

· 临床研究 ·

脆性股骨颈骨折的皮质骨变化

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中图分类号: R683.42 文献标识码: A 文章编号: 1006-7108(2011)06-0508-03

摘要:目的 研究脆性股骨颈骨折的股骨颈皮质骨变化及临床意义。方法 对59例病人行股骨近端CT扫描,骨折组28例,年龄:74.4±9.3岁;男9例,女19例;非骨折组31例,年龄:64.1±9.2岁;男11例,女20例。取对侧(正常侧)股骨小转子顶点上方20 mm(T₂₀)平面CT横截面影像,计算T₂₀长径和股骨颈宽径皮质比率,计算公式为:T₂₀长径皮质比率=T₂₀长径-T₂₀髓腔长径/T₂₀长径×100%;股骨颈宽径皮质比率=股骨颈宽径-股骨颈髓腔宽径/股骨颈宽径×100%。结果 T₂₀长径皮质比率:骨折组:18.02%±4.62%;非骨折组:23.38%±5.19%(P=0.000);T₂₀股骨颈宽径皮质比率:骨折组:26.78%±4.90%;非骨折组:33.08%±5.93%(P=0.000)。提示脆性股骨颈骨折病人股骨颈皮质明显变薄。结论 股骨颈皮质变薄是导致脆性股骨颈骨折重要因素,T₂₀长径皮质比率和T₂₀股骨颈宽径皮质比率是观察股骨颈皮质骨变化的有效指标。

关键词: 脆性骨折; 股骨颈; 皮质骨

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Abstract: Objective To study the cortical change of femoral neck in fragile fracture of femoral neck and its clinical significance. **Methods** The proximal femur was examined with CT scan for 59 patients. There were 28 patients with fragile fracture of femoral neck in fracture group including 9 males and 19 females. The patients' age was 74.4±9.3 yrs. There were 31 patients including 11 males and 20 females in non-fracture group. The patients' age was 64.1±9.2 yrs. The parameters were defined from the CT films at T₂₀ level (the neck at 20 mm higher than the apex of lesser trochanter) in the contralateral (normal side) hip. The cortex ratio was calculated. The cortex ratio of T₂₀ long dimension = T₂₀ long dimension - T₂₀ long dimension of marrow cavity / T₂₀ long dimension × 100%. The cortex ratio of wide dimension of neck at T₂₀ = wide dimension of neck at T₂₀ - wide dimension of neck cavity at T₂₀ / wide dimension of neck at T₂₀ × 100%. **Results** The cortex ratio of T₂₀ long dimension was 18.02% ± 4.62% in the fracture group and was 23.38% ± 5.19% in non-fracture group (P=0.000). The cortex ratio of wide dimension of neck at T₂₀ was 26.78% ± 4.90% in the fracture group and was 33.08% ± 5.93% in non-fracture group (P=0.000). The results suggest that the thinning cortex of femoral neck is significant in the patients with fragile fracture of femoral neck. **Conclusion** The thinning cortex of neck was a main factor leading to fragile fracture of femoral neck. The cortex ratio of T₂₀ long dimension and of wide dimension of neck at T₂₀ was effective for evaluating cortex change of femoral neck.

Key words: Fragile fracture; Femoral neck; Cortex

脆性股骨颈骨折是常见于老年人的髋部外伤,与骨质疏松密切相关,具有较高的致残率和病死率,

髋部骨折后1年死亡率高达30%~33%^[1,2]。若无抗骨质疏松治疗,2年内13.9%的病人发生再次骨折^[3]。因此股骨颈骨折与骨质疏松的关系日益受到临床医师的重视,外科治疗股骨颈骨折的同时,强调对骨质疏松的治疗^[4,5],抗骨质疏松治疗能有效减低死亡率和再骨折率^[3]。股骨颈由皮质骨和松

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质骨组成,临床上股骨颈骨折以皮质骨断裂为特征,因此皮质骨的因素值得研究。我们利用CT扫描观察脆性股骨颈骨折病人股骨颈的皮质骨变化并探讨其临床意义。

1 材料和方法

1.1 一般资料

自2006.3~2010.11,我们对59例50岁以上住院病人行股骨近段CT扫描,分为2组。骨折组28例,年龄:54~88岁,平均 74.4 ± 9.3 岁;性别:男9例,女19例;均为脆性股骨颈骨折。非骨折组31例,年龄:50~82岁,平均 64.1 ± 9.2 岁;性别:男11例,女20例;疾病类型:股骨头坏死16例,骨性关节炎10例,髋关节发育不良伴骨关节炎2例和髋关节以外疾病3例。

1.2 方法

对股骨近段行CT扫描,层厚2 mm,取病变对侧股骨小转子顶点上方20 mm(T_{20})平面CT横截面影像,测量该平面的 T_{20} 长径、 T_{20} 髓腔长径、股骨颈宽径和股骨颈髓腔宽径(图1),计算 T_{20} 长径和股骨颈宽径皮质比率,计算公式为: T_{20} 长径皮质比率 = T_{20} 长径 - T_{20} 髓腔长径/ T_{20} 长径 $\times 100\%$;股骨颈宽径皮质比率 = 股骨颈宽径 - 股骨颈髓腔宽径/股骨颈宽径 $\times 100\%$ 。

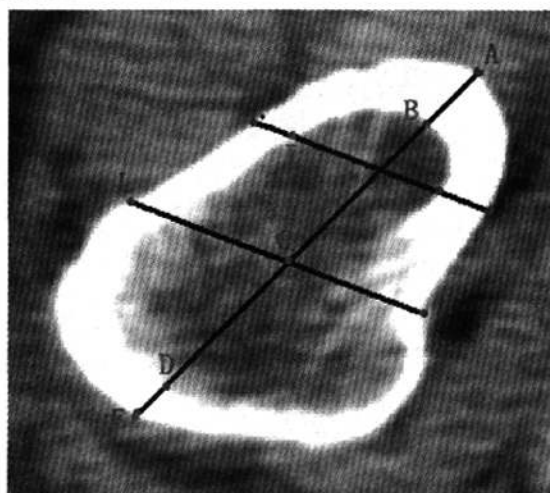


图1 T_{20} 平面CT横截面影像

A-E: T_{20} 长径 B-D: T_{20} 髓腔长径; L-M: 股骨颈与大转子交界处外径; F-K: 股骨颈宽径, 与 L-M 平行且经过 A-C 中点的外径; I-J: 股骨颈髓腔宽径, 与 L-M 平行且经过 A-C 中点的内径

1.3 统计学处理

采用SPSS统计软件(11.5版本),骨折组与非骨折组的 T_{20} 长径和股骨颈宽径皮质比率采用随机t

检验进行比较。

2 结果

T_{20} 长径皮质比率:骨折组: $18.02\% \pm 4.62\%$;非骨折组: $23.38\% \pm 5.19\%$ ($P=0.000$)。骨折组与非骨折组的股骨颈 T_{20} 长径皮质比率具有统计学上非常显著性差异。

股骨颈宽径皮质比率:骨折组: $26.78\% \pm 4.90\%$;非骨折组: $33.08\% \pm 5.93\%$ ($P=0.000$)。骨折组与非骨折组的股骨颈 T_{20} 股骨颈宽径皮质比率具有统计学上非常显著性差异。

以上结果提示脆性股骨颈骨折病人股骨颈皮质明显变薄。

3 讨论

皮质骨变薄和小梁骨量丢失是骨质疏松性增加和导致骨质疏松性骨折的重要因素^[6]。目前DXA骨密度测定是诊断骨质疏松的金标准,但单纯依靠BMD评估骨折风险敏感性低。Mazess等^[7]证实股骨骨密度每减少一个标准差,髋部骨折的可能性会增加2~3倍。老年人从60至80岁,髋部骨折的危险性增加13倍,而骨密度的降低仅使骨折的危险性增加1倍^[8,9]。Siris^[10]报道许多骨折发生在骨密度值在骨质疏松阈值之上,尤其是骨量减少的绝经后妇女。Zebaze^[11]报道绝经后松质骨量丢失快于皮质骨,但在65~79岁年龄组骨量丢失最多是皮质骨而不是松质骨,80岁以后90%的骨量丢失来自皮质骨。骨密度主要是反映松质骨的指标,而皮质骨的内在变化骨密度并不能完整反映出来。骨质疏松累及松质骨,也累及皮质骨,股骨颈的骨强度取决于其皮质骨和松质骨,皮质骨的作用值得关注。股骨颈机械测试表明皮质骨在股骨头下区、中段、基底部、转子间区分别承受30%、50%、96%和80%的压力负荷^[12]。在股骨颈去松质骨的情况下,股骨颈强度仅有小于10%的下降,提示松质骨在股骨颈强度中所起作用较小,皮质骨起主要作用^[13]。Ward^[14]在临床上通过pQCT测量皮质骨厚度变化,发现50岁以后的成年人,皮质骨的厚度每10年以14%的速度在减少。我们前期研究发现股骨峡部的皮质骨厚度与年龄呈负相关,即随着年龄的增长,皮质骨变得越来越薄;60岁以上老年人股骨近段皮质骨变薄和髓腔扩大,认为股骨颈前后侧皮质变薄引起骨强度降低可能是老年人跌倒时发生骨折的重要因素^[15-17]。Michelotti和Clark^[18]发现髋部骨折组与对照组相比

股骨皮质骨厚度明显变薄。由于个体差异大,股骨颈粗细不一,采用单纯测量皮质骨的厚度不易发现皮质骨的变化,目前临床上对皮质骨的评估缺乏有效观察指标。我们提出“皮质比率”的概念,采用相对值来反映股骨颈的皮质骨变化,较好地解决个体差异问题,骨折组与非骨折组比较,股骨颈 T_{20} 长径皮质比率和股骨颈宽径皮质比率均具有统计学意义的非常显著性差异,证实脆性股骨颈骨折组存在股骨颈的皮质骨变薄,也提示“皮质比率”可作为观察股骨颈皮质骨变化的指标。尽管本研究中骨折组年龄高于非骨折组,然而这也说明皮质骨变薄发生在骨质疏松后期,对评估骨折风险可能更有帮助。皮质骨变薄是否使骨强度下降易发骨折?皮质骨的结构和微结构参与决定整体骨的机械性能和脆性,皮质厚度、皮质面积及其物理性能强烈预示骨强度和抗骨折能力^[19]。皮质骨变薄是由于皮质骨小梁化,皮质骨组织微结构受到破坏,微损害的累积和皮质骨孔道变大及数目增多会使得股骨近端骨强度降低^[20]。Pistoia^[21]报道皮质骨变薄引起骨强度降低最为明显。骨皮质中断是临床骨折的典型特征,骨强度下降是引起脆性骨折的重要机制,因此皮质骨厚度变薄临床意义重大,部分解释为什么骨密度下降未达到骨质疏松标准,却会发生骨折。各期步态研究证实松质骨的应力峰值在股骨颈压力骨小梁,皮质骨的应力峰值在股骨颈内下区,跌倒时大部分压力发生在股骨颈后上部 and 转子区的后部,其峰值是步行时的4.3倍。骨质疏松的股骨应力分布与正常类似,但应力峰值幅度增加33%~45%^[12]。因此骨质疏松时更易发生股骨颈骨折。我们的研究证实脆性股骨颈骨折组存在股骨颈皮质骨明显变薄,皮质骨变薄会降低骨强度,是导致股骨颈脆性骨折的重要因素, T_{20} 长径皮质比率和股骨颈宽径皮质比率是观察股骨颈皮质骨变化的有效指标。

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(收稿日期:2011-01-25)