

THE IMPACT OF STATIC PROGRESSIVE STRETCH ON THE RANGE OF MOTION IN HAEMOPHILIC PATIENTS AFTER TOTAL KNEE REPLACEMENT

INTRODUCTION

Haemophilic arthropathy is often associated with the loss of range of motion. The total knee arthroplasty (TKA) is an effective treatment option for patients with end-stage haemophilic arthropathy of the knee. However, despite the arthroplasty, the range of motion is sometimes still insufficient. The static progressive stretch using the joint active system (JAS) is an adjunctive technique to traditional physiotherapy, with the goal of restoring the functional range of motion (ROM) and decreasing the knee stiffness and pain. Numerous studies have shown the efficacy of these particular devices for the treatment of stiff knees in non- haemophilic patients after the TKA. The purpose of this study was to evaluate the static progressive stretch as a treatment method for haemophilic patients with decreased range of motion after the TKA.

METHODS

We analysed 26 consecutive haemophilic patients after the TKA performed at our department from 2010 to 2018. Some of them were operated bilaterally and altogether 35 TKA were performed. The inclusion criterion for the study was insufficient ROM. Our study group consisted of patients whose active flexion was less than 80° and/or whose active extension lag was more than 10°.

Five patients (seven knees) were found to fulfill those criteria. The average age of the study group was 54.2 years (mean ± SD age, 54.2 ± 8.8). Each patient had previously received standard physiotherapy. The patients were treated additionally with the JAS orthosis that utilized the principles of the static progressive stretch for a mean of 20 weeks (range 9 to 30 weeks).

The JAS orthosis was used in two 30-minute sessions per day following the protocol (Step 1-4). The self-treatment was performed at patient's home.

The outcome was measured by the Knee Injury and Osteoarthritis Outcome Score and the Knee Society Score performed before the treatment and after the treatment. Every week the range of motion was measured with a goniometer.



Figure 1: The Joint Active System (JAS) knee device was used by patients two to three times per day in 30-minute treatment sessions

STEP 1: Rotate the therapy knob until a gentle, pain-free stretch is felt - level 2-3 on the stretch intensity scale.

STEP 2: Hold the stretch position for 5 minutes. Before turning the knob, re-assess the stretch level: 1. If the stretch intensity has decreased, rotate the knob until you feel the 2-3 level stretch again. 2. If the stretch intensity has not changed, leave it in the same position. 3. If the stretch intensity has increased, rotate the knob in the opposite direction until the 2-3 level stretch is felt.

STEP 3: Hold the stretch position for another 5 minutes. Repeat the steps 2 and 3 for a series of six 5-minute stretches (a 30-minute therapy session).

STEP 4: When the 30-minute session is complete, turn the knob in the opposite direction until the stretch is relieved, then remove the device. You may feel some joint stiffness following your JAS session. Gently move your joint back and forth to "cool down" and relieve the stiffness.



Figure 2: JAS TREATMENT PROTOCOL

RESULTS

Knee	Type of orthosis	Treatment time (weeks)	KOOS										KSS*		ROM*	
			Pain*		Symptoms		FDL		FSR		QL		Before	After	Before	After
			Before	After	Before	After	Before	After	Before	After	Before	After				
1	JAS Ext.	30	77.78	77.78	71.43	64.29	92.65	82.35	20	20	87.5	87.5	59	64	25/90	15/95
2	JAS Ext.	30	69.44	77.78	64.29	64.2	72.06	76.47	10	0	87.5	87.5	59	59	30/90	20/90
3	JAS Flex.	30	100	100	71.43	71.43	100	72.06	20	20	31.25	37.5	64.5	65.5	15/70	12/80
4	JAS Ext.	20	85.71	97.22	100	67.86	95.59	100	20	20	75	81.25	74.5	79.5	20/95	10/95
5	JAS Ext.	20	85.71	97.22	100	67.87	95	100	20	20	75	81.25	77.5	81	15/100	10/110
6	JAS Flex.	13	88.89	88.89	57.14	57.14	52.94	52.94	0	0	0	0	55.5	56.5	15/55	15/65
7	JAS Ext.	9	80.56	72.22	39.29	42.86	83.82	73.53	0	0	62.5	56.25	63.5	68.5	20/85	20/85
Average±SD		22±8	84.01±9.5 5	87.30± 11.3	71.94±22 .05	62.23± 9.63	89.95±16. 78	79.62±1 6.60	12.85±9 .51	11.43± 10.69	59.82±3 2.64	61.61±3 2.95	64.8±8.2 7	67.7±9. 45	18/84±6 /16	15/89± 4/14

Table 1: KOOS - Knee injury and Osteoarthritis Outcome Score (pain, other symptoms, FDL - Function in Daily Living, FSR - Function in Sport and Recreation, QL - Quality of Life); KSS - Knee Society Score; ROM - Range of Motion, JAS - Joint Active Systems; * P<0,05

We found no statistically significant change in the KOOS comparing the pre-treatment and post-treatment values, however, we found statistically significant change in the Pain subscale, as well as statistically significant improvement in KSS comparing the pre-treatment and post-treatment values.

Comparing the pre-treatment and post treatment values, the ROM in our study group increased in the way that the average extension lag decreased and the average flexion of the knee increased. The changes were statistically significant.

For the statistical analysis we used the t-test. The P-value of less than 0,05 was regarded as statistically significant.

DISCUSSION

The static progressive stretch using the orthotic device is a successful method for the treatment of joint stiffness in haemophilic patients after the TKA. The study showed an increase in the total range of motion and an increase in the KSS, however, we found no statistically significant difference in the KOOS after the treatment. Most patients reported less stiff knees and better joint function. Our study supports the use of the static progressive stretch orthosis as an effective treatment of decreased ROM in haemophilic patients after the TKA. Due to the small study group and the short observation period more studies will be needed to evaluate the value of our results.