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Transverse Acetabular Ligament – A Guide Toacetabular Component Anteversion

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Abstract: *Positions of acetabular component generally are considered to be major causative factors of dislocation in total hip replacement.Accurate positioning is important to prevent wear and dislocation.In this study Transverse acetabular ligament is used as a reference in acetabular component positioning.In 50 patients undergoing total hip replacement, acetabular component positioning was done using transverse acetabular ligament as a guide.The anteversion of acetabular component was measured postoperatively with ct scan.The mean anteversion was 17.8 degrees this was within the safe zone as described by Lewinnek.Our study concludes the use of transverse acetabular ligament in acetabular component positioning.*
Keywords: *Transverse acetabular ligament,acetabular anteversion,total hip replacement*

I. Introduction

In total hip replacement (THR) malposition of the acetabular component may lead to dislocation, impingement, wear and revision. [1, 2] This aspect of THR has not been lessened by the use of minimally-invasive techniques [3, 4] Currently, many surgeons depend on precise positioning of the patient to orient the acetabular component. However, this method cannot always be relied on. Although computer- assisted surgery has the potential to improve accuracy, the early results have been disappointing, with controversy continuing to exist regarding the optimal orientation [5] This study presents the preliminary data on the technique which uses the transverse acetabular ligament to determine the anteversion of the acetabular component and to determine the effect of such positioning on the risk of dislocation

II. Aim

To Assess The Efficacy Of Transverse Acetabular Ligament As A Guide In Orientation Of Acetabular Component In Total Hip Replacement.

III. Materials and methods

A total number of 56 total hip replacements were performed between June 2010 and March 2012. All surgeries were done by senior consultants. Four patients were lost to follow up and 2 patients died during follow up period. The remaining 50 patients available for clinical and radiological review were studied

3.1Surgical exposure

In this approach the patient is placed in the true lateral position with the affected limb uppermost. We make a 10 to 15 cm curved incision on the posterior aspect of the greater trochanter. We incise the fascia lata and gluteus maximus. We internally rotate the hip to put external rotator muscles on a stretch and to pull the operative field away from the sciatic nerve. We detach the muscles close to their femoral insertion and reflect them backward. The posterior aspect of the hip joint capsule is now fully exposed. The hip joint capsule is incised with a longitudinal or T – shaped incision. We achieve dislocation of hip by internal rotation, flexion, and adduction. Now we remove the femoral head and neck and excellent exposure of the acetabulum is obtained.

3.2 Acetabular reaming and placement

We start reaming with size 43mm reamer. We ream in 2mm increments until we come close to final acetabular reaming. The final acetabular reamer should be parallel to TAL Fig (1, 2).The transverse acetabular ligament should embrace the final acetabular reamer and thereby, the acetabular component Fig (3) As the ligament cannot define the inclination of the component, this may be assessed with the residual labrum. By orientating the reamer, and hence the acetabular component, flush with the residual labrum inclination can be controlled

3.3 Method to calculate anteversion of acetabular component by CT.

Acetabular anteversion, as measured on computerized tomographic scans, is the angle between the sagittal plane and a line drawn tangential to the anterior and posterior acetabular margins Fig (5, 6, 7). Anterior pelvic tilt reduces acetabular anteversion whereas a posterior pelvic tilt [an upright pelvic position] increases it.

Position

A neutral position of the pelvis is obtained by having the patient lie prone, with the anterior tips of the iliac crests and the symphysis pubis resting evenly on the table. A support placed beneath the ankles keeps the feet parallel to each other. A line is drawn midway between the two halves of the pelvis; this is the best method for defining the sagittal plane when the scan cuts the hemipelves at different levels or when the pelvis is not perfectly horizontal. On each side, a parallel line is drawn in the sagittal plane, beginning at the posterior margin of the acetabulum. The angle of acetabular anteversion is measured between the line corresponding to the sagittal plane and a line drawn tangential to the anterior and posterior acetabular margins. At this level, the femoral head is in full and congruent contact with the anterior surface of the acetabulum.

IV. Results

The visibility of transverse acetabular ligament is based on Arachbolt criteria 45 cases grade 1, three cases of grade 2, two cases had grade 3. The anteversion of the operated hip ranged between 5.79 deg to 30.02 deg with a mean of 17.88 deg. Our study showed that the mean anteversion of TAL was within the safe zone described by Lewinnek.

V. Discussion

Total hip replacement is one of the common surgical procedure among orthopaedic surgeries.One of the complication after total hip replacement is dislocation.Acetabular component malpositioning is an important cause of dislocation, increased wear and impingment [1] Recent studies support the use of transverse acetabular ligament in determining the anteversion of the acetabular component[2,3,4].

Transverse acetabular ligament forms a bridge across inferior acetabular notch and continues along the outer edge of acetabulam .The function of transverse acetabular ligament is not clearly understood [5, 6, 7, 8]. Inoue et al studied the variations in tal anatomy intraoperatively using CT flouronavigation system ,and concluded the tal anteversion is between 6.80 and 30.84 degrees which is within the safe zone as described by Lewinnek.A Viste [6] in cadaveric study concluded that TAL anteversion was outside the safe zone , while labrum anteversion was within this safe-zone.In our study we positioned the cup using tal as a guide, the average cup inclination was 42 degrees and anteversion was17.88degrees which was within the Lewinnek safe zone

Biederman et al showed that true lateral and cross table lateral view are inaccurate in determining the anteversion of the acetabulam.In our study ct scans were used postoperatively to reduce the radiological errors of measurements due to position of the pelvis

Archbold et al 2006 in a series of 1000 cases identified tal in 99.7% of all the cases and dislocation rate of 0.6% however they showed the limitations of tal in severe hip dysplasia and pelvic trauma, however the acetabular component anteversion and inclination was not measured postoperatively. In our study tal was identified in all cases. Forty five cases grade 1, three cases grade 2, and two cases of ankylosing spondylitis had grade 3, The acetabular component position was measured postoperatively using ct scan..The acetabular component measurment nearly reproduced the native acetabular positions with the mean abduction angle of 42 degrees and anteversion of 17.8degrees this was within lewinnek safe zone we did not have any pelvic dysplasia or pelvic trauma in our study there was no dislocation at 1year of follow up.

Epstein *et al* [2011] compared anteversion and abduction angles using tal and freehand technique,he concluded that acetabular position was not improved using the TAL for referencing the acetabular component this was in contrast to our study as acetabular component positioning with tal as a guide was within safe zone and was nearly equal to native acetabulam

VI. Conclusion

Though the causes of dislocation are multifactorial acetabular component positioning is critical and tal acts as a guide in positioning the acetabular component . Our results demonstrate the importance of TAL in positioning the acetabular component in order to reduce dislocation.

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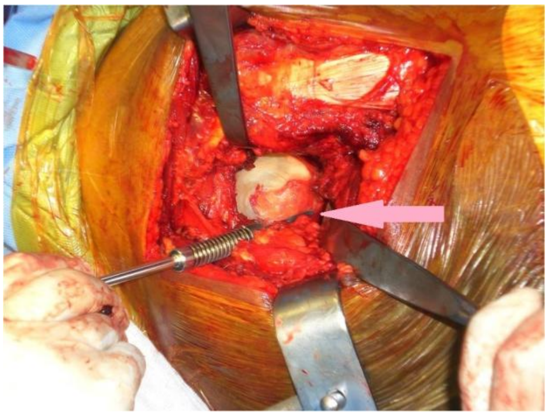

Fig (1) Locating the TAL

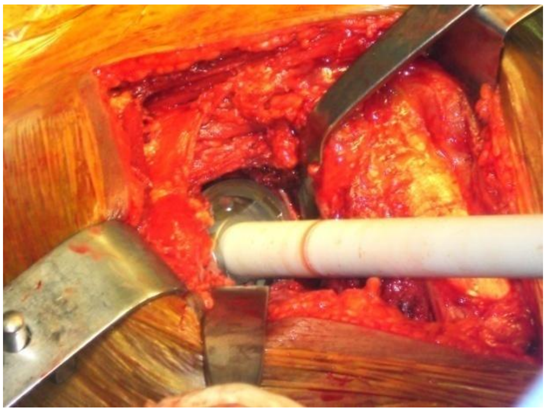

Fig (2) Reaming parallel to TAL

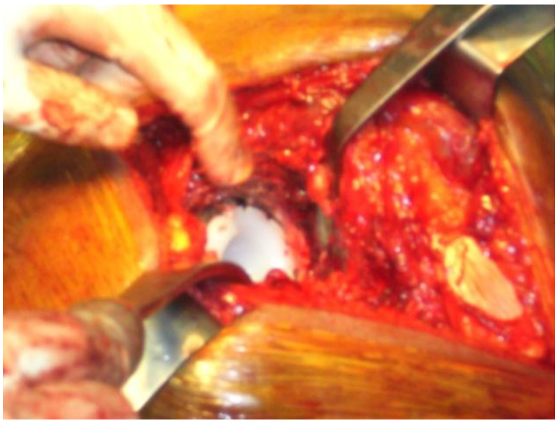

Fig (3) Cup positioned parallel to TAL

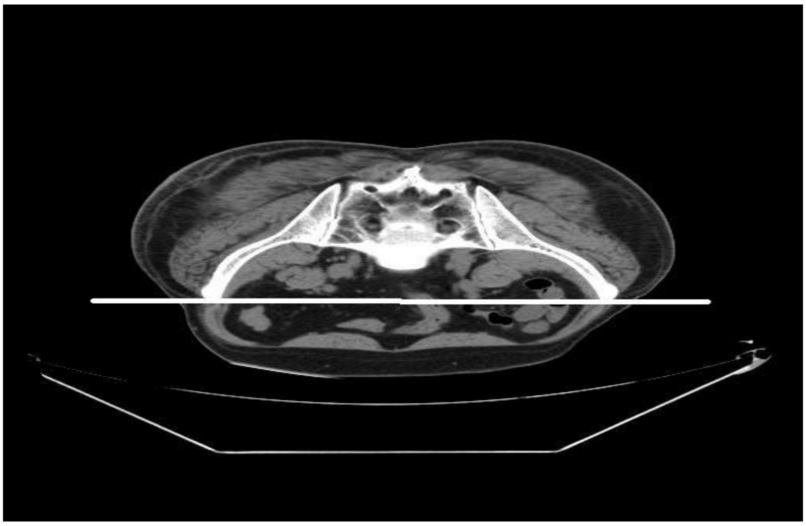

Fig (4) Line drawn between two axis corresponds to axial line

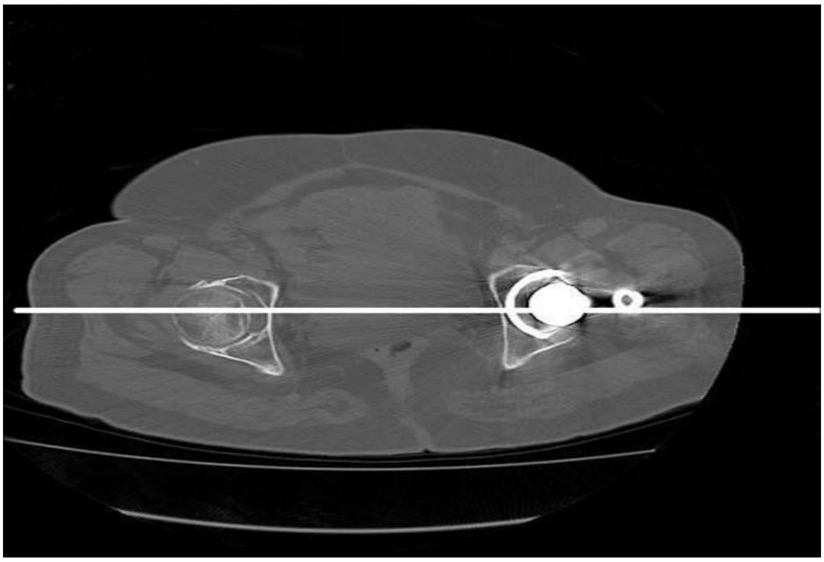

Fig (5) The line is transported to middle of cup corresponding to axial line

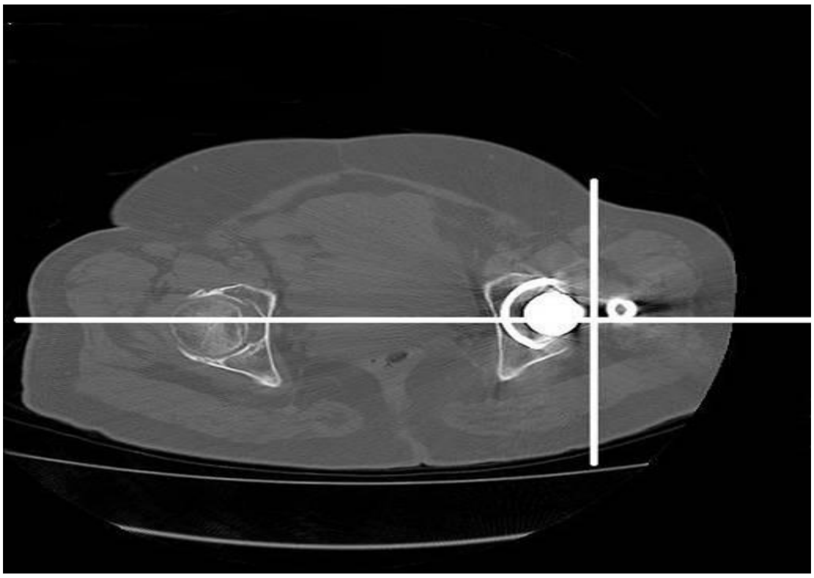

Fig (6) Perpendicular line which represents the saggital plane

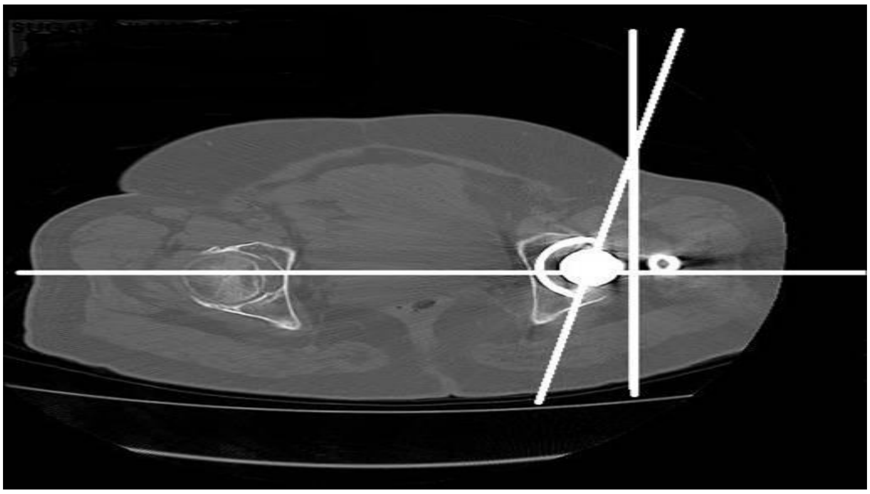

Fig (7) Line drawn tangential to anterior and posterior margins