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Age-dependent factors in the occurrence of pathological fractures in myelomeningocele

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Statement of the Problem: Pathological fractures (PF) are common in patients with myelomeningocele; however, no standardized and effective preventive measure has been proposed. The aim of our study was to characterize patterns of PF occurrence and to identify risk factors and causal relationships to derive successful prevention strategies.

Methodology & Theoretical Orientation: We performed a retrospective cross-sectional study based on medical records of 210 patients with myelomeningoceles who were treated at the Center for Chronically Sick Children at the Charite University Medicine Berlin, Germany, between 1976 and 2016. Using a standardized data collection sheet, we extracted demographic data, fracture events and potentially relevant comorbidities, such as scoliosis, hip dysplasia, hip dislocation.

Findings: 28 out of 210 patients (13.3 %) suffered a total 55 pathological fractures. The average age was 6.8 years, with frequency peaks between 1 and 5 years and between 10 and 12 years ($p=0.013$). The age at fracture correlated with the fracture site. All fractures were located in the lower limbs and, 84% in the femur in the first five years. We observed an increased incidence of tibia and foot fractures later in life. 33% of cases had experienced an immobilising event in the previous three months, mainly orthopedic surgery or treatment for a fracture. High lesion level ($p=0.002$), as well as hip dislocation and scoliosis (both $p<0.0001$) are a risk factor for PFs. Nevertheless, femur fractures occurred in children under 6 years of age regardless of their lesion level. Based on our results, we can distinguish two main groups of patients: (1) Children with a first PF before the age of 6 years. These children developed multiple fractures within the following 1-5 years. Such early fracture series, though, were self-limiting within a few years. (2) Children with a first PF after the age of 6 years often had fewer fractures, but these also occurred in adolescence ($p=0.001$).

Conclusion & Significance: We identified a bimodal frequency distribution of PFs in childhood, showing that preschool and prepubescent age represents two vulnerable phases. We link early-onset PF occurrence with the risk of multiple fractures arises in a short time period but the chance of self-limitation of fracture series later in life. On the basis of these findings, future physiotherapeutic and/or pharmaceutical concepts need to be developed in an age-adapted setting, taking into account the potentially self-limiting nature of fracture series.

Biography

Joanna Schneider is working at the Center for Chronically Ill Children at Charité University, Department Neuropediatrics as a physician. Her research interests include neuromuscular diseases and neural tube defects. She is a participant of the Clinician Scientist Program of Berlin Institute of Health and a member of the Muscle Center Berlin and the German Neuropediatrics Society.