

肾脏肌样型血管平滑肌脂肪瘤的 CT特征

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[摘要] **背景与目的:** 肾脏占位性病变的检出日益增多, 肾脏的肌样型血管平滑肌脂肪瘤(myomatous angiomyolipoma, mAML)与恶性病变的鉴别对诊疗有重要意义。本研究旨在探讨肾脏mAML的CT特征, 以提高其诊断及鉴别的准确性。**方法:** 回顾性分析手术病理证实的肾脏mAML 10例。其中男性4例, 女性6例, 年龄38~64岁, 平均53.2岁。分析其CT平扫、增强和临床资料, 记录病灶的一般形态特征, 有无可见脂肪、钙化、假包膜、瘤内囊变或出血, 劈裂征是否阳性; 观察其平扫及动态增强CT表现, 并与邻近正常肾脏实质和同侧腰背部骨骼肌对照。**结果:** 10例病例中, 9例为单发, 1例伴混合型血管平滑肌脂肪瘤。病灶位置位于左肾6例, 右肾4例; 5例位于肾外, 5例位于肾内。所有病例均边界清楚, 9例形态规则。肿瘤最大径15~80 mm, 平均(43±19)mm。2例病灶含少量可见脂肪, 3例含增粗的瘤内血管, 2例伴囊变, 所有病灶均无钙化或出血。CT平扫结果显示, 7例病灶呈稍高密度, 3例为等密度, 5例病灶均质, 3例为轻度不均, 2例为不均。病灶平均CT值为(48.60±5.50) HU, 显著高于邻近正常肾脏实质[(39.70±6.67) HU]($P<0.05$), 与骨骼肌平均CT值[(48.90±2.28) HU]差异无统计学意义($P>0.05$)。增强扫描结果显示, 4例呈轻度强化, 5例中度强化, 1例明显增强; 强化均匀、轻度不均匀和不均匀者分别为3例和4例、3例。持续性强化者为4例, 渐进性强化者为4例, 快进快出者为2例。**结论:** mAML在CT上主要表现为边界清楚的结节, 大多不含可见脂肪, 平扫呈稍高密度, 均质或轻度不均, 增强后呈轻度至中度强化, 强化均匀或轻度不均, 渐进性强化或持续性强化。对于影像表现的综合分析有利于其诊断和鉴别诊断。

[关键词] 肾脏; 肌样型血管平滑肌脂肪瘤; 体层摄影术, 螺旋计算机

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Imaging features of renal myomatous angiomyolipoma on CT ZHOU Bingni, LIU Xiaohang, TANG Wei, GAN Hualei, LI Can, ZHOU Liangping (Department of Radiology, Fudan University Shanghai Cancer Center; Department of Oncology, Shanghai Medical College, Fudan University, Shanghai 200032, China)
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[Abstract] **Background and purpose:** Since the detection of renal neoplasm is increasing, it's important to distinguish myomatous angiomyolipoma (mAML) from malignant tumors. This study aimed to investigate the imaging features of renal mAML on computer tomography (CT) and improve the accuracy of diagnosis and differential diagnosis. **Methods:** Ten patients were diagnosed with mAML. The cases were composed of 4 men and 6 women, with a mean age of 53.2 years (range 38-64). Among all of the cases, the percentage of spindle cell is more than 70%. Two radiologists reviewed all of the images to evaluate general characteristics, imaging features on unenhanced CT and enhanced CT. The mean attenuation on the unenhanced CT of mAML, normal renal parenchyma and skeletal muscle was compared by the paired-sample t test. **Results:** Among all of the tumors, nine lesions were solitary, and the other one was accompanied with typical AML. Six lesions were at the left kidney while four lesions were at the right side. Five lesions located intracapsularly. All the lesions were well-defined, nine of them were regular. The tumor sizes ranged from 15 to 80 mm with mean (43±19) cm. Intratumoral macroscopic fat, cystic degeneration and vessels were found in two lesions, two lesions and three lesions, respectively. Calcification or hemorrhage was not detected in any cases. On unenhanced CT, 70% cases were hyperattenuating. Eight cases were homogeneous or slightly heterogeneous. The

mean attenuation of the tumor lesions on unenhanced CT was (48.60 ± 5.50) HU, which was higher than that of normal renal parenchyma (39.70 ± 6.67) HU ($P < 0.05$), and similar to that of skeletal muscle (48.9 ± 2.28) HU ($P > 0.05$). After intravenous injection of contrast media, seven cases were categorized as the slightly heterogeneous or heterogeneous enhancement type. Four cases showed a weak enhancement whereas five cases were with a moderate enhancement. The gradual, prolonged and early washout enhancement patterns were observed in 40%, 40%, and 20% of the cases, respectively. **Conclusion:** The radiological appearance of mAML had a tendency to be hyperattenuating on unenhanced CT images without macroscopic fat; it could be homogeneous or slightly heterogeneous on unenhanced scans. After the injection of contrast agent, mAML tended to have a weak or moderate, lightly heterogeneous to heterogeneous enhancement, and it could demonstrate gradual and prolonged enhancement patterns.

[**Key words**] Renal; Myomatous angiomyolipoma; Computed tomography

肾脏血管平滑肌脂肪瘤(angiomylipoma, AML)最常见的肾脏间质肿瘤,由血管、平滑肌细胞和脂肪细胞组成^[1]。根据分化和组织成分的优势,可将AML分为4种类型:混合型、脂肪瘤样型(脂肪成分大于等于70%)、肌样型和血管瘤样型^[2]。大多数AML脂肪含量高,在影像学上有独特表现易于诊断,然而以平滑肌细胞为主型的肌样型AML(myomatous AML, mAML)较为少见,术前易与肾癌混淆^[3],从而导致不必要的手术^[4-6]。因此对于此类型AML的正确诊断尤为重要。Boraschi等^[7]报道了1例肝脏mAML的影像学表现。本研究报道了10例经手术病理证实的mAML,对其CT表现等方面进行回顾性分析,旨在提高对本病的认识及诊断水平。

1 资料和方法

1.1 一般资料

收集复旦大学附属肿瘤医院2010年3月—2016年1月经手术病理证实的肾脏mAML 10例,其中男性4例,女性6例,年龄38~64岁,平均53.2岁。根据病理诊断标准,平滑肌细胞含量均大于70%的AML为肌样型,本组10例mAML中8例行免疫组织化学检查,抗黑色素瘤相关抗原阳性8例,平滑肌肌动蛋白阳性7例。本组病例均未进行结节性硬化基因测定。

1.2 CT检查方法

使用德国Siemens公司Somatom 40或64层螺旋CT。扫描参数管电压120 KV,管电流

150~250 mAs,螺距1,层厚为1~5 mm,层间距5 mm。所有患者扫描均包括平扫、动脉期和静脉期。采用CT机专用高压注射器,对比剂为碘伏醇80~120 mL(300 mg I/mL),流率为2.0~2.5 mL/s,分别在开始注射对比剂后25~30 s、75~80 s行动脉期和静脉期扫描。

1.3 图像分析

采用双盲法,由2位放射科医师对CT图像进行观察分析。观察病灶的一般特征:大小、形状、边缘(规则或不规则)、边界(清晰或不清晰)、位置(左肾或者右肾,肾内或者肾外),有无可见脂肪、血管影、钙化、假包膜、瘤内囊变或出血,劈裂征及杯口征是否阳性;平扫特征:病灶密度、病灶的均匀性;强化特征:强化程度、强化均匀性及强化方式。病灶位置判断标准:当瘤体中心位于肾脏轮廓之内,则认为肿瘤位于肾内,瘤体中心位于肾脏轮廓之外则为肾外^[8]。分别测量平扫时病灶、邻近正常肾脏实质、同侧腰背部骨骼肌的CT值,以及增强后病灶动脉期、静脉期的CT值。强化程度大于80 HU为明显强化,50~80 HU为中度强化,低于50 HU为轻度强化^[9]。根据动脉期与静脉期CT值之差将肿瘤强化方式分为:①大于等于20 HU为快进快出性强化;②小于等于-20 HU为渐进性强化;③-19~19 HU为持续性强化^[6, 10]。

1.4 统计学处理

采用SPSS 20.0软件处理数据。采用配对 t 检验,比较病灶、邻近正常肾脏实质、骨骼肌平扫的CT值。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 一般形态特征

10例病灶中9例为单发，1例伴混合型血管平滑肌脂肪瘤。病灶位置位于左肾6例，右肾4例；5例位于肾外，5例位于肾内。病灶最大径15~80 mm，平均(43 ± 19) mm。9例形态规则，呈结节样，1例形态不规则。所有病例均边界清楚，其中2例伴假包膜。劈裂征阳性5例，杯口征阳性2例。2例病灶内可见少量脂肪，3例瘤内见增粗的血管，2例病灶伴囊变，所有病灶均无钙化或出血。

2.2 CT平扫特征

平扫CT图像中，7例呈稍高密度，3例显示等密度。病灶CT值42~60 HU，平均(48.60 ±

5.50) HU，邻近正常肾脏实质CT值33~53 HU，平均(39.7 ± 6.67) HU，同侧腰背部骨骼肌的CT值46~52 HU，平均(48.9 ± 2.28) HU，病灶与骨骼肌的CT值差异无统计学意义($P>0.05$)，两者均显著高于邻近正常肾脏实质($P<0.05$)，表1)。对于肿瘤均匀性的评估，5例病灶均质，3例为轻度不均，另外2例因含脂肪及囊变呈不均质表现。

2.3 强化特征

增强后10例病灶中4例呈轻度强化，5例中度强化，1例明显增强；在动脉期CT值分别为76~152 HU，平均(90.50 ± 24.7) HU，静脉期CT值60~144 HU，平均(97.4 ± 25.40) HU，均匀强化者、轻度不均匀强化者、不均匀强化者分别为3、4和3例。持续性强化者为4例，渐进性强化者为4例，快进快出者为2例。

表1 CT平扫上病灶、邻近正常肾实质、骨骼肌的平均CT值及配对t检验

Tab. 1 The attenuation of the tumor lesions, normal renal parenchyma and skeletal muscle on unenhanced CT and the paired-sample *t* tests of them

No	Attenuation of lesion on unenhanced CT (HU)		
	Tumor lesion	Normal renal parenchyma	Skeletal muscle
1	50	41	51
2	42	35	48
3	48	33	48
4	43	30	51
5	55	42	48
6	44	39	45
7	48	46	52
8	60	53	50
9	47	38	46
10	49	40	50
Average value	48.60±5.50	39.70±6.67	48.9±2.28
<i>P</i> value	0.000(P_{T-N})	0.001(P_{N-S})	0.865(P_{S-T})

HU: Hounsfield units; T-N: Tumor lesion-normal renal parenchyma; N-S: Normal renal parenchyma-skeletal muscle; S-T: Skeletal muscle-tumor lesion 0

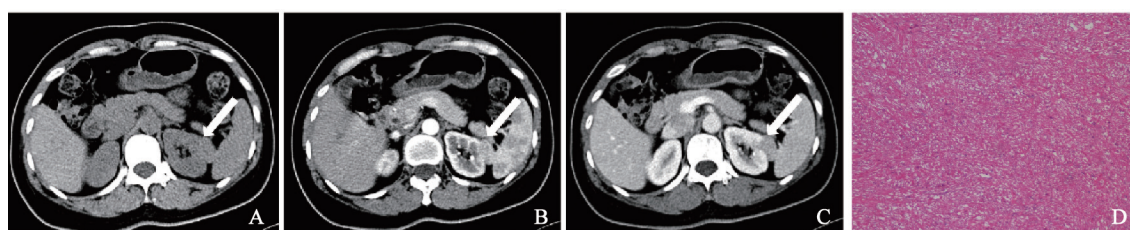


图1 肾肌样型血管平滑肌脂肪瘤CT及病理表现

Fig. 1 Imaging features and pathological characteristics in renal myomatous angiomyolipoma

Images from a 42-year-old woman with mAML (2.5 cm×2.2 cm) in the left kidney. A: Unenhanced CT scan showed an extracapsular mass with slight hyper-attenuation compared with the renal parenchyma; B, C: The tumor (arrow) showed a moderate enhancement of the gradual pattern; D: Hematoxylin-eosin staining specimen reduced from (×40) showed a large amount of spindle-shaped smooth muscle cells with large hyperchromatic nuclei and abundant eosinophilic cytoplasm

3 讨 论

AML是肾脏最常见的间叶性肿瘤, 约占肾脏肿瘤的1%, mAML少见, 病理特点是70%以上为平滑肌成分, 其生物学行为均为良性, 生长缓慢, 临床准确诊断可避免不必要的手术。国外文献报道mAML 40%~50%合并结节硬化症, 外科病例中不伴结节硬化症(tuberous sclerosis complex, TSC)的患者男女发病率比例为1:4, 发病年龄45~55岁, 伴TSC患者男、女性发病率相近, 发病年龄25~35岁^[3]。国内AML多不伴有结节硬化症, 本组10例病例均未进行结节性硬化基因测定, 发病率男女比例及发病范围与不伴结节硬化症AML相似。

影像学上典型AML边界清楚, 多外生性生长, 可伴劈裂征, 并且可依据瘤内脂肪成分诊断。本组结果表明mAML具有典型AML的一些特征, 形态规则、边界清楚、部分伴劈裂征等, 然而本组资料中仅2例含少量可见脂肪, 其余病例未探及脂肪, 即为“乏脂肪血管平滑肌脂肪瘤”的一类亚型。本组研究病例肿瘤长径为1.5~8.0 cm, 平均(4.28 ± 1.93) cm, 而以往研究中非特指性的乏脂肪血管平滑肌脂肪瘤约2.2~5.0 cm, 平均为3 cm^[9-11]。据报道乏脂肪血管平滑肌脂肪瘤在CT平扫上多均质^[11-12], 然而本组研究中, 均质的病例占50%, 30%的病例轻度不均, 20%的病例不均质, 可能与本组病例的直径较大有关。此外, 70%的病例在平扫CT中呈稍高密度, 为本组病例的特征表现。根据配对 t 检验, 病灶平均CT值高于邻近的正常肾脏实质, 差异有统计学意义, 而病灶与骨骼肌的平均CT值差异无统计学意义。换言之, 病灶平均CT与骨骼肌相近, 这项特征与mAML含大量平滑肌细胞相符。据研究^[13], 血管平滑肌脂肪瘤赖于不同的血管成分而表现出不同程度的增强。本组研究中, 90%的病例呈轻度至中度强化, 与病灶富含平滑肌细胞而血管成分含量少的病理特征相符。增强后, 本组10例病灶30%均匀强化、40%轻度不均匀强化、

30%不均匀强化; 持续性强化、渐进性强化、快进快出者分别为40%、40%和20%, 笔者推测由于mAML组成成分混杂, 比例各异, 致使其强化后呈现多样性的表现, 然而因为其含有大量的平滑肌细胞成分, 使其以均匀或轻度不均匀强化、持续性强化或渐进性强化的表现方式为主。

肌样型血管平滑肌脂肪瘤大多在CT上缺乏可见脂肪, 因此需要与恶性的肾细胞癌及具有恶性潜能的上皮样血管平滑肌脂肪瘤(epithelioid angimyolipoma, eAML)鉴别。肾细胞癌不同亚型的强化方式及其他影像学特征不同^[8, 10, 13]。肾透明细胞癌大多呈现快进快出的强化方式, 然而mAML在CT上大多呈现持续性强化或者渐进性强化, 并且肾透明细胞癌囊变、出血及坏死常见。乳头状肾细胞癌常呈延迟强化^[14], 47.8%的乳头状肾细胞癌呈不均匀强化^[4]。然而乳头状肾细胞癌在CT平时中大多表现为等密度, 而mAML多表现为稍高密度。肾嫌色细胞癌多呈渐进性强化, 然而肾嫌色细胞癌可呈圆形、分叶状或不规则形^[15], CT增强后强化峰值约84.7 HU, mAML多呈规则圆形, 平均强化峰值为97.4 HU。此外因肿瘤生长方式等原因, 肾细胞癌劈裂征阳性率为19.2%^[16], 而本组病例中mAML劈裂征阳性率50%。综合分析病灶的影像表现有利于mAML和肾细胞癌的鉴别。此外mAML还需要与eAML鉴别。平滑肌细胞最常见的是梭形细胞, 也可以表现为圆形的上皮样细胞, 当后者占主导成分后即形成eAML。根据2004年WHO的分类标准^[3], eAML是具有恶性潜能的间质肿瘤, 据报道约1/3会发生转移^[17]。据Tsukada等^[9]研究, eAML平均直径较大, 可达7.4 cm, 常常伴有出血、囊变或坏死, 可以表现为不均匀的实质肿块、均匀的肿块或者是多发囊性病灶, 3种表现分别为50%、12.5%和37.5%。而本组研究中, mAML平均直径约4.28 cm, 大多均质或轻度不均, 囊变少。

mAML在CT上主要表现为边界清楚的结节, 平扫呈稍高密度, 均质或轻度不均, 增强

后呈轻度至中度强化, 强化均匀或轻度不均, 渐进性强化或持续性强化。影像表现的综合分析将有利于mAML的诊断和鉴别诊断。

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