Research Square

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Short-time Modified Robert Jones Bandage Does Not Worsen Postoperative Swelling in Enhanced-recovery After Primary Total Knee Arthroplasty without Tourniquet: A Single-centre, Randomized Controlled Study

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Abstract

Purpose

Despite evidence showing the Modified Robert Jones Bandage (MRJB) is ineffective in reducing joint swelling after total knee arthroplasty (TKA), its use persists due to clinical tradition. This study examines the impact of a shortened MRJB duration on knee swelling and early postoperative rehabilitation in primary unilateral TKA without a tourniquet.

Methods

This single-centre, randomized controlled study included 114 patients, who were randomly assigned to two groups using an envelope method. All surgeries were performed by the same surgeon. The short-time group received MRJB for 4 hours postoperatively, while the long-time group wore the bandage for 24 hours post-surgery. Knee swelling was assessed by measuring the circumferences of the knee, thigh, and calf. Postoperative rehabilitation outcomes were evaluated using both subjective measures (self-reported knee comfort and pain, assessed by VAS scores at rest and during activity) and objective measures (passive and active extension, active flexion, extension lag, range of motion (ROM), Timed Up and Go (TUG) test, and adverse events).

Results

No significant differences in knee, thigh, or calf circumferences were observed at 1-, 3-, 14-, and 28-days post-surgery. On postoperative day 1, the long-time group exhibited slightly better passive extension (-1.39 ± 3.01 versus − 2.98 ± 3.07, $P = 0.006$). No significant differences were found in other rehabilitation parameters.

Conclusion

Reducing the duration of MRJB application to 4 hours did not exacerbate postoperative knee swelling. Furthermore, prolonged MRJB use did not improve rehabilitation outcomes. Based on these findings, we recommend adopting a 4-hour postoperative MRJB as a feasible and effective practice for TKA without tourniquet.

Level of Evidence:

Level I, RCT

Trial registration:

Chinese Clinical Trial Registry, Registration No. ChiCTR2100052219, Registered 22 October 2021, https://www.chictr.org.cn/

1. Introduction

Total knee arthroplasty (TKA) is a commonly performed and highly successful procedure that effectively alleviates pain and improves knee function in patients who have advanced knee osteoarthritis.[1] However, postoperative knee swelling is a common issue due to bleeding within the joint cavity and inflammation in the surrounding soft tissues. Excessive swelling can impair rehabilitation, increase the risk of wound complications, and heighten the likelihood of infection.[2] Various strategies have been explored to manage postoperative knee swelling, including minimally invasive techniques, controlled hypotension, cryotherapy, and compression bandaging.[3–6] Compression bandaging remains one of the most widely employed methods for reducing knee swelling following TKA. [7] The Modified Robert Jones Bandage (MRJB) is a bulky compression bandage that extends from the toe to the mid-thigh and consists of three layers of cotton. It is believed to help alleviate pain through immobilization, reduce soft tissue swelling by promoting venous return in the lower limb, and limit postoperative bleeding by compressing capillaries. [8]

However, recent studies have raised concerns about the effectiveness of compression bandaging techniques, including MRJB, in reducing knee swelling and blood loss after non-tourniquet TKA. [9, 10] For instance, Yu et al. [10] found no significant difference in knee swelling between MRJB and non-compression groups in TKA performed using a non-tourniquet approach. Additionally, the compression force applied by such bandages is often inconsistent, and overly tight bandaging can result in discomfort, peroneal nerve paralysis, pressure ulcers, and increased healthcare costs. [3, 11] While several randomized controlled trials have demonstrated that MRJB is ineffective in reducing joint swelling after TKA, [9, 10, 12–16] the practice persists due to clinical tradition, with many clinicians hesitant to abandon it. Nevertheless, long-duration postoperative MRJB (typically applied overnight or for more than 12 hours) continues to be routine in many institutions. Notably, the peak period for hematoma formation occurs within the first 4 hours post-TKA, [17] suggesting that prolonged MRJB use may be unnecessary.

In light of these considerations, this randomized controlled study aimed to compare the effects of short-term MRJB (4 hours) application with long-term MRJB (24 hours) use on knee swelling following primary TKA without the use of a tourniquet. Our hypothesis is that a shortened MRJB application will not result in increased postoperative knee swelling. Given the challenges clinicians face in completely discontinuing long-term MRJB, adopting a shorter duration of bandaging may be a more acceptable alternative and could provide a viable option in clinical practice.

2. Materials and Methods

2.1 Patients

This randomized controlled trial included 114 patients scheduled for unilateral primary TKA without the use of a tourniquet, conducted between December 2021 and May 2024. All surgeries were performed by the same surgeon (the corresponding author), and all patients followed the same perioperative enhanced recovery protocols. Postoperative rehabilitation was managed by a consistent team of rehabilitation therapists. The study was approved by the Ethics Committee of Zhongshan Hospital Fudan University **(B2021-614R).**

Inclusion criteria: Patients who have knee osteoarthritis undergoing primary unilateral TKA without tourniquet, aged between 18 and 80 years. **Exclusion criteria**: Patients who have a history of peripheral vascular disease, peripheral neuropathy, coagulation disorders, deep vein thrombosis, or those with varus or valgus greater than 15 degrees were excluded.

Randomization

Randomization was performed using the sealed envelope method. A total of 114 envelopes were prepared, with 57 assigned to the short-time group and 57 to the long-time group. Patients were screened and enrolled before surgery, with randomization occurring after the application of the MRJB. This ensured that the surgeon was not biased toward the results of the randomization before and during operation. In the short-time group, MRJB was removed 4 hours post-surgery, while in the long-time group, it was removed 24 hours post-surgery.

Blinding and Data Management

While patients and surgeons were aware of the group assignments, the observer responsible for measurement and the statistical analyst were blinded to the group allocation. Data entry accuracy and adherence to the study protocol, particularly regarding the random allocation process, were monitored by an independent data monitoring board. This board did not participate in patient recruitment, surgery, or outcome measurements.

Sample Size

The primary outcome was the assessment of knee swelling in the operated knee. We hypothesized that the short-time MRJB group would be non-inferior to the long-time group in terms of knee swelling reduction. Based on prior literature[3, 10, 13], a power of 0.8 and a significance level of 0.05 were used. After allowing for a 20% dropout rate, 114 patients (57 per group) were enrolled. The power to reject the null hypothesis was 80.37%, and the effect size was 0.60, justifying the use of a two-sided, two-sample equal variance *t*-test.

Baseline Demographics

Baseline demographic data were recorded for all patients, including age, gender, body mass index (BMI), comorbidities, and the surgical side. These details are summarized in Table 1. A flowchart outlining patient enrollment and loss to follow-up is provided below (Fig. 1**)**. Our study adhered to CONSORT guidelines and CONSORT checklist was submitted as a Supplementary material.

Table 1
Baseline Demographic Characteristics

Characteristics	Short-time group(n = 57)	Long-time group(n = 57)	P value
Gender			
Men	8 (14.0%)	9 (15.8%)	
Women	49 (86.0%)	48 (84.2%)	0.793
Age (years)	70.42 (52 to 80; 6.48)	70.44 (56 to 80; 5.30)	0.987
BMI (kg/m^2)	26.17 (18.43 to 33.78; 3.59)	26.00 (17.19 to 32.47; 3.30)	0.796
Surgical side (left:right)			
Left	21 (36.8%)	28 (49.1%)	
Right	36 (63.2%)	29 (50.9%)	0.185
Comorbidities			
Hypertension	32 (56.1%)	31 (54.4%)	0.851
Diabetes	9 (15.8%)	8 (14.0%)	0.793
Coronary heart disease	4 (7.0%)	3 (5.3%)	1.000
Cerebral infarction	2 (3.5%)	1 (1.8%)	1.000
Circumference (cm)			
Knee	37.36 (31.5 to 44.0; 2.94)	37.45 (31.0 to 44.5; 2.82)	0.871
Thigh	43.87 (32.0 to 57.0; 4.70)	43.04 (32.0 to 53.0; 4.16)	0.318
Calf	33.37 (27.0 to 40.0; 2.95)	33.53 (26.0 to 39.0; 2.82)	0.761
Pain at walking(VAS)	5.53 (0 to 10; 1.85)	5.09 (0 to 8; 1.89)	0.214
Pain at rest(VAS)	0.86 (0 to 5; 1.36)	1.35 (0 to 4; 1.29)	0.050
Degree of passive extension	-5.00 (-20 to 0; 5.78)	-4.32 (-30 to 0; 6.39)	0.550
Degree of active extension	-10.19 (-30 to 0; 7.21)	-9.49 (-35 to 0; 7.49)	0.611
Extension lag	5.19 (0 to 10; 2.96)	5.18 (0 to 15; 2.80)	0.974
Degree of active flexion	104.72 (45 to 138; 15.54)	108.25 (75 to 135; 12.39)	0.183
ROM	94.53 (40 to 127; 17.32)	98.89 (60 to 135; 16.76)	0.174

BMI body mass index, VAS visual analogue scale, TUG time of up and go test, ROM range of motion.

Characteristics	Short-time group(n = 57)	Long-time group(n = 57)	P value
TUG (seconds)	16.12 (9.0 to 38.0; 5.34)	14.95 (9.0 to 35.0; 4.42)	0.205
Walking aid during TUG	0 (0)	1 (1.8%)	1
BMI body mass index, VAS visual analogue scale, TUG time of up and go test, ROM range of motion.			

2.2 Surgical Procedures and Postoperative Management

Tranexamic acid (1g) was administered intravenously at the beginning of surgery to reduce blood loss. The operation was performed under either spinal or general anesthesia using a standard medial parapatellar approach. All procedures were conducted by the same experienced surgeon, utilizing a midline skin incision and a posterior stabilized cemented Legion implant (Smith & Nephew, UK), without patellar resurfacing. Controlled hypotension was achieved, but no intraoperative tourniquet was used.

Local infiltration analgesia was administered with 120 mL of normal saline containing 1g of tranexamic acid and 150mg of ropivacaine, injected around the knee joint in three separate doses: immediately after the skin incision, subcutaneously on both sides of the knee, before implant insertion, and prior to wound closure. No drain was used. At the end of surgery, MRJB was applied from above the ankle to the mid-thigh by the corresponding author (Fig. 2). Following randomization, patients were assigned to either the short-time or long-time group based on the envelope method.

In the short-time group, MRJB was removed 4 hours post-surgery, while in the long-time group, it was removed 24 hours post-surgery. The analgesic regimen included intravenous Parecoxib (40mg) every 12 hours for 3 days, followed by oral Celecoxib (200mg) twice daily and oral Pregabalin (75mg) twice daily for 4 to 8 weeks, with gradual dose reduction if pain was well controlled. Rivaroxaban (10mg) was administered orally for thromboprophylaxis from day 1 to day 15 post-surgery. Patients were instructed to return for clinical examination and data collection at 2 and 4 weeks postoperatively.

2.3 Clinical Evaluations

Primary outcome was knee swelling in the operated knee within the first 4 weeks after surgery. Knee circumference was measured at the midpoint of the long axis of the patella. Thigh measurements were taken 15 cm above the superior margin of the patella, and calf circumference was measured at the maximum girth of the gastrocnemius.

Secondary outcomes included postoperative rehabilitation parameters, which were assessed using both subjective and objective measures. Subjective parameters consisted of self-reported knee comfort and pain, evaluated using the Visual Analog Scale [12, 14] (VAS) both at rest and during activity. Knee comfort was rated on a 5-point scale, with 5 being the most satisfied and 1 being the least satisfied. Objective parameters included knee extension (both passive and active), extension lag, active flexion, range of motion (ROM), the Timed Up and Go (TUG) test, and complications (e.g., peroneal nerve paralysis). Knee

extension lag was defined as the difference between passive and active extension. ROM was calculated as the difference between active flexion and active extension. The TUG test, consisting of multiple tasks, is widely used to assess basic mobility and balance in patients. [18]

All measurements were taken preoperatively and at days 1, 3, 14, and 28 after surgery. Measurements were performed by an independent observer who was trained in the procedures prior to the study's commencement.

2.4 Statistical analysis

Continuous variables are presented as means (minimum-maximum; standard deviation), while categorical variables are presented as frequencies and percentages. The independent *t*-test was used for continuous variables, and the *chi-square* test was applied to categorical variables. A *P*-value of less than 0.05 was considered statistically significant. All statistical analyses were performed using SPSS version 29.0 (IBM Corporation, Armonk, NY, USA).

3. Results

3.1. Patients' characteristics

Between December 2021 and May 2024, 273 patients were scheduled for primary unilateral TKA in our research group. After screening and obtaining informed consent, 114 patients who met the inclusion criteria were enrolled and randomly assigned to either the short-time or long-time MRJB groups immediately following surgery. A majority of eligible patients were not enrolled, largely due to the ongoing COVID-19 pandemic affecting our country. The demographic characteristics of both groups are presented in Table 1. The demographic composition revealed that 11.4% (17/114) of the subjects were male. No significant differences were observed in terms of gender, age, BMI, surgical side, comorbidities (hypertension, diabetes, coronary heart disease, and cerebral infarction), or baseline knee measurements between the two groups.

3.2. Primary outcome

Table 2 displays the primary outcomes for both groups. There were no significant differences in knee, thigh, or calf circumferences at any postoperative time point. At the final follow-up, 96 patients were available for analysis, resulting in a 15.79% dropout rate (18/114). Between December 2021 and December 2022, there were only 19 patients enrolled. However, due to the global COVID-19 situation and relevant policies in China, 4 of these patients were lost to follow-up. Additionally, during their postoperative hospital stay, 3 patients declined data measurements and withdrew from the study. Efforts to contact the remaining patients lost to follow-up at that time were unsuccessful.

Table 2
Postoperative primary outcomes

Variable	Short-time group	Long-time group	P value
Mean circumference (cm)			
POD1 (case No.)	56	57	
Knee	38.81 (33 to 46.5; 3.18)	38.54 (33 to 45; 2.79)	0.634
Thigh	45.44 (34.5 to 58; 4.84)	44.50 (34.5 to 55; 4.13)	0.270
Calf	33.91 (27 to 40; 3.07)	33.79 (26 to 39; 2.73)	0.830
POD3 (case No.)	55	56	
Knee	39.40 (32 to 47; 3.29)	39.44 (35 to 47; 2.77)	0.961
Thigh	46.28 (36 to 59; 4.76)	45.78 (37 to 54; 4.08)	0.554
Calf	34.84 (28 to 42; 3.23)	34.95 (27 to 41.5; 3.00)	0.848
POD14 (case No.)	53	53	
Knee	39.31 (32.5 to 48; 3.10)	39.38 (34 to 47; 2.98)	0.909
Thigh	45.30 (33.5 to 56.5; 4.84)	44.97 (34 to 57; 4.30)	0.722
Calf	34.46 (27 to 41; 3.22)	34.69 (27.5 to 40; 2.95)	0.711
POD28 (case No.)	48	48	
Knee	38.88 (31.5 to 48; 3.11)	38.91 (33 to 46; 2.99)	0.955
Thigh	44.34 (33 to 56; 4.66)	44.38 (33 to 54; 4.12)	0.963
Calf	34.48 (27 to 42; 3.19)	34.60 (27 to 42.5; 3.09)	0.848
POD postoperative day			

3.3. Secondary outcome

Tables 3 and 4 present the secondary outcomes. On postoperative day 1 (POD 1), the short-time group (-2.98; range: -10 to 0; SD: 3.07) showed significantly worse passive extension compared to the long-time group (-1.39; range: -10 to 6; SD: 3.01) (**P** = 0.006). No significant differences were observed in other postoperative parameters.

Table 3
Postoperative secondary outcomes: subjective parameters

Variable	Short-time group	Long-time group	P value
POD1 (case No.)	56	57	
Self-reported knee comfort	2.93 (1 to 4; 0.81)	3.09 (2 to 4; 0.69)	0.261
Pain at walking (VAS)	4.34 (2 to 8; 1.58)	4.16 (0 to 8; 1.50)	0.532
Pain at rest (VAS)	1.82 (0 to 8; 1.64)	1.79 (0 to 7; 1.51)	0.914
POD3 (case No.)	55	56	
Self-reported knee comfort	3.35 (2 to 4; 0.65)	3.45 (2 to 5; 0.63)	0.406
Pain at walking (VAS)	2.98 (0 to 6; 1.27)	2.84 (0 to 5; 1.25)	0.552
Pain at rest (VAS)	0.73 (0 to 3; 0.89)	0.61 (0 to 3; 0.95)	0.493
POD14 (case No.)	53	53	
Self-reported knee comfort	3.36 (2 to 5; 0.71)	3.32 (1 to 4; 0.78)	0.795
Pain at walking (VAS)	3.15 (0 to 7; 1.51)	2.72 (0 to 7; 1.32)	0.119
Pain at rest (VAS)	1.00 (0 to 6; 1.43)	0.96 (0 to 6; 1.29)	0.887
POD28 (case No.)	48	48	
Self-reported knee comfort	3.79 (2 to 5; 0.54)	3.56 (1 to 4; 0.71)	0.080
Pain at walking (VAS)	2.06 (0 to 6; 1.45)	2.15 (0 to 8; 1.49)	0.782
Pain at rest (VAS)	0.81 (0 to 7; 1.50)	0.77 (0 to 5; 1.28)	0.884

POD postoperative day, VAS visual analogue scale.

Table 4
Postoperative secondary outcomes: objective parameters

Variable	Short-time group	Long-time group	P value
POD1 (case No.)	56	57	
Degree of passive extension	**-2.98 (-10 to 0; 3.07)**	**-1.39 (-10 to 6; 3.01)**	**0.006***
Degree of active extension	-8.77 (-20 to 0; 4.28)	-7.44 (-25 to 0; 4.35)	0.104
Extension lag	5.79 (0 to 11; 2.94)	6.05 (2 to 15; 2.65)	0.613
Degree of active flexion	80.36 (45 to 101; 14.65)	80.53 (40 to 100; 13.91)	0.950
ROM	71.73 (25 to 95; 15.19)	73.14 (32 to 94; 13.92)	0.608
TUG (case No.)	59.13 (14.0 to 112.0; 22.97) (53)	52.47 (17.0 to 153.0; 25.20) (53)	0.158
Walking aid during TUG	50 (94.3%)	49 (94.3%)	1.000
Complication (Numbness)	1 (1.9%)	3 (5.7%)	0.618
POD3 (case No.)	55	56	
Degree of passive extension	-1.36 (-5 to 0; 2.18)	-0.95 (-10 to 0; 2.17)	0.314
Degree of active extension	-6.18 (-20 to 0; 3.74)	-6.13 (-15 to 0; 2.89)	0.929
Extension lag	4.82 (0 to 17; 2.72)	5.18 (0 to 10; 1.93)	0.421
Degree of active flexion	88.67 (60 to 120; 11.65)	88.13 (40 to 110; 11.97)	0.808
ROM	82.62 (52 to 115; 12.19)	82.00 (35 to 102; 12.57)	0.793
TUG (case No.)	40.44 (10.0 to 90.0; 19.33) (54)	36.23 (12.0 to 126.0; 24.86) (56)	0.325
Walking aid during TUG	41 (75.9%)	37 (66.1%)	0.329
Complication (Numbness)	2 (3.7%)	4 (7.1%)	0.679
POD14 (case No.)	53	53	
Degree of passive extension	-1.55 (-10 to 0; 2.43)	-0.98 (-10 to 0; 2.33)	0.226

TUG time of up and go test, ROM range of motion.

* significant statistical difference between two groups

Variable	Short-time group	Long-time group	P value
Degree of active extension	-7.21 (-20 to 0; 4.15)	-6.02 (-20 to 0; 4.12)	0.142
Extension lag	5.66 (0 to 15; 2.81)	5.04 (0 to 10; 2.99)	0.272
Degree of active flexion	99.17 (80 to 125; 10.16)	98.91 (70 to 120; 8.83)	0.887
ROM	92.06 (70 to 120; 11.58)	92.79 (65 to 115; 9.21)	0.718
TUG	18.43 (10.0 to 55.0; 7.22)	16.51 (9.0 to 33.0; 5.26)	0.120
Walking aid during TUG	6 (11.3%)	4 (7.5%)	0.741
Complication (Numbness)	3 (5.7%)	4 (7.5%)	1.000
POD28 (case No.)	48	48	
Degree of passive extension	-0.81 (-5 to 0; 1.76)	-0.58 (-10 to 0; 1.89)	0.540
Degree of active extension	-4.88 (-15 to 0; 4.04)	-4.54 (-20 to 0; 3.95)	0.684
Extension lag	4.06 (0 to 10; 3.16)	3.96 (0 to 10; 2.83)	0.865
Degree of active flexion	109.42 (90 to 140; 10.45)	107.81 (90 to 130; 8.62)	0.414
ROM	104.54 (80 to 140; 11.09)	103.27 (70 to 127; 10.39)	0.564
TUG (seconds)	14.14 (7.0 to 28.0; 3.71)	12.89 (8.0 to 20.0; 2.56)	0.057
Walking aid during TUG	1 (2.1%)	1 (2.1%)	1.000
Complication (Numbness)	6 (12.5%)	6 (12.5%)	1.000
TUG time of up and go test, ROM range of motion.			
* significant statistical difference between two groups			

4. Discussion

The present study examines the impact of a shortened MRJB duration on knee swelling and early postoperative rehabilitation in primary unilateral TKA based on ERAS protocols without a tourniquet. The most important finding in this study is that a shorter duration of MRJB application did not result in increased knee swelling.

Several randomized controlled trials have shown that MRJB is ineffective in reducing knee swelling, pain, or postoperative bleeding after TKA. For example, Piya et al. [12] found no difference in knee swelling,

pain, or blood loss between MRJB and conventional wound dressings with traditional, including the use of a tourniquet, in 2013. Similarly, Yu et al. [10] reported no significant difference in knee swelling between MRJB and no-compression groups in enhanced-recovery TKA using a non-tourniquet technique in 2018. When a tourniquet is used, compression bandages are thought to stabilize intra-articular pressure and reduce bleeding; however, this may not be necessary in non-tourniquet procedures. [7]

Feng et al conducted a systematic review evaluating the effectiveness of MRJB in TKA, including 5 RCTs. The review found no significant differences in total blood loss, pain score, range of motion, or knee circumference between MRJB and alternative methods. [19] Our findings align with these results, suggesting that when TKA is performed without a tourniquet and complete intraoperative hemostasis is effectively managed, long-duration MRJB may not be necessary to control knee swelling. In our study, we employed a multimodal approach, which included periarticular multi-drug injections and intravenous tranexamic acid—treatment strategies known to be effective in reducing knee swelling. [9, 10] This likely contributed to the lack of significant differences in swelling between the two groups. The combination of these interventions, as part of an ERAS management protocol, appears to mitigate swelling effectively, making extended MRJB application unnecessary.

Extension lag, a common complication after knee surgery, is often associated with arthrogenic muscle inhibition caused by knee swelling. Consequently, extension lag can serve as an indirect measure of postoperative knee swelling. [20] Potential causes of extension lag include muscle weakness, joint stiffness, and postoperative pain, and it is primarily a concern during the rehabilitation process. Our results showed no significant difference in extension lag between the two groups, indicating that both groups had similar levels of knee swelling and function.

While the long-time MRJB group showed slightly better passive knee extension on postoperative day 1 (POD1), the difference was minimal and likely within the measurement error range, thus not considered clinically significant. Furthermore, no differences were observed in other key rehabilitation parameters, including self-reported knee comfort, pain (VAS scores), range of motion (ROM), and Timed Up and Go (TUG) test results. This suggests that prolonged MRJB application did not enhance rehabilitation outcomes. In fact, while long-time MRJB did not hinder mobilization, it also did not improve postoperative function, likely due to its minimal impact on swelling. These findings are consistent with previous studies. For instance, Chaturong et al. [16] found no benefit of MRJB over non-compressive dressings in terms of postoperative pain scores, ROM at discharge, or complication rates. Similarly, Yu et al. [10] reported no significant differences in pain, ROM, or complications between MRJB and no-compression groups. In our study, the TUG test, which measures basic mobility and balance through tasks such as sit-to-stand, walking, and turning was unaffected by the timing of MRJB application, further supporting the lack of impact on functional recovery. [18] Li et al conducted a meta-analysis indicating patients with MRJB had not required the additional advantage compared to the conventional wound dressing in terms of range of motion, visual analog scale pain sores, and operative time for TKA. [21]

Several limitations exist in our study. First, we did not measure the sub-bandage pressure in each patient. It is possible that the pressure under the bandage may only be maintained for a short period of time.[12] If postoperative pressure monitoring could confirm that compression is sustained briefly, it would provide stronger evidence that prolonged compression bandaging is unnecessary. Second, our study focused on patients who have primary osteoarthritis, limiting the generalizability of the results to individuals with secondary osteoarthritis or inflammatory arthritis, where postoperative swelling and recovery dynamics may differ. Additionally, the long-time group only had one extra night of compression bandaging compared to the short-time group. On the night of surgery, multiple factors—such as nurse rounds, infusion, and ward noise—could have affected patient comfort, making it difficult to detect differences in subjective comfort between the two groups. Despite these limitations, they did not affect the core findings of this study. Our conclusion specifically applies to TKA patients with primary knee osteoarthritis who are managed under ERAS protocols without tourniquet.

5. Conclusions

This study demonstrates that the short-time application of MRJB (4 hours) does not worsen postoperative knee swelling compared to long-duration (24 hours) MRJB. Moreover, prolonged MRJB use did not improve postoperative rehabilitation outcomes. As multimodal strategies have already proven effective in reducing knee swelling, the extended use of MRJB may no longer be necessary for patients undergoing primary TKA without a tourniquet. Given the clinical dogma surrounding MRJB, many clinicians may find it challenging to completely abandon its long-duration use. However, our study suggests that short-time postoperative compression bandaging is a viable alternative—one that can be easily adopted and promoted in clinical practice.

Abbreviations

MRJB, Modified Robert Jones Bandage

TKA, total knee arthroplasty

BMI, body mass index

VAS, visual analogue scale,

TUG, time of up and go test

ROM, range of motion

POD: postoperative day.

Declarations

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Human Ethics and Consent to Participate declarations:

The present study was conducted in accordance with the Declaration of Helsinki. Moreover, the study protocol was approved by the Medical Ethics Committee of Zhongshan Hospital Fudan University(**B2021-614R**). The dissemination of personal data is contingent on the explicit consent of all individuals involved, a consent that has been obtained in written form from each participant. In the event that a request is submitted for the relevant documentation, consent will be granted for the consent form to be reviewed.

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Consent for publication: Not Applicable

Availability of Data and Materials: The relevant datasets, along with the analytical methods employed in the present study, are available upon reasonable request from the corresponding author.

Author Contribution

Authors' contributions:Yun-qi Jiang: Writing - original draft, Investigation, Data curation. Yue-jun Lin: Supervision, Investigation, Data curation. Yu-zhu Wang: Supervision, Resources, Data curation. Bing-xuan Hua: Formal analysis, Data curation. Qing Xia: Investigation, Data curation. Yun-chao Shao: Writing - review & editing, Project administration, Investigation, Formal analysis, Conceptualization.

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Figures

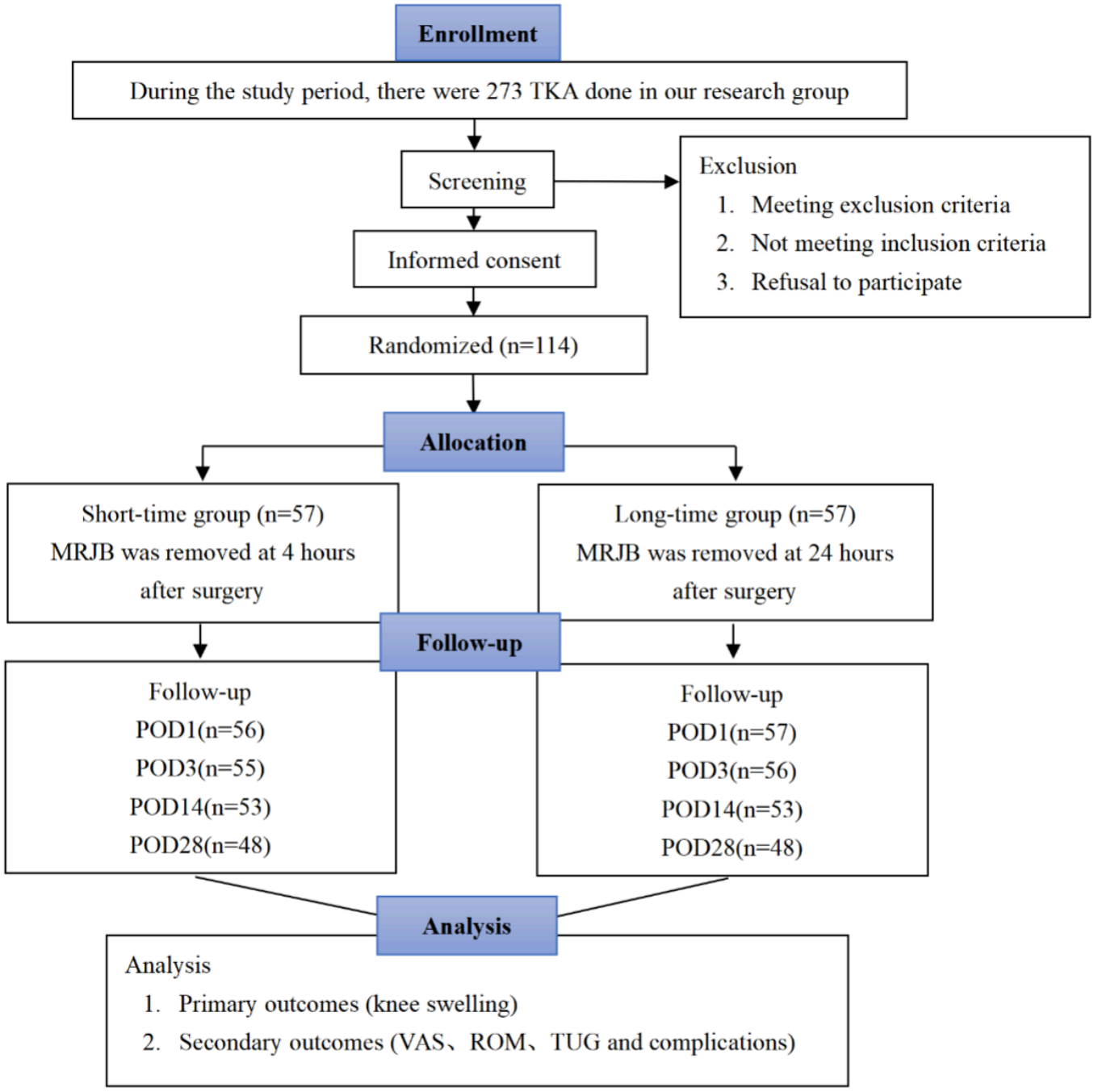

Figure 1

Flowchart of the study



Figure 2

A MRJB is shown on a patient

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