



## **The relationship between hip displacement, scoliosis and pelvic obliquity in 106 nonambulatory children with cerebral palsy: A longitudinal retrospective population-based study**

Terje Terjesen<sup>1</sup>, Svend Vinje<sup>2</sup> and Thomas Kibsgård<sup>2</sup>

<sup>1</sup>Section of Children's Orthopaedics and Reconstructive Surgery

<sup>2</sup>Section of Spinal Surgery, Division of Orthopaedic Surgery, Oslo University Hospital, Rikshospitalet and Institute of Clinical Medicine, University of Oslo, Oslo, Norway

### **Background**

The relationship between hip displacement (HD), pelvic obliquity (PO), and scoliosis in nonambulatory children with cerebral palsy (CP) has not been clearly elucidated. The aims of this population-based study were to examine the prevalence and temporal sequence of these deformities in nonambulatory children with CP and to evaluate how probable it is that severe unilateral HD contributes to development of scoliosis.

### **Methods**

This longitudinal study comprised 106 nonambulatory children, enrolled in a surveillance program. Pelvic radiographs for measurements of migration percentage (MP) and PO were taken once a year from the diagnosis of HD. Spine radiographs were taken in patients with clinically detected scoliosis. Radiographic follow-up continued until skeletal maturity.

### **Results**

Clinically significant scoliosis (Cobb angle  $\geq 40^\circ$ ) occurred in 60 patients at a mean age of 11.8 years. 65 patients developed clinically significant HD (MP  $\geq 40\%$ ) at

a mean age of 4.8 years. 24 patients had no significant hip or spine deformities, 22 had HD only, 17 had scoliosis only, and 43 had both deformities. HD was diagnosed before scoliosis

in all except 1 of the patients with both deformities. 14 of 19 patients with severe unilateral HD (MP  $\geq$  60%) had scoliosis convexity to the opposite side of the displaced hip.

### Conclusion

The combination of scoliosis and HD was frequent, and HD was diagnosed first in almost all the patients. HD might be a contributory cause of scoliosis in patients with severe, unilateral HD, PO, and later scoliosis with convexity to the opposite side.

### Disclosures

The authors have no conflicts of interest

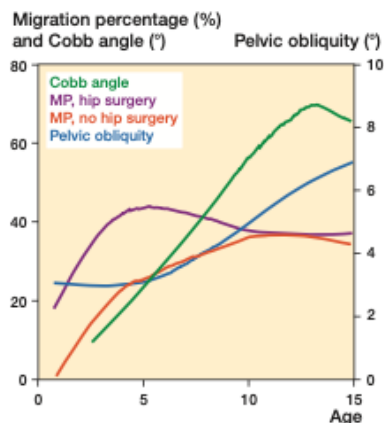


Figure 1. Local linear smooth plots (lowess) showing the development of migration percentage, pelvic obliquity, and Cobb angle in all the patients from age 1 to 15 years. The plots were based on 690 pelvic radiographs (MP and PO) and 211 spine radiographs (Cobb angle).