

·综述·

骨质疏松症患者颌骨骨密度与全身骨密度相关性研究进展

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摘要: 随着人口老龄化的加剧, 骨质疏松症日趋突出, 使得骨密度的测量越来越受到人们的关注。颌骨作为全身骨骼的一部分, 其骨矿量与骨质疏松症密切相关。本文就骨质疏松症患者颌骨骨密度与全身骨密度的相关研究进展及测量方法进行综述, 由于颌骨骨密度的测量方法远未成熟, 研究适合于颌骨测量的探测器及先进的软件开发迫在眉睫。

关键词: 骨质疏松; 骨密度; 下颌骨

Research progress of the correlation of bone mineral density between the mandibular and systemic bone in osteoporosis patient

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Abstract: Due to the serious increasing of aging and osteoporosis, the measurement of bone mineral density has aroused great attention all over the world. As a part of the whole body skeleton, bone mass of the mandible is associated with systemic osteoporosis. This paper reviews literature on the possible correlation between systemic osteoporosis and mandibular bone mineral density, as well as the measuring method of bone mineral density. As the measurement method of jaw bone density is far from mature, it is urgent to study the detector and to develop advanced software.

Key words: Osteoporosis; Mandibular bone; Bone mineral density

骨质疏松 (osteoporosis, OP) 是一种以骨量减少、骨的微结构破坏为特征的全身性骨骼疾病, 其脆性增加, 易发生骨折^[1]。随着世界人口老龄化的加剧, 骨质疏松症已经成为困扰老年人, 特别是中老年妇女健康的主要疾病之一^[2]。据统计, 截至 2013 年, 中国骨质疏松症患者已经超过 8800 万, 并有年轻化趋势, 居世界首位^[3], 因此早期诊断和预防骨质疏松具有重要意义。骨质疏松累及全身骨骼, 而颌骨作为全身骨骼的一部分, 其与全身骨质疏松的关系日益得到人们的关注。本文就骨质疏松与颌骨骨密度的关系及其测量方法进行综述。

1 骨质疏松症与骨密度测量方法

骨质疏松是以骨量减少、骨的微观结构退化为特征, 致使骨脆性增加、易于骨折的一种全身性骨骼

疾病。WHO 建议采用骨密度 (bone mineral density, BMD) 测量结果诊断骨质疏松症^[4-5]。同时, 骨质疏松症亦被称为无症状疾病, 因此, 如何早期、精确地测量骨密度对评价骨质流失、诊断骨质疏松并予以及时治疗对治疗骨质疏松起着至关重要的作用^[6]。

众所周知, 测量的感兴趣区域和病人的体位被认为是除机器本身以外影响测量骨密度精确度的重要因素^[7]。常见的骨密度测量有全身测量、腰椎 (正/侧位)、髌部股骨、前臂骨中下 1/3 处 (桡骨和尺骨中远 1/3 交界处)、足跟等部位^[8-9]。目前, 临床上以测量富含松质骨的腰椎 (前/后位) 和股骨近端为主^[10]。但老年人腰椎因受骨质增生及异位钙化影响可引起骨密度增加造成诊断误差, 且随着年龄增大情况愈加明显^[11], 且这两个部位的测量费用昂贵、停机时间较长, 使得测量并不便捷。此外, 另有研究指出不同部位检测结果诊断 OP 的患病率有很大差异性^[12-15]。故寻找哪一或几个部位检测更

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有利于诊断 OP,仍需进一步研究。

随着科学技术的发展,骨密度检测方法逐渐增多,比较有代表性的有 X 线、单光子吸收骨密度仪、双光子吸收骨密度仪、双能骨密度仪、定量 CT 和 PET CT 等。其各自的优缺点见表 1^[16]。双能 X 线吸收仪(DXA)是目前世界上被公认为 BMD 测定的首选方法,被认为是诊断骨质疏松的“金标准”,具有重复性好、辐射量低、测量方法简单等优点^[17-18],同时也是评价抗骨质疏松药物疗效的主要手段^[19],被广泛应用于骨质疏松的诊断中。

综上所述,因双能 X 射线吸收法测量腰椎(前/后位)和股骨骨密度的灵敏度和准确度成为临床上诊断骨质疏松的主要手段,但因老年人腰椎骨质增生及异位钙化的影响可造成诊断误差,故如何选择感兴趣点并能早期、准确地诊断骨质疏松并给予及时治疗有待进一步研究。

表 1 骨密度测量的主要方法及其优缺点^[16]

Table 1 The advantages and disadvantages of the methods of bone mineral density measurement^[16]

方法 Method	原理 Theory	优点 Advantage	缺点 Disadvantages
观察法/粗测法 (RA)	肉眼观察或尺测量 X 光片	简单易行,费用低廉	不能定量测量;不利于早期防治;只能测量前臂和手掌指骨
单/双光子吸收法 (SPA/DPA)	计算放射性同位素在人体的衰减强度	与观察法相比,可以定量测量	元素衰变快,价格昂贵;强度小,图像不清晰;单能光子法被测部位需浸入水袋
定量断层成像法 (QCT)	常规 CT 机与骨密度校正体模以及相应软件配合测量	定量精确;高分辨率 CT 可计算骨体积与总体积之比	剂量大;人员需要培训,软件复杂;易受脂肪影响
超声波测量法 (QUS)	利用超声波在不同介质中传播速度和超声衰减差异进行测量	无辐射,健康无损	不能测量任意部位(如脊椎和股骨等骨质疏松易发部位)
双能 X 射线测量法 (DXA)	基于双光子法原理,利用双能 X 射线消除软组织影响	“金标准”;精准性高,时间短;图像清晰;全身多部位测量;可提供体脂比	微量辐射

2 颌骨骨密度与全身骨密度相关性

骨质疏松累及全身骨骼,其早期变化为富含松质骨的区域骨量减少。颌骨作为全身骨骼的一部分是富有松质骨的^[20]。此外,有研究表明下颌骨比全身的其它部位能更早反映骨变化状况^[21],且下颌骨的骨质厚度不受牙齿缺失、拔牙后剩余牙槽嵴吸收和牙周炎症等局部生化因素的影响,能较为客观地反映下颌骨的骨密度,其与全身骨质疏松的关系日益得到人们的关注。

很多研究表明骨质疏松症发生与性别和年龄相关,雌激素与骨量变化密切相关^[22-23],其相关关系在下颌骨得到了相同结论。Delvin 等^[24]对 72 位骨质疏松症患者的下颌骨进行骨密度测量,并对结果与年龄进行线性回归分析,结果表明下颌骨骨密度与年龄显著相关;王敏等^[25]应用 γ 射线骨密度分析仪追踪了 19 例无牙颌患者,并测量 5 年前后患者桡骨和下颌骨的骨密度。发现随着年龄的增加,桡骨骨密度和下颌骨骨密度均呈下降趋势,且女性患者均为绝经期妇女,其桡骨骨密度值和下颌骨骨密度值均低于男性,说明骨质疏松症与性别有较大关系。

Elovic 等^[26]发现切除卵巢的大鼠其下颌骨骨密度下降值明显高于未切除卵巢的对照组。这些也从侧面反映出下颌骨骨密度与骨质疏松具有相关性。

下颌骨部位含有的松质骨是一种特殊的牙槽骨(alveolar bone),其骨密度变化亦反映了下颌骨的变化。早在 1974 年,就有研究认为颌骨和桡骨密度呈显著相关。Streckfus 等^[27]证实全身性骨质疏松患者的牙槽骨骨密度减少与第二掌骨密度明显相关。Jonasson 等^[28]研究则表明牙槽骨厚度与前臂远中端骨密度密切相关。Bollen 等^[29]对 487 位 60 岁以上老人进行病例对照研究,发现骨质疏松症与颌骨的骨矿丢失呈正相关,牙槽骨进行性缺失可能是骨质疏松症的表现,骨质疏松症与下颌骨萎缩及牙槽骨吸收有显著的相关性,这与大多数学者的研究结果相一致^[30-33]。以上研究结果表明全身骨质疏松与颌骨骨丢失具有密切的相关性,下颌骨的骨矿含量反映了患者全身骨骼的情况,可用于推测全身 OP 状态。

有研究者采用双能 X 线骨密度测量仪,直接比较骨质疏松患者的腰椎、股骨及下颌骨的骨密度,表明其骨质疏松与下颌骨骨密度降低具有相关性^[34]。

亦有研究者采用同样的方法比较了老年正常人与老年骨质疏松症患者下颌骨骨密度的差别,发现原发性骨质疏松症患者具有较低的下颌角骨密度^[35]。

此外,Nodelman 和 Berinck^[36]从组织学检查的角度,清楚地描述了上下颌骨的骨质疏松现象,证明颌骨的骨性丢失,可能是身体其它部位骨性物质丢失的进一步表现。

但由于研究对象、研究方法和观察指标等因素的不同,研究结果之间也存在一定的争议。有研究者认为全身骨密度和下颌骨骨密度没有相关性^[37-38]。目前大多数学者认为,全身性骨质疏松症与颌骨的骨矿丢失之间呈正相关。随着社会的发展,人口老龄化的增高,人类对于骨质疏松症和颌骨丢失的研究将进一步深化,会对两者的关系更加明确。

3 下颌骨骨密度的测量

有研究表明下颌骨是最早可以了解全身骨密度变化的部位^[39],且大量研究表明下颌骨与全身骨密度存在相关性,且干扰因素较少。但因各种检测方法(γ 射线、光密度法、X线曲面断层片照像法、DXA、QUS及QCT等)不能准确测得其骨密度值^[40],致使该部位并未在临床上得到广泛应用。其原因在于:(1)下颌骨骨密度相对较低,对仪器精密度要求较高,需配有自动曝光系统,目前只有快速笔速的骨密度仪才可完成。(2)由于下颌骨形状不规则,口腔狭窄,影像易重叠及测量某点并不能完全代表下颌骨密度,且在测量时要求体位完美摆放。这均增大的测量的难度。(3)因为下颌骨基本成分为松质骨,若无一个搜寻骨密度最低点的软件支持,是得不到最好精确度的,也就无法获得真正临床意义的变化值。

综上,颌骨骨密度的测量方法远未成熟,有待进一步完善。目前已有学者正在研究适合于颌骨测量的探测器及先进的软件开发,随着科学技术的发展,对于颌骨骨密度的测量会更加精确。

4 小结

随着生活水平的不断提高,中国人口老龄化的加剧,再加之临床上一些用药如抗凝药、质子泵抑制剂、噻唑烷二酮类降糖药、强效利尿药、芳香化酶抑制剂、抗癫痫药、促性腺激素释放激素类药物和糖皮质激素等亦可导致骨质疏松症的发生^[41],如何有效的预防、治疗骨质疏松症已成为医学界乃至全社会

共同关注的问题。在骨质发生疏松之前及早发现BMD的变化,并及时进行预防和治疗,是延缓老化和免遭骨质疏松所造成苦痛的可行策略之一。下颌骨密度具有区别正常人、骨质稀少和骨质疏松的患者^[42]和较早反映全身骨变化^[39]等特点,使其逐渐成为骨密度测量部位的一个选择。但有关下颌骨骨密度与骨质疏松间的相关性研究还不够深入,仅停留在研究阶段,没有相关的诊断标准,故需要大量的临床数据加以佐证、建立诊断标准。

其次,在进行抗骨质疏松新药研发及评价其临床治疗效果时,由于目前临床测量腰椎和髋部的骨密度值至少要等2~3年时间,才能观察到病人用药后的实质临床意义的变化,延误了最佳治疗时机,同时也制约了新药开发。研究者可利用下颌骨骨转换较快,可早期发现全身骨含量的变化这一特点,追踪下颌骨骨密度的变化,及时调整治疗方案,为新药研究和临床用药提供必要的技术支持。

由于颌骨骨密度的测量方法远未成熟,研究适合于颌骨测量的探测器及先进的软件开发迫在眉睫。

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