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Research Paper

Distribution of Sesamoid Bones in the Hand—A Study in the Chinese Population

研究中國人的手部籽骨分佈



Lam Gloria Yan Ting*, Chow Esther Ching San, Ng Ben, Ho Chi Hei Gerry, Chan Chi Wai

Department of Orthopaedics and Traumatology, United Christian Hospital, 130 Hip Wo Street, Kwun Tong, Hong Kong

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ABSTRACT

Objective: To report the prevalence and distribution of hand sesamoid bones in Chinese ethnic group and its left-right symmetry.

Methods: A retrospective study involving hand radiographs taken in patients admitted to United Christian Hospital from January 2011 to June 2014. Exclusion criteria included previous hand fracture, inadequate radiological views and those of non-Chinese ethnic group.

Results: A total of 307 hand radiographs (162 left and 145 right; 181 males and 126 females) in 266 patients were reviewed. Bilateral hand radiographs were available in 41 patients. Their mean age (\pm standard deviation) was 48.8 ± 11.3 years (range, 25–69 years). The total number of sesamoid bones identified was 1,641. Sesamoid bones were found at the first metacarpophalangeal joint (MCPJ) at a rate of 100%, while the prevalence at the second MCPJ, third MCPJ, fourth MCPJ, fifth MCPJ as well as the first interphalangeal joint (IPJ) was 59.0%, 2.93%, 0%, 47.6% and 28.0%, respectively. Bilateral hand radiographs showed 100% symmetrical distribution of sesamoid bones on right and left sides.

Conclusion: This is the first study in Hong Kong to report prevalence of sesamoid bones in the Chinese Population and identify the symmetry of sesamoid bones in bilateral hands. The result revealed that the Chinese ethnic group had a higher prevalence of sesamoid bones at the 2nd and 3rd MCPJ when compared with other ethnic groups. The distribution of sesamoid bones was symmetrical in bilateral hands.

中文摘要

目的: 探討籽骨在中國人的手部出現機率和分佈情況,以及它的左右手對稱程度。

方法: 本次回顧性的研究收集並檢視在於基督教聯合醫院進行的手部 X 光照片,年期包括 2011 年 1 月至 2014 年 6 月。手部曾患骨折,X光片觀不足以及非中國血統的病人則不包括在此研究內。

結果: 共 266 位病人及其 307 張手部 X 光片納入此研究進行分析。當中 181 位為男性,126 位為女性,162 張 X 光為左手,145 張為右手。41 位病人具有兩邊手部 X 光片。研究對象的平均年齡為 48.8 歲。發現籽骨數目總共 1641 顆。籽骨在拇指掌骨頭關節間凹口的出現率為 100%,其次在食指、中指、無名指、尾指及拇指指間關節的出現率分別為 59.0%、2.93%、0%、47.6% 及 28.0%。左手與右手籽骨出現的分佈情況完全相同。

結論: 此研究為香港首份針對中國人口的手部籽骨分佈和左右手對稱程度而作出的報告。結果證實中國人的籽骨在食指和中指掌骨頭關節間凹口的出現率較所有其他族群為高,左右手的對稱率為 100%。

Introduction

Sesamoid bones were first described by Galen circa 180 AD and originated from the Greek word *sesamooides*, meaning sesamoid

seeds, because of the morphological resemblance.¹ These are small oval ossicles typically embedded within tendons passing over joints and therefore believed to be friction-reducing by providing a gliding mechanism.²

Some sesamoid bones are invariably present in human bodies and are considered normal anatomical parts, such as patella.

* Corresponding author. E-mail: Glorialamy@gmail.com.

Others, however, are highly variable in prevalence and distribution and often regarded as incidental findings on radiographs in clinical practice.³ In the upper limb, sesamoids are most commonly found on the palmar surface in the hand⁴ especially over thumb metacarpophalangeal joints (MCPJs), second MCPJs, fifth MCPJs, and thumb interphalangeal joints (IPJs).⁵ Two sesamoids are present at the first MCPJ with different ossification centres and fusion lines.⁶ There are possible sesamoid-related pathologies including fractures,⁷ sesamoiditis⁸ and degeneration of subsesamoid joint.⁹ It is clinically important to recognise these conditions because they are possibly misdiagnosed as other pathologies such as MCPJ arthritis,⁹ trigger thumb¹⁰ and chip fracture,⁵ leading to incorrect treatments.

Previous reports demonstrated a significant variation in the prevalence and distribution of sesamoid bones in the hand among different ethnic groups.¹¹ However, there has been very few related studies focusing on Chinese or Asian population.^{5,6} This study aims to report the prevalence and distribution of hand sesamoid bones in the Chinese ethnic group and its left–right symmetry.

Methods

A retrospective review was performed on patients admitted to United Christian Hospital in Kwun Tong District, Hong Kong, with hand radiographs taken. Two or more different radiological views, including an anteroposterior view, are mandatory for analysis. The study period was from January 2011 to June 2014. The data were retrieved from Clinical Data and Reporting System and Clinical Management System. The exclusion criteria included admission for hand injuries, previous hand fractures, inadequate radiological

views and non-Chinese ethnic group. The presence of sesamoid bones in the five digits and their distribution were independently recorded and analysed by a basic orthopaedic trainee and a hand specialist. Any discrepancy was discussed to achieve consensus prior to the calculation of prevalence. Radiologists were not included in the analysis because the identification of sesamoid bones in this study encountered minimal difficulty, and the study was supervised by an experienced hand specialist.

A total of 307 hand radiographs (162 left and 145 right; 181 males and 126 females) in 266 patients were reviewed. Bilateral hand radiographs were available in 41 patients. Their mean age (\pm standard deviation) was 48.8 ± 11.3 years (range, 25–69 years). The total number of sesamoid bones identified was 1641. Statistical analysis was performed using chi-square test, and a p value <0.05 was considered statistically significant.

Results

As shown in Figure 1, sesamoid bones were found at the first MCPJ at a rate of 100%, whereas the prevalence at the second MCPJ, third MCPJ, fourth MCPJ, fifth MCPJ and first IPJ was 59.0%, 2.93%, 0%, 47.6% and 28.0%, respectively. Two sesamoid bones were always found at the first MCPJ, whereas one sesamoid bone was identified at other joints. The sesamoid bones were statistically more frequent at the first IPJ in female patients ($p = 0.006$). The prevalence of sesamoid bones was found to be higher in female patients at the second MCPJ, third MCPJ and fifth MCPJ compared with male patients; however, these findings were not statistically significant ($p = 0.113$, $p = 0.369$ and $p = 0.238$, respectively) (Table 1).

There were in total 12 different patterns of sesamoid bone distribution identified in the hand. The most common pattern of sesamoid bones distribution was absence of all sesamoids in all locations except first MCPJ (Figure 2), with the prevalence of 25%. The second common pattern, with the prevalence of 24%, was the presence of sesamoid bones in first, second and fifth MCPJs (Figure 3). The least common pattern in the study was the presence of sesamoid in thumb IPJ and all MCPJs except the fourth MCPJ (Figure 4). All identifiable patterns of sesamoid bones are summarised in Table 2.

Bilateral hand radiographs showed 100% symmetrical distribution of sesamoid bones on right and left sides (Figure 5).

Discussion

This study is the first and only study to report the pattern of sesamoid bone distribution in the hand and left–right symmetry in the Chinese population. Twelve different patterns were identified in this study with the most common being the presence of the first MCPJ only, which was also reported in the Turkish study.¹² In comparison to other studies, Joseph¹³ reported 100% prevalence of thumb MCPJ and thumb IPJ in the three common types of patterns, and the most common was thumb MCPJ, IPJ and the fifth MCPJ. In our study, however, no sesamoid bone was identified on the thumb IPJ in the common patterns.

Differences in sesamoid distribution with respect to sex and laterality have been discussed in some studies,^{3,14,15} and majority of the articles revealed no difference. In the Turkish study, sexual difference was found in second MCPJ and third MCPJ, both with higher prevalence in females. In this study, sesamoid bones were statistically more common on the thumb IPJ in females ($p = 0.006$).

Previous reports have reported the prevalence and distribution of sesamoid bone in the hand in different ethnic groups. Their results are summarised in Table 3. African, European and Middle Eastern groups were included for comparison as there was relatively a larger number of studies performed on these ethnic groups,



Figure 1. The distribution of sesamoid bones and their prevalence in the hand.

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