Response to letter to the editor: “Cam impingement: defining the presence of a cam deformity by the alpha angle data from the CHECK cohort an Chingford cohort”

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- Hip
- Osteoarthritis
- Femoroacetabular impingement
- Cam impingement
- Cam deformity
- Definition
- Threshold value
- Epidemiology

We would like to thank Massey et al. for their letter to the editor regarding our article ‘cam impingement: defining the presence of a cam deformity by the alpha angle: data from the CHECK cohort and Chingford cohort’. The points raised by Massey et al. focus both on the radiographic view used to define the threshold values and on the characteristics of both cohorts.

The first concern of Massey et al. is the use of anteroposterior (AP) pelvic radiographs only. They argue that the use of AP radiographs in isolation underestimates the prevalence of cam deformities. This is illustrated by describing a study in which the alpha angle as measured on AP radiographs showed a poor correlation with the alpha angle in the axial oblique plane, the plane in which Nötzli et al. first proposed the alpha angle. Although we fully agree that cam deformities may be missed when using an AP view in isolation, we disagree that this limits the relevance of our work. The poor correlation between the alpha angle on an AP pelvic radiograph and an axial oblique view is simply explained by the fact that the femoral head–neck junction is measured in a completely different anatomical location (lateral vs anterior portion of the head–neck junction respectively). However, there is no argument that a more laterally located cam deformity is not of relevance. Indeed, a strong association between a cam deformity on an AP radiograph and the subsequent development of hip osteoarthritis was found in the two prospective cohort studies available.

This means that an AP radiograph, although producing an underestimation of the true prevalence of a cam deformity, contains valuable information and allow the prediction of the development of hip osteoarthritis years in advance of symptoms. Therefore, an AP pelvic radiograph in isolation is insufficient for clinical purposes to determine if an individual has a cam deformity or not, but AP radiographs are highly relevant especially for research purposes as most large cohorts only have such radiographs available. Alpha angle threshold values to determine the presence or absence of a cam deformity in the AP view are therefore of considerable relevance.

The second concern relates to the population characteristics and differences between both cohorts. Massey et al. argue that the populations are not ideal to investigate the long-term outcome of cam deformity and the development of osteoarthritis. However, our study did not aim to study this; our study aimed to determine threshold values for the definition of a cam deformity on AP pelvic radiographs. For this purpose, the age of the population and differences in cohort characteristics can be regarded as a strength of our article. First, a cam deformity probably develops during skeletal maturation and because all participants of this study were adults, we can be confident that a cam deformity is present in those who developed a cam deformity. Secondly, we investigated if the alpha angle distribution was dependent on the differences between the cohorts such as gender, radiographic protocol, symptomatic status, baseline K&L grade, and the technique of how the alpha angle was measured. It appeared that the bimodal distribution of the alpha angle was independent on these variables. Interestingly, this means that the proposed threshold values—which are based on the bimodal distribution—are in fact quite stable and can be used irrespective of gender, symptomatic status, or radiographic protocol (weight bearing vs supine).

In conclusion, cam deformities on AP pelvic radiographs have previously shown to be highly associated with development of hip osteoarthritis and we therefore aimed to determine threshold values to define the presence of a cam deformity and a pathological cam deformity. We think that a uniform definition of ‘what is a cam deformity’ allows a better comparison between studies and is a valuable contribution to especially epidemiological cohort studies, in which predominantly AP pelvic radiographs are available to date.

Author contributions
All authors were involved in the manuscript drafting, revising, and final approval of the submitted version.

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References


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