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CLINICAL RESEARCH

Coexisting Lumbar Spondylosis in Patients Undergoing TKA: How Common and How Serious?

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Abstract

Background Information on the coexistence of lumbar spondylosis and its influence on overall levels of pain and function in patients with advanced knee osteoarthritis (OA) undergoing total knee arthroplasty (TKA) would be valuable for patient consultation and management.

Questions/purposes The purposes of this study were to document the prevalence and severity of coexisting lumbar spondylosis in patients with advanced knee OA undergoing TKA and to determine whether the coexisting lumbar spondylosis at the time of TKA adversely affects clinical scores in affected patients before and 2 years after TKA.

Methods Radiographic lumbar spine degeneration and lumbar spine symptoms including lower back pain, radiating pain at rest, and radiating pain with activity were assessed in 225 patients undergoing TKA. In addition, the WOMAC score and the SF-36 scores were evaluated before and 2 years after TKA. Potential associations of radiographic lumbar spine degeneration and lumbar spine symptom severities with pre- and postoperative WOMAC subscales and SF-36 scores were examined.

Results All 225 patients had radiographic degeneration of the lumbar spine, and the large majority (89% [200 of 225]) had either moderate or severe spondylosis (72% and 17%, respectively). A total of 114 patients (51%) had at least one moderate or severe lumbar spine symptom. No association was found between radiographic severity of lumbar spine degeneration and pre- and postoperative clinical scores. In terms of lumbar spine symptoms, more severe symptoms were likely to adversely affect the preoperative WOMAC and SF-36 physical component summary (PCS) scores, but most of these adverse effects improved by 2 years after TKA with the exception of the association between severe radiating pain during activity and a poorer postoperative SF-36 PCS score (regression coefficient = −5.41, p = 0.015).

Conclusions Radiographic lumbar spine degeneration and lumbar spine symptoms are common among patients with advanced knee OA undergoing TKA. Severe lumbar spine symptoms (visual analog scale score of ≥ 7) were likely to adversely affect the preoperative clinical scores of patients undergoing TKA; however, most of the adverse effects were not found 2 years after TKA. Nevertheless, because preexisting severe radiating pain during activity may be a source of a poorer outcome after TKA, careful

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Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.
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patient consultation regarding this potential poorer prognosis after TKA needs to be provided to the patient with this symptom.

Level of Evidence Level IV, therapeutic study. See Guidelines for Authors for a complete description of levels of evidence.

Introduction

Both lumbar spondylosis and knee osteoarthritis (OA) are common among older individuals [11, 16, 24]. Therefore, patients with advanced knee OA who are considering TKA often have symptoms of coexisting lumbar spondylosis such as lower back pain or radiating pain to the lower limbs [15, 23]. It is conceivable that the coexistence of lumbar spine symptoms would aggravate the overall symptoms and worsen function in patients with knee OA who undergo TKA. In addition, persistence of coexisting lumbar spine symptoms after TKA might adversely affect postoperative outcomes in terms of pain and function, even after successful TKA. However, little information is currently available on the prevalence and severity of the coexistence of lumbar spondylosis in patients with advanced OA of the knee who undergo TKA [12, 23]. Moreover, whether the coexistence of lumbar spondylosis adversely affects overall symptoms, function, or quality of life (QoL) in these patients before and after TKA has not been established [4, 12, 23].

In the present study, we aimed to document the prevalence and severity of coexisting lumbar spondylosis in terms of radiographic lumbar spine degeneration and lumbar spine symptoms in patients with advanced knee OA undergoing TKA. We then aimed to determine whether the coexisting lumbar spondylosis at the time of TKA adversely affects clinical scores (pre- and post-TKA assessment scores and pre- and postoperative QoL scores) in affected patients before and 2 years after TKA.

Patients and Methods

Study Subjects

For this retrospective study, we reviewed a prospectively collected database of 297 patients undergoing primary TKA between September 2008 and June 2009 at our hospital. Followup was at a minimum of 2 years after the TKA. In our practice, two lumbosacral spine radiographs (AP and lateral views) were taken preoperatively in all patients undergoing TKA because the radiographs would be helpful to check the feasibility of our routine anesthesia (spinal or epidural anesthesia). Additionally, we had expected that the lumbosacral radiographs might be helpful to provide patient consultation regarding a potential source of pain and disability other than his or her knee. Thus, we were able to evaluate all of the 297 patients for potential inclusion in this retrospective study. Our general indications for primary TKA were (1) end-stage knee disease in weightbearing radiographs of the knee; and (2) significant and disabling pain originating from the knee disease that was recalcitrant to conservative measures for more than 3 months. The general contraindications for primary TKA were (1) ongoing infection of the knee or presence of septicemia; (2) extensor mechanism dysfunction; (3) neuromuscular disease resulting in genu recurvatum; and (4) severe vascular disease. In addition, when a patient had radiographic end-stage knee disease but his or her major symptoms originated from another source such as lumbar spine disease, TKA was not performed. To fulfill the study purposes, 72 patients were excluded for the following reasons: (1) a diagnosis other than primary knee OA such as septic knee sequelae, rheumatoid arthritis, or neuropathic arthritis ($n = 12$); (2) another significant comorbidity such as a previous cardiovascular and/or cerebrovascular event, Parkinson's disease, or a major psychological problem ($n = 9$); (3) a positive finding during hip physical examination (Patrick test and impingement tests), a history of hip fracture or hip surgery, or Kellgren-Lawrence grade of > 2 radiographic hip OA ($n = 10$); (4) a history of spinal surgery ($n = 35$); and (5) lack of 2-year followup data ($n = 6$). This left 225 patients with primary knee OA undergoing primary TKA for this study. There were 15 (7%) males and 210 (93%) females with a mean age of 69 years (SD, 6.5) and mean body mass index of 26.8 kg/m^2 (SD, 3.5). All patients had severe radiographic OA (Kellgren-Lawrence grade 4) in the medial and/or lateral tibiofemoral joints and/or the patellofemoral joint. Of the 225 patients, 117 (52%) underwent unilateral TKA, whereas 108 (48%) underwent bilateral TKA. All study protocols were approved by the institutional review board of our hospital.

Evaluation of Lumbar Spine Radiographs

Radiographic evaluation of the lumbar spine was carried out using two lumbosacral spine radiographs (AP and lateral views) of all study patients, which were taken approximately 2 weeks before the index TKA. All radiographic images were taken on 14 × 17-inch cassettes and covered at least from the T10 vertebra to the upper half of the sacrum. Radiographs were digitally acquired using a picture archiving and communication system (PACS), and assessments were performed on a 24-inch (61-cm) LCD monitor (T245; Samsung, Seoul, Korea) in portrait mode using PACS software (Impax; Agfa, Antwerp, Belgium) by a spine specialist (KWP).

The radiographic degree of lumbar spine degeneration (from L1 to S1) was analyzed using a validated radiographic grading system devised by Wilke et al. [29]. Briefly, this grading system is based on assessments of height loss of the disc space, osteophyte formation, and diffuse sclerosis. Each variable was graded on lateral and AP radiographs, and then the grade of degeneration was assigned using a 4-point scale as follows: 0 (no degeneration), 1 (mild degeneration), 2 (moderate degeneration), and 3 (severe degeneration).

To determine intra- and interobserver reliabilities of the radiographic assessments of the lumbar spine, a spine specialist (KWP) and a musculoskeletal radiologist (J-YC) performed two radiographic assessments in each of 50 randomly selected patients with 4-week intervals between evaluations. The intra- and interobserver reliabilities for the grading of lumbar spine degeneration were evaluated using kappa statistics [22]. All kappa coefficients of intra- and interobserver reliabilities for the grading of lumbar spine degeneration were > 0.84 (range, 0.84–0.96), indicating satisfactory agreement. Thus, measurements taken by a single investigator (KWP) were used in the analyses.

Assessment of the Symptoms of Lumbar Spondylosis

For this study, symptoms of lumbar spondylosis in all patients undergoing TKA during the study period were evaluated using a premade evaluation form designed by a spine specialist (KWP) approximately 2 weeks before the index TKA. This form included self-administered questionnaires regarding patients' lower back pain, radiating pain at rest, and radiating pain during activity during the previous 4 weeks. Radiating pain at rest was defined when a patient reported pain that started from the buttock or inguinal area and spread to the knee, ankle, or foot or started from the thigh and spread to the ankle or foot during rest (sitting, lying down, etc). Radiating pain during activity was defined when a patient reported aforementioned pain during walking, working in the kitchen, etc. Levels of pain were rated using a visual analog scale (VAS), where 0 represented no pain and 10 represented the worst imaginable pain. Based on the VAS scores, lumbar spine symptoms were graded as no/mild pain (VAS 0–3), moderate pain (VAS 4–6), or severe pain (VAS 7–10) [18, 30].

Evaluations of Clinical Scores for Pre- and Post-TKA Assessment and Quality-of-life Scores

In all patients, the clinical pre- and post-TKA assessment scores and pre- and postoperative QoL scores were evaluated using the pain and function subscales of the WOMAC [3] and the physical component summary (PCS) and mental component summary (MCS) scores of the SF-36 [28], respectively. All pre- and postoperative evaluations were carried out at the outpatient department of our hospital by a single independent investigator (YGK). For this study, the WOMAC subscales and the SF-36 scores were evaluated approximately 2 weeks before and 2 years after the index TKA. We separately measured the WOMAC scores for each knee in patients undergoing bilateral TKA. In such cases, the preoperative WOMAC subscales for the knee of the first operation during the enrollment period and the postoperative WOMAC subscales for the same knee were used. Because the WOMAC pain and function subscales have different maximum scores (20 points and 68 points, respectively) with a best-to-worst scale, the original WOMAC scores were converted to percentage scores on a worst-to-best scale using the formula as follows: converted score = 100 – (actual raw score × 100/maximum score).

Statistical Analysis

All statistical analyses were carried out using SPSS for Windows (Version 17.0; SPSS, Chicago, IL, USA), and p values < 0.05 were considered significant throughout.

A priori power analysis was performed to calculate an adequate sample size based on the results of our previous studies and preliminary results. It was estimated that the proportion of subjects with severe symptoms from coexisting spine disease would be approximately 25%. In addition, we aimed to detect a 4-point difference in WOMAC function scores between patients with and without severe lumbar spine symptoms [2]. In this case, we found that we needed 215 patients if we set type I error at 0.05 and power at 0.8. This result verified the adequacy of the sample size for this study.

The overall prevalence of lumbar spine degeneration among subjects and the proportions of each grade of degeneration were computed and documented. In addition, VAS scores for lower back pain, radiating pain at rest, and radiating pain during activity were summarized as means and SDs. Then the proportion of patients with each degree of each symptom was computed.

The association between radiographic severity of lumbar spine degeneration and pre- and postoperative WOMAC subscales and SF-36 scores was examined using multiple linear regression analyses with the enter method. In this analysis, the mean grades of degeneration from L1 to S1 on radiographs were used, and potential confounders including sex, age, body mass index, and unilateral versus bilateral TKA were entered.

To elucidate the associations between severity of lumbar spine symptoms and pre- and postoperative WOMAC subscales and SF-36 scores, we examined the effects of moderate and severe lumbar spine symptoms on the pre- and postoperative WOMAC and SF-36 scores using mild lumbar spine symptoms as a reference. For this, crude and adjusted regression models were used. First, crude linear regression models were used to assess the individual effects of modifiers (degrees of lumbar spine symptoms) and potential confounders (sex, age, body mass index, and unilateral versus bilateral TKA) on outcome scores (pre- and postoperative WOMAC and SF-36 scores). Then multiple adjusted linear regression models were used to determine the effects of lumbar spine symptoms on the pre- and postoperative WOMAC subscales and SF-36 scores while controlling for confounders. Variables were included in the analyses as confounders when they were associated with WOMAC and SF-36 subscales ($p \leq 0.1$) and showed a change in the regression coefficient of at least ± 10% when they were included individually in the regression models. The results of the regression analysis are presented as regression coefficients (β coefficients) and their 95% confidence intervals. In these analyses, β coefficients represent the effect of moderate or severe lumbar spine symptoms on changes in the WOMAC and SF-36 scores with respect to mild lumbar spine symptoms.

Results

Radiographic lumbar spine degeneration was found in all study subjects without exception, and a considerable proportion of patients had coexisting moderate to severe lumbar spine symptoms at the time of TKA (Table 1). In the evaluation of the radiographic lumbar spine degeneration, mild degeneration was found in 25 patients (11%), moderate degeneration in 161 (72%), and severe degeneration in 39 (17%). The mean VAS scores for lumbar spine symptoms including lower back pain, radiating pain at rest, and radiating pain during activity were 3.1, 1.9, and 3.0 points, respectively. Based on our definition of lumbar spine symptom grades, 114 patients (51%) had at least one moderate or severe lumbar spine symptom, most commonly lower back pain (identified as moderate or severe by 40% of patients, 91 of 225) or radiating pain during activity (identified as moderate or severe by 39%, 86 of 225).

Radiographic severity of lumbar spine degeneration was not associated with diminished pre- and postoperative WOMAC and SF-36 scores (Table 2), whereas more severe lumbar spine symptoms were likely to adversely affect the preoperative WOMAC and SF-36 PCS scores. However, most of these adverse effects were not found 2 years after TKA. Compared with the patients who had mild lower back pain, those with severe lower back pain (but not those with moderate lower back pain) had significantly poorer WOMAC pain and function scores before TKA. However, the grade of lower back pain was not associated with any scores evaluated 2 years after TKA (Table 3). In terms of radiating pain at rest, patients with severe symptom grades had poorer WOMAC pain and function scores, and those with moderate symptom grades

Table 1. Summary of each grade of radiographic lumbar spine degeneration, visual analog scale (VAS) scores, and each grade of lumbar spine symptoms in 225 patients

Parameter	Result
Radiographic lumbar spine degeneration	
None	0
Mild degeneration	25 (11%)
Moderate degeneration	161 (72%)
Severe degeneration	39 (17%)
Lumbar spine symptoms	
Lower back pain*	3.1 ± 2.7
No/mild pain (VAS 0–3)	134 (60%)
Moderate pain (VAS 4–6)	63 (28%)
Severe pain (VAS 7–10)	28 (12%)
Radiating pain at rest*	3.1 ± 2.4
No/mild pain (VAS 0–3)	176 (78%)
Moderate pain (VAS 4–6)	34 (15%)
Severe pain (VAS 7–10)	15 (7%)
Radiating pain during activity*	3.0 ± 2.9
No/mild pain (VAS 0–3)	139 (62%)
Moderate pain (VAS 4–6)	48 (21%)
Severe pain (VAS 7–10)	38 (17%)

* Data are presented as mean VAS scores ± SDs. Other data are presented as numbers of patients with proportions in parentheses.

Table 2. Results of regression analyses to assess the association between radiographic severity of lumbar spine degeneration and pre- and postoperative WOMAC and SF-36 scores

Parameter	β coefficient	p value
WOMAC pain score		
Pre-TKA	0.077	0.277
2 years post-TKA	−0.028	0.713
WOMAC function score		
Pre-TKA	−0.017	0.804
2 years post-TKA	0.010	0.912
SF-36 PCS score		
Pre-TKA	−0.001	0.993
2 years post-TKA	−0.045	0.508
SF-36 MCS score		
Pre-TKA	0.117	0.103
2 years post-TKA	0.092	0.167

PCS = physical component summary; MCS = mental component summary.

Table 3. Results of adjusted linear regression models to assess the association between grade of lower back pain and pre- and postoperative WOMAC and SF-36 scores

Low back pain grade	WOMAC pain*		WOMAC function*		SF-36 PCS		SF-36 MCS	
	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA
Mild (VAS 0–3)	–	–	–	–	–	–	–	–
Moderate (VAS 4–6)†	−5.24 (−12.95 to 2.46)	4.11 (−2.42 to 10.63)	−5.64 (−12.24 to 1.07)	0.84 (−5.78 to 7.46)	−1.33 (−3.75 to 1.08)	−1.80 (−5.14 to 1.53)	3.08 (−0.66 to 6.83)	2.88 (−1.26 to 7.01)
Severe (VAS 7–10)†	**−11.66 (−21.50 to −1.82)**	2.41 (−6.80 to 11.62)	**−17.8 (−26.36 to −9.24)**	0.57 (−8.75 to 9.90)	−1.61 (−4.74 to 1.52)	−2.51 (−7.44 to 2.42)	−2.48 (−7.33 to 2.37)	−1.40 (−7.50 to 4.71)

Data are presented as adjusted regression coefficient with 95% confidence intervals in parentheses. Regression coefficients and 95% confidence intervals with statistical significance ($p < 0.05$) are in bold; * the original WOMAC scores were converted to percentage scores on a worst-to-best scale; †all values are in reference to mild (VAS 0–3) scores; PCS = physical component summary; MCS = mental component summary; VAS = visual analog scale.

only had significantly poorer WOMAC function scores before TKA. However, as for lower back pain, the grade of radiating pain at rest was not associated with any scores evaluated 2 years after TKA (Table 4). A severe grade of radiating pain during activity was associated with poorer WOMAC pain and function scores and a poorer SF-36 PCS score before TKA. In addition, a moderate symptom grade was associated with a poorer WOMAC function score before TKA. However, 2 years after TKA, only a severe grade of radiating pain during activity was associated with a reduced SF-36 PCS score (Table 5).

Discussion

TKA is a highly successful procedure for treating patients with advanced OA of the knee [1, 5, 6, 9, 13]. Nevertheless, because most patients with advanced OA of the knee undergoing TKA are older than 60 years (92%, 208 of 225 patients in the current series), symptoms resulting from coexisting lumbar spondylosis frequently present in addition to knee symptoms in these patients [21, 23]. Thus, information on the coexistence of lumbar spondylosis in patients with advanced knee OA who undergo TKA would be valuable for patient consultation and management. To address this issue, we investigated the prevalence of lumbar spondylosis in patients with advanced knee OA undergoing TKA and its effects on clinical knee OA and TKA assessment scores and QoL scores before and 2 years after TKA.

The present study has several limitations that warrant consideration. First, this study included only patients undergoing TKA who were selected on the basis of our surgical indications, ie, patients with radiographic advanced knee OA and with disabling symptoms originating in the knee. Thus, our findings should not be generalized to patients with radiographic advanced knee OA and lumbar spondylosis together with the major symptoms originating from the lumbar spine. Second, we did not use an evaluation form that is more specialized for lumbar spine symptoms such as the revised Oswestry disability index [10]. However, although such a form would be better to assess the spine symptoms per se, scores for several items of the form can be significantly affected by severe knee disability in the patients warranting TKA [10]. Thus, we believe that our current evaluation form for spine symptoms would be a simple but more appropriate way to detect spine symptoms in our patients. Third, the female preponderance (93% [210 of 225 patients]) in our study cohort should be noted. Although several studies have demonstrated that women are more prone to develop advanced and symptomatic OA of the knee [8, 11, 26], for some unclear reason, this female preponderance is

Table 4. Results of adjusted linear regression models to assess the association between grade of radiating pain at rest and pre- and postoperative WOMAC and SF-36 scores

Radiating pain at rest	WOMAC pain*		WOMAC function*		SF-36 PCS		SF-36 MCS	
	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA
Mild (VAS 0–3)	–	–	–	–	–	–	–	–
Moderate (VAS 4–6)†	−1.07 (−10.19 to 8.05)	−1.00 (−7.79 to 7.59)	**−11.84 (−19.88 to −3.80)**	−3.36 (−11.08 to 4.37)	−1.43 (−4.32 to 1.45)	−3.28 (−7.15 to 0.59)	1.72 (−2.80 to 6.24)	0.44 (−4.42 to 5.31)
Severe (VAS 7–10)†	**−12.98 (−25.88 to −0.08)**	−4.27 (−17.32 to 8.78)	**−11.74 (−23.06 to −0.41)**	0.34 (−12.76 to 13.43)	−3.41 (−7.50 to 0.68)	−3.77 (−10.83 to 3.29)	−3.42 (−9.83 to 3.00)	1.92 (−6.96 to 10.80)

Data are presented as adjusted regression coefficients with 95% confidence intervals in parentheses. Regression coefficients and 95% confidence intervals with statistical significance ($p < 0.05$) are in bold; * the original WOMAC scores were converted to percentage scores on a worst-to-best scale; †all values are in reference to mild (VAS 0–3) scores; PCS = physical component summary; MCS = mental component summary; VAS = visual analog scale.

Table 5. Results of adjusted linear regression models to assess the association between grade of radiating pain with activity and pre- and postoperative WOMAC and SF-36 scores

Radiating pain with activity	WOMAC pain*		WOMAC function*		SF-36 PCS		SF-36 MCS	
	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA	Pre-TKA	2 years post-TKA
Mild (VAS 0–3)	–	–	–	–	–	–	–	–
Moderate (VAS 4–6)†	−2.23 (−10.38 to 5.92)	−4.19 (−11.18 to 2.79)	**−8.39 (−15.57 to −1.20)**	−4.67 (−11.68 to 2.35)	−2.10 (−4.74 to 0.46)	−2.83 (−5.86 to 1.09)	−1.63 (−5.67 to 2.41)	−0.14 (−4.56 to 4.27)
Severe (VAS 7–10)†	**−9.69 (−18.56 to −0.81)**	−4.65 (−13.33 to 4.04)	**−13.61 (−21.24 to −5.99)**	−5.42 (−14.14 to 3.30)	**−3.12 (−5.58 to −0.37)**	**−5.41 (−9.77 to −1.05)**	−1.94 (−6.35 to 2.46)	−0.58 (−4.49 to 3.90)

Data are presented as adjusted regression coefficients with 95% confidence intervals in parentheses. Regression coefficients and 95% confidence intervals with statistical significance ($p < 0.05$) are in bold; * the original WOMAC scores were converted to percentage scores on a worst-to-best scale; †all values are in reference to mild (VAS 0–3) scores; PCS = physical component summary; MCS = mental component summary; VAS = visual analog scale.

especially strong among Korean patients [7, 20]. Because symptom perceptions and surgical treatments may differ between men and women with lumbar spondylosis and OA of the knee [19], our findings may not be applicable to male patients. Fourth, we did not look into additional management options for coexisting lumbar spine symptoms in our patients and the resultant changes in their lumbar spine symptoms after TKA. Although we should manage the coexisting lumbar spine symptoms in our patients by additional medication and/or patient consultation with relevant specialists, it would be difficult to determine all information about management such as self-medication and management at other hospitals for the coexisting lumbar spine symptoms during the 2 years after TKA. Thus, we were not sure to what degree cotreatments were used for the spinal symptoms in our cohort. In addition, although lumbar spine symptoms can be changed at the time of postoperative WOMAC and SF-36 score evaluation, the effect of lumbar spine symptoms detected at the time of TKA on postoperative outcomes after TKA would be more helpful and practical information for knee surgeons. Regarding the value of management methods for coexisting lumbar spine symptoms in patients undergoing TKA, further studies that involve strict control and evaluation of spine management methods should be conducted. Finally, we did not use other imaging modalities such as CT or MRI during our evaluations. CT and/or MRI of the lumbar spine may provide better information about the lumbar spine condition, but their cost-effectiveness and practical value for screening purposes in patients undergoing TKA are questionable.

Regarding the prevalence of lumbar spondylosis in terms of radiographic findings and related symptoms, all patients in this study had radiographic lumbar spine degeneration, and half of the patients had at least one moderate or severe lumbar spine symptom. These findings imply that a knee surgeon would need to add assessment of lumbar spine conditions, particularly that of symptoms from the lumbar spine, to overall preoperative assessments for his or her TKA candidates. Nevertheless, the absence of an association between the radiographic grades of lumbar spine degeneration and pre- and postoperative WOMAC and SF-36 scores suggests that routine preoperative radiographic assessment of the lumbar spine condition would not be helpful for predicting the effect of lumbar spondylosis on patients' preoperative overall symptoms and function or on their clinical outcomes after TKA. In fact, this finding is not surprising when considering that lumbar spine symptom severity is not well correlated with radiographically assessed lumbar spondylosis severity [16, 17].

Our most important finding was that more severe coexisting lumbar spine symptoms were associated with poorer subscale scores in several domains of the WOMAC and SF-36 before TKA, but 2 years after TKA, only a severe grade of radiating pain during activity and a poorer SF-36 PCS score were associated. It is conceivable that severe lumbar spine symptoms detected before TKA adversely affect preoperative WOMAC and SF-36 scores because symptoms of lumbar spondylosis such as lower back pain reportedly aggravate those with advanced knee OA [27]. Moreover, both symptoms can cause similar difficulties in some identical activities such as long-distance walking. Interestingly, however, most of the adverse effects of the preexisting lumbar spine symptoms on the preoperative clinical scores were neutralized 2 years after TKA. The reason for these findings is unclear. A possible explanation is that improved knee function and gait pattern after TKA may improve lumbar spine symptoms, particularly lower back pain [14]. Another possible explanation is that drugs for pain management after TKA may be helpful for improving lumbar spine symptoms [25] or that the precise evaluation of the lumbar spine symptoms in our patients may have increased both doctor and patient awareness of the symptoms, which might have led to more active management of the spine symptoms after TKA. These speculations should be confirmed by future studies. In terms of lumbar spine symptoms, our findings suggest that coexisting lumbar spine symptoms at the time of TKA can be improved and would not have a persistent adverse effect on TKA outcomes as long as the lumbar spine symptoms are not the major symptoms of the patients. Nevertheless, severe radiating pain during activity may adversely affect clinical outcomes even 2 years after TKA. Thus, knee surgeons need to pay more attention to detecting this symptom in patients undergoing TKA and counsel the patient with this symptom before TKA that such a coexisting symptom originating from the lumbar spine may be a source of a relatively poorer outcome even after successful TKA.

In conclusion, lumbar spine degeneration and lumbar spine symptoms are common among patients with advanced knee OA undergoing TKA. Severe lumbar spine symptoms (VAS score of ≥ 7) were likely to adversely affect the preoperative clinical scores of patients undergoing TKA; however, most of the adverse effects were not found 2 years after TKA. Nevertheless, because preexisting severe radiating pain during activity may be a source of a poorer outcome after TKA, careful patient consultation regarding this potential poorer prognosis after TKA needs to be provided to the patient with this symptom.

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