Ossicle vs. avulsion fracture: Cinematic rendering of
MDCT data as an additional diagnostic key

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Background
The differentiation between variants within the normal range and pathologic findings is a frequent challenge to radiologists in the daily routine. In trauma patients for example, it may be difficult to differentiate an ossicle from an avulsion fracture, even in cross-sectional images [1]. Ossicles are a frequent finding and usually require no further therapy. On the other hand, through their relation to tendons or ligaments, avulsion fractures are frequently considered as "complex fractures" and require conservative and - in some cases - surgical management [2-4]. Thus, the clear differentiation between ossicles and avulsion fractures, even in anatomically difficult regions, is an important aspect of the radiologist’s report [5]. We present a case in which cinematic rendering of MDCT data was a helpful key in the differentiation between an ossicle and an avulsion fracture.

Case report
We report a 31-year-old male patient with recent trauma to the right knee. After initial clinical examination and plain radiograms of the knee an avulsion fracture of the intercondylar eminence was suspected, differential diagnosis ossicle (Figure 1).

Subsequently, the patient was referred to computed tomography (CT) examination for further evaluation. A non-contrast conventional multi-detector computed tomography (MDCT) with axial slicing was carried out. Multiplanar reformations (MPR) were acquired in coronal and sagittal orientation. In postprocessing, a 3D-cinematic rendered overview for the whole volume and a separate reconstruction of the tibial head were conducted. Conventional MDCT images confirmed the bone dense formation close to the intercondylar eminence, suspicious of an ossicle. No other bone lesions were detected (Figure 2).

Additionally, 3D cinematic rendered images clearly confirmed that the bone dense structure was an ossicle in the intercondylar eminence (Figure 3).

Discussion
Especially in difficult anatomic regions it might be hard to differentiate between variations within the normal range and pathological findings even in MDCT images [5]. Regarding the presented case, radiological reports are frequently inconclusive in the differentiation between ossicles and avulsion fractures. This might lead to further, cost-intensive imaging and may delay immediate therapy[1,3,5].

Ossicles usually are sharply demarcated and show a sclerosed border. They are a frequent finding in articular and periarticular regions and appear in every age group. Normally, ossicles require no further therapy. Avulsion fractures on the other hand have a relation to the...
adjunct in cases with inconclusive findings and/or difficult anatomic circumstances and play a role for better illustration in interdisciplinary conferences [6,7].

Disclosure
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References
5. Doornberg JN, Rademakers MV, van den Bekerom MP, Kerkhoffs GM, Ahn J, et al. (2011) Two-dimensional and three-dimensional computed tomography for the classification and characterisation of tibial plateau fractures. Injury 2: 1416-1425. [Crossref]
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In conclusion, 3D-cinematic rendered images can be a helpful

adjunct in cases with inconclusive findings and/or difficult anatomic circumstances and play a role for better illustration in interdisciplinary conferences [6,7].

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