

Six Sesamoid Bones on Both Feet: Report of a Rare Case

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ABSTRACT

There is a variation of the total number of distinct bones in the human in the literature. This difference is mainly caused by the variable existence of sesamoid bones. Sesamoid bones at the first MTP are seen regularly. In contrast additional sesamoid bones at the second to fifth MTP are rare. We report a case of additional sesamoid bones at every metatarsophalangeal joint (MTP) of both feet.

A 22-year-old female Caucasian presented with weight-dependent pain of the second MTP of the left foot. In the radiographs of both feet additional sesamoid bones at every MTP could be seen. This case reports a very rare variation in human anatomy. A similar case has not been displayed to the academic society and therefore should be acknowledged.

Keywords: Anatomy, Genetics, Variation

CASE REPORT

In 2014 a 22-year-old female Caucasian presented to our department's daily clinic. She was suffering from weight-dependent pain at the second MTP of the left foot for the last one and a half year without any trauma. Additionally, she reported of aggravating pain after exercising such as running and playing volleyball. Inspection of the left foot revealed no abnormality. The longitudinal and transversal arches of both feet were unremarkable. No suspicious generation of callosities could be seen. There was an isolated plantar tenderness of the second MTP. The joint was stable and free in range of motion. The mobility of the extensor and flexor tendons was free of pain or mechanical irritation.

The plain X-rays in anterior to posterior and oblique technique of the feet revealed additional medial sesamoid bones at the second to fifth MTP bilaterally [Table/Fig-1-4]. Medial and lateral sesamoid bones at the first MTPs were displayed bilaterally. The medial sesamoid bone at the right first MTP presented as *O*s sesamoideum bipartitum [Table/Fig-2]. The sesamoid bones at the left first MTP were marginally shifted to lateral, whereas the tarsometatarsal, the intertarsal and the tarsophalangeal angle were within reference values [Table/Fig-1]. The initiated MRI of the left forefoot showed an isolated increased uptake for the contrast agent into the synovial membrane of the second MTP. There was no bone bruise or erosive alteration of this joint. The blood chemistry was unremarkable.

Therapy was initiated with sport abstinence and prescription of a stiff sole. A rheumatologic assessment was recommended. At six months follow up pain had almost completely resolved. A rheumatologic assessment had not been performed.

DISCUSSION

There is a variation of the total number of distinct bones in the human in the literature. The classic reference of the human body Grey's Anatomy stats 200 different bones, whereas Marieb et al., report a total number of 206 bones [1]. This difference is mainly caused by the variable existence of sesamoid bones. Sesamoid bones are bones, which are partially or completely embedded into tendons. They function as hypomochlia, reduce friction of tendons over joint forming bones and protect the tendon against direct trauma [2]. On the one hand formation of sesamoid bones underlies biomechanical effects, such as mechanical force, motion and muscular traction. On the other hand genetic factors may play an important role [3]. Variable difference in prevalence rates are reported depending on the ethnic background. In the literature prevalence rates of additional sesamoid bones at the second to fifth digit are between 0 and 13% [4-7]. A meta-analysis published by Yammine including 37 studies showed a dependence on the ethnic background [4]. Coskun et al., examined 985 Turkish men and women. Additional sesamoid bones of the feet were found in 0.4% at the second, in 0.2% at the third, in



[Table/Fig-1]: X-ray of the left foot – anterior to posterior view [Table/Fig-2]: X-ray of the right foot –anterior to posterior view [Table/Fig-3]: X-ray of the left foot oblique view [Table/Fig-4]: X-ray of the right foot oblique view

0.1% at the fourth and in 4.3% of the cases at the fifth digit. In most of the cases additional sesamoid bones were unilateral [5]. A slightly higher prevalence was found in an Arabian population by Dharap et al., In their study of 336 feet they found prevalence rates of 2.1% at the second, 0.6% at the third and the fourth and 11.6% at the fifth MTP [6]. In the Malawian population the prevalence seems to be considerably lower. In a study of 129 feet from Malawi by Msamati et al., no additional sesamoid bones at the second to fourth digit were seen [7]. In the meta-analysis by Yammine overall prevalence rates were 100% for the first, 1.9% for the second, 0.32% for the third, 0.9% for the fourth and 13% for the fifth digit. The author concluded the highest prevalence rates for European ancestry, whereas African ancestry showed the lowest [4].

In the reported case the coaction of epigenetic and genetic factors led to a unique anatomical variation. To our knowledge this is the only reported case of additional sesamoid bones at every digit of both feet.

CONCLUSION

The number of distinct bones in the human body is variable. Whereas sesamoid bones at the first MTP present regularly, additional sesamoid bones at the other digits of the foot are rare. Prevalence rates of sesamoid bones depend on ethnic ancestry. We report on a

case of additional sesamoid bones at every MTP of both feet. To our knowledge this variation of the human anatomy is unique.

Patients consent

The patient has given written informed consent to publication of the figures and the text.

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