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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

" قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ "

صدق الله العظيم

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Relationship Between Mandibular And Lumbar Bone Mineral Density In Osteoporotic Patients With Quantitative Computerized Tomography (QCT)

Thesis

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Abstract

Osteoporosis is a skeletal disease characterized by low bone mass that was thought to affect the jaw bones. In the current study, twenty females aged between 40 and 70 years were selected and screened by DXA scan of spine, femur and forearm. According to the resultant T-scores, they were categorized into normal group (five patients), osteopenic group (seven patients) and osteoporotic group (eight patients). The patients were further subjected to QCT examinations of both spine and mandible. Our results showed that on comparing the three groups concerning the mandibular BMD measurements by QCT, no statistically significant difference was found between the normal, osteopenic and osteoporotic groups regarding the buccal cortex, the lingual cortex or the trabecular bone. We concluded that systemic osteoporosis is not necessarily associated with mandibular osteoporosis and that the disease is not an absolute contraindication for dental implants placement.

Key words: Osteoporosis, DXA, T-scores, QCT, buccal cortex, lingual cortex, trabecular bone, dental implants.

المخلص العربي

هشاشة العظام هو مرض يتميز بانخفاض كتلة العظام وفي السابق كان من المعتقد أنه يؤثر أيضا على عظام الفك. في الدراسة الحالية، تم اختيار عشرين من الإناث اللاتي تتراوح أعمارهن بين أربعين و سبعين عاما. وقد تم تصنيفهن على اساس نتائج جهاز قياس امتصاص الأشعة السينية ثنائي الطاقة لفحوصات العمود الفقري ، وعظم الفخذ والساعد الى مجموعة الاصحاء (و تتكون من خمسة اناث) ، مجموعة مريضات قلة العظم (وتتكون من سبعة مريضات)، ومجموعة مريضات هشاشة العظام (و تتكون من ثمانية مريضات). كما تم فحص المريضات باستخدام جهاز الأشعة المقطعية الكمية لكل من العمود الفقري والفك السفلي.

وقد كشفت نتائج الدراسة عندما تم تحليلها إحصائياً أن الفك السفلي لا يتأثر بالضرورة بتطور مرض هشاشة العظام ، و إنه لا يعكس خصائص باقى الهيكل العظمي. وإذا كان هناك تأثيراً، فإن التأثير القوي قد يظهر على لوحة الشدق القشرية و تكوينها.

كلمات مفتاحية: هشاشة العظام، كتلة العظام، جهاز قياس امتصاص الأشعة السينية ثنائي الطاقة ، جهاز الأشعة المقطعية الكمية، لوحة الشدق القشرية.

Recommendations

- Further studies using QCT, on a larger sample size including both sexes are needed to assess the exact effects of osteoporosis on the maxillofacial region exploring more different maxillary and mandibular regions.
- More epidemiological studies using QCT including a long follow-up period of osteoporotic patients receiving dental implants in different jaw regions are necessary to reach more precise conclusions about the disease progression rate in both jaws.
- Further studies should be directed to employ the 3D QCT to perform an accurate evaluation of bone growth, the healing of fractures and the value of orthodontic anchorage.
- Regular screening programs should be installed for Egyptian females after 40 years either pre or postmenopausal to assess regularly their BMD at different skeletal sites. The detection of any osteopenic changes should be followed by the start of a careful therapeutic and preventive program to avoid the progression of the disease.
- Educational courses should be directed to women, mostly susceptible to osteoporosis, in all the society fields about this silent epidemic disease, its preventive measures, the importance of its early diagnosis and the detrimental effects of the osteoporotic-related fractures on their health.

List of abbreviations

2D	Two dimensions
3D	Three dimensions
BCBMD	Buccal cortical bone mineral density
BMC	Bone mineral content
BMD	Bone mineral density
BMU	Basic multicellular unit
BON	Bisphosphonate-associated osteonecrosis
BP	Bisphosphonate
CT	Computed Tomography
DPA	Dual-Photon Absorptiometry
DXA	Dual energy X-ray absorptiometry
ESR	Erythrocyte sedimentation rate
FEA	Finite element analysis
hrCT	High resolution computed tomography
HU	Hounsfield Unit
KVP	Kilovoltage peak
LCBMD	Lingual cortical bone mineral density
mA	milliamperage
MDCT	Multi-Detector Computed Tomography
MR	Magnetic Resonance
MTF	Modulation transfer function
ONJ	Osteonecrosis of the jaw
pQCT	Peripheral Quantitative computed tomography
PTH	Parathyroid hormone
QCT	Quantitative computed tomography
QUS	Quantitative Ultrasonography
ROI	Region of interest
SD	Standard deviation
SFOV	Scanned field of view
SPA	Single-Photon Absorptiometry
SXA	Single X-ray Absorptiometry
TBMD	Trabecular bone mineral density
VOI	Volume of interest
vQCT	Volumetric Quantitative computed tomography
WHO	World Health Organization

μm	Micrometer
μSv	Micro Sievert

Contents

	<u>Pages</u>
Introduction	<u>1</u>
Review of Literature	<u>5</u>
<i>Osteoporosis</i>	<u>7</u>
Definition and Pathogenesis	<u>7</u>
Risk factors for Osteoporosis	<u>9</u>
Classification of Osteoporosis	<u>10</u>
Clinical Manifestations of Osteoporosis	<u>12</u>
Oral Findings of Osteoporosis	<u>14</u>
Dental Implications of Osteoporosis	<u>18</u>
Prevention and treatment	<u>22</u>
Diagnosis of Osteoporosis	<u>23</u>
Imaging Modalities of Osteoporotic Patients	<u>24</u>
Methods using Non-ionizing Radiation	<u>29</u>
Methods using Ionizing Radiation	<u>32</u>
Gamma Radiation	<u>32</u>
Single Photon Absorptiometry (SPA)	<u>32</u>
Dual Photon Absorptiometry (DPA)	<u>34</u>
X-radiation	<u>35</u>
Conventional Radiographic Techniques	<u>35</u>

Single X-ray Absorptiometry (SXA)	<u>37</u>
Dual X-ray Absorptiometry (DXA)	<u>39</u>
Quantitative Computerized Tomography (QCT)	<u>45</u>
Advanced CT Bone Imaging in Osteoporosis	<u>56</u>
QCT Applications of The Maxillofacial Skeleton	<u>60</u>
Aim of the study	<u>64</u>
Material and Methods	<u>65</u>
Results	<u>93</u>
Case presentation	<u>113</u>
Discussion	<u>135</u>
Summary and Conclusion	<u>155</u>
Recommendations	<u>158</u>
References	<u>159</u>
Appendix I	<u>181</u>

List of Figures

<u>Figures</u>		<u>Page</u>
<u>Figure (1)</u>	<i>Scanning electron microscope picture showing the honey comb pattern in normal bone (Left) and the honey comb pattern with big holes in osteoporotic bone (Right) (www.healthjockey.com)</i>	<u>8</u>
<u>Figure (2)</u>	<i>Scanning electron micrographs of normal (left) and osteoporotic (right) bone</i>	<u>8</u>
<u>Figure (3)</u>	<i>(a) A typical osteoporotic patient with kyphosis of the thoracic spine "dwager's hump" (b) Skin folds running down the back of an osteoporotic patient referred as The Tannenbaum-Phänomen (fir tree phenomenon)</i>	<u>13</u>
<u>Figure (4)</u>	<i>In vivo ultrasound attenuation imaging of the heel (below). The pair of transducers placed on opposite side of the heel (medium). The ultrasound image, compared to the X-ray plain radiography, showing good quality details (above) (www.acoustics.org)</i>	<u>31</u>
<u>Figure (5)</u>	<i>Diagram of single photon absorptiometry technique used primarily in distal radius and ulna (www.rad.washington.edu)</i>	<u>33</u>
<u>Figure (6)</u>	<i>Patient undergoing bone density measurement with a single photon absorptiometer where the patient arms were surrounded by a water bath(www2.massgeneral.org)</i>	<u>33</u>
<u>Figure (7)</u>	<i>Metacarpal Radiogrammetry technique showing measurement of the cortical thickness in the mid shaft of the second metacarpal of the hand (metacarpal index) using calipers (www.mdconsult.com)</i>	<u>36</u>
<u>Figure (8)</u>	<i>Patient undergoing SXA BMD measuerment of the forearm surrounded by a water bath (Kelly et al 1994)</i>	<u>38</u>
<u>Figure (9)</u>	<i>SXA report showing BMD measurement of the forearm (Kelly et al 1994)</i>	<u>38</u>
<u>Figure (10)</u>	<i>Diagrammatic presentation showing the fan X-</i>	<u>40</u>