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COMPARISON OF COMPLICATIONS FOLLOWING SIMULTANEOUS VERSUS UNILATERAL TOTAL KNEE ARTHROPLASTY

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Background
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Total knee arthroplasty (TKA) was introduced into Mongolia during the mid-2000s. The first bilateral total knee arthroplasty (BTKA) was performed at Joint Center of the First Central Hospital of Mongolia (FCHM) in 2008. From 2011, the number of patients who undergone TKA has been increasing progressively due to TKA's efficiency, as well as social welfare compensation and insurance coverage. In the years after its introduction, TKA has been performed frequently because it has been shown that it is a clinically efficient procedure for relieving pain and restoring functions for the cases with end-stage joint diseases such as osteoarthritis and rheumatoid arthritis. At the same time, the patients' choice to undergo TKA also depends on their ability to pay their portion of its costs. Nevertheless, without standardized criteria it is challenging for doctors to decide who are appropriate patients for BTKA. In Mongolia, joint replacement surgeons are more concerned about age, body mass index (BMI), patient's desires rather than the length of stay in hospital, or the cost of treatment when selecting patients for BTKA. It has been reported that there is a higher risk of perioperative and postoperative complications following BTKA compared to unilateral TKA (UTKA). Although a patient with symptomatic bilateral knee arthritis can be treated by replacing both knees during a single operative session, the rates of perioperative and postoperative morbidity and mortality remain a major concern.
The purpose of this study is to conduct a systematic review of our experience following UTKA and BTKA.

Objectives

The main objective of this study was to compare the surgical outcomes and demographics characteristics of patients who had UTKA and BTKA performed at the FCHM in Ulaanbaatar, Mongolia.

Materials and methods

This study design is a retrospective cohort study. The study subjects were the patients who had BTKA and UTKA between January 2008 and December 2017 at FCHM. Baseline demographics such as age, weight, gender, indication for surgery (diagnosis), and implant information, were collected at the time of surgery. Medical records were reviewed to gather preoperative and postoperative range of motion (ROM) and volume of blood loss reported in the drain. Complication such as infection, wound dehiscence, aseptic loosening, ankyloses, hemarthroses, fracture, and mortality were identified and their rates calculated. Outcomes between 2 groups were compared.

Fourteen complications, including 10 from National Orthopedic and Trauma Center of Mongolia, 1 from Gurvangal hospital, 2 from South Korea, 1 from China were excluded due to the primary TKA performed at the other hospitals or countries. All deaths as a consequence of other causes such as H1N1 infection and deaths from unknown reasons were included.

Chi-square and Fisher's exact test were used to compare categorical variables. P values with two-sided with $p<.05$ were considered statistically significant.. Statistical analyses were performed using the SPSS21 software.

Results

From 2008 to 2012, 346 (31.9%) BTKA and 1083 (68.1%) UTKA were performed at FCHM for a total of 1429 primary total knees. There was no statistically significant difference in gender (16% of patients were male for each group), BMI (28.6 in UTKA group vs. 29.2 in BTKA group, $p>.05$). The primary indication for the surgery was osteoarthritis (70%) for both groups, followed by rheumatoid arthritis (6.2%). The average age was 64.7 years for UTKA compared to 63.3 years of age for BTKA group ($p>.05$). The average volume of drain output was 450 ml for UTKA while it was 1000 ml for BTKA ($p<.01$). Auto blood transfusion system was used in every BTKA case. There was no difference between preoperative ROM and postoperative ROM between the two groups ($p>.05$).

The total complication rate of TKA was 4.68% (n=67). In the UTKA group the rate was 4.7% (51), whereas 4.6% (16) cases noted in the BTKA group. The various complications are shown in Table 1. Seventy-two percent (n=21) cases of infection were identified within the first 6 months after operation while 28% (8) cases were diagnosed more than 6 months after surgery. The mortality rate was 0.09% (1) for the UTKA group and 0.57% (2) for the BTKA group. One patient in the UTKA group died from H1N1 infection and 2 patients in BTKA group experienced sudden death (unknown reasons) after 1 month from discharge. The average length of stay in hospital was 7 days for both groups.

	Infection	Wound dehiscence	Aseptic loosening	Fracture	Ankylosis	Hemarthrosis	Death
UTKA	2.1% (23)	1.2% (13)	0.73% (8)	0.46% (5)	0.09% (1)	0.09% (1)	0.09% (1)
BTKA	1.73% (6)	0.57% (2)	1.56% (6)	0.28% (1)	0.28% (1)	-	0.56% (2)
p-value	>.05	<0.01	>.05	>.05	>.05	>.05	>0.05

Table 1. Comparison of complications following UTKA and BTKA

The most common comorbidities were chronic heart failure, chronic kidney failure, liver cirrhosis, HBV infection, HCV infection, diabetes and rheumatoid arthritis. The frequencies of commodities associated with infection and wound dehiscence are shown in Table 2.

Comorbidity	Infection	Wound Dehiscence
Chronic heart failure	-	1
HCV related liver cirrhosis	5	2

HBV related liver cirrhosis	4	1
Diabetes	8	6
Rheumatoid arthritis	1	2
HCV related liver cirrhosis and diabetes	4	2
Diabetes and chronic kidney failure	3	-
Chronic kidney failure, diabetes and HCV related liver cirrhosis	1	-
Total	26	14

Table 2. Frequencies of comordities associated with infection and wound dehiscence

The comorbidity most commonly associated with infection and wound dehiscence was diabetes at 61.5% (16) and 33.3% (8) respectively. This was followed by liver cirrhosis at 53.8% (14) and 35.7 (5) respectively.

In addition, two different suture materials were used during the period. There was a significant association between suture materials and wound dehiscence with 73.3% (11) of wound dehiscence occurring when the cheaper suture material was used whereas 26.6% (4) wound dehiscence occurring with the better-quality suture materials ($p<05$).

Conclusions

In conclusion, in the 1429 TKA's in our study done in the developing country of Mongolia, we are unable to detect any difference in the rates of death or complications such as infection, fracture, ankyloses, aseptic loosening or hemarthrosis when comparing BTKA to UTKA. Such differences may exist but we are unable to detect them with the numbers available in our study. Comorbidities such as diabetes and liver cirrhosis increase the risks of postoperative infection and wound dehiscence in our patients. The quality of suture material is important to prevent wound dehiscence. Further study is needed to determine whether other comorbidities or factors influence postoperative complications.