Vitamin D status and bone mass density in adolescents with Fontan circulation

Oslo University Hospital, Norway

Introduction: Although patients with a Fontan circulation are at risk of malnutrition and growth delay, the implications on vitamin D metabolism and bone health have barely been investigated.

Methods: We prospectively measured serum levels of 25-OH-vitamin D in a nationwide cohort of Fontan patients aged 16 to 18 years old. We also measured bone mass density by narrow fan-beam dual energy x-ray absorptiometry (DXA) scan. The DXA results were compared to age and gender matched reference data and expressed as Z-scores.

Results: Seventeen consecutive patients were recruited from our pre-transition national Fontan clinic. All 17 patients had vitamin D levels < 75.0 nmol/L, which has been suggested as a lower limit in patients with chronic illness. Thirteen patients (76%) had vitamin D insufficiency with levels <50.0 nmol/L, 9 (53%) patients had deficiency with values <37.5 nmol/L and two patients (12%) had severe vitamin D deficiency with non-measurable values <12.5 nmol/L. The DXA showed abnormally low z-scores of -1.7 ± 0.9 (mean ± SD) (p<0.001) for columna and -0.8 ± 1.1 (p=0.009) for total body measurement respectively. There was no correlation between DXA result and vitamin D level.

Conclusion: Adolescent Fontan patients have a high prevalence of vitamin D deficiency and low bone mass density, however, without these two being correlated. Whether the vitamin D deficiency is due to limitations in sun exposure and dietary intake of vitamin D, or if vitamin D deficiency and insufficient bone mass density are differently related to the Fontan circulation is unknown. Future studies should investigate pathogenesis of both vitamin D deficiency and low bone mass density, as well as determine fracture implications and identify interventions.

Figur 1. Vitamin D levels in nmol/L and bone mass density by Z-score for each of the patients.