

Paper #43

The Influence of Intraoperative Soft Tissue Balance on Patellar Pressure In Total Knee Arthroplasty

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Summary:

In the intraoperative assessment of patellar pressure and soft tissue balance in mobile-bearing posterior-stabilized total knee arthroplasty, lateral laxity at flexion showed reduced lateral patellar pressure, suggesting that femoro-tibial and patello-femoral joint are closely related with each other. In conclusion, appropriate lateral laxity may be important for appropriate patellar tracking.

Abstract:

BACKGROUND

Appropriate soft tissue balancing is well known to be essential for the success of total knee arthroplasty (TKA). Recent papers regarding soft tissue balance provides useful information regarding femoro-tibial joint [1-3]. However, the influence of intraoperative soft tissue balance on patellar tracking is unknown. Therefore, in the present study, the relationship between intraoperative soft tissue balance and medial/lateral patellar pressure was examined in mobile-bearing posterior-stabilized (PS) TKA.

METHODS

Thirty mobile-bearing PS TKAs (PFC Sigma RP-F; DePuy, Warsaw, Ind) were performed in patients with varus-type osteoarthritis using a computed tomography-based navigation system (Vector Vision; Brain Lab, Heimstetten, Germany). Standardized navigated TKA technique was performed with independent cut manner. During the surgery, appropriate medial release was done by step-by-step release; care was taken to avoid excessive release. Femoral component was placed with 3 or 5 degrees of external rotation to posterior condylar axis based on preoperative computed tomography. No cases needed lateral retinacular release. After the femoral trial prosthesis placement, knee balancer (40lbs) was fixed on the proximal tibia and the medial parapatellar arthrotomy was tightly repaired. Using the balancer, soft tissue balance including joint center gap (component gap) (mm) and varus ligament balance (varus angle) (°) were recorded at 0, 10, 30, 60, 90, 120, 135 degrees of flexion. Following the assessment of soft tissue balance, femoral, tibial trial prosthesis and appropriate insert were placed, and then medial/lateral patellar pressure was measured at each flexion angle. Patellar pressure was measured medially and laterally using two uniaxial ultrathin (100 µm) force transducers (FlexiForce; Nitta Corporation, Osaka, Japan) embedded between a backside of trial component of patella and an originally developed metal plate fixed to bony cut surface of the patella. Simple regression analysis was performed between each patellar pressure and each parameter of soft tissue balance.

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RESULTS

The intraoperative soft tissue balance throughout the range of motion including component gap and varus angle showed similar pattern to the previous report [1, 3]. Lateral patellar pressure showed significantly higher values compared to medial patellar pressure at 60, 90, and 135 degrees of flexion. Lateral patellar pressure showed inverse correlations to varus ligament balance (varus angle) at 60 and 90 degrees of flexion (60°: $R=-0.423$, $p=0.248$; 90°: $R=-0.404$, $p=0.0328$). Medial patellar pressure showed no significant correlation to each parameter.

DISCUSSION

Mobile-bearing PS TKA and medial pivot motion are reported to reduce patellar pressure by improving patellar tracking [4, 5]. In the present study, soft tissue balance was also found to influence the patellar pressure. Especially, lateral laxity at flexion showed reduced lateral patellar pressure, suggesting that femoro-tibial and patella-femoral joint are closely related with each other. In conclusion, appropriate lateral laxity may be important for appropriate patellar tracking.

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