Bone microstructures of adult patients with post-surgical hypoparathyroidism and non-surgical hypoparathyroidism

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Background

Due to lack of parathyroid hormone (PTH), bone metabolic profiles such as turnover rates and fracture risks are altered for patients with hypoparathyroidism (hypoPT). Risk for fractures differ among patients with hypoPT due to different etiologies, including post-surgical hypoPT (ps-hypoPT) and non-surgical hypoPT (ns-hypoPT); therefore, bone structures are supposed to be different for these patients with distinct etiologies. Evidence is lacking to support such hypothesis. The current study aimed to analyze bone microstructure of patients with hypoPT of different etiologies using high-resolution peripheral quantitative computed tomography (HR-pQCT).

Methods

Adult patients with hypoPT were recruited from a major tertiary hospital in Beijing, China between Jan, 2016 to Dec, 2017. All participants received HR-pQCT scan and biochemical assessment. Demographic information and use of hypoPT-related medications were also noted. Healthy controls were chosen from previously measured data bank of HR-pQCT, matching for gender and age±3 years.

Results

A total of 110 patients with hypoPT were recruited, including 16 patients with ps-hypoPT and 94 patients with ns-hypoPT. Mean age of ps-hypoPT patients was 57.0±9.1 years old and 94% were female, whereas ns-hypoPT patients were younger (36.2±12.5 years old) and female only accounted for 55%. There were significant increase in trabecular thickness and number for patients with hypoPT regardless of gender and diagnosis, compared to healthy control; whereas increase in vBMD were only prominent for female patients with ns-hypoPT(**Figure 1**).

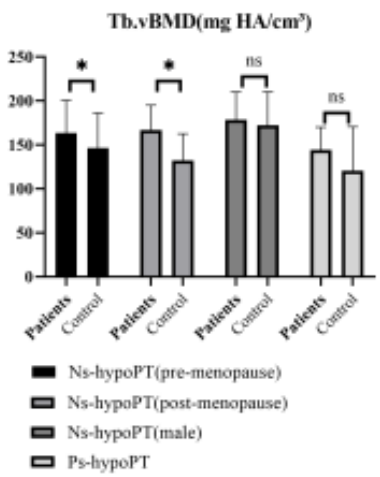

Figure 1. Trabecular vBMD of the tibia between patients (stratified by gender, etiology for hypoPT) and control.

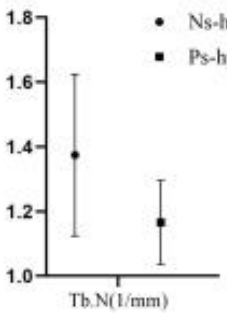

Figure 2. Trabecular number between post-menopausal female patients with ns-hypoPT and ps-hypoPT.

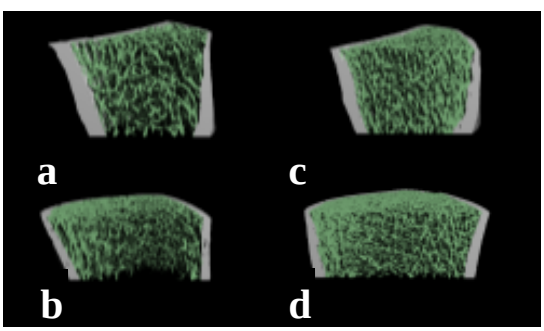

Figure 3. Example of 3D reconstruction of bone microstructures (a,c radius; b,d tibia) from one post-menopausal female patients with ps-hypoPT (a,b F/58) and one post-menopausal female patient with ns-hypoPT (c,d F/52)

After controlling for gender, diagnosis and menstrual status, patients with ns-hypoPT had significantly higher vBMD (316.797±45.62 vs 254.925±57.15mg HA/cm^3) and trabecular number(1.374±0.25 vs 1.166±0.13mm) in the tibia, compared to patients with ps-hypoPT (**Figure 2&3**). While gender, age and BMI all influenced bone microstructures, influence of disease duration and treatment duration had on bone microstructures were inconsistent and mostly insignificant.

Conclusions

This study assessed bone microstructures of patients with hypoPT using non-invasive techniques. It provided data on bone microstructures from the largest patient cohort with ns-hypoPT so far. It is also the first study to reveal the significant differences in bone microstructures between patients with ps-hypoPT and ns-hypoPT, which provided disease-specific data on metabolic bone profiles for patients with hypoPT.

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