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低剂量 64 排 CT 双期增强扫描在胃癌淋巴结转移评估中的应用价值

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[摘要] 目的: 分析低剂量64排CT双期增强扫描在胃癌淋巴结转移评估中的应用价值, 为临床诊疗提供参考。方法: 选取2015年2月至2019年5月六安市第二人民医院收治的胃癌患者40例进行研究, 所有患者行低剂量64排CT双期增强扫描与常规剂量CT三期增强扫描, 并将手术病理结果与CT检查结果进行比较。结果: 低剂量64排CT双期增强扫描诊断胃癌淋巴结转移的敏感度为83.33%, 特异度为90.00%, 差异有统计学意义($P < 0.05$); 常规剂量CT三期增强扫描诊断胃癌淋巴结转移的敏感度为62.50%, 特异度为43.75%, 差异有统计学意义($P < 0.05$); 低剂量64排CT双期增强扫描对病理分期N0-N3b的准确度依次为71.43%, 60.00%, 84.62%, 75.00%, 28.57%, 总准确度为67.50%。胃癌转移与非转移淋巴结的短径、长径相比, 差异无统计学意义($P > 0.05$); 转移淋巴结的强化程度为(48.39 ± 5.77) HU, 明显高于非转移淋巴结[(30.17 ± 5.78) HU], 差异有统计学意义($P < 0.05$)。结论: 低剂量64排CT双期增强扫描对胃癌淋巴结转移的敏感度及特异度明显较高, 可准确判断胃癌的病理分期, 有助于提高诊断符合率, 建议临床推广使用。

[关键词] 胃癌; 淋巴结转移; 64排CT双期; 敏感度; 特异度; 准确度

Value of low-dose 64-slice CT double-phase enhanced scan in the evaluation of lymph node metastasis of gastric cancer

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Abstract **Objective:** To analyze the application value of low-dose 64-slice CT double-phase enhanced scan in the evaluation of lymph node metastasis of gastric cancer, and to provide reference for clinical diagnosis and treatment. **Methods:** Forty patients with gastric cancer admitted to Liu'an Second People's Hospital from February 2015 to May 2019 were selected for study, all patients underwent low-dose 64-slice CT double-phase enhanced scan and conventional-dose CT three-phase enhanced scan, the surgical pathological results were compared with the results of CT examination. **Results:** The sensitivity and specificity of low-dose 64-slice CT double-phase enhanced CT in diagnosing lymph node metastasis of gastric cancer were 83.33% and 90.00% respectively, the difference was statistically significant ($P < 0.05$); the sensitivity of the conventional three-phase enhanced CT scan to diagnose

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lymph node metastasis of gastric cancer is 62.50%, and the specificity is 43.75%, the difference was statistically significant ($P < 0.05$); the accuracy of low-dose 64-slice CT dual-phase enhanced scan for pathological staging N0-N3b was 71.43%, 60.00%, 84.62%, 75.00%, and 28.57%, the total accuracy was 67.50%. The short and long diameter of gastric cancer metastasis and non-metastasis lymph nodes were compared, and the difference was not statistically significant ($P > 0.05$). The enhancement of metastatic lymph nodes is (48.39 ± 5.77) HU, which is significantly higher than that of non-metastatic lymph nodes $[(30.17 \pm 5.78)$ HU], and the difference was statistically significant ($P < 0.05$).

Conclusion: The low-dose 64-slice CT double-phase enhanced scan has significantly higher sensitivity and specificity for gastric cancer lymph node metastasis, can accurately determine the pathological stage of gastric cancer, helps improve the diagnostic coincidence rate, which is recommended to promote clinical use.

Keywords gastric cancer; lymph node metastasis; 64-slice CT double-phase; sensitivity; specificity; accuracy

胃癌是临床治疗中较为常见的肿瘤科疾病,是一种来自于胃黏膜上皮的恶性肿瘤。其发病率高,且呈逐年递增趋势,好发于50岁以上的男性,男女发病率为2:1^[1]。近年来,随着饮食结构的改变、幽门螺杆菌的感染及工作压力的增大,胃癌的发病群体呈年轻化倾向。胃癌可发生于胃的任何部位,大部分胃癌患者在患病初期,通常会出现一系列非特异度症状,如上腹不适、暖气。因与胃炎、胃溃疡等病的症状相似,难以引起足够的重视,极易被患者忽略^[2]。随着肿瘤的不断生长,胃功能受到影响时,才会出现比较明显的症状。因此,胃癌的早期诊断率相对较低^[3]。据有关调查^[4]显示:早期胃癌患者术后5年生存率约为90%及以上;而晚期胃癌患者因缺乏有效的治疗手段,即使对患者采取积极干预,其5年生存率小于30%,在危及患者生命安全的同时,给患者及其家属带来沉重的经济压力。胃癌的转移途径以淋巴转移为主,70%的进展期胃癌存在淋巴结转移,而影响胃癌患者预后的关键因素就是淋巴结转移。因此,术前有效判断胃癌淋巴结是否转移,对胃癌患者治疗方式的选择尤为重要^[5]。目前,胃癌术前临床分期及诊断多选用多排螺旋CT扫描,但临床对于其判断胃癌淋巴结转移的研究较少。本研究拟分析低剂量64排CT双期增强扫描在胃癌淋巴结转移评估中的应用价值。

1 对象与方法

1.1 对象

选取2015年2月至2019年5月六安市第二人民医院收治的胃癌患者40例进行研究。纳入标准^[6]: 1)患者经病理组织学及胃镜检查,结果证实为胃癌; 2)患者临床资料完整。排除标准: 1)合并肝、肾功能严重障碍患者; 2)既往有精神病史的患者; 3)听

觉障碍的患者; 4)不能主动配合本次研究的患者。40例胃癌患者中,男32例,女8例,年龄22~76(48.96 ± 8.72)岁;高分化腺癌6例,中分化腺癌11例,低分化腺癌23例;肿瘤 ≤ 3 cm者34例, > 3 cm者6例;肿瘤分期: II期7例, III期28例, IV期5例。本研究已获得六安市第二人民医院医学伦理委员会批准同意,患者均签署知情同意书。

1.2 方法

患者均采取胃癌根治术、淋巴清除术进行治疗,术后对各组淋巴结及肿瘤进行病理切常规的病理切片镜下观察。

低剂量64排CT双期增强扫描方法: 1)检查前1周内,所有患者禁服重金属类药物,检查前8 h禁食,扫描前15 min,注射10 mg盐酸消旋山莨菪碱(厂家:杭州民生药业有限公司;规格:10 mg \times 10支;批号:国药准字1901213),同时口服800~1 200 mL温开水,以显示病灶; 2)取患者仰卧位,扫描范围为以膈顶到脐平面;设置扫描参数为0.7 s的机架旋转时间,64 \times 0.625的螺旋准直,0.7 mm的层间距,1.0 mm的矢状图及冠状螺距,1.0 mm的层厚,120 kV的管电压,260~320 mA的管电流,3 mm的图像重组层厚; 3)选取64排螺旋CT(飞利浦)行双期增强扫描,对比剂使用非离子型造影剂,保持1.5 mg/kg的用量,3.0~3.5 mL/s的注射速度,通过高压注射器,肘正中静脉注入; 4)增强扫描时相为动脉期,延迟21~25 s,门静脉期延迟55~65 s,延迟期延迟3~4 min; 5)结束扫描后,以1.0 mm的层厚进行数据重建,并传送PHILIPS PACS工作站以做分析。

常规剂量CT三期增强扫描方法: 1)检查前准备同低剂量64排CT双期增强扫描法的步骤; 2)扫描范围为以膈顶到脐平面;设置扫描参数为5~8 mm的层厚,1.0~1.5的螺距; 3)增强扫描时

相, 动脉期21~25 s、门静脉期60~65 s、延迟期3~4 min; 对比剂碘海醇300 mg I/mL, 经静脉注射1.5 mL/kg的剂量, 保持3.0~3.5 mL/s的注射流率; 4)结束扫描后, 以1.0 mm的层厚进行数据重建, 并传送飞利浦PACS工作站以做分析。

1.3 评定标准

CT扫描图像质量的评价标准^[6]: 由2名主治医师, 采取双盲法, 对CT动脉期扫描的图像质量行统一主观评价, 双方意见不一致时, 需共同讨论直至结果一致。

淋巴结转移的CT判断方法: 1)淋巴结的门静脉期>70 HU; 2)淋巴结的短径 \geq 6 mm; 3)淋巴结短径/长径 \geq 0.6; 4)增强扫描静脉期呈现轻中度强化, 为 \geq 75 HU。符合以上至少2项内容, 或者不符合上述条件, 但存在群集淋巴结, 可以考虑存在淋巴结转移。

病理N分期的评定标准: N0为区域淋巴结不存在转移; N1为淋巴结转移为1~2枚; N2为淋巴结转移为3~6枚; N3a为淋巴结转移为7~15枚; N3b为淋巴结转移为 \geq 16枚。

1.4 统计学处理

采用SPSS 18.0统计学软件进行数据分析。计

数资料以率(%)表示, 用 χ^2 检验, 计量资料以均数 \pm 标准差($\bar{x}\pm s$)表示, 用 t 检验。 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 低剂量64排CT双期增强扫描与手术病理结果对比

40例胃癌患者经手术共取出淋巴结496个, 术后病理检查证实淋巴结转移的患者26例, CT检查误诊1例, 漏诊5例; 非转移的患者14例, CT检查正确诊断9例。低剂量64排CT双期增强扫描诊断胃癌淋巴结转移的敏感度为83.33%, 特异度为90.00%, 差异有统计学意义($P<0.05$, 表1)。

2.2 低剂量64排CT双期增强扫描与常规剂量CT三期增强扫描结果对比

40例胃癌患者中, 常规剂量CT三期增强扫描与低剂量64排CT双期增强扫描结果一致者15例, CT检查误诊7例、漏诊9例; 非转移的患者18例, CT检查正确诊断9例。常规剂量CT三期增强扫描诊断胃癌淋巴结转移的敏感度为62.50%, 特异度为43.75%, 差异有统计学意义($P<0.05$; 表2, 图1~4)。

表1 低剂量64排CT双期增强扫描与手术病理结果对比

Table 1 Comparison of low-dose 64-slice CT double-phase enhanced scanning and surgical pathology results

低剂量64排CT双期增强扫描	病理结果/例		敏感度/%	特异度/%
	转移	非转移		
转移	25	1	83.33	90.00
非转移	5	9		

表2 低剂量64排CT双期增强扫描与常规剂量CT三期增强扫描结果对比

Table 2 Comparison of low-dose 64-slice CT double-phase enhanced scan and conventional-dose CT three-phase enhanced scan

常规剂量CT三期增强扫描	低剂量64排CT双期增强扫描		敏感度/%	特异度/%
	转移	非转移		
转移	15	7	62.50	43.75
非转移	9	9		

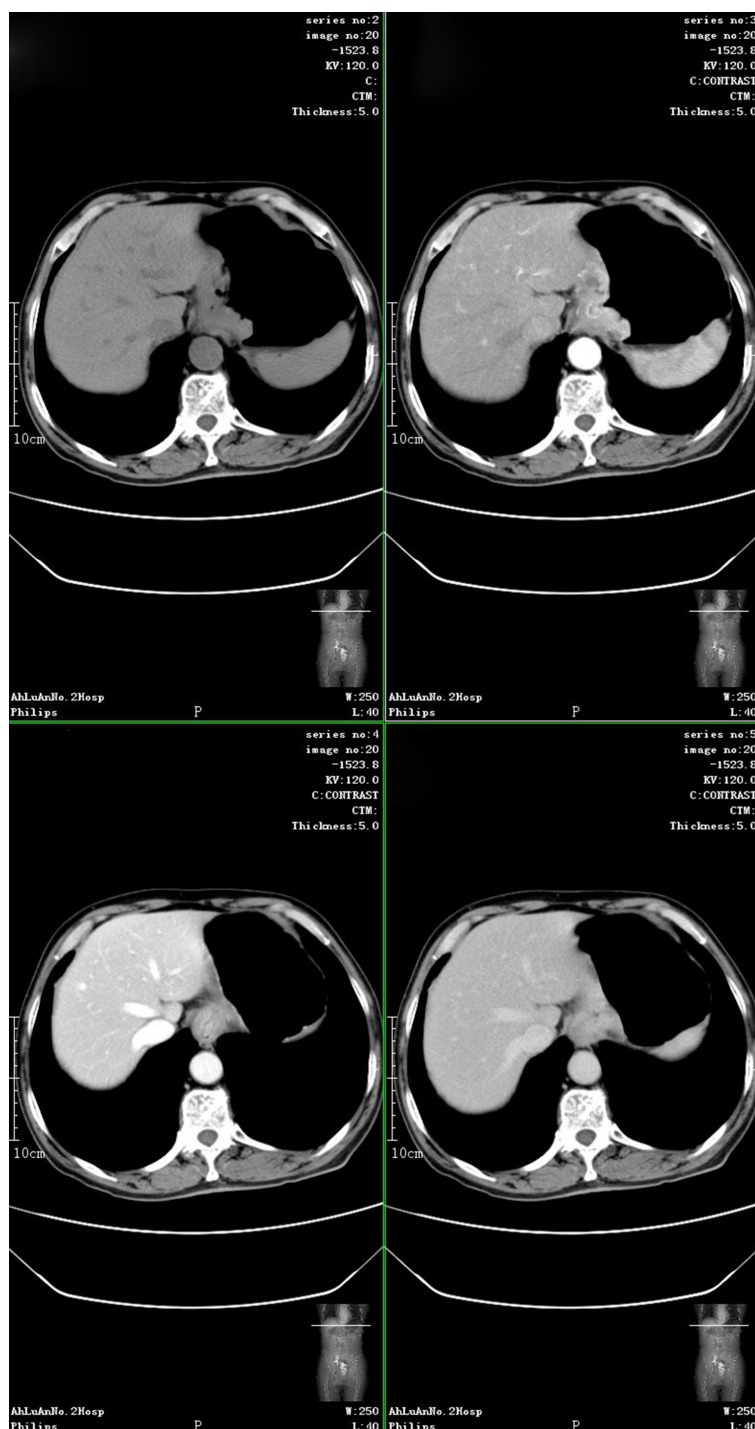


图1 一名75岁男性胃底、小弯侧胃腺癌患者的CT影像

Figure 1 CT images of a 75-year-old male patient with gastric fundus and lesser curvature adenocarcinoma

图片从左至右、从上至下依次为平扫、动脉期、静脉期、延迟期。胃底、小弯侧胃壁不规则性增厚，局部向胃腔突出呈菜花状，胃壁僵硬；增强后，病灶不均匀性强化，动脉期胃黏膜层面强化明显，静脉期及延迟期病变强化减退。

Images from left to right, top to bottom are plain scan, arterial phase, venous phase, and delayed phase. Irregular thickening of the gastric wall at the fundus and lesser curvature, locally protruding into the gastric cavity in the shape of cauliflower, the stomach wall is stiff, after enhancement, the unevenness of the lesion is strengthened, gastric mucosal enhancement was obvious in the arterial phase, and lesion enhancement in the venous phase and delayed phase decreased.



图2 60岁男性胃窦腺癌伴腹腔、腹膜后淋巴结转移患者的CT影像

Figure 2 CT images of a 60-year-old male patient with antral adenocarcinoma with peritoneal and retroperitoneal lymph node metastasis

图片从左至右、从上至下分别为平扫、动脉期、静脉期，延迟期。平扫示胃窦部弥漫性不均匀性增厚，局部呈肿块突入胃腔，胃壁僵硬，黏膜连续性中断，并见龛影，增强后，病灶中度强化，延迟后病灶强化减低。胃窦周围、腹膜后见多发肿大淋巴结影，增强后，上述淋巴结与胃部病灶同步强化。

Images from left to right, top to bottom are plain scan, arterial phase, venous phase, and delayed phase. Plain scan showed diffuse inhomogeneity thickening of the antrum, a local mass protrudes into the gastric cavity, stiff stomach wall, continuous interruption of mucosa, and seeing niches, after enhancement, the lesion was moderately enhanced and the lesion was reduced after delay. There are many enlarged lymph nodes around the gastric antrum and behind the peritoneum. After enhancement, the above lymph nodes are strengthened simultaneously with the gastric lesions.



图3 一名71岁男性胃底贲门腺癌伴肝转移患者的CT影像

Figure 3 Images of a 71-year-old male patient with fundus cardia adenocarcinoma and liver metastasis

图片从左至右、从上至下依次分别为平扫、动脉期、静脉期、延迟期。平扫示胃底、贲门不规则性增厚，相应胃壁僵硬，胃黏膜连续性中断，增强后，动脉期病灶强化稍高于同层胃壁，静脉及延迟期病灶较动脉期密度减低。肝脏I段见类圆形软组织肿块影，密度尚均匀，边界欠清，增强后动脉强化稍高于同层肝脏，静脉及延迟期病灶强化减低。

Images from left to right, top to bottom are plain scan, arterial phase, venous phase, and delayed phase. Plain scan showed irregular thickening of gastric fundus and cardia, corresponding stiffness of gastric wall and interruption of gastric mucosal continuity. After enhancement, the enhancement of arterial lesions was slightly higher than that of the same gastric wall, and the density of venous and delayed lesions was lower than that of arterial lesions. Circular soft tissue mass shadows were seen in section I of the liver, with uniform density and unclear boundary, after enhancement, the arterial enhancement is slightly higher than that of the liver in the same layer, and the venous and delayed lesion enhancement is reduced.



图4 图3患者的冠状位重建图像，层厚及层间距为1 mm，胃底贲门腺癌伴肝转移

Figure 4 This case is a 71-year-old male with coronal reconstruction image of the same patient in Figure 3, layer thickness and layer spacing of 1 mm, with fundus cardia adenocarcinoma with liver metastasis

图片为上腹部动脉期冠状位，胃底、贲门不规则性增厚，相应胃壁僵硬，胃黏膜连续性中断，增强后，动脉期病灶强化稍高于同层胃壁。肝脏I段见类圆形软组织肿块影，密度尚均匀，边界欠清，增强后动脉强化。

The picture shows the coronary position in the arterial phase of the upper abdomen, with irregular thickening of the fundus and cardia, the corresponding gastric wall stiffens, the continuity of the gastric mucosa is interrupted, after enhancement, the arterial phase of the lesion strengthened slightly higher than the same layer of stomach wall. In section I of the liver, a round soft tissue-like mass is seen, the density is still uniform, the boundary is not clear, and the artery is strengthened after enhancement.

2.3 低剂量64排CT双期增强扫描对病理N分期的准确度对比

低剂量64排CT双期增强扫描对病理分期N0-N3b的准确度依次为71.43%，60.00%，84.62%，75.00%，28.57%，总准确度为67.50% (表3)。

2.4 胃癌转移与非转移淋巴结的短径、长径、强化程度对比

胃癌转移与非转移淋巴结的短径、长径相比，差异无统计学意义($P>0.05$)；转移淋巴结的强化程度明显高于非转移淋巴结，差异有统计学意义($P<0.05$ ，表4)。

表3 低剂量64排CT双期增强扫描对病理N分期的准确度对比

Table 3 Comparison of the accuracy of low-dose 64-slice CT double-phase enhanced scanning for pathological N staging

病理N分期	64排CT双期增强扫描N分期					准确度/%
	N0	N1	N2	N3a	N3b	
N0	5	1	1	—	—	71.43
N1	—	3	2	—	—	60.00
N2	1	1	11	—	—	84.62
N3a	—	—	2	6	—	75.00
N3b	—	—	—	5	2	28.57

表4 胃癌转移与非转移淋巴结的短径、长径、强化程度对比

Table 4 Comparison of the short diameter, long diameter, and enhancement of gastric cancer metastatic and non-metastatic lymph nodes

组别	n	短径/cm	长径/cm	强化程度/HU
转移淋巴结组	26	1.08 ± 0.15	2.23 ± 0.57	48.39 ± 5.77
非转移淋巴结组	14	1.05 ± 0.11	2.16 ± 0.54	30.17 ± 5.78
t		0.657	0.383	9.520
P		0.514	0.701	<0.001

3 讨论

胃癌属于恶性肿瘤类疾病,其发病率及病死率都非常高。早期胃癌患者大多都无明显症状,少数患者存在恶心呕吐,极易被忽略。进展期胃癌常见的临床症状为体重减轻、疼痛,患者的上消化道症状较为明确,如进食后饱胀、上腹不适,随着病情的不断加重,患者上腹疼痛感加重,且伴有乏力、食欲下降等症状,严重影响患者的身心健康^[7]。胃癌的预后与胃癌的组织类型、治疗措施、生物学行为、病理分期及部位有关,早期胃癌患者的治愈率相对较高,预后较好,但目前我国胃癌患者的早期诊断率仍较低^[8]。而晚期胃癌患者的预后相对较差,其治疗应在延长患者的生存时间、减轻患者痛苦的前提下进行。胃癌的转移途径以淋巴转移为主,术前准确诊断胃癌淋巴结的转移对患者的预后具有重要的意义^[9]。随着经济的发展及影像技术的不断完善,螺旋CT应运而生。研究^[10]发现:低剂量64排CT双期增强扫描在胃癌淋巴结转移评估中的效果显著。

胃癌患者在术前准确掌握胃周淋巴结的分布及转移情况,对术中进行淋巴结的清扫十分有利。胃癌转移途径是以淋巴结转移为主,而CT诊断的依据是淋巴结的大小^[11]。近年来,随着多排CT、薄层扫描及双期增强扫描的不断改进和普及,小淋巴结的检出率明显提高。其中,CT双期增强扫描可以进行动态显示脏器及血管的强化表现,不仅有利于检测出小淋巴结,同时也可显示淋巴结的强化特征、形态及密度,有助于临床全面判断淋巴结的转移情况^[12]。本研究对比了手术后的病理结果与胃癌螺旋CT平扫、动脉期、静脉期、延迟期的扫描影像资料,以分布类型和淋巴结强化为分析内容,结果显示:增强扫描后,胃底、小弯侧胃腺癌患者的病灶呈现不均匀性的强化,且动脉期胃黏膜层面强化明显,静脉期及延

迟期病变强化减退;胃窦腺癌伴腹腔、腹膜后淋巴结转移患者的淋巴结与胃部病灶同步强化;胃底贲门腺癌伴肝脏转移患者的动脉强化稍高于同层肝脏,静脉及延迟期病灶强化有所减低。提示胃周围淋巴结的转移随着癌肿强化形式而不断改变增高。

本研究结果显示:低剂量64排CT双期增强扫描诊断胃癌淋巴结转移的敏感度为83.33%,特异度为90.00%,而常规剂量CT三期增强扫描诊断胃癌淋巴结转移的敏感度为62.50%,特异度为43.75%。分析其原因如下:胃癌患者随着炎症反应或癌转移,其自身的淋巴结密度会明显升高,已经转移的淋巴结与癌肿靠近,导致界线不清楚,且处于较为复杂的部位时也难易进行判定。常规剂量CT三期增强扫描的误诊及漏诊率相对较高,很大程度受限于淋巴结部位的影响。低剂量64排CT双期增强扫描能更为清晰地显示淋巴结,同时与附近组织器官界限也较明显,并可动态显示其强化特征,为临床诊断提供更多较为准确的依据^[13-14]。

本研究中对照术后病理结果,对胃癌淋巴结转移情况进行综合诊断评估,其诊断的准确度相对较高,结果显示:低剂量64排CT双期增强扫描对病理分期N0-N3b的准确度依次为71.43%,60.00%,84.62%,75.00%,28.57%,总准确度为67.50%。由于淋巴结肿大、淋巴结聚集融合及胃周脂肪少等因素,限制了CT对胃周淋巴结的检出,导致淋巴结计数变少。因此,理想的病理N分期准确度比较难达到。庄新所^[15]的研究结果中,胃癌病理N分期的准确度为62.40%~70.55%,与本研究结果基本一致。CT判断胃周淋巴结转移的关键点在于淋巴结最短直径大小,但具体指标尚未明确。孙宗琼等^[16]指出:直径>5 mm的淋巴结转移,增强时呈现轻中度强化,表现为周边高密度中心低密度,或者相对高密度,短径与长径的比

值 ≥ 0.7 。本研究结果显示:胃癌转移与非转移淋巴结的短径、长径相比均无意义,表明淋巴结转移以大小作为诊断标准,具有局限性。但本研究中,转移淋巴结的强化程度明显高于非转移淋巴结,说明淋巴结发生转移时,与肿瘤类似,表现出明显的强化,且血供较丰富,而非淋巴结转移的强化程度较弱^[17-18]。

此外,本研究仅仅从淋巴结本身特征的角度出发进行分析,而既往研究大多表明淋巴结转移与组织学分型、浸润深度及胃癌大小相关,周围淋巴结是否发生转移与胃癌生物学行为的关系尚待研究。低剂量64排CT双期增强扫描在胃癌淋巴结转移方面具有较高的检出率,但相较于部分脂肪少的患者,可能存在病理与CT判断的胃周淋巴结分组不符的情况,降低了检测的准确性。加之本研究选取患者的例数相对较少,还需扩大研究样本量进行进一步的研究论证。

综上所述,低剂量64排CT双期增强扫描对诊断胃癌病理N分期的准确度相对较高,同时对胃癌淋巴结转移有较高的敏感度及特异度,有助于临床手术方案的制订。

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