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Original Investigation

Semi-quantitative analysis of scintigraphic findings in the hands of adults without osteoarticular disease☆

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ABSTRACT

Introduction: Bone and joint disease has a high incidence and impact on the population. The bone scan is a diagnostic tool that provides important metabolic and clinical information, therefore the interpretation of the images by the nuclear medicine physician must be very precise. The isotopic distribution pattern in hands has not yet been described. For this reason a description is presented of common scintigraphic findings in adults without osteoarticular disease.

Materials and methods: A prospective analysis was conducted on 156 hands of patients whose bone scans met inclusion criteria. There were delineated regions of interest in the carpal, metacarpal, proximal, and distal interphalangeal joints of the second and third fingers of both hands. An analysis was made, including the total counts, means, and standard deviations. The cut-offs were selected using the normal distribution, which was defined as the cut at the 99th percentile of each variable. A semi-quantitative analysis was made of the images.

Results: The study included 36 men (23%) and 119 women (77%), and the mean age was 44.9±13.9. The mean total counts gradually decreased from proximal to distal in all age groups and in both genders in the following proportions: the activity in carpus was 4.4 fold more than the metacarpus; the metacarpus was 1.7 fold more than proximal interphalangeal joint; proximal interphalangeal joint was 1.4 fold more than distal one.

Conclusions: A scintigraphic pattern consisting of a gradual decrease from proximal to distal joints (degradation) was found in the hands of adults without bone and joint disease, regardless of gender and age.

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Hallazgos gammagráficos en manos de población adulta, sin patología osteoarticular, bajo un análisis semicuantitativo

Palabras clave:
Medicina nuclear
Gammagrafía ósea
Articulaciones de las manos

RESUMEN

Introducción: La gammagrafia ósea es uno de los estudios más frecuentemente utilizados para el abordaje diagnóstico de la patología osteoarticular, sin embargo, no se conocen patrones claros de normalidad para algunos sitios anatómicos, llevando a tasas altas de variabilidad interobservador, como es el caso de la evaluación de las manos. No se encuentra en la literatura una descripción del patrón gammagráfico normal sobre manos, por lo cual pretendemos describir el patrón de captación más frecuente en una población adulta sin enfermedad osteoarticular.

Materiales y métodos: Se hizo un análisis prospectivo de 156 gammagrafías óseas sobre manos que cumplieron el criterio de inclusión. Se delinearon regiones de interés en el carpo, metacarpo, articulaciones interfalángicas proximales y distales de los dedos índice y medio de ambas manos; se tomaron las cuentas totales, se analizaron promedios y desviación estándar, y se hizo análisis semicuantitativo de la imagen.

Resultados: Se incluyeron 36 hombres (23%) y 119 mujeres (77%), la edad media fue de 44.9±13.9. Los promedios de las cuentas totales disminuyeron progresivamente de proximal a distal en todos los grupos de edad y en ambos géneros, siguiendo la siguiente proporción: carpo 4.4 veces más que metacarpo; metacarpo 1.7 veces más que interfalángica proximal; interfalángica proximal 1.4 veces más que distal.

Conclusiones: En manos de pacientes adultos, sin enfermedad osteoarticular, sin distinción de género y edad, encontramos un patrón gammagráfico en «degradé» con mayor concentración isotópica en carpo, seguida del metacarpo y de las articulaciones interfalángicas proximales y distales.

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Introduction

During the last decades, nuclear medicine studies have demonstrated an accelerated growth, due to the development of new and better radiopharmaceuticals[1–3]; among the numerous isotopic studies, bone scintigraphy is the second most frequently performed procedure in the nuclear medicine services[4,5] after myocardial perfusion; only in the United States, more than 3,450,000 of these procedures were carried out in the year 2005, being the inflammatory and osteoarticular pathology one of the most important indications.[4,6]

In the study of the osteoarticular pathology (degenerative/inflammatory) of the hand, nonisotopic images play an important role, being conventional radiography the simplest, most economical and widely used method, especially in the initial assessment.[7,8] Another important technique is the nuclear magnetic resonance which evaluates early changes in the articular cartilage before bone destruction occurs.[9,10] On the other hand, ultrasonography is used to evaluate joint effusions and erosions, and currently there are stratification systems such as Power Doppler, which has demonstrated to be reproducible and accurate for synovitis of the hand.[11–13]

The bone scan is not part of the initial evaluation of osteoarticular disease, but is highly sensitive to detect changes previous to structural alterations, it is also reproducible and it has a negative predictive value higher than 90%[14,15]; it can help to discriminate the origin of the pain (soft tissues or bone), locate the most painful points in patients with complex symptoms[16,17] and detect bone pathologies when other imaging techniques have failed.[18] The radiopharmaceutical most commonly used for bone imaging is methylene diphosphonate which, bound to Tc^{99m} forms a radioactive compound which reaches the bone through the bloodstream and binds to hydroxyapatite crystal with high affinity,[19,20] allowing to evaluate indirectly the osteoblastic activity.

The identification and the familiarization with the normal pattern of radiotracer uptake in the hands are very important for the proper scintigraphic evaluation of this area; however, at the present time there is no recognized normal scintigraphic reference pattern. Making a review of the literature, it was found only one study related to the subject, conducted by Wilfrido et al., who in 1977 mentioned in a heterogeneous group of patients some normal trends of radiotracer concentration, divided into 2 groups, the first with a detailed image of the joints of the hand seen in adolescents, and the second, in a pattern called “washed-out” with less definition of the image, observed in older patients.[21]

Knowing the normal patterns of radiotracer concentration in the different bone structures allows to improve the diagnostic accuracy, avoiding overdiagnoses and underdiagnoses.

The purpose of this study is to describe the radiotracer distribution pattern in the bone scan of the hands of adult patients without osteoarticular pathology, under a semiquantitative analysis which can be reproducible and that allows and objective evaluation of the hands.

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