



Original Article

Densitometric study of the clavicle: bone mineral density explains the laterality of the fractures^{☆,☆☆}



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ABSTRACT

Introduction: Epidemiological studies have shown laterality in clavicle fractures, such that the left side is more frequently fractured. The present study had the aim of evaluating whether the clavicle on the dominant side is denser and thus explaining the greater incidence of fractures on the non-dominant side.

Materials and methods: This was a descriptive study on 52 healthy patients, who were classified according to age, sex and whether the dominant or non-dominant side was affected. **Results:** The participants comprised 28 women (53.8%) and 24 men (46.2%). Regarding the dominant side, 30 were right-handed (57.7%) and 22 were left-handed (42.3%). The mean age was 25 years. In this study, it could be seen that the non-dominant side had greater bone mass than the dominant side. It was also observed that the bone density was greater in the middle and distal thirds on the non-dominant side, with a statistically significant difference. In the women, the density was also greater on the non-dominant side; this difference was not significant in relation to the dominant side, but there were significant differences between the middle thirds ($p < 0.001$) and the distal thirds ($p < 0.006$).

Conclusion: Variations in bone density, toward higher and lower bone mass, may have been responsible for the fractures. According to the findings from this study, fractures occur more in the middle third of the non-dominant clavicle, as a result of greater bone mineral mass, which gives rise to lower flexibility and fractures in the region.

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Estudo densitométrico da clavícula: a densidade mineral óssea explica a lateralidade das fraturas

R E S U M O

Palavras-chave:
Densitometria
Fratura óssea
Fisiopatologia
Clavícula

Introdução: Estudos epidemiológicos mostram uma lateralidade nas fraturas da clavícula, com o lado esquerdo mais frequentemente fraturado. O presente estudo tem como finalidade avaliar se a clavícula do lado dominante é mais densa e explicar, dessa forma, a maior incidência de fraturas no lado não dominante.

Material e métodos: Estudo descritivo de 52 pacientes hígidos, classificados quanto a idade, sexo e lado dominante ou não.

Resultados: Fizeram parte deste estudo 28 mulheres (53,8%) e 24 homens (46,2%); em relação ao lado dominante, 30 eram destros (57,7%) e 22, canhotos (42,3%); a idade média foi de 25 anos. Neste estudo, foi possível constatar que o lado não dominante teve maior massa óssea quando comparado ao lado dominante. Também observamos que a densidade óssea foi maior nos terços médios e distais no lado não dominante, com diferença estatisticamente significativa. Nas mulheres, a densidade também foi maior no lado não dominante; essa diferença não foi significativa quando comparado com o lado dominante, porém foi significativamente diferente entre os terços médio ($p < 0,001$) e distal ($p < 0,006$).

Conclusão: As variações da densidade óssea, tanto com maior como com menor massa óssea, podem ser responsáveis pelas fraturas. De acordo com os achados deste estudo, as fraturas ocorrem mais no terço médio da clavícula não dominante, em decorrência de uma maior massa mineral óssea, o que acarretaria uma menor flexibilidade da região e as fraturas.

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Introduction

Changes in therapeutic methods for clavicle fractures have led to epidemiological studies conducted more frequently.¹⁻³ Classically, conservative treatment was used with excellent results. However, some fracture patterns have been shown to be problematic with conservative treatment, independent of the management used. Thus, new studies have emerged, outlining the epidemiological profile and management of clavicle fractures.⁴

Clavicular fractures account for approximately 5% of all patients with fractures admitted to emergency services.⁵ Male children and adolescents up to the age of 20 years are the group most likely to suffer this type of fracture, and its incidence decreases with increasing age. Among female patients, the incidence is greatest during the adolescent years and diminishes in subsequent decades, but then increases again in old age.^{6,7}

In an epidemiological study conducted in Sweden, on 535 fractures of the clavicle alone, greater frequency was observed on the left side (60.7%) than on the right side (49.3%) and this difference was statistically significant. It is known that different bone densities may cause fractures.⁸⁻¹¹ Pycnodysostosis is a syndrome characterized by bone fragility and fracturing due to diffusely increased bone density. Osteoporosis, on the other hand, is a disorder characterized by diminished bone mass and increased risk of fractures.^{12,13}

This study has the aims of evaluating clavicular bone mineral density between the dominant and non-dominant sides and evaluating bone mineral mass in the middle and lateral thirds of the clavicle, so as to ascertain whether different bone

mineral densities could explain certain epidemiological characteristics of fractures of the clavicles.

Materials and methods

This was a cross-sectional study conducted in the imaging department of our hospital between May and June 2007 and between January and May 2012. Densitometric examinations were performed on both clavicles in a sample of 52 patients, comprising 24 males (eight left-handed and 16 right-handed) and 28 females (14 left-handed and 14 right-handed). The examinations were performed using bone densitometry apparatus and were analyzed by means of the Dual Femur software, adapted for the clavicle.

All university students aged between 20 and 30 years who were in a healthy condition were eligible for inclusion in the study. Professional athletes, individuals with previous clavicular fractures (whether congenital or not), individuals with osteometabolic diseases, cases of brachial plexus injury, ambidextrous individuals and cases of any orthopedic disorder that affects the shoulder were excluded.

The individuals analyzed were chosen by means of a questionnaire (Annex 1), which was applied before the densitometric examination on the clavicle, in order to assess whether potential subjects met the inclusion and exclusion criteria. All participants agreed with the free and informed consent statement. Following this, the population underwent bone densitometry examinations on the middle and distal thirds of both clavicles. One copy of the bone densitometry examination results was given to the research subject and

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