转或痊愈;23例患者均经骨髓穿刺被确诊为恶性血液系统疾病患者,其中13例为急性非淋巴细胞性白血病,10例为急性淋巴细胞性白血病,所有患者均进行了不同方案及疗程的化疗。主要临床表现为反复发热,体温波动在 $38.0 \sim 39.8^\circ\text{C}$ ,其中有15例伴有头晕、乏力,6例伴有咳嗽,3例伴有牙龈出血,2例伴有反复腹痛,1例伴有皮肤瘀斑。

### 1.2 方法

所有患者均采用SOMATOM Definition AS 64层螺旋CT进行上腹部CT平扫及双期增强扫描,患者检查前空腹口服500 mL 0.5%泛影葡胺液,扫描范围为隔顶至肝下缘,扫描条件为:管电压120 V,管电流250~280 mA,矩阵 $512 \times 512$ ,层厚0.5 mm,间距0.5 mm,对比剂使用非离子型碘对比剂300 mgI/mL的碘海醇,肘静脉注射75~100 mL,注射流率为3.5 mL/s,先进行平扫,对比剂注射后30 s行动脉期扫描,60 s后行门脉期扫描,2 min后行延时期扫描。得到图像后经高年资影像科医师阅片得出判断。

## 2 结果

### 2.1 病灶大小、形状、分布

经CT表现发现所有23例患者中,12例(52.17%)出现肝脏肿大,以右侧肋弓下缘至肝下缘为测量标准,肿大范围2.3~7.6 cm,平均3.3 cm。所有患者均为多发病灶,23例共发现285个病灶。病灶呈圆形或类圆形,直径均小于20 mm。病灶呈散在或弥漫分布,无特殊好发部位。

### 2.2 病灶的CT表现类型

CT表现可以分为以下5种类型:①单纯低密度影,该型病灶较小,直径均小于10 mm,平扫及动脉期均表现为低密度,门脉期及延时期表现为等密度,该型患者共2例(8.70%);②环形,平扫表现为中央低密度影(图1a),动脉期周围可出现一过性灌注强化环(图1b),门脉期该环消失,延时期边缘扩大且模糊,仅表现为中央低密度或整体不均匀等密度(图1c、d),该型患者共10例(43.48%);③靶形,平扫期病灶表现为边界较为清晰的低密度影(图2a),CT值在25~53 HU,平均35 HU;动脉期病灶边界更为清晰,中央表现为小结节状强化,CT值在63~91 HU,平均75 HU,周围表现为低密度环状,CT值在44~65 HU,平均51 HU,外周出现一薄厚不均的环状强化带,且强化程度明显较正常肝组织高(图2b);门脉期及延时期周围低密度环状区域出现不同程度的强化,CT值在59~122 HU,平均77 HU,外周的强化带消失,密度与肝组织相同(图2c),该型患者共出现8例(34.78%);④牛眼形,三期均表现为中央低密度,且中心区域有点状高密度影,CT值在43~84 HU,平均54 HU,周边为强化环,密度高于肝脏,CT值在48~86 HU,平均66 HU,该型患者共1例(4.35%);⑤病灶呈现多个结节融合的不规则肿块,有2个及以上上述类型的病灶聚集在一起,该型患者共2例(8.70%)。

### 2.3 患者治疗前后CT表现

患者,女,62岁,1月考虑肝囊肿,抗炎治疗后2月复查,肝脏病灶较前清晰,未见明显消退;骨髓穿刺证实白血病,血象提示真菌感染,经抗真菌感染治疗后8月复查病灶消失。见图3~5。

## 3 讨论

恶性血液系统疾病患者由于自身血液系统的基础疾病、细胞毒性药物的使用、骨髓移植治疗手段及广泛使用广谱抗生素进行治疗等原因导致患者的自身免疫力降低、菌群失调等,会使患者更容易遭受真菌感染。有研究显示白血病患者较易发生散播性真菌病,发病几率可达3%~29%,而肝脾是最常见的受



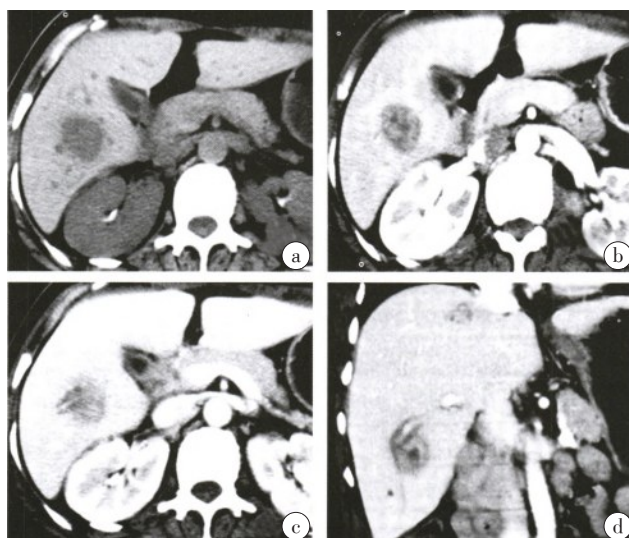


图1 环形患者的三期CT扫描图

Fig.1 Three-phase CT scans of patients with annular lesions

The ring disappears during the portal period, and the edge of the delay period is enlarged and blurred. a: Plain scan revealed low density shadow in central region; b: Peripheral perfusion enhancement ring; c, d: The ring disappeared during portal period, and the edge of delay period was enlarged and blurred, only manifesting as low density in central region or overall uneven density

累器官,肝脏感染就是其中一种,因此对该病的诊断应引起临床医师及影像科医师的重视<sup>[5-7]</sup>。肝脏发生真菌感染可能的病理机制是由于真菌血症控制的不理想从而累及到肝脏,或者由于真菌穿过胃肠道粘膜直接蔓延至肝脏所致<sup>[8-10]</sup>。

肝脏真菌感染的主要临床症状表现为反复而不同程度的发热,且抗菌药物治疗无效,肝脏包膜肿胀导致上腹部疼痛等,但这些症状均缺乏特异性,往往无法为疾病的诊断提供可靠依据。实验室检查对于该病的诊断具有重要意义,但有研究显示其阳性率不高,极易导致漏诊、误诊的发生<sup>[11-13]</sup>。病理检查可较为准确地诊断疾病,但往往由于病情危急或患者存在出血倾向,而使得穿刺活检不易被施行。另外由于该病多为散在分布的较小病灶,使得活检的阳性率不高。有报道此种感染的死亡前诊断率仅为9%<sup>[14]</sup>。而影像学检查具有无创、快速等优势,在该疾病的早期诊断中借助影像学的帮助就显得尤为重要<sup>[15-16]</sup>。

在所有的影像学检查中,CT及MRI在肝脏病变的显示中较有优势,对病灶的检出率较高,而CT又较MRI快速便捷且临床应用率更高,因此,对该病CT表现的

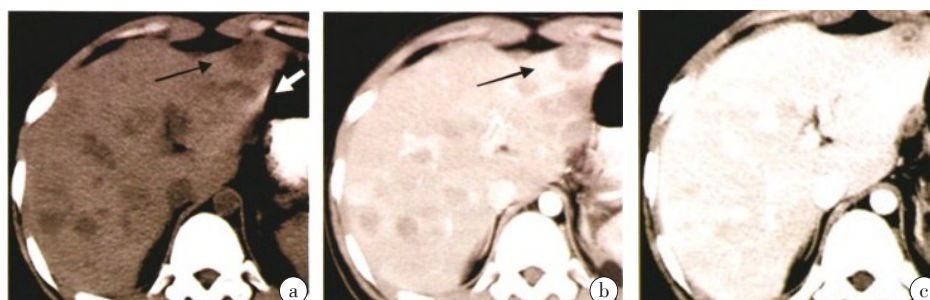


图2 靶形患者的三期CT扫描图

Fig.2 Three-phase CT scans of patients with lesions of target shape

a: Lesions with a clear low density boundary; b: A ring of uneven thickness was observed in the periphery, and the degree of enhancement was significantly higher than that of normal liver tissue; c: Peripheral enhancement bands disappeared and the density was the same as that of liver tissue



图3 患者治疗前CT扫描图

Fig.3 CT scan before treatment



图4 患者抗炎治疗后CT扫描图

Fig.4 CT scan after anti-inflammatory treatment

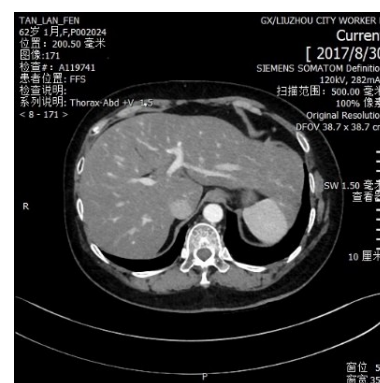


图5 患者抗真菌治疗后CT扫描图

Fig.5 CT scan after antifungal treatment

正确认识在疾病诊断中有着至关重要的意义<sup>[17-18]</sup>。本研究显示23例患者中有12例(52.17%)出现肝脏肿大,可能是由于肝脏内多发病灶导致。有报道称29例恶性血液系统疾病患者发生肝脏真菌感染后有15例(54%)出现肝脏肿大,与本研究结果基本相符<sup>[13]</sup>。平扫结果显示肝脏内多发低密度影,病灶多为圆或类圆形,直径一般小于2 cm,可能是由于真菌经血行散播而在肝脏内形成的小脓肿。

本研究将CT表现大致分为5种类型,而CT表现多与其病理变化相关:①单纯低密度影,病灶可能为小脓肿,为纤维组织并少量炎性细胞浸润造成,由于纤维组织的延迟强化使得平扫及动脉期均为低密度而门脉期及延迟期出现等密度;②环形,可能是由于病灶周围的正常肝组织充血表现出动脉期一过性的灌注强化环,而内部组织与单纯型相似;③靶形,最外周的强化环及周围低密度环与环形相似,而动脉期出现的中央小结节状强化可能是上皮样细胞组成的结节;④牛眼形,病灶中央纤维组织增生、伴有肉芽肿性炎症表现为中央低密度伴点状高密度,周围炎性细胞表现为密度高于正常肝组织的强化环;⑤不规则肿块,当上述几种类型的病灶融合在一起即可表现为不规则形状的肿块。以上5种类型中以环形、靶形型居多,23例患者中共18例,占78.26%。

肝脏真菌感染的CT表现具有特异性。与细菌性肝脓肿相鉴别,细菌性肝脓肿多表现为平扫边缘模糊、增强边缘清晰、外周出现强化环的典型性环靶征,其与病理变化相对应为中央坏死区显示低密度,肉芽组织增生形成的脓肿壁增强扫描为边界清晰的增强环,外周出现环形水肿,脓腔内部可出现气体影,且细菌性肝脓肿与真菌感染相比病灶较大<sup>[19-20]</sup>。与白血病肝浸润相鉴别,白血病肝浸润的病灶多表现为单发的强化结节影,偶多发,病灶大小不等。与肝转移瘤相鉴别,肝转移瘤多表现为平扫圆形、类圆形或不规则的低密度影,边缘清晰,密度不等,单发、多发或全肝弥漫性病灶,病灶大小不等,增强扫描动脉期由于血供较差往往不出现强化,而门脉期由于门静脉供血,可出现周边强化的牛眼征<sup>[15]</sup>。

综上所述,肝脏真菌感染的CT表现具有一定的特征性,CT检查对其诊断具有积极的意义,值得在临床推广。

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(编辑:薛泽玲)