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Case Report

Large human fabella bone

[1]Romini Niranjan, [2] T.Gobyshanger

[1]Department of Anatomy, Faculty of Medicine, University of Jaffna

[2]Jaffna Teaching Hospital

Abstract:

Fabella bone is identified as an accessory and evolutionary sesamoid bone in humans. It was noticed as an irregular shape located within the lateral head of gastrocnemius in the posterolateral capsule of the left knee of a 55-year-old male. Another smaller fabella was noted and both were kept in a safe place Measurements were taken after a week and their length was 2.7 cm and 1.8 cm respectively. The size of fabella usually ranges from 5mm-20mm in diameter, but in this study, the length of the larger one was 2.7 cm. Fabella originated as a small cartilaginous nodule and underwent endochondral ossification. It helps to reduce resistance within tendons and redirect muscle forces. In humans, gastrocnemius acts to flex the knee and plantar flex the foot. Fabella function was thought to stabilize the femoral complex and medial femoral condyle. Patients with fabella pain syndrome usually complain of increased posterolateral pain during the full extension of the knee joint. Fabella pain syndrome could be treated with physical therapy, local anaesthetics injection, radial extracorporeal shock wave therapy or fabellectomy. It has been observed that there has been an increase in the prevalence of fabella in recent years. Larger moments acting on the knee and increasing muscle or tendon strain could produce stimuli essential to encourage fabella formation.

Keywords: Fabella, Sesamoid bone, Posterolateral knee pain, Fabellar complex

Introduction:

The patella is a well-known sesamoid bone in the knee joint. There are few sesamoids present in human hands and feet. Fabella is identified as an accessory and evolutionary sesamoid bone in humans. Previous studies mentioned the presence of fabella in humans and it is constantly present in domestic animals. Fabella size is variable and it could be either cartilage or bony components. Fabella prevalence(FP) in humans has increased recently within 150 years and could be mistaken for loose bodies or osteophytes.

Case report:

Incidentally noticed an irregular shape fabella located within the lateral head of gastrocnemius in the left knee of a 55-year-old male cadaver during dissection at the Department of Anatomy, Faculty of Medicine, University of Jaffna. It was white and shiny immediately after dissection and seemed to be covered by jelly fluid. Its surfaces had small furrows and ridges. A small area of the smooth surface was noticed at one end. Thus its surfaces were not well oriented and dissimilar with patella bone. Another bone comparatively smaller than the first one was found beneath the same muscle. It seems to be broken out from the fabella described above. The smaller one has comparatively smooth surface on one side. Bones were kept in a safe place measurements were taken after a week and its length was 2.7 cm and 1.8 cm respectively. The white glistening appearance disappeared later and both bones exactly looked like ossified bones.

Figure 1: The large fabella bone

Corresponding Author: Romini Niranjan, Email: rominiranjan@yahoo.com https://orcid.org/0000-0001-6647-1735, Submitted Jan 2024 Accepted May 2024

Discussion:

Fabella is present in the posterolateral capsule of the knee where lines of tensile stress overlap (3). It articulates with the posterior articular surface of the lateral femoral condyle and is embedded in fibers of gastrocnemius (4). Size of fabella usually ranges from 5mm-20mm in diameter (1) but in this study length of the larger one was 2.7 cm.

Fabella prevalence was 10-30% among the general population with a higher prevalence in Asians (1). FP was an equal percentage in both genders and bilateral cases were more common than unilateral occurrences (5). FP was similarly common on the right and left sides (6). Men had an incidence of 21.2 % whereas females had 27.2% and that there were no major sex-based differences (1).

Previous studies observed the presence of either whole ossified bony fabella or partly ossified cartilage. The human patella normally formed from one primary ossification center but started to ossify by 3-6 years and completed the ossification by 20 years. Osteoarthritis and age-related degeneration were causes for its ossification and it suggested that Fabella was definitely ossified by the endochondral method. Lateral fabella also had a common origin comprising plantaris muscle, oblique popliteal, and arcuate ligaments and contained in fabellar complex(FC) where they made a small articular cavity between FC and lateral femoral condyle(2). Ossification of fabella in the lateral head was easier than medial fabella(2). Thus bony fabella made an impression on femoral condyle. Therefore, fabella seems to be fixed in the same part of the femur regardless of knee movement. The fabellar complex was made of plantaris, gastrocnemius, arcuate fabello-fibular, fabello-popliteal and oblique popliteal ligaments (1). Presence, width, and thickness of those ligaments would depend on presence of fabella(2). Fabella helped to reduce resistance within tendons and redirecting muscle forces. In humans, gastrocnemius acts to flex knee and to plantar flex the foot. Fabella's role was thought to stabilized FC and medial femoral condyle(1).

Posterolateral knee pain could be associated with contact between fabella and lateral femoral condyle(3). FP could lead to various pathological conditions such as fabellar pain syndrome(FPS), common peroneal nerve(CPN) palsy, and popliteal artery entrapment (PAE) syndrome(1). In CPN palsy,20.8% of patients had a nerve located posterior to the fabella. Less subcutaneous fat in overweight patient might lead to compression of CPN by Fabella (1).

Differential diagnoses for posterolateral knee pain were FPS, meniscal tears, lateral ligament unsteadiness, Baker's cyst and proximal tibiofibular joint hypo mobility. Patient with FPS usually moans increased posterolateral pain during the full extension of knee joint(1). First known case of FPS with PAE presented with intermittent claudication and severe knee osteoarthritis (1). FPS could be treated with physical therapy, local anaesthetics injection, radial extracorporeal shock wave therapy(rESWT) or fabellectomy(1). A significant relationship between FP and os peroneum in the tendon of human peroneus longus was noted (7).

Conclusions:

Though there are not enough evidence-based studies, it has been observed that there is an increase in FP rate. It could be due to many factors such as global increase in human height and weight, increase tibial length and muscle mass(5). This lead to a larger moment acting on knee and increase muscle or tendon strain. This could harvest stimuli essential to encourage fabella formation.

References:

1. Dalip D, Iwanaga J, Oskouian R J, et al. (June 05, 2018) A Comprehensive Review of the Fabella Bone. Cureus 10(6): e2736. DOI 10.7759/cureus.2736

2. Kawashima T, Takeishi H, Yoshitomi S, Ito M, Sasaki H. Anatomical study of the fabella, fabellar complex and its clinical implications. Surg Radiol Anat. 2007 29(8):611-6. doi: 10.1007/s00276-007-0259-4. Epub 2007 Sep 19. PMID: 17882346.

3. Weng SP, Wu TM, Chien CS, Lin SH. Treatment of Fabella syndrome with arthroscopic fabellectomy: a case series and literature review. BMC Musculoskelet Disord. 2021 Aug 30;22(1):748. doi: 10.1186/s12891-021-04630-w. PMID: 34461874; PMCID: PMC8406563.

4. Driessen A, Balke M, Offerhaus C, White WJ, Shafizadeh S, Becher C, Bouillon B, Höher J. The fabella syndrome - a rare cause of posterolateral knee pain: a review of the literature and two case reports. BMC Musculoskelet Disord. 2014 Mar 26;15:100. doi: 10.1186/1471-2474-15-100. PMID: 24666711; PMCID: PMC3987160.

5. Berthaume MA, Federico ED and Bull AMJ. Fabella prevalence rate increases over 150 years, and rates of other sesamoid bones remain constant: A systematic review. J. Anat. (2019) 235, 67—79

6. Berthaume MA, Bull AMJ. Human biological variation in sesamoid bone prevalence: the curious case of the fabella. J Anat. 2020 Feb;236(2):228-242. doi: 10.1111/joa.13091. Epub 2019 Oct 17. PMID: 31623020; PMCID: PMC6956444.

7. Vineet k. Sarin,* Gregory M. Erickson, Nicholas J. Giori, A. Gabrielle Bergman, and Dennis R. Carter. Coincident development of sesamoid bones and clues to their evolution. The Anatomical Record (New Anat.) 257:174–180, 1999