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"The Cliff Sign" – A New Radiographic Sign of Hip Instability

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Summary:
A radiographic finding, the Cliff Sign, where there is a steep drop off of the lateral femoral head-neck junction, is associated with the intraoperative diagnosis of hip instability

Abstract:
Introduction: Hip instability is increasingly recognized as a cause of non-arthritic hip pain. There have been no reports of radiographic features suggesting hip laxity in the non-dysplastic hip. We have noted a steep drop-off of the lateral edge of the femoral head-neck junction in some instability patients . The purpose of this study was to determine the relationship of this radiographic finding, the Cliff Sign, with intraoperative hip laxity.

Materials & Methods: 115 consecutive patients who underwent hip arthroscopy by the senior author were studied. Exclusion criteria were prior hip surgery, LCP disease, fractures, PVNS, or synovial chondromatosis. A total of 96 patients (mean age 33 years; range 14-62) were included. On an AP pelvis XR, a perfect circle around the femoral head (FH) was created using PACS software. If the lateral FH did not completely fill the perfect circle, then it was considered a positive Cliff Sign. The steep drop-off was termed the "Cliff" and the space in the perfect circle that was not filled by the FH was termed the "Empty Space." In patients who had a Cliff Sign, 5 measurements were calculated to provide an objective measure of the drop off: 1) The Cliff Angle, 2) The Reverse Alpha Angle, 3) The Cliff / Femoral Neck Cobb Angle, 4) The Cliff / Femoral Shaft Cobb Angle, and 5) The ratio of the length of the Cliff to the FH diameter. Instability was defined by intraoperative: 1) Amount of traction required to distract the hip, 2) Lack of hip reduction after traction release, or 3) Intraoperative findings of hip laxity. A capsular plication was performed in all patients (n=44) with intraoperative laxity. Continuous variables were analyzed using unpaired t-tests and discrete variables were analyzed using chi-square and Fisher's exact tests.

Results: In the group of patients with instability, 89% (39 of 44) had a Cliff Sign compared to 27% (14 of 52) of non-instability patients with a Cliff Sign ($p<0.0001$). Only 5 of 43 patients (7%) without a Cliff Sign were diagnosed with instability compared to 89% with a Cliff Sign ($p<0.0001$). In women aged <32 years with a cliff sign, 100% (20 of 20) of patients were diagnosed with instability ($p<0.05$). 10 of the 11 patients with a Cliff Angle > 450 had instability. 14 of the 16 patients with a Cliff / Femoral Neck Cobb Angle > 500 had instability. All 9 patients who had both a Cliff Angle > 250 and a Cliff / Femoral Neck Cobb Angle > 500 were diagnosed with instability. In the group of patients who had a positive cliff sign, there were no differences between the mean values in any of the 5 measurements comparing patients with and without instability.

Discussion and Conclusion: A radiographic finding, the Cliff Sign, is associated with the intraoperative diagnosis of hip instability. 100% of young women with a cliff sign on preoperative radiographs had the intraoperative diagnosis of instability. The Cliff Sign may be useful in the preoperative diagnosis of hip instability.