Stadtspital Zürich

Cortical Thickness Index and Calcar Canal Ratio: A comparison of proximal femoral fractures and non-fractured femora of octa- and nonagenerians

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Introduction

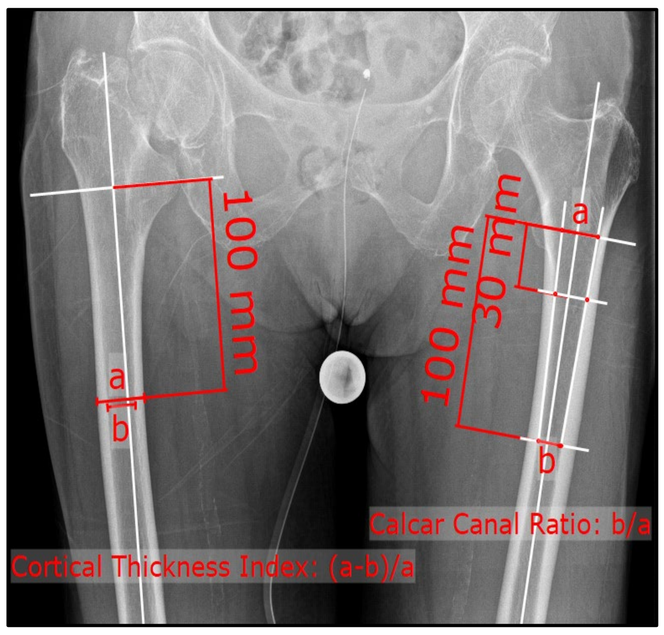
The cortical thickness index (CTI) is a measure of bone quality and correlates with the risk for proximal femoral fractures[1]. The purpose of the study is to investigate the CTI in femoral neck-, trochanteric fractures and none fractured proximal femora in geriatric patients.

Materials & Methods

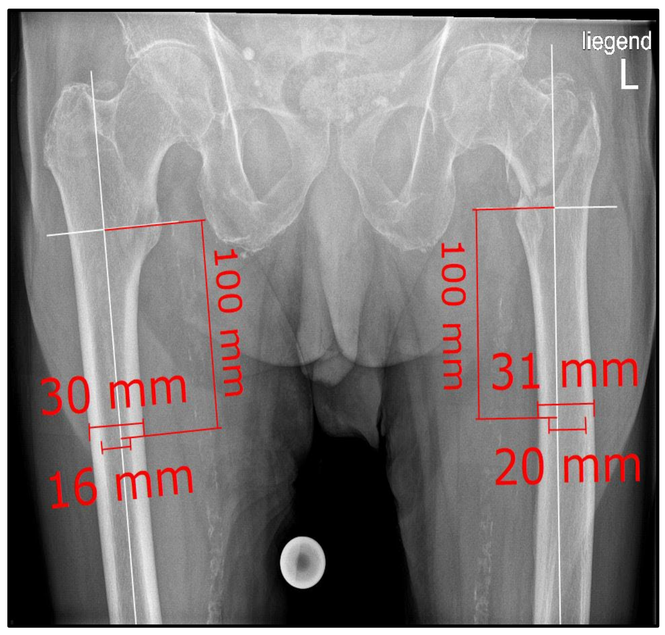
One-hundred-fifty patients (50 femoral neck-(FN), 50 trochanteric fractures (TF) and 50 without fracture (Nofx)) older than 80 years were identified. Hip radiographs (antero-posterior (ap), lateral) were evaluated. Radiographic measurement included the CTI and the Dorr's calcar to canal ratio (CCR)[2]. Measurements were assessed for inter-observer reliability (ICC), differences of each fracture and correlation of the parameters.

Results

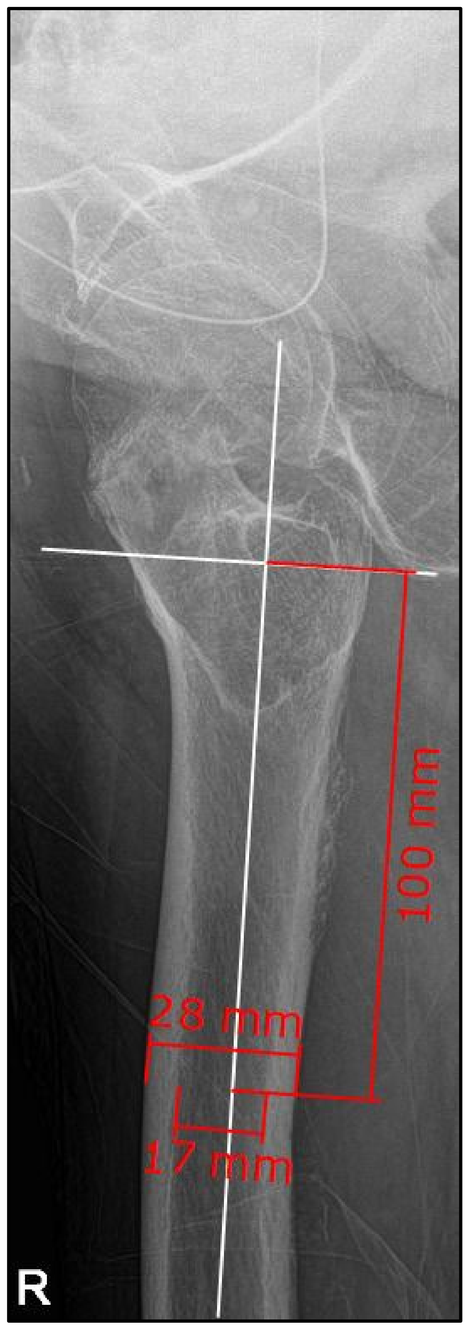
Among all patients (mean age 91 (range 80-104) years), mean ap CTI was 0.434, 0.453 and 0.545 for FN, TF and Nofx. There was a significant difference of the fracture groups, of the ap CTI and CCR ($p<0.001$) comparing the injured and healthy side. Significant differences between the injured side of FN and TF group when comparing to the Nofx group was seen ($p<0.05$). There was neither a difference in ap CTI between the two fracture groups ($p=0.327$) nor for CTI or CCR comparing both sides in the Nofx group (0.545 versus 0.548). The mean inter-observer reliability was excellent (ICC 0.88).



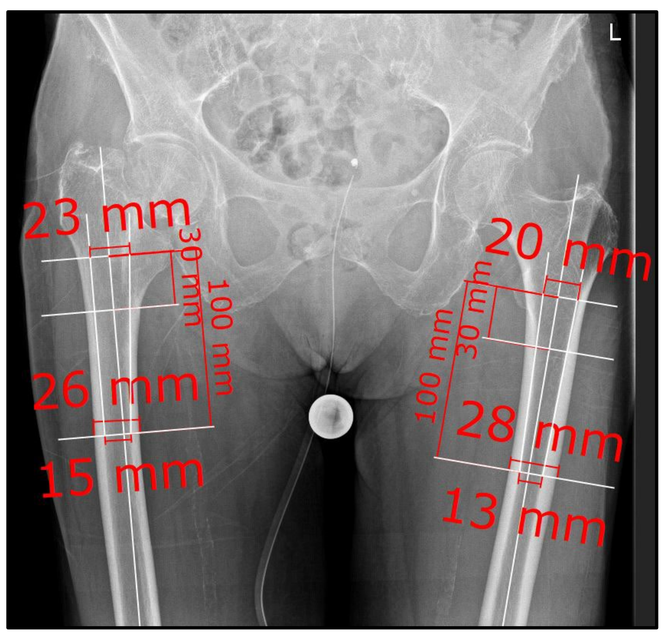
Measurement of antero-posterior CTI (right) and CCR (left).



Example of antero-posterior CTI in a trochanteric fracture.



Example of lateral CTI in a femoral neck fracture.



Example of antero-posterior CCR in a femoral neck fracture.

Conclusion

Radiographic measurement using the CTI and Dorr's CCR are reliable measurements with a good correlation in the geriatric patients. Both parameters are associated with increased fractures when compared to the healthy side. Therefore, even for very old patients, the CTI and CCR may help to predict fracture risk and consult patients in daily practice.

1 Sah AP et al. Correlation of plain radiographic indices of the hip with quantitative bone mineral density. Osteoporos Int. 2007 Aug;18(8):1119-26.
2 Dorr LD et al. Structural and cellular assessment of bone quality of proximal femur. Bone. 1993 May-Jun;14(3):231-42.
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