“The Cliff Sign” – A New Radiographic Sign of Hip Instability

Jonathan Packer, UNITED STATES
Kota Shibata,
Geoffrey Riley, MD, UNITED STATES
Marc Raymond Safran, MD, UNITED STATES

Stanford University
Redwood City, California, UNITED STATES

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 without a Cliff Sign 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 Angle > 250 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.