



The incidence of accessory bones of the foot and their clinical significance

Ayakta aksesuar kemiklerin sıklığı ve klinik önemi

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Amaç: Aksesuar kemikler sık olarak yanlışlıkla avulsiyon kırıkları olarak değerlendirilmektedir. Bu çalışmada ayak iskeletindeki aksesuar kemiklerin sıklığı araştırıldı.

Çalışma planı: Yaşları 20-46 arasında değişen tümü erkek 464 olguya ait ön-arka ve yan ayak radyografileri aksesuar kemikler açısından incelendi ve aksesuar kemiklerin görülme sıklıkları ve dağılımları araştırıldı. Aksesuar kemiklerin tanımlanmasında Kohler sınıflaması kullanıldı.

Sonuçlar: İncelenen 464 grafinin 85'inde (%18.3) aksesuar kemik saptandı. Aksesuar kemik görülen tüm olgular semptomsuzdu. En sık görülen aksesuar kemik os peroneumdu (%31.8), bunu os navikulare (%28.2) ve os trigonum (%23.5) izlemekteydi. Os vesalianum %5.9, os supranavikulare ve os infranavikulare %3.5, os supralare %2.4 ve os intermetatarsium ise %1.2 oranlarında görüldü.

Çıkarımlar: Ayak şikayetleri nedeniyle sağlık kurumlarına başvuran hastaların ilk muayenelerinde aksesuar kemiklerden kaynaklanan yanlış tanıların ve gereksiz ortopedi konsültasyonlarının azaltılması için ayaktaki aksesuar kemikler ve klinik önemleri iyi bilinmelidir.

Anahtar sözcükler: Ayak deformitesi/radyografi; ayak hastalığı/tanı/anormallik; askeri personel/istatistik ve numerik veri; podiatri.

Objectives: Accessory bones of the foot are often confused with avulsion fractures. This study was designed to investigate the incidence of accessory bones of the foot.

Methods: Anteroposterior and lateral foot radiographs of 464 male patients with an age range of 20 to 46 years were examined with regard to the presence, incidence, and distribution of accessory bones. Identification of the accessory bones were made according to the Kohler classification.

Results: Of 464 radiographs, accessory bones were identified in 85 feet (18.3%), all of which were symptomless. The most common accessory bones in descending order were os peroneum (31.8%), os naviculare (28.2%), os trigonum (23.5%), os vesalianum (5.9%), os supranaviculare (3.5%), os infranaviculare (3.5%), os supralare (2.4%), and os intermetatarsium (1.2%).

Conclusion: Accessory bones of the foot should be well recognized and their clinical significance should be appreciated in order to decrease the rate of incorrect diagnoses and unnecessary orthopedic consultations on initial presentations of patients with foot complaints.

Key words: Foot deformities/radiography; foot diseases/diagnosis/abnormalities; military personnel/statistics & numerical data; podiatry.

A great majority of patients who referred to emergency departments of hospitals has musculoskeletal injuries. Orthopaedic consultations have been asked for such injuries and the necessity of consultations can be discussed for some part of these cases. Eventually, inappropriate orthopaedic consultations cause time loss, heavier practice for

orthopaedic surgeons and increase in health expenses. In a recent study, musculoskeletal conditions accounted for 13.8 % of all hospital visits and were the largest single anatomic disease category. It was found that the first diagnosis at emergency room were not consistent with the final diagnosis at foot outpatient clinic for 21.4 % of the patients. It was

also noted in the same study that after inservice lectures on this issue, the rate of misdiagnosis and unnecessary referrals decreased.⁽¹⁾

After a traumatic condition, in the feet of patients at emergency rooms, the normal anatomic variants of accessory bones are often confused with avulsion fractures and cause unnecessary referrals. We conducted this retrospective study in an effort to find out the incidence of the normal anatomic variants of accessory bones of the foot and noted some significant clinical points to facilitate correct diagnosis.

Material and methods

Between October 2003 and July 2004, 464 antero-posterior and lateral feet roentgenograms were collected from the patients referred to orthopaedic outpatient clinic and emergency room. All of these roentgenograms were evaluated in terms of accessory bones of the foot. All patients were male. The youngest patient was 20 years old and the oldest was 46. Study was planned in two parts :

All roentgenograms were evaluated and accessory bones were noted. Kohler classification was used for description of accessory bones.

Only the roentgenograms with accessory bones were evaluated again and the incidence of accessory bones were noted.

Results were evaluated and expressed in terms of percentage.

Results

A total of 464 foot roentgenograms were evaluated. Eighty-five (%18.3) of all foot roentgenograms had identifiable accessory bones. The most common accessory bones in descending order were: os peroneum (31.7%), accessory navicular (28.3%), os trigonum (23.6%), os vesalianum (5.9%), os supranavicular (3.5%), os infranavicular (3.5%), os supratalar (2.3%) and os intermetatarsium (1.2%) (Table-1, Figure-I).

Discussion

Accessory bones of the foot arise from separated centers of ossification, are due to an abnormal division of a usual solitary ossification center or represent the failure of centers of ossification to unite.⁽³⁾

The incidence of accessory bones, (18.3 %), in our study was consistent with the other results

Table-1. Incidence of accessory bones in terms of percentages

Accessory bone	Percentage	
Os peroneum	27	31.7%
Accessory navicular	24	28.3%
Os trigonum	20	23.6%
Os vesalianum	5	5.9%
Os supranavicular	3	3.5%
Os infranavicular	3	3.5%
Os supratolare	2	2.3%
Os intermetatarsium	1	1.2%
	85	100 %

reported in previous studies. The incidence of normal anatomic variants of accessory bones in the foot ranges from 18 % to 36.3 % in different articles.^(4,5) Shands noted accessory bones in an average of 26% of children 8 years or older. The percentage increases with age. In this study of Shands, less than 3% of children under age of 8 years had identifiable acces-



Figure-I. 1-os supratalar, 2-os supranavicular, 3-os infranavicular, 4-os intermetatarsium, 5-os vesalianum, 6-os peroneum, 7-os trigonum. Accessory navicular is not shown on lateral view.

sory bones, whereas they were noted in 28.8% of children age 14 to 16 years.⁽⁴⁾ The most commonly noted accessory bones are the os peroneum, accessory navicular and os trigonum. Os peroneum was reported to appear until 14 to 16 years of age. Accessory navicular tends to appear between 10 and 12 years of age, whereas os trigonum between 8 and 10 years.⁽⁵⁾

Symptoms are rarely seen for normal accessory bones of the foot.⁽⁶⁾ If an accessory bone causes pain, this is probably accessory navicular in the adolescent or os trigonum after trauma. Pain on the normal localization of accessory navicular or os trigonum is a sign of the presence of these two bones.

In a study from Japan, which is the largest one to date, 3460 foot roentgenograms were evaluated. The most common accessory bones were os tibiale externum (21.3 %), os trigonum (12.7 %) and os peroneum (9%). It was also noted in the same study that most of the patients who had accessory bones in their foot seemed to have no clinical symptoms related to these bones.⁽⁷⁾ Radionuclide imaging techniques have been known to be helpful in describing the symptomatic normal variants.^(2, 6, 8, 9) Increased radioactive uptake is usually a sign of repetitive trauma.

There were almost no symptoms related to the accessory bones in our study. Localization of the complaints usually points the localization of the accessory bones and this is the most important sign in clinical examination. That's why, clinicians should have an average level of knowledge about the localization of accessory bones. All physicians, especially general practicing ones should have inservice lectures on this issue to avoid inappropriate diagnosis. The important points in differential diagnosis of accessory bones can be summarized as follows :

- a) Normal localizations of accessory bones should be known.
- b) Configuration and the outlines of adjacent bones should also be known.
- c) If there is a suspicion on diagnosis, the roentgenograms of the other foot will be helpful.
- d) A small bone fragment on roentgenograms should never be described as fracture unless a corre-

sponding defect has been seen.

e) Accessory bones has cortical outlines. A fracture has no cortex on at least one surface.

f) After a time period has passed, one should look for the signs of callus formation.

g) Accessory bones are usually regular in shape. Fractures has no regular shapes.

If painful localization on clinical exam is consistent with an accessory bones on roentgenograms, activity limitation and basic analgesics will be enough for treatment at first. If there is a history of acute trauma or symptoms can not be controlled with activity limitation, immobilization with a cast or cast splint will control the pain. If pain persists or can not be localized well, then radionuclide imaging techniques will be helpful in correct diagnosis. Surgical excision of accessory bones is a rare way of treatment and indication of surgery should be made carefully. Successful results of surgical treatment can be achieved for painful accessory navicular.^(9, 10, 11) Even for such cases, surgery should be performed after all other conservative methods were tried.

Our study objecting evaluation of incidence of accessory bones has some limitations. First of all, in larger series it would be possible to get more correct statistical evaluation about accessory bones of the foot. Second limitation is that, all the patients in our study were male. We could not make a comparison of the incidence and localization of accessory bones between genders. In Kruse's study, the most common accessory bones were reported to be different in male and female study groups. In study of Kruse, os infranavicular was found to be the most common accessory bones in male group. (5). The other limitation of our study is the evaluation of only one foot of the patients. Bilateral roentgenographic evaluation lets a comparative study and can give some more information in understanding accessory bones of the foot.

As conclusion, we detected accessory bones in 18.3% of all roentgenograms. The most common accessory bones were os peroneum, accessory navicular and os trigonum in descending order. Accessory bones and their clinical significance should be the subject of inservice lectures for physicians in medical facilities. This will improve the rate

of incorrect diagnosis of accessory bones as fractures and decrease the inappropriate orthopaedic consultations. It will be possible to save time, money and avoid overtreatments.

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