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THE QUALITY OF BONE TISSUE AS A RISK FACTOR FOR VERTEBRAL COMPRESSION FRACTURES IN CHILDREN

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Objective. Juvenile osteoporosis is considered as one of the causes of vertebral compression fracture in children. Spinal fractures in children are serious and prognostically unfavorable musculoskeletal injuries. The objective was to investigate parameters of bone mineral density (BMD) in children with vertebral compression fractures.

Methods. We performed dual energy X-ray absorptiometry using osteodensitometer HOLOGIC (QDR, Discovery-A, USA) to examine 166 children and adolescents of both genders aged 6 to 16 years having compression fractures of one or more vertebrae. These children also underwent plain radiography and computer tomography. Osteodensitometry results were assessed

based on Z score.

Results. The injury occurred due a backfall from the own height in 53.1% of children; sliding down snow slope and a fall out from the tree or the swing in 18.2% ; fall on the buttocks in 18.4%; and due an undetermined cause in 10.3%. Traumatic vertebral compression was more frequent in the middle thoracic spine (48.6%) and in the lower thoracic spine (32.1%), versus 9.1% and 8.9% frequencies in the upper thoracic and thoracolumbar spine, respectively. Localizations of compression fractures in cervical and lumbar spine were singular – 1.3%. Decrease in bone mineral density at all skeletal regions expressed as Z-score £–2.0 SD and more was reported in 73 children (43.9%). BMD changes were 1.8-fold more often observed in boys than in girls (28.3% and 15.7%, respectively). Our study identified a prevalence of children aged 6 to 9 years among those having vertebral compression fractures (50.6%), and some less incidence in patients aged 10 to 12 years and 13 to 14 years (27.7% and 21.7%, respectively). It was found that vertebral compressive fractures, regardless of BMD deficit amount, were more frequent in the middle and lower thoracic spine (80.7%). The high incidence fractures in patients with normal BMD (24.7%) or systemic osteopenia (44%) testifies that bone mass deficit (mineralization) is not a single cause for bone strength decrease in pediatric osteoporosis, and that a fracture risk depends on qualitative and structural disorders in bone tissue occurring in the process of it’s remodeling. Among children with normal BMD compression fractures were 2.7-fold more frequent in girls than in boys (18.0% and 6.6%, respectively). With advancing age the number of children with vertebral compression fractures associated with different-grade systemic osteopenia and osteoporosis gradually increases.

Conclusion. Mineral density of the skeleton in critical periods of the growth in children reflects bone mass and size to a grater degree than bone quality. The absence of close correlation between vertebral compression fractures and BMD decrease in children and adolescents is not most likely depending on disorder in bone tissue mineralization but on that in formation of organic component of the bone matrix. This is eventually accompanied by bone density accumulation and by low peak bone mass at the appropriate age.