Superior detection of scaphoid fractures with High Resolution peripheral Quantitative Computed Tomography compared to conventional CT

Daniels A.M.1,2 Wyers C.E.2,3,4 Sassen S.5 Van Rietbergen B.6 Geusens P.P.M.M.5,7 Kaarsemaker S.8 Hannemann P.F.W.9 Poeze M.2,9 Janzing H.M.J.1 Van den Bergh J.P.2,3,4

Background
The scaphoid is the most common fractured carpal bone. It has a unique anatomy and position and thereby serves a key role in wrist functionality. Adequate diagnosis of scaphoid fractures is of great importance to prevent complications such as non-union and early osteoarthritis.

However, no consensus is reached on the best modality for scaphoid fracture diagnosis as result of varying diagnostic performance results.

We hypothesized that the use of HR-pQCT in patients with a clinically suspected scaphoid fracture would increase scaphoid fracture detection in clinical setting compared to conventional CT.

Initiating a new imaging technique at first requires an analysis of precision; we therefore aimed to determine the interobserver agreement of HR-pQCT for scaphoid fracture diagnosis.

Methods
Prospective study 12.2017 – 10.2018
Ninety-one patients, aged ≥ 18 years, with a clinically suspected scaphoid fracture at the ED of VieCuri MC

Conventional radiographs at presentation at the ED
Clinical assessment at presentation and after 10 days

CT and HR-pQCT 10 days after presentation at the ED
CT assessment by two independent observers
HR-pQCT assessment by 1 radiologist and 31 randomly selected scans by four independent observers

Study population
Total N=91
♀ N=46
♂ N=45
Median age 52 yrs [IQR 29-67]
Median age 62 yrs
Median age 37 yrs

Results
Fleiss kappa for HR-pQCT scaphoid fracture assessment by four independent observers was 0.91 (95% CI 0.76-1.00, p<0.001) representing almost perfect agreement.

Conclusions
Scaphoid fracture detection with HR-pQCT is reliable (κ=0.91) and superior compared to CT.

37.5% of scaphoid fractures detected on HR-pQCT were not detected on CT.