Introduction: Obesity, which is currently surging to epidemic levels within the United States, has been linked to hyperostotic conditions like DISH and OPLL. Excess adipose tissue and insulin-resistance may cause a systemic increase in serum levels of pro-inflammatory cytokines and these signals can affect bone metabolism. Spinal ligaments and discs may have receptors for these signaling molecules, and anecdotal observations at this institution suggested that there is a clinically important subset of patients with early obesity and multilevel stenosis in the presence of unusual calcifications of the spinal ligaments that is distinct from DISH. The purpose of this study is to determine if there is an association with truncal obesity and calcifications in the spine.

Methods: 214 adult subjects aged 29-50 years were included in the study using a comprehensive, prospective trauma database at our Level 1 trauma center. CT scans of the cervical, thoracic, and lumbar spine were examined for calcification in the region of the Anterior Longitudinal Ligament and Annulus (ALLA), Posterior Longitudinal Ligament and Annulus  (PLLA), and the Ligamentum Flavum (LF). Calcification of the ALLA, PLLA, and LF were assigned a score at each level and then combined for a Total Calcification Score (TCS) for the entire spine. The Truncal Adipose Volume (TAV)—a quantitative measure of the total amount of adipose tissue present from T10 to the coccyx—was also obtained from 3D-CT reconstructions of the abdomen using a previously validated protocol that correlates with body mass index. Univariate and multivariate logistic regression analysis were utilized to correlate the presence of calcification in the spinal ligaments with the level of obesity determined by TAV.

Results: ALLA calcification was significantly associated with increasing age, male gender, higher obesity and the presence of Type 2 diabetes. PLLA calcification was significantly associated with age and HTN, and LF calcification was associated with only obesity. TCS was significantly associated with increasing age and higher obesity.

Conclusion: These findings support the evolving evidence that adipose tissue is intimately involved in the control of bone metabolism in general and hyperostotic conditions of the spine in particular. Calcification of the ligamentum flavum was associated only with obesity in this series, which suggests that normal age related degenerative changes are not as important in the calcification of the ligamentum flavum as are factors related to obesity. Further research is warranted to explore the clinical significance of these findings with reference to early development of spinal stenosis and/or premature stiffening of the spine that may occur in the obese population.