

Radiological Study on the Incidence and Clinical Importance of Os Vesalianum of 5th Metatarsal Bone

MUTHIAH PITCHANDI¹, MALLIKARJUN ADIBATTI², V BHUVANESWARI³

ABSTRACT

Introduction: Os Vesalianum (OSV) is an accessory ossicle of the foot, first described by Andreas Vesalius, during 1543 in “de humani corporis fabrica”. It is located proximal to the base of the fifth metatarsal bone within the peroneus brevis tendon, rarely symptomatic, detected incidentally on routine radiographs, with an incidence of 0.1% to 5.9%. OSV has rarely been implicated as a causative factor for lateral foot pain, peroneus brevis tendonitis and is commonly been misdiagnosed on routine radiographic examination as fracture of fifth metatarsal bone, due to the lack of knowledge pertaining to it.

Aim: To study the presence, incidence, location and morphology of OSV.

Materials and Methods: Retrospectively, 1000 radiographs both anteroposterior and oblique view of the foot was observed for the presence, incidence, location and morphology of OSV. Statistical analysis was done by descriptive statistics.

Results: In the present study, we observed an incidence of 1.5% of OSV, with predominantly round or ovoid shaped. OSV was more common in males than females in the present study, which was more often located on the posterolateral aspect of the base of fifth metatarsal and lateral to cuboid bone.

Conclusion: Orthopaedician and radiologists must be aware of such bony variants in the foot and ankle, which can serve as radiological pitfalls that can cause confusion leading to wrong diagnosis and delayed management in cases presenting with history of trauma and lateral foot pain.

Keywords: Accessory ossicle, Lateral foot pain, Peroneus brevis tendonitis

INTRODUCTION

Accessory ossicles of foot are the most common skeletal variations of the foot and ankle. They usually arise commonly from unfused accessory ossification centers, and may appear to be normal subdivisions of ordinary bones or nearby additional free elements. Most common accessory bones of the foot are the Os trigonum, Os navicular, while the less frequent ones include Os vesalianum, Os sustentaculi, Os supranaviculare, Os calcaneus secundarius, Os subtibiale and Os subfibulare [1-4].

OSV is a rare accessory bone located at proximal part of the base of fifth metatarsal bone. OSV is present within the peroneus brevis tendon with a reported incidence of 0.1% to 5.9% [2,5,6]. It is rarely symptomatic, has characteristics typical of an accessory bone, like rounded shape and smooth edges with presence of a well-developed fifth metatarsal tuberosity.

Plantar lateral foot pain can occur due to ossifying apophysis/apophysitis of the fifth metatarsal base fracture of the tuberosity of the fifth metatarsal, non-union of a tuberosity fracture of the fifth metatarsal, un-united apophysis of the fifth metatarsal base [5]. However, symptomatic OSV is often neglected due to lack of awareness and knowledge pertaining to it. Hence, the retrospective radiographic study on OSV was taken up in our institute, to observe for the presence, incidence, location and distribution of OSV. OSV is been reported for its rarity and clinical importance.

MATERIALS AND METHODS

Convenient sampling method was used and X-rays were retrospectively taken from Sept 2016 onwards. Study was conducted for a period of one year between Jan 2017-Dec 2017. Consecutively 1000 X-rays of foot, both anteroposterior and oblique view of foot radiographs of both sexes in the age group 12-80 years were used for the study, which were examined for the presence, number, location and distribution of accessory ossicles of the foot

such as Os Peroneum (OSP) and OSV. OSV has been reported in this article for its rarity. OSV was confirmed by the presence of distinct well corticated margins, which was separated from the base of fifth metatarsal by a radiolucent line, along with a well-corticated edge. Radiographs of patients with incorrect patient positioning, with any foot deformity or known diseases, and with any fractures of metatarsal and tarsal bones were excluded from the study. Data collected by reading of both anteroposterior and lateral radiographs of the foot were recorded and analysed for the incidence, location and distribution of OSV. Data analysis was done by applying descriptive statistical tests.

RESULTS

Out of 1000 radiographs of the foot, 15 cases of OSV were observed with predominantly round or ovoid in shape, which accounts for 1.5 % incidence. In the present study, we noticed that in all cases the OSV articulated with the base of the fifth metatarsal [Table/Fig-1,2] and only in one case it was interposed between the base of fifth metatarsal and cuboid bone [Table/Fig-3], but articulation with cuboid were not observed in any case. OSV was more commonly seen on the right side in both males and females, while it was slightly more frequent in males (1.5%) in comparison to females (1.45%) [Table/Fig-4]. OSV in the present study was round or ovoid shape, with well-corticated appearance and presence of distinct margins between adjoining bones. OSV was located more commonly near the base of fifth metatarsal bone, except in one case only where it was interposed between the base of fifth metatarsal and cuboid bone.

DISCUSSION

Many skeletal variations like accessory ossicles, sesamoid bones, bipartitions and coalitions exist around foot and ankle, OSV pedis is one of the rare accessory bone located proximal to the base of the fifth metatarsal, with a prevalence of 0.1% to 5.9% of the population [1-4].



[Table/Fig-1]: Showing small round OSV in left foot.



[Table/Fig-3]: Showing large OSV of right foot interposed between the cuboid and lateral aspect of fifth metatarsal.



[Table/Fig-2]: Showing small OSV in right foot.

Sex (N)	OSV Present	Percentage (%)
Male (589)	9	1.52
Female (411)	6	1.45
Total (1000)	15	1.5

[Table/Fig-4]: Depicting the incidence of OSV in both sexes.

adjacent to cuboid. In only one case, OSV interposed between base of the fifth metatarsal bone and cuboid bone.

When patients present with a history of trauma, this condition is usually misdiagnosed as a fifth metatarsal avulsion fracture and treated with unnecessary immobilization. OSV must be differentiated from a fracture of the base of fifth metatarsal, failure of fusion of apophysis of the base of fifth metatarsal or apophysitis and even from Os peroneum [4,6-8].

Incidence of OSV ranges between 0.1% and 5.9%. They are usually asymptomatic and detected incidentally on radiographs [4,7-11]. In the present study, we had an incidence of 1.5 % among 1000 radiographs of the foot which correlates with the study of Arslan S et al., [12]. Accessory ossicles such OSV is usually derived from the failure of union of secondary ossification centers to the main bony mass. These ossicles can be misdiagnosed and interpreted as avulsion fractures, or vice versa [13]. However, the delayed maturation of the secondary growth centers should not be confused with traction apophysitis or avulsion fracture in the absence of clinical symptoms [13].

OSV can be differentiated from fractures, which have sharp, radiolucent lines, with irregular geometry with absence of cortex, whereas OSV have well-defined cortical margins and a rounded or oval shape [9]. Avulsion fracture of the base of the fifth metatarsal bone involves the insertion site of the peroneus brevis tendon, which usually lie in a transverse plane. The avulsed fragment has sharply marginated piece of bone which lacks cortication at the fracture line [1,4]. Advanced imaging modalities such as CT and MRI may be used in doubtful cases for further investigation [9,11].

Painful OSV results from fracture, degenerative change, and avascular necrosis due to irritation or impingement of adjacent soft tissues. OSV

OSV is an infrequent cause of lateral foot pain. OSV has characteristics typical of an accessory bone, such as its rounded shape and smooth edges in the presence of a well-developed fifth metatarsal tuberosity [4-6]. In the present study, also we observed OSV were rounded or large ovoid in shape, localized adjacent to the base of the fifth metatarsal bone and lateral to cuboid bone with a well-corticated appearance and clear articulation with base of fifth metatarsal bone

is located adjacent to the base of the fifth metatarsal, and is embedded in the peroneus brevis tendon. It articulates both with the base of the fifth metatarsal and the cuboid bone. In symptomatic cases treatment involves excision of the OSV from the symptomatic foot, as well as osteosynthesis and bone grafting. However, if it is complicated by the insertion of peroneus brevis muscle to the ossicle it can be repaired by careful tenorrhaphy and sometimes tenodesis [7,8].

OSV of the foot is located proximal to fifth metatarsal tuberosity. It has a well corticated and smooth margin. The size and shape of the OSV can vary enormously and can even alter the attachment and angulation of peroneus brevis tendon. Radiologically, it acts as a diagnostic pitfall, as it mimics the avulsion fractures of fifth metatarsal base. It is usually asymptomatic in majority of individuals, but rarely can be one of the reasons leading to lateral foot pain and peroneus brevis tendinitis. It is more often neglected because of the lack of knowledge pertaining to the anatomy of OSV and its implications in lateral foot pain and peroneus brevis tendinitis.

Embryological Basis

Accessory ossicles are congenital in development, which result from unfused ossification centers. They can also result due to prior trauma. These are found adjacent to various joints, which are incidentally diagnosed on radiographs. At times, they mimic fractures or loose bodies, proving to be a diagnostic conundrum, thus leading to wrong diagnosis. They may also contribute to or exacerbate underlying pathology, giving rise to symptoms [14].

LIMITATION

Detailed Morphology of OSV can be studied using higher imaging modalities such as CT and MRI.

CONCLUSION

OSV normally mimics avulsion fracture of proximal fifth metatarsal bone; hence, it should not be misinterpreted and misdiagnosed in cases presenting with history of trauma. Knowledge regarding the

presence, incidence and distribution of OSV is essential for both radiologists and orthopaedic surgeons for the accurate diagnosis and management of lateral foot pain.

Ethical Approval: Ethical approval was obtained from Institutional Ethics Committee. No.36/2018.

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PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Radiodiagnosis, ESIC Medical College and PGIMSR, Chennai, Tamil Nadu, India.
2. Assistant Professor, Department of Anatomy, ESIC Medical College and PGIMSR, Chennai, Tamil Nadu, India.
3. Professor and Head, Department of Radiodiagnosis, ESIC Medical College and PGIMSR, Chennai, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Mallikarjun Adibatti,
Department of Anatomy, ESIC Medical College and PGIMSR, Chennai-600078, Tamil Nadu, India.
E-mail: na_mallikarjun@rediffmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Jan 11, 2019**
Date of Peer Review: **Feb 01, 2019**
Date of Acceptance: **Feb 16, 2019**
Date of Publishing: **Apr 01, 2019**