A criterion for manipulation under anesthesia for stiffness after total knee arthroplasty

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Key words / total knee arthroplasty, manipulation under anesthesia, criterion

[Background]
Stiffness has been described as a frustrating complication after total knee arthroplasty (TKA). There are many reports that recommend manipulation under anesthesia (MUA) for stiffness after TKA. We previously reported that MUA could improve flexion range of motion (ROM) by about 20 degrees, demonstrating the effect of MUA. However, the timing and criteria for MUA are unclear. Regarding the timing, Yercan et al. suggested that MUA at three weeks after TKA can improve flexion ROM at final follow up. Therefore, the aim of this study was to examine flexion ROM in the preoperative period and three weeks after TKA and to identify a criterion for performing MUA at three weeks after TKA.

[Methods]
A retrospective analysis of 281 knees (208 patients) that underwent a primary TKA in our hospital between July 2013 and July 2017 was performed. The clinical outcome was passive flexion ROM in the preoperative period and three weeks after TKA, and the presence or absence of MUA less than one year after TKA. First, a regression line was calculated using the preoperative flexion ROM as an explanatory variable and the flexion ROM at three weeks after TKA as a criterion variable. Second, using this regression line, the predicted value of flexion ROM at three weeks after TKA was calculated for each case. Third, the measured flexion ROM at three weeks after TKA was divided by the predicted flexion ROM to calculate the flexion ROM achievement rate. To identify a criterion value for performing MUA, the cut-off value was determined using a receiver operating characteristic (ROC) curve with the flexion ROM achievement rate as an explanatory variable and the presence or absence of MUA as a criterion variable, and the accuracy was evaluated by the area under the curve (AUC).

[Results]
MUA was performed in 6% (17/281 knees) of cases. The ROC curve plotted for the flexion ROM achievement rate showed an optimal cut-off value of 93%, with sensitivity of 88% and specificity of 89%. The AUC was 0.93 (95%CI : 0.89-0.97), and the accuracy for predicting whether to perform MUA was high.

[Conclusion]
The flexion ROM achievement rate with the optimal criterion for performing MUA was 93%. If the flexion ROM achievement rate is less than or equal to 93% at three weeks after TKA, it is necessary to consult with the surgeon about MUA based on the patient's wishes. In a future study, we will consider prospectively the validity of this criterion.

[Ethical considerations]
The research protocol conformed to the Declaration of Helsinki, and the study protocol was approved by the Nittutaduka Medical and Welfare Center’s ethics committee.

The effects on the knee flexion angle at 8 weeks postoperatively by swelling management using medical gauze and elastic bandaging during hospitalization after a total knee arthroplasty

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Key words / sustained compression, swelling, knee flexion angle

[Background/Purpose]
We aimed to examine the effects on postoperative thigh circumference, knee pain, and knee flexion angle by compression with medical gauze and elastic bandaging in patients with total knee arthroplasty (TKA).

[Methods]
The subjects were 34 knees who underwent the primary TKA between March and July in 2018. Exclusion criteria were those who had spinal fusion, total hip replacement. All surgeries were performed by one experienced orthopedic surgeon and physical therapy was performed according to our TKA postoperative protocol. Subjects were randomly assigned to an elastic bandage group and a control group. The elastic bandage group contained 17 knees (female 16, age 72.4 ± 5.9 years, BMI 28.0 ± 2.3 kg/m²) and the control group contained 17 knees. There was no significant difference between the two groups in preoperative data. The elastic bandage is gradually compressed from the proximal lower thigh to the distal femur while the medical gauze is tightly squeezed and placed around the patella. It continued to compress a 24-hour basis except during the shower from the second postoperative day to the discharge day. We evaluated the above knee circumference, knee pain and knee flexion angle at preoperatively and at 1 week postoperatively. Additionally, the knee flexion angle was evaluated during surgery and at eight weeks postoperatively. The circumference and knee pain were adopted by dividing the 1 week postoperatively by the preoperative value. The values obtained by dividing the 1- and 8-week postoperative values by the preoperative value were used (1/w/intra, 8/w/intra). Statistical analysis was used the Mann-Whitney U test to compare between the elastic bandage group and the control. The significance level was less than 0.05.

[Results]
The circumference of the elastic bandage group (1.06 ± 0.04) was significantly lower than the control group (1.10 ± 0.03). The knee pain of the elastic bandage group (0.71 ± 0.39) was significantly lower than the control group (1.53 ± 1.04). There was no significant difference between the elastic bandage group (0.80 ± 0.11) and the control group (0.77 ± 0.11) in 1/w/intra knee flexion angle. The 8/w/intra knee flexion angle of the elastic bandage group (0.93 ± 0.07) was significantly higher than the control group (0.87 ± 0.07).

[Discussion/Conclusion]
It was found that swelling management using elastic bandaging during hospitalization reduced swelling rather than the control group at 1 week postoperatively. It was effective to compression using medical gauze and elastic bandaging reduced swelling, decreased knee pain, therefore increased knee flexion angle at 8 weeks after TKA.

[Ethical considerations/Informed consent]
We explained to subjects and agreement was obtained. This research has been approved by the Seijoh University Ethics Committee.