

急性单侧上尿路梗阻肾周桥隔增厚与分肾功能的相关性

张福康¹, 黄凯清¹, 陈桂泉¹, 蔡华崧²

(1. 南方医科大学南海医院, 广东 佛山 528244; 2. 中山大学附属第一医院放射科, 广东 广州 510080)

摘要:【目的】探讨急性单侧上尿路梗阻肾周桥隔增厚与分肾功能的相关性。【方法】收集因结石所致急性单侧上尿路梗阻病例50例,所有病例均行多排螺旋CT(MSCT)平扫及增强扫描;根据其是否存在肾周桥隔增厚,分为有桥隔增厚组和无桥隔增厚组,各25例;测量双肾皮质平扫及增强扫描肾皮质期的CT值,采用独立样本 t 检验分析组间肾皮质CT增强值(C_{T皮增}-C_{T皮平})及皮质期患侧与健侧皮质CT值比值(C_{T患皮}/C_{T健皮})的差异。【结果】有桥隔增厚组与无桥隔增厚组比较,肾皮质增强值分别为(103±30)HU及(128±24)HU, $P<0.01$;皮质期患侧与健侧肾皮质CT值比值分别为0.81±0.13和0.96±0.06, $P<0.01$ 。【结论】急性单侧上尿路梗阻MSCT扫描出现患侧肾周桥隔增厚时,肾皮质增强程度减低,患侧分肾功能损害的可能性增加。

关键词:急性单侧上尿路梗阻;桥隔增厚;分肾功能;多排螺旋CT(MSCT)

中图分类号:R69 文献标志码:A 文章编号:1672-3554(2018)02-0252-06

Correlation of Bridging Septa Thickening in the Perinephric Space and Split Renal Function in Acute Unilateral Upper Urinary Tract Obstruction

ZHANG Fu-kang¹, HUANG Kai-qing¹, CHEN Gui-quan¹, CAI Hua-song²

(1. Department of Radiology, Nanhai Hospital, Southern Medical University, Foshan 528244, China; 2. Department of Radiology, The First Affiliated Hospital, Sun Yat-Sen University, Guangzhou 510080, China)

Corresponding to: CAI Hua-song, E-mail: caihuas@mail.sysu.edu.cn

Abstract: 【Objective】 To study the relationship between bridging septa thickening in the perinephric space and split renal function in acute unilateral upper urinary tract obstruction. 【Methods】 50 patients with acute unilateral upper urinary tract obstruction by calculus were analyzed retrospectively. According to the images of multi-slice spiral CT (MSCT) scanning, all cases were divided into thickened bridging septa group ($n=25$) and normal bridging septa group ($n=25$). The CT values of renal cortical in the plain (C_{Tp}) and renal cortical enhancing (C_{Te}) phase were measured, the difference of increasement value (C_{Te}-C_{Tp}) and the CT value ratio of the ipsilateral and opposite in renal cortical phase was analyzed by independent sample T test. 【Results】 The CT increasement value of bridging septa thickening and normal group were (103±30) HU and (128±24) HU respectively, the difference between the two groups was statistically significant ($P<0.01$); and C_{Tac}/C_{Tuc} were 0.81±0.13 and 0.96±0.06 respectively ($P<0.01$). 【Conclusion】 Thickening of bridging septa in the perinephric space with acute unilateral upper urinary tract obstruction will weaken the enhancement of renal cortical, and increased the likelihood of split renal function impairing.

Key words: acute unilateral upper urinary tract obstruction; bridging septa thickening; split renal function; multi-slice spiral CT (MSCT)

[J SUN Yat-sen Univ (Med Sci), 2018, 39(2): 252-257]

收稿日期: 2018-01-08

作者简介: 张福康, 副主任医师, 医学硕士, 研究方向: 腹部疾病影像诊断, E-mail: zfk@21cn.com; 蔡华崧, 通信作者, 教授, E-mail: caihuas@mail.sysu.edu.cn

多排螺旋CT(MSCT)扫描是目前诊断泌尿系结石的首选影像学方法^[1],肾周桥隔增厚是急性上尿路梗阻较常见的继发征象之一^[2];急性单侧上尿路梗阻时因健侧肾脏有代偿功能,肾功能实验室检查通常在正常范围之内,所造成功能损害易被为临床医生所忽视^[3],而导致肾功能不可逆损伤。本研究旨在探讨急性单侧上尿路梗阻肾周桥隔增厚与患侧肾功能的相关性,提高对早期肾功能受损间接征象的认识,及早解除梗阻,避免造成患侧肾功能进一步受损。

1 材料与方方法

1.1 临床资料

研究方案通过我院伦理委员会审批。收集2015年9月至2017年5月间因结石引起急性单侧上尿路梗阻病例50例,男30例,女20例;年龄:18~76岁,平均年龄44.9岁。入院8h内行血肾功能(Cr、BUN)及血常规检查;所有病例均行泌尿系CT平扫及增强扫描,根据CT图像是否存在肾周桥隔增厚,分为有桥隔增厚组和无桥隔增厚组,各25例。临床症状表现为腰痛,血尿,尿频,尿急以及胃肠道等症状。纳入标准:结石引起的急性单侧上尿路梗阻(病程小于2周)。排除标准:有肾脏肿瘤、肾炎、结核或慢性肾病等疾病;对侧肾、输尿管有病变或梗阻;有邻近器官病变(如胰腺炎)。

1.2 扫描设备及方法

CT扫描设备为16层螺旋CT机,增强对比剂

为碘海醇(依碘含量350 mg/mL),自肘前静脉以3.5 mL/s流率,注射90~95 mL,平扫后行泌尿系三期增强扫描,皮质期增强延迟时间为25~30 s,扫描范围从肾上极至耻骨上缘水平。

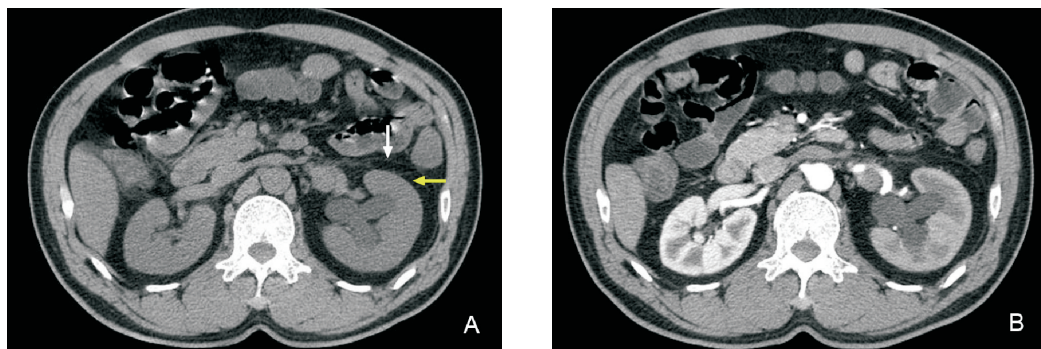
1.3 图像分析

由两名高级职称放射科医师在工作站共同分析阅读CT图像,意见有分歧时通过讨论达成一致意见。主要从以下几方面观察泌尿系及周围情况:(1)结石的位置;(2)输尿管和(肾盂、肾盏)扩张程度;(3)有无肾周桥隔增厚;(4)测量双肾皮质平扫及增强扫描肾皮质期的CT值。

1.3.1 肾周桥隔增厚的判断标准 肾周桥隔增厚是指对比健侧,患侧肾周间隙脂肪密度增高,出现条索状稍高密度影,可有肾前、后筋膜增厚,增强后无强化,排除肾周间隙内血管影及肿大淋巴结^[4-5](图1A-B);无肾周桥隔增厚为对比健侧,患侧肾周间隙清晰,密度无增高,肾前、后筋膜无增厚(图2A-B)。

1.3.2 分肾功能评估 分别在双肾上、中、下极CT轴位图取3个肾皮质感兴趣区(ROI:20 mm²),测量双肾皮质平扫及皮质期的CT值,取三者平均值,分别记为“CT皮平”和“CT皮增”(图3A-F),计算患侧肾皮质CT增强值为CT皮增-CT皮平,皮质期患侧与健侧的肾皮质CT值比值为CT患皮/CT健皮^[6-7]。

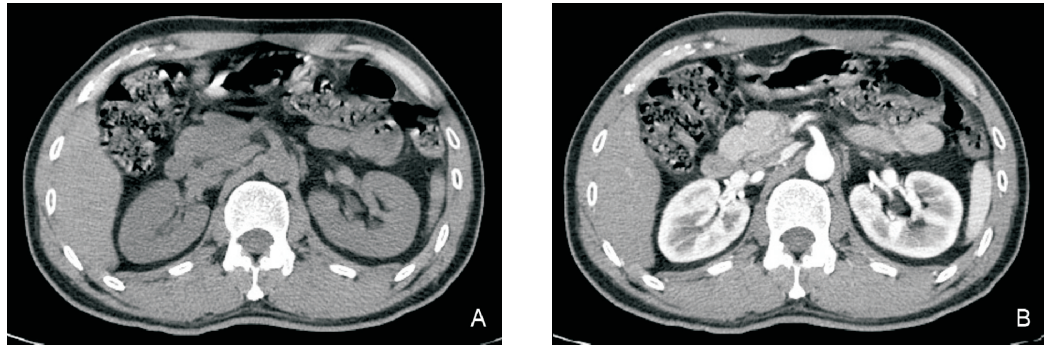
1.3.3 肾盂、输尿管积水分度 参考大剂量IVU法:Ⅰ度为肾盂无明显扩张,仅肾盏穹窿部变钝,肾实质厚度无改变;Ⅱ度为肾盂及肾盏轻度扩张,



Male, 45 years old, left lower ureteral calculi, A showed the density of fat gap around left renal were increased, there were cable-like shadows (yellow arrow), the thickness of pre-renal fascia and kidney fascia was increase (white arrow), B showed no strengthening in enhanced scan, this is bridging septa thickening.

图1 有肾周桥隔增厚的判断

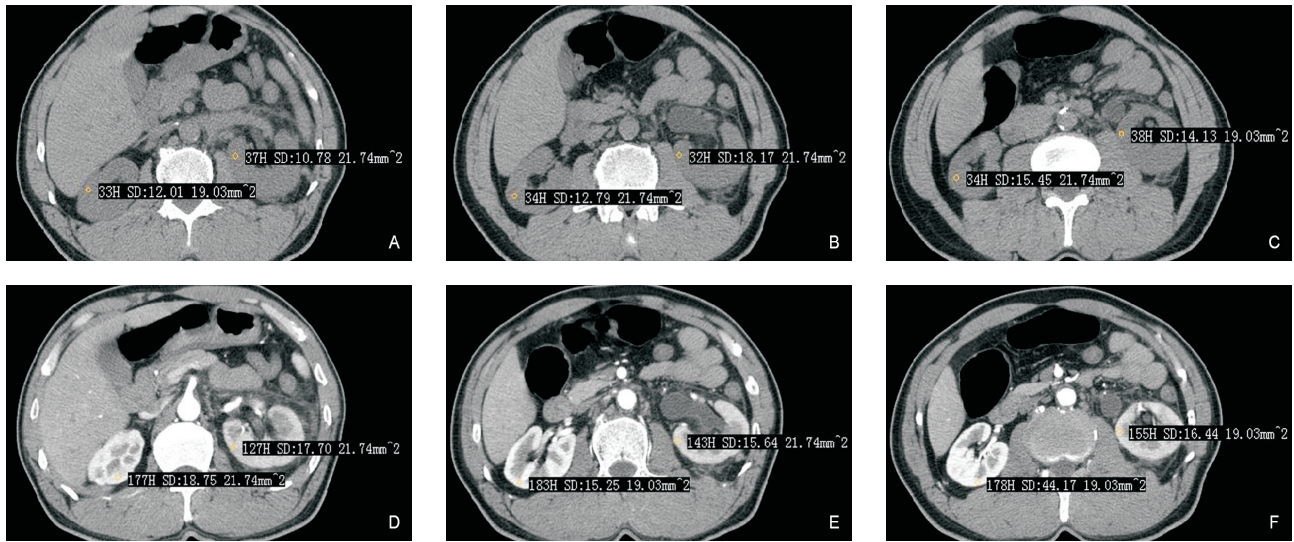
Fig.1 Judgement of the bridging septa thickening of the perinephric space



Male, 50 years old, right upper ureteral calculi, A and B showed the gap around right renal was clear, the density had no increase, the thickness of prerenal fascia and kidney fascia had no increase, this is no bridging septa thickening.

图2 无肾周桥隔增厚的判断

Fig.2 Judgement of the no bridging septa thickening of the perinephric space



Male, 49 years old, left lower ureteral calculi, A-C were the CT scan for upper middle and lower pole of the kidneys. D-F were renal cortical period enhancing for the upper middle and lower pole of the kidneys. The CT enhancement value of ipsilateral kidney and the CT value ratio between the ipsilateral and renal cortical phase were 106 HU and 0.73, this is renal function decrease.

图3 分肾功能判断

Fig.3 Judgement of split renal function

乳头变平或呈杵状改变,肾实质大于正常厚度的3/4;Ⅲ度为肾盏及肾盂明显扩张,实质变薄,但仍大于正常厚度的1/2;Ⅳ度为肾盏扩张呈囊状,实质变薄,但大于正常厚度的1/4;Ⅴ度为肾盂、肾盏极度扩张,与肾盂完全融合,或仅残留薄而不完全的间隔,肾实质萎缩成薄型。

1.4 统计学方法

应用SPSS18.0软件包进行数据分析,计量资料以 $\bar{x} \pm s$ 表示,两组间统计采用方差分析;采用两独立样本 t 检验分析组间肾皮质CT增强值及皮质

期患侧与健侧肾皮质CT值比值的差异,协方差分析校正性别、年龄;采用了卡方检验分析两组间血常规白细胞增高病例数的差异,logistic回归校正性别、年龄; $P < 0.05$ 为差异有统计学意义。

2 结果

有桥隔增厚组与无桥隔增厚组两组间的年龄差异无统计学意义($P > 0.005$),性别差异有统计学意义($P = 0.041$)。

2.1 结石部位

有桥隔增厚组 25 例,左上尿路结石 14 例,右上尿路结石 11,输尿管上段、肾盂结石 9 例,输尿管中下段结石 16 例;无桥隔增厚组 25 例,左上尿路结石 13 例,右上尿路结石 12 例,输尿管上段、肾盂结石 10 例,输尿管中下段结石 15 例。结石部位在两组间的差异无统计学意义($P>0.05$)。

2.2 积水程度

有桥隔增厚组 25 例, I - II 度积水 24 例, III 度积水 1 例;无桥隔增厚组 25 例, I - II 度积水 23 例, III 度积水 2 例,两组均无 IV、V 度积水,组间积水程度差异无统计学意义。

2.3 血生化检查

有桥隔增厚组出现血白细胞增高的病例数高于无桥隔增厚(表 1);所有病例血 BUN 及 Cr 的值均在正常范围。

表 1 组间血白细胞增高病例数比较

Table 1 Comparison the number of cases of leukocytosis between groups

Group	n	Leukocytosis	No leukocytosis
Bridging septa thickening	25	17	8
No bridging septa thickening	25	7	18
χ^2		8.013	
P		0.005 ¹⁾	

1) $P=0.02$ after age and gender were adjusted.

2.4 分肾功能分析

有桥隔增厚组患侧肾皮质增强值($CT_{皮增}-CT_{皮平}$)及皮质期患侧与健侧肾皮质 CT 值比值($CT_{患皮}/CT_{健皮}$)均较无桥隔增厚组低(表 2)。

表 2 组间肾皮质 CT 增强值及皮质期患侧与健侧肾皮质 CT 值比值比较

Table 2 Comparison of CT enhancement value of ipsilateral kidney and the CT ratio of ipsilateral over contralateral in the renal cortex between groups ($\bar{x} \pm s$)

Group	n	CT enhancement/HU	CT ratio
Bridging septa thickening	25	103±30	0.81±0.13
No bridging septa thickening	25	128±24	0.96±0.06
t		-3.177	-5.532
P		0.003 ¹⁾	0.000 ²⁾

1) $P=0.001$, 2) $P<0.001$ after age and gender were adjusted

3 讨论

3.1 急性上尿路梗阻的病理生理改变

急性上尿路梗阻时,患侧集合系统内压力急剧上升,梗阻一段时间(1 h)后,肾内的“安全阀”开放,尿液发生返流,一般认为有 4 种途径:肾盂-静脉返流、肾盂-肾小管返流、肾盂-淋巴返流、肾盂-肾窦返流,从而减轻了肾小管压力,相对延缓的肾功能的损害,所以急性尿路梗阻引起肾、输尿管积水较轻^[8-10]。本研究 50 例急性单侧上尿路梗阻病例中 47 例为 I - II 度积水,3 例为 III 度积水,无 IV、V 度积水。

3.2 肾周桥隔增厚

肾周桥隔是肾周脂肪组织内的纤细间隔,是连接肾前后筋膜和肾包膜的桥梁结构,其作用为分隔、局限并引流液体^[4-5]。肾周桥隔增厚常见于急性上尿路梗阻,也可发生于肾及肾上腺源性病变、肾周(旁)间隙病变、输尿管源性梗阻性疾病及其他腹腔及腹膜后炎症等;急性上尿路梗阻出现肾周桥隔增厚,部分学者认为是肾周炎的表现^[9-10],但尿路梗阻性肾周围炎一般是指急性尿路梗阻引起的肾包膜及肾周脂肪组织发生的炎症,主要是指细菌引起的肾周炎症,可形成肾周脓肿,多有畏寒、高热及全身中毒症状^[11]。本研究有桥隔增厚组与无桥隔增厚组比较,有桥隔增厚组出现血白细胞增高的病例数较多($P<0.05$),说明桥隔增厚与身体炎症反应有一定关系,但 50 例急性上尿路梗阻的患者均无寒、高热及全身中毒症状,CT 增强扫描,增厚的肾周桥隔无强化。笔者认为急性上尿路梗阻出现的肾周桥隔增厚主要是由于集合系统内压力增高返流所致^[8-10],不能诊断为肾周炎症。

3.3 肾周桥隔增厚与分肾功能的相关性

近年来,利用 CT 增强扫描来评价分肾功能进行了大量研究^[12-16],认为肾皮质 CT 增强程度能够反映血液在肾脏内滤过循环灌注情况,是间接判断分肾功能的有力指标^[6-7, 15]。急性上尿路梗阻时肾周桥隔增厚主要是由于集合系统压力急剧增加所致,也将导致患侧肾小球的滤过率减低,发生急性肾功能减退^[1, 12]。本研究有桥隔增厚组与无桥隔增厚组比较,有桥隔增厚组患侧肾皮质增强值($CT_{皮增}-CT_{皮平}$)明显低于无桥隔增厚组

($P<0.01$);有桥隔增厚组增强后肾皮质期患侧与健侧肾皮质的CT值比值明显低于无桥隔增厚组($P<0.01$),说明急性单侧上尿路梗阻MSCT扫描出肾周桥隔增厚时,患侧肾皮质增强程度减低,患侧分肾功能损害的可能性增加,应及时采取积极治疗,避免造成患侧肾脏功能进一步受损。

3.4 本研究的局限性

本研究采用的肾功能评价方法只是半定量评价肾功能情况^[6-7],只能比较宏观判断急性单侧上

尿路肾梗阻出现肾周桥隔增厚与分肾功能损害的相关性;肾周桥隔增厚主要是通过主观判断,部分体形瘦长患者,肾周脂肪较少,影响对肾周桥隔增厚的判断,可能存在误差,需要结合急性上尿路肾梗阻出现的其他继发征象。此外,在本研究中,肾周桥隔增厚和无桥隔增厚组间的性别差异有统计学意义,但性别差异对肾周桥隔增厚征象的出现是否有影响尚需进一步研究。

参考文献:

- [1] 杜宇明,孙洁,梁仁涛,等. 64排CT评估急性结石性输尿管梗阻继发征象的临床意义[J]. 中国卫生产业, 2013, (30): 108, 110.
Du YM, Sun J, Liang RT, et al. Assess the clinical significance of the secondary signs of acute calculi ureteral obstruction by 64 rows of CT [J] China Health Industry, 2013, (30): 108, 110.
- [2] 金保良,何之彦,陈勤,等. 急性输尿管梗阻时肾脏及肾周间隙的CT表现[J]. 临床放射学杂志, 2004, 23(11): 964-967.
Jin BL, He ZY, Chen Q, et al. The CT performance of the renal and perirenal space in acute ureteral obstruction. [J]. J Clin Radiol, 2004, 23 (11): 964-967.
- [3] 张立君,李晓阳,张德江,等. MSCT在急性肾后性肾梗阻中的诊断价值[J]. 医学影像学杂志, 2012, 22(5): 860-862.
Zhang LJ, Li XY, Zhang DJ, et al. The diagnostic value of MSCT in acute renal injury after renal obstruction [J]. J Med Imag, 2012, 22 (5): 860-862.
- [4] 于武江. 肾周间隙桥隔: 正常走向及异常增厚的CT表现[J]. 实用放射学杂志, 2017.33(8): 1233-1235, 1240.
Yu WJ. Peritoneal space bridge: the CT performance of normal direction and abnormal thickening [J]. J Pract Radiol, 2017.33 (8): 1233-1235, 1240.
- [5] 张海深,王勇,钟涛. 肾周间隙桥隔增厚的MSCT表现及临床意义[J]. 临床放射学杂志, 2011, 30(5): 685-688.
Zhang HS, Wang Y, Zhong T. The MSCT and its clinical significance of peri-renal interstitial thickening [J]. J Clin Radiol, 2011, 30 (5): 685-688.
- [6] 胡娟,唐光健. 肾脏常规皮质髓质CT平扫及增强扫描与肾功能的相关性研究[J]. 中华放射学杂志, 2010, 44(9): 958-962.
HU J, TANG GJ. Study the correlation between renal conventional corticomedullary CT scan and enhanced scan and renal function [J]. Chin J Radiol, 2010, 44 (9): 958-962.
- [7] 吴杰,朱小云. 肾脏皮质厚度与皮质期分肾功能相关性的增强CT研究[J]. 中国CT和MRI杂志, 2013, 11(4): 72-74.
Wu J, Zhu XY. Study the correlation between renal cortex thickness and cortical renal function by enhancement CT [J]. Chin J CT MRI, 2013, 11 (4): 72-74.
- [8] 姜召福,周扬,鲁冰,等. 急性尿路梗阻及尿路梗阻性肾周围炎的影像学研究[J]. 实用放射学杂志, 2016, 32(10): 1566-1569.
Jiang ZF, Zhou Y, Lu, et al. Imaging studies of acute urinary tract obstruction and urinary tract obstruction of perirenal inflammation [J]. J Pract Radiol, 2016, 32 (10): 1566-1569.
- [9] 袁立新,杨军,龚承友,等. 急性尿路梗阻性肾周围炎的影像学特征和解剖基础[J]. 中国医学计算机成像杂志, 2011, 17(1): 41-45.
Yuan LX, Yang J, Gong CY, et al. The imaging features and anatomical basis of acute urinary tract obstruction nephritis [J]. Chin Med Comp Imag J, 2011, 17(1): 41-45.
- [10] 房伟,李媛媛,张友军,等. 多层螺旋CT平扫诊断急性梗阻性尿外渗应用分析[J]. 中国医学计算机成像杂志, 2010, 16(4): 312-315.
Fang W, Li YY, Zhang YJ, et al. The application analysis in the diagnosis extravasation of urine in acute obstructive urogenital by Multi-slice spiral CT [J]. Chin Med Comp Imag J, 2010, 16 (4): 312-315.

- [11] 张林川, 刘强, 王艳, 等. 肾及肾周炎性病变的CT诊断[J]. 实用放射学杂志, 2000, 16(1): 48-50.
Zhang LC, Liu Q, Wang Y, et al. the diagnosis of renal and renal inflammatory lesions by CT [J]. J Pract Radiol, 2000, 16 (1): 48-50.
- [12] 庞小溪, 钟浩, 陈雪红, 等. SPECT肾功能显像与CT扫描对单侧肾积水术前肾功能的评估[J]. 中国医学影像学杂志, 2015(2): 120-124.
Pang XX, Zhong H, Chen XH, et al. Evaluation of prerenal renal function in patients with unilateral hydronephrosis by SPECT renal function imaging and CT scan [J]. Chin J Med Imag, 2015(2): 120-124.
- [13] 刘日信, 曾凤伟, 谢昌辉, 等. 64层螺旋CT测量肾积水体积评估肾功能的初步研究[J]. 实用放射学杂志, 2017, 33(4): 563-566.
Liu RX, Zeng FW, Xie CH, et al. The initial research of evaluation renal function by measurement of hydronephrosis volume use 64- slice spiral CT [J]. J Pract Radiol, 2017, 33 (4): 563-566.
- [14] 彭聪, 吕发金, 盛波, 等. 64层螺旋CT增强扫描评价肾功能[J]. 中国医学影像技术, 2012, 28(10): 1878-1881.
Peng C, Lv FJ, Sheng B, et al. Evaluation of renal function by 64-slice spiral CT enhanced scan [J]. China Med Imag Technol, 2012, 28 (10): 1878-1881.
- [15] 高泽寿, 李振华, 殷磊, 等. 肾脏CT扫描在判断分肾功能中的价值[J]. 中华泌尿外科杂志, 2012, 33(10): 763-766.
Gao ZS, Li ZH, Yin L, et al. The value of renal CT scan in judgment the renal function [J]. Chin J Urol, 2012, 33 (10): 763-766.
- [16] Kim DW, Yoon SK, Ha DH, et al. CT-based assessment of renal function impairment in patients with acute unilateral ureteral obstruction by urinary stones [J]. Abdom Imag, 2015, 40(7): 2446-2252.
(编辑 王晓鹰)

(上接第206页 from page 206)

- [15] Kwon H, Pak Y. Prolonged tyrosine kinase activation of insulin receptor by pY27-Caveolin-2 [J]. Biochem Biophys Res Commun, 2010, 391(1): 49-55.
- [16] Baudrand R, Gupta N, Garza AE, et al. Caveolin 1 modulates aldosterone-mediated pathways of glucose and lipid homeostasis [J]. J Am Heart Assoc, 2016, 5(10): 1-12.
- [17] Chen S, Wang X, Wang J, et al. Genomic variant in CAV1 increases susceptibility to coronary artery disease and myocardial infarction [J]. Atherosclerosis, 2016, 246(9): 148-156.
- [18] Qiu Y, Liu S, Chen HT, et al. Upregulation of Caveolin-1 and SR-B1 in mice with non-alcoholic fatty liver disease [J]. Hepatobiliary Pancreat Dis Int, 2013, 12(6): 630-636.
- [19] Pritchard KA, Ackerman AW, Ou J, et al. Native low-density lipoprotein induces endothelial nitric oxide synthase dysfunction: role of heat shock protein 90 and Caveolin-1 [J]. Free Radic Biol Med, 2002, 33(1): 52-62.
- [20] Le LS, Krief S, Farnier C, et al. Cholesterol, a cell size-dependent signal that regulates glucose metabolism and gene expression in adipocytes [J]. J Biol Chem, 2001, 276(20): 16904-16910.
(编辑 徐杰)