·临床研究·

腰椎间盘退变和骨密度的相关性分析

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摘要:目的 通过对临床病例腰椎间盘退变分级、MRI-T1ρ值与相应骨密度(bone mineral density,BMD)的相关性分析,推断腰椎间盘退行性变与原发性骨质疏松的相关性关系。**方法** 2014年4月-2015年4月我院骨科病例共338例,并对其进行腰椎影像学检查和骨密度检查,测得所有病例的腰椎间盘退变的Pfirrmann分级、椎间盘MRI-T1ρ值及相应骨密度(T值),并行前两者与骨密度的统计学相关性分析,进而分析探讨腰椎间盘退变与相应骨密度的相关性。**结果** Pfirrmann腰椎间盘退变MRI分级与相应骨密度存在显著相关关系($r=-0.206$,$P<0.01$)。腰椎间盘MRI-T1ρ值与相应骨密度存在显著相关关系($r=0.312$,$P<0.01$)。**结论** 腰椎间盘退变与原发性骨质疏松存在显著的相关关系。

关键词: 椎间盘退变;Pfirrmann分级;MRI-T1ρ值;骨密度

An analysis of the correlation between lumbar disc degeneration and bone mineral density

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Abstract: Objective To analyze the degree of lumbar disc degeneration, MRI-T1ρ, and the related bone mineral density (BMD), so as to evaluate the correlation between lumbar disc degeneration and primary osteoporosis. **Methods** A total of 338 cases in our hospital were selected from April 2014 to April 2015. Images and BMD examination of the lumbar spine were performed. The degree of lumbar disc degeneration (according to Pfirrmann's method), the average lumbar disc MRI-T1ρ, and the average BMD (T) were measured. The correlation between the parameters was analyzed. **Results** The degree of lumbar disc degeneration was significantly correlated with BMD ($r=-0.206$, $P<0.01$). The lumbar disc MRI-T1ρ was significantly correlated with the BMD ($r=0.312$, $P<0.01$). **Conclusion** The lumbar disc degeneration is significantly correlated with primary osteoporosis.

Key words: Intervertebral disc degeneration; Pfirrmann classification; MRI-T1ρ; BMD

随着科技与社会的发展,我国已进入人口老龄化阶段。其中,老年人群中骨质疏松与腰椎间盘退行性疾病都有较高的发病率。有研究表明腰椎间盘退变相关基因与骨质疏松相关基因具有重叠性[1-2],分析两种病变的相关性,对于两者可能的相互作用关系及防治具有积极的意义。

本研究采用国际上公认的基于MRI诊断[3]腰椎间盘退变程度的Pfirrmann分级系统、椎间盘MRI-T1ρ值和DXA法测量相应骨密度[4],对于骨质疏松和腰椎间盘退变发病率较高的55岁以上女性病例,展开腰椎间盘退变程度与骨密度之间的相关性研究。

1 材料与方法

1.1 一般资料

1.1.1 纳入标准:2013年4月-2015年4月以腰腿痛来我院骨科就诊的55岁及以上的女性患者。总计纳入338例患者。

1.1.2 排除标准:(1)外伤及肿瘤可导致椎体及椎间盘破坏的疾病;(2)慢性肝肾功能不全等对骨代谢有影响的疾病;(3)糖尿病、甲状腺及甲状旁腺等

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影响骨代谢的内分泌疾病;(4)6个月内使用过钙剂、糖皮质激素及性激素等影响骨代谢药物者;(5)其他影响骨代谢疾病严重脏器功能不全者;(6)依从性差者。

1.2 检查方法

所有病例均行X线片、腰椎MRI检查,椎间盘退变程度分级A(L4-L5)、MRI-T1ρ(L1-S1平均值);DXA法检查骨密度B(腰椎及双髋ward's三角区平均T值)。

1.3 诊断标准

1.3.1 骨密度:根据中国老年学学会骨质疏松委员会标准诊断法[4],-1SD ~ +1SD为骨量正常;-1SD ~ -2SD为骨量减少;≤ -2SD为骨质疏松;≤ -2SD并发生一处或多处骨折为严重骨质疏松。

1.3.2 椎间盘退变分级:应用于椎间盘退变的分级种类很多。目前临床上应用最多的Pfirrmann分级系统,该分级方法和临床症状紧密结合,能够通过MRI图像观察到椎间盘退变情况,这种分级结果和大体形态学分级结果具有高度的一致性[5]。在本研究中采用Pfirrmann分级标准进行椎间盘退变的判定,主要根据腰椎MRI矢状位T2WI髓核信号的改变,髓核与纤维环的界限、椎间隙高度的改变来分级,Ⅰ级定义为正常椎间盘;Ⅱ级定义为中央区域有均匀高信号,与外纤维环区分明显;Ⅲ级,中央椎间盘区域信号强度不均匀,低于脑脊液信号,但仍能与外围纤维环相区别;Ⅳ级,椎间盘高度减少,且中央区域很难与外纤维环区分;Ⅴ级,椎间盘的空间塌陷,椎间隙狭窄,且中央椎间盘区域与外围纤维环之间的信号强度没有什么区别[6-7]。见表1。

表1 Pfirrmann腰椎间盘退变MRI分级

Table 1 Grading of lumbar disc degeneration on T2-weighted sagittal MRI-scans according to Pfirrmann

分级 Grade	结构 Structure	髓核边界 Distinction of nucleus and annulus	信号强度 Signal intensity	椎间盘高度 Height of intervertebral disc
Ⅰ	均匀,亮白 Homogeneous, bright white	清楚 Clear	强信号,信号强度同脑脊液 Hyperintense, isointense to Cerebrospinal fluid	正常 Normal
Ⅱ	不均匀,有或无分界带 Inhomogeneous with or without horizontal bands	清楚 Clear	强信号,信号强度同脑脊液 Hyperintense, isointense to Cerebrospinal fluid	正常 Normal
Ⅲ	不均匀灰色 Inhomogeneous, grey	模糊不清 Unclear	中等信号 Intermediate	正常至轻微降低 Normal to slightly decreased
Ⅳ	不均匀灰至黑色 Inhomogeneous, grey to black	消失 Lost	中等信号至低信号 Intermediate to hypointense	正常至中等降低 Normal to moderately decreased
Ⅴ	不均匀黑色 Inhomogeneous, black	消失 Lost	低信号 Hypointense	椎间隙塌陷 Collapsed disc space

1.3.3 蛋白多糖与T1ρ-MRI技术:蛋白多糖(PG)是椎间盘中重要的细胞外基质,在椎间盘退变过程的早期其含量及成分的改变先于病理形态上的改变,并可造成椎间盘生物力学功能的改变。蛋白多糖含量及成分的变化是造成椎间盘退变的主要原因之一,是椎间盘退变的最显著特征[8-9]。T1ρ-MRI技术对于蛋白多糖含量的变化敏感,可对其定量分析,并且有研究表明,椎间盘MRI-T1ρ值与椎间盘蛋白多糖含量及Pfirrmann椎间盘退变MRI分级存在明显相关关系,且与尸体椎间盘标本研究结果一致[10-12]。综上,MRI-T1ρ与椎间盘椎间盘退变程度密切相关,T1ρ-MRI技术是继普通MRI椎间盘退变Pfirrmann分级方法后,可以客观、敏感、准确并定量分析椎间盘退变的一种可靠方法[12]。

2 结果

据Pfirrmann分级系统,338例患者椎间盘退变分级情况见表2。所有测量数据均用统计学软件SPSS 17.0进行统计学相关性分析处理。Pfirrmann腰椎间盘退变MRI分级A与骨密度B(T值)存在相关关系($r = -0.206$, $P < 0.01$)。腰椎间盘MRI-T1ρ值与骨密度B(T值)存在相关关系($r = 0.312$,

$P<0.01$)。腰椎间盘退变与原发性骨质疏松存在显著的相关关系。

表2 338例患者椎间盘退变分级情况(n)

Table 2 Grading of intervertebral disc degeneration in 338 patients (n)

椎间盘退变分级 Disc grade	正常 Normal	骨量减少 Osteopenia	骨质疏松 Osteoporosis	严重骨质疏松 Severe osteoporosis
Ⅰ	9	7	10	5
Ⅱ	2	23	13	18
Ⅲ	8	16	32	15
Ⅳ	6	12	45	37
Ⅴ	3	14	21	42

3 讨论

有研究表明腰椎间盘退变相关基因与骨质疏松相关基因具有重叠性[1-2]，腰椎体骨密度与要椎间盘退变的个数和程度具有一定的相关性，腰椎间盘突出症患者的椎体骨密度明显降低[13]，腰椎体骨密度降低是腰椎间盘突出的危险因素[14]。也有文献指出，腰椎间盘突出症对骨密度有一定的影响，但两者的关系不显著，腰椎间盘突出症并非骨质疏松的独立影响因素[15]。

本研究结果表明腰椎间盘退变的Pfirrmann法MRI分级与骨密度之间有相关关系，相关系数-0.206，总体大致表现出腰椎间盘退变分级越高，相应骨密度越低的趋势；腰椎间盘MRI-T1ρ值与骨密度B(T值)存在相关关系，相关系数$r=0.312$，总体表现出腰椎间盘的MRI-T1ρ值越高，相应骨密度越高的趋势。

腰椎体骨密度与腰椎间盘退变之间可能的相互作用关系：椎间盘由纤维环和髓核构成，人体成年后，椎间盘失去直接血供，椎体终板软骨和纤维环的渗透成为其主要的营养来源。而骨密度的降低，骨强度下降，导致椎体及骨性终板的微小骨折，从而引起椎间盘的营养供给受到破坏，加快了椎间盘的退变[16-18]。

椎间盘退变、骨密度分别与年龄及体重指数之间的关系：既往文献研究表明，腰椎间盘退变与年龄呈现正相关关系，与体重指数呈现正相关关系；骨密度与年龄呈现负相关关系，与体重指数呈现正相关关系[19-21]，与本研究过程中的研究结果相似。虽然椎间盘退变、骨密度及年龄、体重指数之间存在相关关系，但其中仍存有疑问：(1)椎间盘退变与骨密度的下降是否均只是随年龄增长机体衰老的伴发病症，椎间盘退变与骨密度下降之间是否有确切的相互作用关系；(2)体重指数是如何影响骨密度的；(3)体重指数是如何影响椎间盘的。目前尚未有文献能明确阐明上述问题，从多因素多角度多层次着手研究分析，应该是下一步研究的方向。

从现有研究结果的表观现象看，老年人尤其是老年女性，保持相对正常的体重指数，增加钙的摄入与吸收，增加骨强度，减少椎体微小骨折的发生，对延缓腰椎间盘退变具有积极的作用。

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