Ultrasound as a clinical instrument for physiotherapists to study hip positioning: a pilot study

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Background

Hip positioning represents an important topic in the treatment of children with cerebral palsy (CP) and related pathologies. Femoral head coverage is routinely measured by X-ray but can also be assessed by ultrasound (US)[1]. US has been shown to be reliable for describing hip joint position in neurotypical children and adolescents[2] and for diagnosing decentred hips in children with CP[3] through the lateral head distance (LHD) measurement. LHD is defined in millimetres as the part of the femoral head not covered by the bony acetabulum[3]. Moreover, it is known that hip abduction increases hip coverage[4]. Considering the spread of US as a clinical instrument for physiotherapists, we could hypothesise to use it in our clinical setting to study hip positioning for clinical purposes, describing the femoral head position in relation to the acetabulum. To our knowledge, no studies have addressed to confirm or refute that US LHD measurements change between two hip joint positions.

Objective

Verify if LHD values decrease when the hip is in abduction compared to the neutral position.

Methods

In 15 neurotypical children and adolescents (age 4-16 years), US was used to measure LHD in 30 hips in the supine neutral position, in two different hip joint positions: neutral position (HP0) and 20° abduction (HAbd20). A manual goniometer was used to position the subjects' hips.

All images (4 per subject) were collected, and LHD measures were calculated by the same physiotherapist. LHD was calculated on a longitudinal lateral scan as the distance in millimetres between the lateral tangent of the femoral head and the lateral acetabular rim[2].

Statistical analysis was performed to compare LHD values in the two positions. A $p < 0.05$ was set as significant.

Results

The mean value of LHD was -0,22 mm (SD 1,99) and -3,22 mm (SD 1,70) in HP0 and HAbd20 positions, respectively. A LHD value ≤ 0 indicates the complete coverage of the femoral head. Due to the distribution of the study variables, a paired t-test was performed. We found a statistically significant difference between the two LHD measurements ($p < 0,0001$).

Conclusion

Results confirm that LHD measure discriminates femoral head position within the acetabulum, describing a more centred hip as the LHD values decrease. US could be used by physiotherapists

during clinical practice, in real-time, to study hip positioning, for example, in CP. Further research is warranted to confirm the results.

References

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