Does posterior osteophyte of femoral condyle affect on gap balancing and limb alignment during computer assisted total knee arthroplasty? A preliminary study

SIRAMANAKUL C¹, SRIPHIROM P², WONGLERTSIRI S³, CHANOPAS B⁴, BOONRUKSA S⁵, UTHAICHARATRATSAME C³, SAHAJARUPAT S³, CHOMPOOSANG T¹

¹Department of Orthopaedics Surgery, Banphaeo Hospital (Prommitr Branch), Bangkok, Thailand
²Department of Orthopaedics Surgery, Rajavithi Hospital, Bangkok, Thailand
³Department of Orthopaedics Surgery, Nopparat Rajathanee Hospital, Bangkok, Thailand
⁴Department of Orthopaedics Surgery, Pattana Medical Center Clinic, Bangkok, Thailand
⁵Department of Orthopaedics Surgery, Phraphutthabat Hospital, Saraburi, Thailand

chaisira@hotmail.com

Background: The goal of navigated total knee arthroplasty (TKA) with gap balancing technique is to equalize extension and flexion gap and restoration of limb alignment. Gap planning before femoral bony resection in navigated TKA is critically concerned[1]. Osteophyte is one of the contributing factors to gap balancing in TKA. In operation, osteophyte is normally removed before gap planning; excepting for the posterior osteophyte of femoral condyle which will be removed along with resection of posterior femoral condyle during the flexion gap preparation. To date, there are a few studies on whether posterior
osteophyte has any effect on gap balancing and limb alignment during the operation[2]. Therefore, this study attempts to investigate on how osteophyte of posterior femoral condyle affects on gap balancing and limb alignment during the operation. Additionally, it also aims to examine whether the size of osteophyte affects on gap balancing or not, and how it has an effect.

Materials and Methods: This prospective study conducted on 25 varus osteoarthritis knees with posterior osteophyte of femoral condyle undergone TKA with navigation system (Orthopilot 4.4, B. Braun Aesculap Tuttlingen, Germany) All knees were performed CT scan for measuring the size of posterior osteophyte of femoral condyle according to its width (from the edge of femoral condyle to the outer edge of osteophyte). Extension gap, flexion gap width and limb alignment were measured by using tension device with distraction force of 98 N on both medial and lateral side under navigation[3]. The measuring of extension gap, flexion gap width and limb alignment was undertaken before and after posterior osteophyte of femoral condyle removal for determining differences comparative the analysis.

Results: This study reveals that mean of the size of posterior osteophyte of femoral condyle is 8.96 mm. The posterior osteophyte of femoral condyle has an effect on the increase of medial extension gap and lateral extension average 0.78 ± 0.73 mm; and 0.52 ± 0.74 mm. respectively (mean of the extension gap increase is 0.652 ± 0.61 mm.), also includes 0.87 ± 1.11 mm. in medial flexion gap and 1.09 ± 1.56 mm. in lateral flexion gap (mean of the flexion gap increase is 0.97 ± 1.66 mm.). After posterior osteophyte of femoral condyle removal the mean of varus deformity decreases 0.87° ± 1.25 º while the mean of extension angle of sagittal limb alignment increases 1.52°±1.80°. There is also a significant relationship between the size of posterior osteophyte of femoral condyle and the increase of lateral flexion gap. If the size of posterior osteophyte increases 10 mm. the lateral flexion gap will increase 0.86 mm. However, there is no significant relationship between the size of posterior osteophyte femoral condyle and the increase of extension gap and medial flexion gap found.

Conclusion: Posterior osteophyte femoral condyle removal has an effect on the increase of both extension and flexion gap. It is noted that the increase of flexion gap is greater than extension gap and the increasing size of posterior osteophyte femoral condyle directly affects on the increase of lateral flexion gap. In addition, posterior osteophyte femoral condyle removal is not only resulted in the decrease of varus deformity angle in terms of coronal limb alignment but also the increase of extension angle of sagittal alignment. The result of this study put a further concern that the computer assisted TKA for the osteoarthritis knee with posterior osteophyte of femoral condyle can increase the gaps to be greater than as in gap balancing plan.

References