

Relationship Between Crossover Sign and Acetabular Coverage in Dysplastic Hip

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Summary:

In patients with borderline DDH ($15^\circ < \text{center-edge angle} < 25^\circ$), positive COS does not indicate excessive anterior acetabular coverage but indicates posterior deficiency. Therefore, arthroscopic bone resection of anterior acetabular rim in the positive COS patients with borderline DDH does not improve the pincer type FAI, but just impairs the acetabular coverage for femoral head.

Abstract:

INTRODUCTION

Crossover sign (COS), which is the radiographic feature of pincer type femoroacetabular impingement (FAI), is also observed in some patients with developmental dysplasia of the hip (DDH). Positive COS may indicate anterior acetabular over-coverage and/or posterior deficiency. It is unclear how crossover sign relate to three-dimensional acetabular coverage for femoral head in DDH patients. Therefore, arthroscopic bone resection of anterior acetabular rim in the positive COS patients with borderline DDH is especially controversial.

OBJECTIVES

The relationship between COS and acetabular coverage in DDH patients was investigated.

METHODS

We reviewed plain radiographs of 145 dysplastic hips (center-edge (CE) angle $< 25^\circ$) from 90 patients with no osteoarthritic changes. According to the extent of CE angle, we divided these hip joints into two groups (DDH: CE angle $< 15^\circ$ and borderline DDH: $15^\circ < \text{CE angle} < 25^\circ$). In order to evaluate COS appropriately, the cases with pelvic rotation over three degrees were excluded using Tannast's method. After this rotational evaluation, 71 hips of 41 patients (3 male and 38 female, average age: 37 years old) were finally analyzed. ACX software calculating acetabular coverage by the geometrical method was used. This software created the cranio-caudal projection images established from a plain antero-posterior pelvic radiograph. The regional area of acetabular coverage (total, anterior 1/2 (A1/2), posterior 1/2 (P1/2), antero-lateral (AL) and postero-lateral (PL)) in the cranio-caudal projection images were measured. We compared the regional acetabular coverage rate between positive and negative COS in two groups.

RESULTS

In DDH group, the average rate of acetabular coverage were total 56%, A1/2 50%, P1/2 63%, AL 10% and PL 26% in positive COS hips, and total 55%, A1/2 45%, P1/2 65%, AL 8% and PL 32% in negative COS hips, respectively. There were no significant differences of regional acetabular coverage rate between positive and negative COS hips. In borderline DDH group, the average acetabular coverage rate were total 68%, A1/2 61%, P1/2 74%, AL 26% and PL 48% in positive COS hips, and total 69%, A1/2 60%, P1/2 79%, AL 26% and PL 58% in negative COS hips, respectively. The average P1/2 and PL in positive COS hips were significantly smaller than those of negative COS hips ($p < 0.05$). Except P1/2 and PL, the average rates of the acetabular coverage in other areas were not significantly different

ISAKOS

**International Society of Arthroscopy, Knee Surgery and
Orthopaedic Sports Medicine**

10th Biennial ISAKOS Congress • June 7-11, 2015 • Lyon, France

Paper #153

between positive and negative COS hips.

CONCLUSION

In patients with borderline DDH, positive COS does not indicate excessive anterior acetabular coverage but indicates posterior deficiency. Therefore, bone resection of anterior acetabular rim in the positive COS patients with borderline DDH does not improve the pincer type FAI, but just impairs the acetabular coverage for femoral head.