

Variation in functional pelvic tilt in patients undergoing total hip arthroplasty with acetabular dysplasia

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Purpose

Dysplastic hips with acetabular under-coverage may be compensated by the patient's anterior pelvic tilt. It is important to clarify the link between acetabular dysplasia and pelvic tilt to optimize surgical planning and postoperative outcomes. We sought to investigate functional pelvic tilt in patients undergoing total hip arthroplasty with acetabular dysplasia.

Materials & Methods

From 2014 to 2020, pre-operative AP Pelvis X-rays, CT scans, and other patient-specific data such as pelvic tilt, lumbar lordotic angle, and etc were collected as part of surgical planning for total hip arthroplasty. The OPS Dynamic Hip Analysis protocol (Optimized Ortho, Sydney, Australia) was adhered to for imaging techniques. The OPS planning software is a commercially available medical device. Images were analyzed by qualified engineers (JP and BM) and inspected by a second engineer. From this database, we investigated 733 female patients under the age of 50 that had undergone preoperative functional standing AP pelvis X-rays. Hip dysplasia was defined as LCEA of less than 25°. Anterior pelvic tilt was defined as a positive standing pelvic tilt angle. Analysis was performed by investigating how many patients whose hips are unilaterally or bilaterally dysplastic displayed anterior pelvic tilt. Anterior pelvic tilt was defined in three different positions, sitting/supine/standing, to account for the range of motion of the pelvis. Correlation between the severity of the dysplasia and anterior pelvic tilt will also be investigated.

Results

In this database, data collection analysis has been completed for 678 of the 725 patients. Out of the 678 patients, 80.7% had unilateral or bilateral acetabular dysplasia. Within the total patient population, 70.7% displayed an anterior standing pelvic tilt, 89.2% displayed an anterior supine pelvic tilt, and 98.3% displayed seated anterior pelvic tilt. An observed 81.3% of the patients who have an anterior pelvic tilt have a unilaterally or a bilaterally dysplastic hip. Out of the anterior pelvic tilt group, 63.9% were bilaterally dysplastic hip patients.

Conclusions

The majority of the pre-operative patients displayed an anterior pelvic tilt in all 3 positions (standing, supine, seated). Unilaterally or bilaterally dysplastic patients were also more likely to display an anterior pelvic tilt. Within the dysplastic group, bilateral patients were more likely to display anterior pelvic tilt.