Does the Severity of Pre-operative Radiographic Changes Affect the Outcome of Total Knee Arthroplasty?

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INTRODUCTION:
Radiographic joint space narrowing (JSN) and osteophytes are classic hallmarks of advanced knee osteoarthritis which often lead physicians to recommend Total Knee Arthroplasty (TKA) as a treatment option. However, few studies have reported how JSN and osteophytes affect the actual TKA procedure and subsequent outcome. Therefore, the purpose of this study was to investigate if the severity of JSN and osteophytes affect the TKA procedure and whether there is a relationship between these changes and clinical outcome.

METHODS:
Preoperative standing AP knee radiographs were collected from 138 consecutive osteoarthritis patients who underwent total knee arthroplasty between June 2007 and September 2008. JSN and osteophyte overall scores were graded by two observers on two occasions using the osteoarthritis research society international (OARSI) atlas which can separately evaluates joint space narrowing and osteophytes formation at the medial femoral, lateral femoral, medial tibial, and lateral femoral compartments. WOMAC and SF-12 data were prospectively collected preoperatively, at 1 year and 2 years postoperatively. Surgical time, estimate blood loss, height of tibia insert, and length of stay were evaluated as possible outcome parameters. Correlation analysis was used to find possible association and multiple regression analysis was performed to control for confounding factors. Additionally, to compare the difference in mean postoperative WOMAC and SF 12 scores, all patients were divided into three groups (mild, moderate, and severe) depending on osteophyte overall scores or JSN overall scores. Analysis of covariance was used to compare the mean of clinical outcome after arthroplasty between three groups, controlling the confounding variable including age, gender, BMI, comorbidity, preoperative WOMAC and preoperative SF-12 scores. P-values ≤ 0.05 were considered significant.

RESULTS:
The overall osteophyte score had a positive correlation with the height of the tibia insert (ρ=0.034, correlation coefficient (ρ) = 0.157, figure 1) and surgical time (ρ=0.038, ρ = 0.166). The overall score of JSN had a positive correlation with surgical time (ρ=0.015, ρ = 0.216). However, the severity of osteophytes and JSN did not show any correlation with WOMAC and SF-12 scores at minimum 1 year follow up (ρ >0.05). In comparing clinical outcome between groups, there were no significant differences of WOMAC score and SF 12 score after TKA between moderate grade OA group and severe grade OA group depending on osteophyte and JSN (figure 2). We only found that SF-12 physical and WOMAC pain scores of minimal osteophyte group had significantly lower than those of moderate osteophyte group and severe osteophyte group (figure2,3).

DISCUSSION:
There is no gold standard to define knee OA though the Kellgren and Lawrence (KL) classification is most frequently used in research. The KL classification combines a mixture of OA features into a single score and prejudgets based on the assumption that osteophytes precede JSN. However, accumulating evidence has shown that osteophyisis and JSN have distinct etiologic mechanisms and that their progression is neither constant nor proportion. Therefore, to overcome the problem, we used the OARSI system published by the OA Research Society International in 1995 followed by a revised version in 2007. To our knowledge, there has been only one paper which attempts to correlate preoperative radiographic degree of osteoarthritis and outcome using the KL classification. They reported that patients with severe radiographic changes of OA eventually experienced the same degree of function and pain relief after TKA as those with less severe radiographic OA. Our study also showed discordance between radiographic finding and outcome after TKA. Our study reported that the severity of osteophytes and JSN increased the height of the tibia insert and surgical time. These reasons would be due to the resection of osteophytes during the stage of ligamentous balancing and extensive surgical exposure against tightenting of ligament.

CONCLUSION:
The severity of osteophytes and JSN may increase the height of the tibia insert and surgical time. However, these factors did not affect TKA outcome at a minimum 1 year follow up.