Predetermination of Femoral Head Size: Comparison of Two Methods in Accurate Prediction

***Olasode Israel Akinmokun, FWACS, FMCOrtho, MD**; Suleiman O. Giwa*

Purpose: Preoperative templating is an important step in preparation for surgery. Predetermination of the femoral head size (FHS) is part of the preoperative planning for hemiarthroplasty. Estimation of FHS from plain pelvic radiographs is commonly done. However, accuracy of the measurement from the radiograph has been source of great concern. An equation, 'Femoral head = [16 + 0.7 * trochanteric length (cm)] ± 5 mm' was recently propounded to predict a range for FHS. This equation was derived from a study that analyzed the relationship of femoral head (FH) with other parts of femoral bone. The equation was studied in a cadaveric study. This study was conducted to compare the use of plain radiographs and the equation for preoperative determination of FHS.

Methods: This was a prospective descriptive study that spanned 14 months. The study involved estimation of FHS using both measurement from plain pelvic radiographs and the equation. The diameter of the FH retrieved at surgery was then compared with diameters obtained from the 2 methods. The 'trochanteric length' is the maximum distance from the tip of the greater trochanter to the most distal part of the lateral femoral condyle. Ethical approval and Informed consents were obtained.

Results: 44 hips were studied. The actual femoral head (AFH) size ranged from 39 mm to 56 mm with an average of 46.7 ± 3.9 mm. The average predicted FHS from the plain radiograph (PFHSrad) was 45.7 ± 8.00 mm while the average predicted FHS from the equation (PFHSeq) was 46.6 ± 3.3 mm. The Student t-test performed indicated no significant statistical mean difference for both methods when compared with the mean of AFH (P = 0.4753 and 0.8819 for PFHSrad and PFHSeq, respectively). The Pearson correlation coefficient was 0.3300 for AFH and PFHSrad and 0.6279 for AFH and PFHSeq. However, when the range ±5 mm was used, 42 (95.5%) of the AFH sizes fell with the range provided by the equation.

Conclusion: The PFHSeq obtained from the equation had better correlation with AFH than PFHSrad. The use of the equation has a predictive ability of 95% and it is superior to the use of plain pelvic radiographs as a tool for preoperative determination of femoral head size. It can be used where implants are not usually stocked.