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Comparison of simultaneous bilateral with unilateral total knee arthroplasty

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Objective: The aim of this study was to compare simultaneous bilateral total knee arthroplasty (BTKA) and unilateral total knee arthroplasty (UTKA) in terms of morbidity, clinical and radiological findings and quality of life.

Methods: The study included 48 simultaneous BTKAs (46 females, 2 males; mean age: 64.00±8.31 years) and 53 UTKAs (46 females, 7 males; mean age: 64.40±7.45 years) performed between November 2007 and June 2012. Groups were compared with respect to comorbidity, complications, blood transfusion, hospital stay, clinical and radiological (American Knee Society Score) findings and quality of life (SF-36).

Results: Three patients in the BTKA group and 1 in the UTKA group required intensive care admission due to pulmonary embolism; 2 cases occurred within the first postoperative 30 days. One BTKA patient died in the early postoperative period and 1 patient from the BTKA and 1 from the UTKA group died within 1 year. Hospital stay, perioperative blood transfusion parameters and mortality rates were significantly different in favor of UTKA and revision operation rates in favor of BTKA ($p<0.05$). All patients had improved knee and function scores and SF-36 scores. However, there was no significant difference between the groups ($p>0.05$).

Conclusion: Simultaneous BTKA should be considered in selected patients under 70 years of age with good compliance and no comorbid disease.

Key words: Complication; simultaneous bilateral; total knee arthroplasty; unilateral.

Arthrosis can develop in the knee joint due to primary osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, hemophilic arthropathy, tuberculosis arthritis, septic arthritis and posttraumatic arthritis. Quality of life decreases due to excessive degenerative changes, pain, and limited motion in the knee joint. Knee arthrosis is managed by conservative and surgical management. Surgical methods include debridement, synovectomy, osteotomy and arthroplasty.[1, 2]

Most patients with arthritic knee have bilateral involvement and surgery is generally needed in both knees. Simultaneous unilateral total knee arthroplasty (UTKA) or bilateral total knee arthroplasty (BTKA) can be performed based on the side and degree of involvement and the presence of comorbidities.[1,2] As the majority of patients with gonarthrosis have bilateral involvement, BTKA has been reported to be more beneficial than two-stage surgery due to advantages including

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shorter duration of hospital stay, anesthesia time, physical therapy, and postoperative pain, as well as lower total costs.[3,4] However, increases in early postoperative mortality and perioperative and postoperative cardiac complication rates have also been reported.[5,6]

The aim of this study was to compare patients who underwent simultaneous BTKA and UTKA in terms of comorbidity, complication rates, blood transfusion, hospital stay, clinical and radiological signs and quality of life.

Patients and methods

Patients who underwent surgery with a diagnosis of primary osteoarthritis between November 2007 and June 2012 at the Department of Orthopedics and Traumatology of Faculty of Medicine at Erciyes University, regularly attended follow-up and gave informed consent were included in the study. The BTKA group consisted of 96 knees of 48 patients (46 females, 2 males; mean age: 64.00±8.31 years, range: 48 to 85 years). The 53 knees of 53 patients (46 females, 7 males; mean age: 64.40±7.45 years, range: 43 to 78 years) in the UTKA group were selected using a simple computerized random sampling method from patients who underwent UTKA for bilateral gonarthrosis. All patients had indication of BTKA.

Patients were given a follow-up number by computer software under which the following data were recorded: name, surname, age, sex, file number, body mass index (BMI), date of surgery, operated side operated, preoperative disorders, amount of bleeding, transfusions, length of hospital stay and neurological, cardiovascular, pulmonary and gastrointestinal complications within 30 days. Patients with comorbid diseases were referred to relevant departments.

All patients were given anti-embolic socks during the postoperative period until mobilization and 40 mg/0.4 ml enoxaparin (Clexane®; Sanofi-Aventis, Istanbul, Turkey) daily for 30 days to prevent thromboembolic complications. In addition, 1 g of intramuscular cefazolin sodium (Sefazol®; M. Nevzat İlaç Sanayi, Istanbul, Turkey) was administered as antibiotic prophylaxis 2 hours before surgery. All operations were performed using a pneumatic tourniquet. A standard anterior longitudinal skin incision and medial parapatellar arthrotomy were performed. The posterior cruciate ligament was mostly spared while the anterior cruciate ligament, if present, was divided. An intramedullary guide was used in cuttings for femoral surfaces, and an extramedullary guide for tibial surfaces. A cemented prosthesis was used and the tibial component was placed first. Patelloplasty was performed in all patients. After surgery, tourniquet use was terminated and bleeding was checked. A Hemovac drain was placed until the 24th postoperative hour.

Blood transfusions were given to patients with postoperative hemoglobin values below 9 g/dL or hemoglobin values between 9 and 10 g/dL in addition to symptoms including fatigue, tachycardia or hypotension.

Passive exercises were performed in all patients up to a tolerated degree of flexion on postoperative Day 2 using a continuous passive motion (CPM) device. Patients were discharged when full extension and flexion of 110° was achieved.

Outpatient follow-up occurred on the 45th postoperative day and at the 3rd, 6th and 12th months. Annual follow-up visits were scheduled after the first year. Range of motion (ROM) of the knee joint was measured using a standard goniometer and patients were evaluated for infection. Radiological evaluations were performed.

Pre- and postoperative clinical and radiological assessments were performed according to the scoring system recommended by the American Knee Society.[7]

Clinical assessment was performed using the knee score and function score. Maximum scores were 100 points in both. Function score was assessed after the second surgery in BTKA patients. Scores of 85 to 100 points were considered 'excellent', 70 to 84 points 'good', 60 to 69 points 'moderate' and less than 60 points 'poor'.

Radiological assessments were performed using standard anteroposterior orthoroentgenography. Lateral knee and tangential patella radiographs using the Merchant technique were obtained before and after surgery and at the final follow-up. Postoperative radiographs were assessed according to the American Knee Society radiological evaluation criteria; a radiolucent area ≤4 mm was considered insignificant, a radiolucent area 5 to 9 mm should be monitored for potential loosening and a total radiolucent area of ≥10 mm with or without symptoms indicated possible loosening.[8]

The Short Form-36 (SF-36) is a subjective measure for quality of life used to assess patient health status. Patients completed the form at the preoperative examination and the final follow-up. The form includes 36 items in 8 domains scored between 0 to 100 points for each domain. Higher scores indicate better health status.[9] The original 4-page SF-36 was developed by Ware and Sherbourne. The authors modified the form to a more practical 1-page) form that was used in this study (Table 1).

SPSS for Windows v.15.0 (SPSS Inc., Chicago, IL, USA) software was used in statistical analysis. The paired samples t-test, Mann-Whitney U-test and chi-square test were used to compare dependent variables. P values of <0.05 were considered significant.

Table 1. SF-36 (Short Form 36)

Name: _____ **Patient #** _____

Instructions for completing the questionnaire: Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully by filling in the bubble that best represents your response.

1) 1-In general, would you say your health is:

•Excellent •Very Good •Good •Fair •Poor

2-Compared to one year ago, how would you rate your health in general now?

- •Much better now than a year ago
- •Somewhat better now than a year ago
- •About the same as one year ago
- •Somewhat worse now than one year ago
- •Much worse now than one year ago

3-How TRUE or FALSE is each of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33-I seem to get sick a little easier than other people					
34-I am as healthy as anybody I know					
35-I expect my health to get worse					
36-My health is excellent					

2) The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
3-Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.			
4-Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?			
5-Lifting or carrying groceries			
6-Climbing several flights of stairs.			
7-Climbing one flight of stairs.			
8-Bending, kneeling or stooping.			
9-Walking more than one mile.			
10-Walking several blocks			
11-Walking one block.			
12-Bathing or dressing yourself.			

3) During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	Yes	No
13-Cut down the amount of time you spent on work or other activities?		
14-Accomplished less than you would like?		
15-Were limited in the kind of work or other activities		
16-Had difficulty performing the work or other activities (for example, it took extra time)		

4) **21-**How much bodily pain have you had during the past 4 weeks?

•Not at all •Slightly •Moderately •Quite a bit •Extremely

8-During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

•Not at all •Slightly •Moderately •Quite a bit •Extremely

5) During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	Yes	No
17-Cut down the amount of time you spent on work or other activities?		
18-Accomplished less than you would like		
19-Didn't do work or other activities as carefully as usual		

6) These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks.

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23-Did you feel full of pep?						
27-Did you have a lot of energy?						
29-Did you feel worn out?						
31-Did you feel tired?						
7) **24-**Have you been a very nervous person?						
25-Have you felt so down in the dumps nothing could cheer you up?						
26-Have you felt calm and peaceful?						
28-Have you felt downhearted and blue?						
30-Have you been a happy person?						
8) **32-**During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?						

20-During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- • Not at all
- • Slightly
- • Moderately
- • Quite a bit
- • Extremely

1- General Health

2- Physical Function

3- Role Physical

4- Bodily Pain

5- Role Emotion

6- Energy/Vitality

7- Mental Health

8- Social Function

Table 2. Demographic data of the patients.

	BTKA (n=48)	UTKA (n=53)	Total (n=101)	p
	Mean±SD (Range)	Mean±SD (Range)	Mean±SD (Range)	
Age	64±8.31 (48-85)	64.4±7.45 (43-78)	64.2±7.83 (43-85)	0.233
BMI	32.1±4.71 (21.7-46.2)	32.7±4.11 (20.9-45.7)	32.5±4.36 (20.9-46.2)	0.254
Follow-up time (months)	38.2±20.83 (7-46)	39.8±19.56 (10-49)	39.1±19.54 (7-56)	0.076
Postop hospitalization time (days)	7.5±1.84 (5-16)	6.1±1.24 (4-13)	6.7±1.74 (4-16)	0.027
Blood transfusion (units)	3.3±0.91 (2-6)	2.3±0.69 (1-4)	2.8±1.44 (1-6)	0.005

BMI: Body mass index; BTKA: Bilateral total knee arthroplasty; SD: standard deviation; UTKA: Unilateral total knee arthroplasty.

Results

There were no significant difference in age and BMI between groups ($p>0.05$) (Table 2). Length of hospital stay and amount of perioperative blood transfusion were significantly lower in the UTKA group ($p<0.05$) (Table 2).

Patients had several comorbid diseases, including diabetes mellitus and hypertension (Table 3). Fifteen patients had two or more comorbidities. All patients with comorbid disease were referred to the related departments and arthroplasty was performed after management of the comorbid disease.

Subcutaneous hematoma was detected at the surgical site in 5 knees (5.2%) of 3 patients in the BTKA group and 3 knees (5.7%) in the UTKA group. Anticoagulant drug dosages were reviewed according to the results of coagulation tests. The hematoma was drained and a compressive bandage and cold packages were applied after drainage. Complete recovery was achieved in all patients.

Two patients (4 knees, 4.2%) in the BTKA group and 3 patients (5.6%) in the UTKA group were re-admitted to hospital due to superficial infection development. Culture tests were obtained from serous discharge and parenteral treatment was administered. Patients were discharged as no growth was detected in culture and an improvement was recorded in the clinical status.

Deep infection occurred in one patient (1.9%) in the UTKA group. As parenteral treatment failed, the prosthesis was removed and a spacer was inserted. A revision prosthesis procedure was subsequently performed.

Revision arthroplasty was performed in one patient (1.9%) in the UTKA group at Month 8 due to posttraumatic loosening.

In the follow-up period, pulmonary thromboembolism developed in 3 patients (3.1%; 2 cases within first 30 days) in the BTKA group and in 1 (1.9%) in the UTKA group and they were managed in the intensive care unit (ICU). One BTKA patient died in the early postoperative period (within 30 days) and 1 patient in the UTKA and 1 in the BTKA group died one year after discharge.

Mean ROM of the knee joint in the BTKA group was 86.2° before surgery and 123.6° at the final follow-up. In the UTKA group, mean ROM improved from 89.8° preoperatively to 122.9° at the final follow-up.

Table 3. Distribution of preoperative comorbid diseases of the patients.

Preop comorbid disease	BTKA (n=48)	UTKA (n=53)
Diabetes mellitus	12	15
Hypertension	11	9
Coronary artery disease	2	3
Heart failure	2	3
Asthma-COPD	3	2
Acute renal failure	2	1
Chronic renal failure	2	1
Hypothyroid	2	1
Cerebrovascular disease	1	2
Parkinson's	–	1
Two or more comorbidity	8	7

BTKA: Bilateral total knee arthroplasty; COPD: Chronic Obstructive Pulmonary Disease; UTKA: Unilateral total knee arthroplasty.

ROM improved in all patients. A minimal ROM of 100° was achieved after surgery.

Knee score results were excellent in 86 (89.6%) and good in 10 (10.4%) knees in BTKA patients and excellent in 49 (92.5%) and good in 4 (7.5%) knees in the UTKA group. Similarly, function scores were excellent in 81 (84.4%), good in 10 (10.4%) and moderate in 5 (5.2%) knees in patients who underwent BTKA. In the UTKA group, scores were excellent in 40 knees (75.5%), good in 9 (17.0%), moderate in 3 (5.7%) and poor in one (1.9%).

While the American Knee Society Score scores improved significantly in both groups, there was no significant difference between groups ($p>0.05$) (Table 4).

In both groups, all knees had a varus alignment before surgery. Mean varus alignment was 4.8±2.34° (20° varus- 6° valgus) in the preoperative period and 3.1±2.58° (6°-10°valgus) at the final follow-up in the BTKA group. In the UTKA group, preoperative mean varus alignment was 5.1±2.34° (28° varus-5° valgus) and 4.0±2.84° (7°-9° valgus) at the final follow-up (Table 5). There was a significant improvement in postoperative alignment in both groups with a significant difference favoring the UTKA group ($p<0.05$).

Component compatibility was assessed by measuring alpha (α) and beta (ß) angles at the frontal plane and gamma (γ) and delta (δ) angles at the sagittal plane. While a significant difference was found in the α and beta ß angles ($p<0.05$), there was no significant difference in γ and δ angles between groups ($p>0.05$).

In BTKA patients, a radiolucent area of 0 to 4 mm was detected on lateral femur radiographs in 10 knees, on anteroposterior tibia radiographs in 9 and on lateral tibia radiographs in three. In the UTKA group, a radiolucent area of 0 to 4 mm was found on lateral femur radiographs in 6 knees and on anteroposterior tibia radiographs in 1 and a radiolucent area of 5 to 9 mm in 2 knees on lateral femur radiographs and in 1 knee on anteroposterior tibia radiographs.

A significant improvement was seen in both groups in all 8 domains of the SF-36. However, no significant difference was detected between groups ($p>0.05$) (Table 6).

Discussion

Total knee arthroplasty (TKA) is a successful surgical technique that aims to relieve pain and movement limitation caused by degenerative disorders such as gonarthrosis.[10,11] The patient's age, previous medical-surgical therapies, benefit obtained from these therapies, symptom duration and bilateral or unilateral involvement should be considered when deciding on surgical treatment.

The common indications of TKA include osteoarthritis, rheumatoid arthritis and traumatic arthritis.[12] In the present study, all cases had a diagnosis of primary osteoarthritis.

Mean age was reported as 65.2 years by Akgun et al., 66.5 years by Barrack et al., 62.8 years by Heal et al., and 65 years by Waters et al.[13-16] In our study, mean age was 64.1 (range: 43 to 85) years and was similar in both groups.

The majority of patients with knee osteoarthritis have symmetrical involvement and BTKA is warranted in most cases. Unilateral or bilateral TKA is performed

Table 4. American Knee Society Score results.

Knee Society Score	BTKA (Mean±SD)		UTKA (n=53) (Mean±SD)		p
	Preoperative	Postoperative	Preoperative	Postoperative	
Pain	3.4±5.19	48.3±2.47	2.6±4.87	48.4±2.34	0.155
Flexion range	18.5±6.98	24.3±1.64	19.6±5.81	25.1±1.87	0.816
Stability	20.4±2.87	24.2±2.25	21.9±3.33	24.6±2.48	0.602
Alignment	-12.8±7.85	-2±4.03	-12.6±8.12	-1.6±2.65	0.186
Flexion contracture	-8.8±6.81	-1.6±3.52	-8.1±6.24	-1.2±2.21	0.608
Loss of extension	-1.4±2.58	-0.3±1.21	-2.1±4.35	-0.7±1.34	0.912
Knee Score	19.3±14.09	92.9±7.18	19.3±14.3	93.2±6.41	0.919
Walking	18.4±10.79	47.3±6.23	15.3±9.12	45.6±7.11	0.336
Climbing stairs	25.9±11.11	44.1±5.9	23.9±9.17	44.5±6.26	0.624
Walking aids	-1.8±3.01	-0.7±2.04	-1.5±3.13	-1.2±2.83	0.061
Functional Score	42.3±20.42	91.1±10.8	38.5±15.2	89.9±11.1	0.223

BTKA: Bilateral total knee arthroplasty; SD: Standard deviation; UTKA: Unilateral total knee arthroplasty.

Table 5. Radiological evaluation results.

Radiological evaluation	BTKA (n=96)	UTKA (n=53)	p
	Mean±SD	Mean±SD	
AP mediofemoral angle (α)	94.1°±2.09	94.8°±2.4	0.027
AP mediotibial angle (β)	86.8°±2.1	87.7°±2.86	0.043
Preop alignment (varus-valgus)	4.8°±2.34varus	5.1°±2.34 varus	0.163
Postop alignment (varus-valgus)	3.1°±2.58 valgus	4°±2.84 valgus	0.011
Lateral femoral flexion (γ)	2.9°±2.27	3.4°±2.47	0.159
Lateral posterotibial angle (δ)	86.6°±2.11	87.6°±2.66	0.168
Patellar tilt	4.9°±3.96 lateral	5.5°±5.29 lateral	0.138

BTKA: Bilateral total knee arthroplasty; SD: standard deviation; UTKA: Unilateral total knee arthroplasty.

Table 6. SF-36 results.

SF-36 domains	BTKA (n=48) (Mean±SD)		UTKA (n=53) (Mean±SD)		p
	Preoperative	Final follow-up	Preoperative	Final follow-up	
General health	51.2±12.64	72.3±15.05	45.5±11.45	71.5±18.31	0.267
Physical function	37±19.1	74.2±17.39	43.3±24.12	77.2±19.91	0.149
Role physical	40.4±20.95	93±16.5	41.7±25.71	94.4±16.12	0.633
Bodily pain	12.3±9.13	88.9±11.09	9.2±10.73	87.3±16.33	0.134
Role emotion	29.5±24.09	81.6±16.25	40.1±26.32	90.1±18.37	0.519
Energy/Vitality	41.9±15.68	73.4±14.42	46.4±13.74	72.5±15.24	0.167
Mental health	67.1±8.22	81.8±12.18	62.4±14.43	81.6±13.17	0.509
Social function	48.6±16.39	87.9±13.08	42.2±19.13	88.3±18.65	0.526

BTKA: Bilateral total knee arthroplasty; SD: standard deviation; UTKA: Unilateral total knee arthroplasty.

in patients with gonarthrosis based on location and severity of involvement. Both simultaneous bilateral and unilateral TKA have specific advantages and disadvantages. Thus, the choice of surgical management remains a subject of debate.

It has been suggested that patients undergoing simultaneous BTKA experience a delay in rehabilitation, including a longer duration of physical therapy and length of hospital stay, greater number of painful postoperative days, greater need for blood transfusion, and increased costs. However, these parameters have been reported to be markedly better than in patients undergoing two-stage surgeries.[3,4,6] While several reports have suggested that medical complications, especially severe ones, are more commonly seen in patients who underwent BTKA,[5,17,18] other authors report similar complication rates.[19,20]

It is widely accepted that BTKA patients require a greater number of blood transfusions. Lane et al. reported a 1.7-fold and Fabi et al. a 2.1-fold increase.[21,22] In our study, transfusion need was 1.5-fold greater in the BTKA group.

Hersekli et al. reported a mean hospital stay length of 17.19 days in BTKA patients and 10.48 days in UTKA patients.[20] Studies have reported different length of hospital stay due to the variation in discharge criteria. In our study, while similar in both groups, the length of hospital stay was slightly higher with BTKA.

In a study with a 14-year follow-up, Goldberg and Kraay reported excellent knee scores in 75%, good in 10%, moderate in 2%, and poor in 13% of patients.[10] Hungerford et al. observed excellent results after 5.1 years of follow-up in 73%, good results in 19%, moderate results in 2% and poor results in 6% of patients.[23] In our study, better knee and function scores were achieved compared to the literature in both groups.

Ritter et al. reported that preoperative ROM is the most important factor determining postoperative ROM in a study of 4727 TKAs.[24] In our study, ROM improved significantly in both groups with betters results in patients who complied with the prescribed exercise program.

Several authors have suggested that poor alignment is the most important reason for loosening of total knee prosthesis. Success depends on restoration of normal

alignment load distribution. It is recommended that the tibiofemoral angle defined by the anatomical axes of the femur and tibia should be at valgus. Agliette et al. recommend a valgus angle of 2 to 6°, whereas Dorr et al., Ewald et al., Hungerford et al., Insall et al. and Scuderi et al. recommend angles of 3 to 9°, 5 to 8°, 6°, 7° and 5 to 10° valgus, respectively.[8] In our study, significant improvement was achieved in the alignment of both groups. Although improvement was significantly different between groups, values for both groups were consistent with the literature. Kilincoglu et al. reported no significant difference in α, β, γ and δ angles between groups.[25] In our study, while a significant difference was found in α and β angles between groups, values were consistent with the literature.

Oakes and Hanssen reported an increase in cardiac events, thromboembolism, stroke, confusion, ileus, gastrointestinal bleeding, deafness, admission to the ICU and death in the postoperative period, and this increase was greater in BTKA patients.[18]

The likelihood of severe complications is higher in patients over 70 years of age.[26,27] Gill et al.[28] reported a mortality rate of 0.13% in patients under 65 years of age and 4.65% in those above 85. The authors also noted that the majority of deaths occurred in patients who underwent UTKA. Parvizi et al.[26] evaluated 22,540 knee arthroplasties performed between 1969 and 1997 to identify risk factors causing mortality. The authors found a 30-day mortality rate of 0.21% (47 patients) after arthroplasty and a mortality rate 10 times higher in patients over 70 years of age. However, Kim et al. reported a mortality rate of 0.3% in UTKA patients and 0.7% in BTKA patients and that all deaths were caused by myocardial infarction.[29] Mangaleshkar et al. reported 4 deaths in 54 BTKA cases (108 knees) and 543 UTKA cases with a mean age of 84 years.[30] In our study, all patients requiring ICU admission and those who died were over 70 years of age and had a comorbid disease. The patient who died had a positive history of coronary heart disease. Although in agreement with the literature, the slightly higher mortality rate in our study could be explained by the smaller sample size. Moreover, we believe that the cause of death in the late postoperative period was linked to the comorbid disease.

Postoperative thromboembolism is a serious complication causing fatal consequences. Risk factors include advanced age, sedentary lifestyle, previous venous insufficiency, congestive heart failure, malignity, obesity, estrogen therapy, hyperlipidemia, prolonged operation time, and immobilization.[31]

In a study on 2050 BTKA and 1796 UTKA patients, Ritter et al. reported a 0.9% thromboembolism incidence in the BTKA group and 0.3% in the UTKA group, indicating a 3-fold higher rate in the UTKA group.[24] Pavone et al. reported no deaths in 501 BTKA patients with a pulmonary embolism incidence of 0.4%.[32] Soudry et al. reported a pulmonary embolism rate of 11% and deep vein thrombosis incidence of 59% and indicated that no significant difference existed between BTKA and UTKA groups.[33] In contrast, Jankiewicz et al. reported a lower deep vein thrombosis rate in BTKA patients, while Ritter et al. suggested the same for pulmonary embolism risk.[19,24] In our study, pulmonary thromboembolism developed in 3 patients (3.1%) in the BTKA group and 1 (1.9%) in the UTKA group. The high rate of pulmonary thromboembolism, despite prophylaxis, may be related to advanced age and comorbid disease.

Oakes and Hanssen reported a greater number of cardiovascular events in BTKA,[18] while Lane et al. reported an incidence 3-fold higher in cardiopulmonary problems.[21] However, some authors concluded that there was no difference in terms of cardiovascular complications.[19,34,35]

Sulek et al. proposed that postoperative confusion was caused by intraoperative cerebral microembolism.[36] Some authors suggest that postoperative confusion is more frequent after BTKA.[18,21] In our study, no patient experienced postoperative confusion.

Infection is the most commonly seen complication after TKA, with reported incidence rates between 0.5% and 2%. Predisposing factors for infection include previous open surgeries, immunosuppressive therapy, malnutrition, diabetes mellitus, obesity, hypothyroidism, alcohol consumption, and smoking.[34]

In a study on 3048 TKAs, Gill et al. reported that superficial infection occurred in 0.08% of cases, deep infection within 90 days after surgery in 0.13% and late deep infection in 0.38%.[28] Robertsson et al. reviewed 41,223 TKAs in the Swedish Knee Society Arthroplasty Register and reported a deep infection rate of 1.7% in osteoarthritis and 4.4% in rheumatoid arthritis cases.[34] Ritter et al. and Hutchinson et al. reported a lower infection risk in patients undergoing BTKA.[24,35]

In the present study, the rate of deep infection was parallel with the literature while the rate of superficial infection was slightly higher. We believe infection could be reduced by postoperative care and compliance with sterile practices.

The SF-36, a measure of general health status, has been used in numerous studies on knee osteoarthritis. It can be reliably used in the assessment of treatment re-

sponse as well as in the determination of general health status.[37] In our study, patients reported satisfaction with knee arthroplasty and that the surgery increased physical, psychological and social quality of life.

In conclusion, patients who underwent either BTKA or UTKA were satisfied with the results of surgery and had an improved physical and social quality of life. Simultaneous bilateral surgery is mainly requested by patients who wish to be out of pain as soon as possible and by those who do not want to re-experience similar processes by receiving a single anesthesia. The significant increase in complication risk for patients over 70 years of age with preoperative comorbid disease, particularly cardiac diseases, should be considered.

Conflicts of Interest: No conflicts declared.

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