

## **Abstract 11364: Radiographic Analysis of the Pediatric Hip in Hereditary Multiple Exostoses**

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**a. Background:** In Hereditary Multiple Exostoses (HME), osteochondromas affect the hip in a high percentage of cases. Although they are often asymptomatic, they can produce abnormal mechanical forces, which may lead to osseous deformities, compromising the normal development of the joint. However, the development of osteochondromas pattern and the evolution of hip deformities are still not clear. Therefore, there is currently no consensus about the proper treatment of these patients.

**b. Questions/Purposes:** 1- What is the pattern of osteochondromas around the hip in HME and how does this change with time? 2- What is the evolution of hip measurements in children with HME?

**c. Patients and Methods:** Radiographs (AP pelvis) children with HME, between 2003 and 2014, were retrospectively reviewed. Only patients who were skeletally immature at the first visit were included. One radiograph per patient per year was reviewed. Radiographs were examined for the presence of osteochondromas and their locations. Additionally, different parameters were evaluated: Femoral neck-shaft angle, Reimer's migration percentage (MP), Sharp acetabular angle, Wiberg's angle, femoral head-neck ratio (coronal plane) and Shenton's line. All measured radiographs were divided into three age groups:  $\leq 8$  years,  $>8$  and  $<13$  years and  $\geq 13$  years. Development of the measured parameters with age could then be evaluated. Radiographs of children with a minimum two year follow up were also reviewed and any change of osteochondromas' presence over time was recorded. Children with unilateral or bilateral hip subluxation were identified and any relationship with osteochondromas locations was then recorded.

**d. Results:** A total of 51 children (102 hips) with HME were identified. Osteochondromas were found in the medial femoral neck in 65% of hips, in lateral femoral neck in 55%, ischium (50%), pubis (27%), acetabulum (16%) and femoral head (6%). In all locations, there was an overall increase of the occurrence of osteochondromas in the older age groups. However, in the medial femoral neck, a significantly less numbers of osteochondromas were found after 13 years of age ( $p=0.018$ ). Thirty six children had a minimum follow up of 2 years (mean age at first visit 8.5 years and mean age at last visit 13.1 years). In these children, an increased occurrence of lesions was found in medial femoral neck and ischium ( $p<0.05$ ) between the first and the last visits.

There was a decrease in MP with age ( $p<0.05$ ). There was also an increase in Sharp and Wiberg's angles in the older patients ( $p<0.05$ ). Hips with broken Shenton's line decreased in number with age ( $p 0.028$ ) (Please see attached table).

Hip subluxation was encountered in 63 hips. Ninety percent had a unilateral subluxation. No specific location of osteochondromas was found to have a relationship with subluxation.

Limitations of this study are the retrospective nature, the small number of patients with adequate follow up and the use of only plain radiographs for osteochondromas detection.

**e. Conclusions:**

In children with HME, radiographic hip parameters showed a trend to improve with age, mainly after 13 years of age; therefore, surgical treatment should be proposed cautiously and should primarily target symptomatic deformities in older patients.

Table: Comparison of hip measurements between age groups. Independent t-test was used to compare each two groups. Level of significance was set as 0.05.

Measure	Mean			Comparison between age groups (p value)		
	≤8 years	>8-<13 years	≥ 13 years	≤8 yrs vs. >8-<13 yrs	≤8 yrs vs. ≥ 13 yrs	>8-<13 yrs vs. ≥ 13 yrs
Femoral neck-shaft angle	148°	146°	145°	0.028*	<0.001*	0.112
Reimer's migration percentage	25 %	24 %	20 %	0.724	<0.001*	<0.001*
Sharp acetabular angle	48°	48°	43°	0.377	<0.001*	<0.001*
Wiberg's angle	16°	17°	24°	0.118	<0.001*	<0.001*
Femoral head-neck ratio	1.09	1.21	1.14	0.224	0.017*	0.517
Shenton's line broken N (%)	49 (48 %)	44 (43 %)	34 (28 %)	0.482	0.021*	0.021*

\*: p value <0.05 indicating a significant difference.