

# Factors influencing the range of motion for total knee arthroplasty in haemophilic patients

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## OBJECTIVES

Recurrent haemarthrosis causes arthropathy in many haemophilic patients, leading to stiff painful joints. Knees and ankles are the major target joints which start to show symptoms of arthropathy as early as the third decade of life. Currently the only established treatment for severe knee arthropathy is total knee arthroplasty (TKA). However, it is well known amongst surgeons that TKAs to haemophilic patients have less mobility compared to those with osteoarthritis. Here, we analyzed data to determine factors affecting the surgical outcome focusing on postoperative range of motion.

## PATIENTS & METHODS

19 haemophilic patients (haemophilia A=16; haemophilia B=3; all male) receiving 20 TKAs, who have been followed for more than 6 months were included. The severity were severe=3; moderate=2; mild=2 and 5 had inhibitors. The mean age  $\pm$  SD was  $44.0 \pm 10.8$  and mean BMI  $\pm$  SD was  $22.9 \pm 2.9$ . Range of motion was analyzed thoroughly and the outcome was defined as 'good' when all three, 'fair' when two, 'poor' when one or less of the following conditions were satisfied.

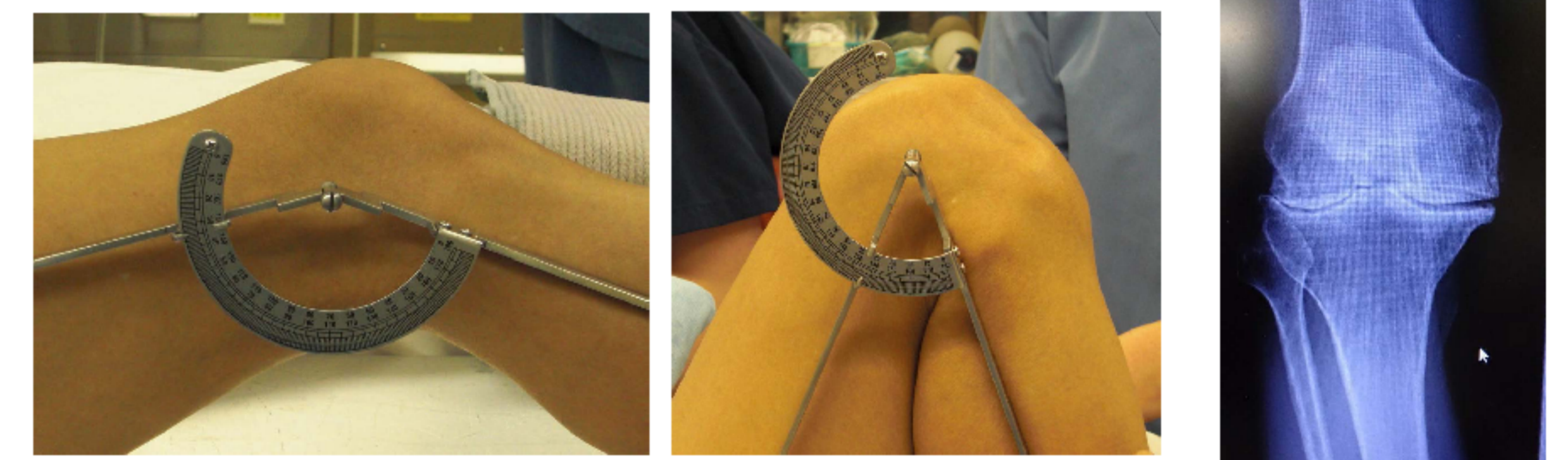
- (1) Flexion  $\geq 100^\circ$
- (2) Flexion contracture  $\leq 10^\circ$
- (3) active range of motion (ROM)  $\geq 80^\circ$

We also assessed preoperative ADL i.e. walking with or without a cane, perioperative data (operation time, blood loss, gap balance), quadriceps and hamstring muscle strength, ambulatory function (80m test), duration of hospital admission, to evaluate the influence on ROM. Gap balance was measured using Stryker® JDK-mini system. Wilcoxon rank sum test, Fisher's exact test were used appropriately to evaluate statistical significance.

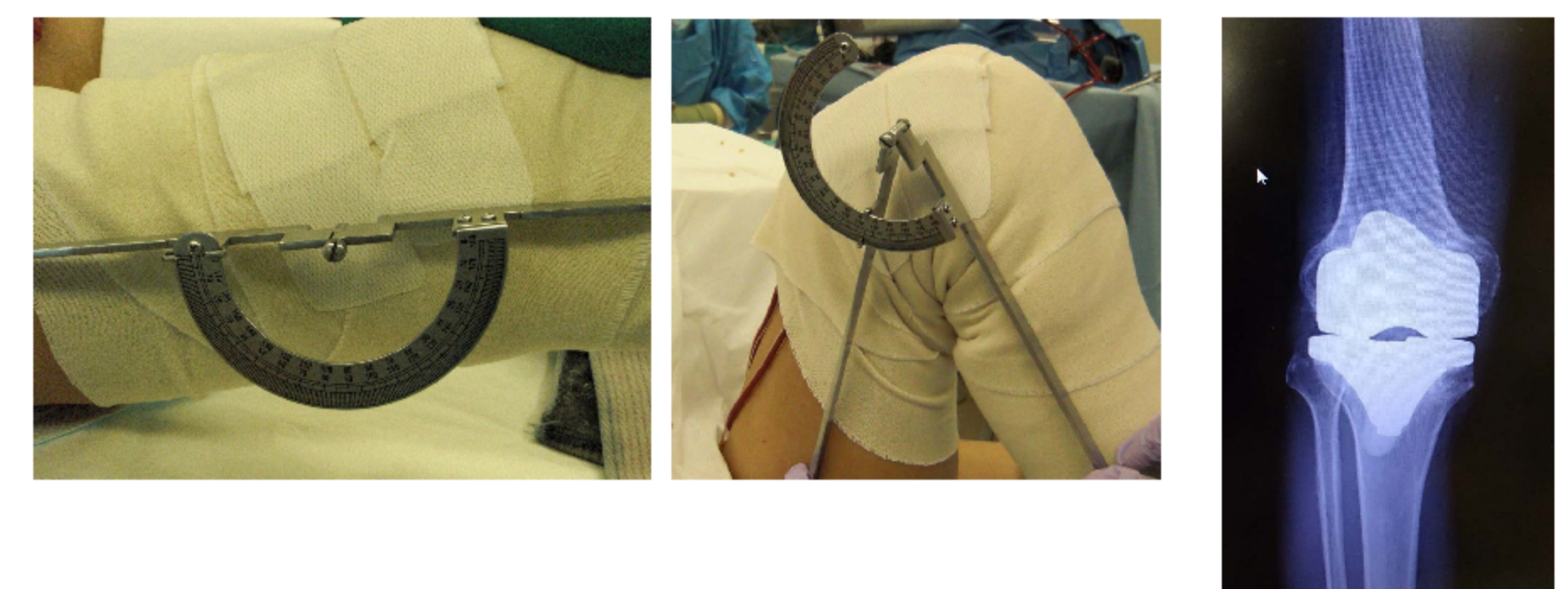
## RESULTS

Outcome	Good	Fair	Poor
No. of knees	12	3	5
Haemophilia A/B	10/2	3/0	4/1
Inhibitor +/-	1/11	2/1	2/3

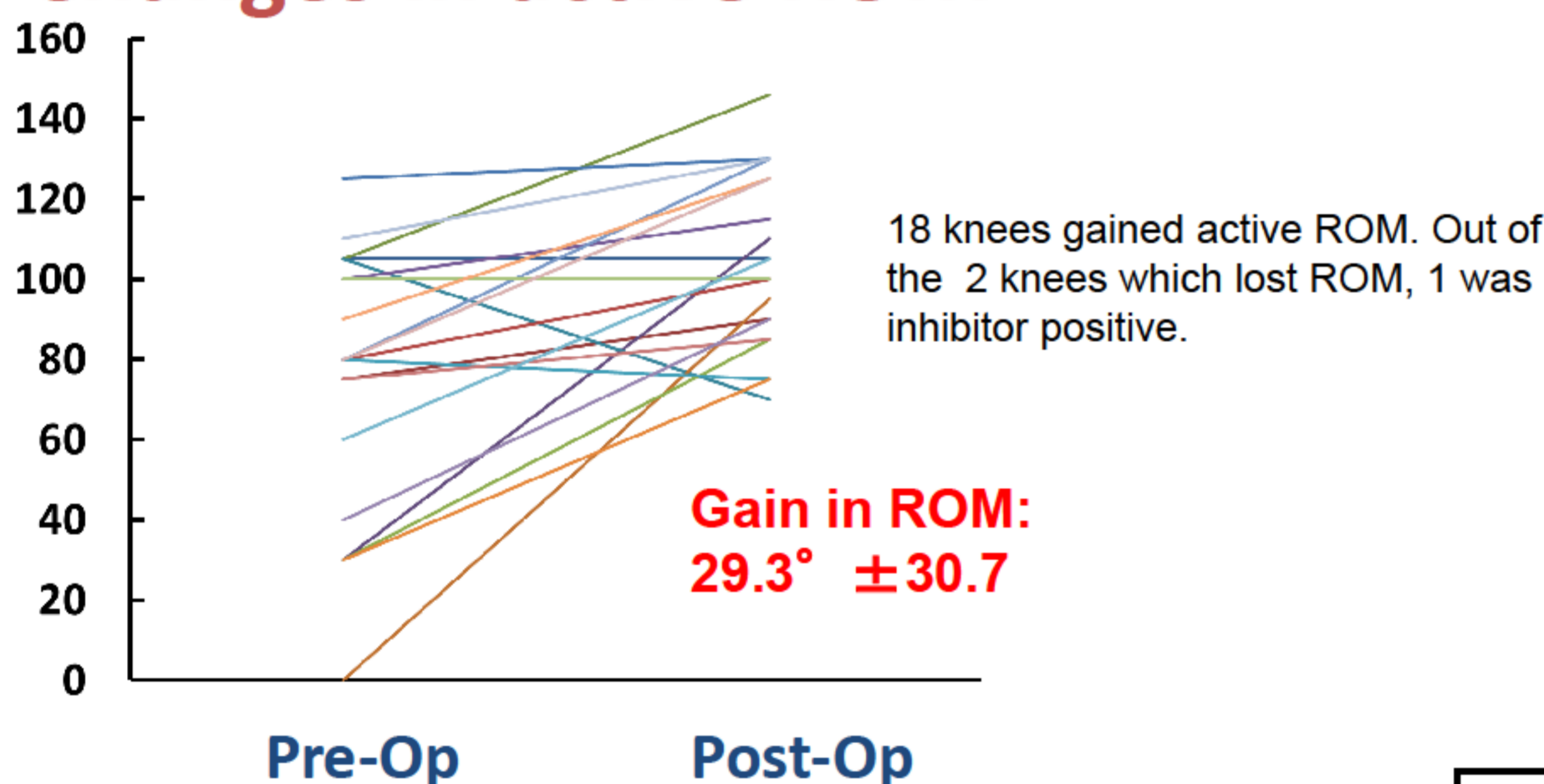
Pre-Operation



Post-Operation



### Changes in active ROM



### Factors affecting the Outcome

#### Good vs Fair/Poor

		Outcome (Mean $\pm$ SD)		p-value*	
		Good	Fair/Poor		
Pre-operation	ROM	Flexion	109.2° $\pm$ 7.3	76.9° $\pm$ 11.3	0.04
		Flexion contracture	20.4° $\pm$ 3.2	21.3° $\pm$ 4.3	0.67
	Muscle strength	Hamstring	96.5N $\pm$ 8.2	87.5N $\pm$ 14.1	0.43
		Quadriceps	108.2N $\pm$ 19.1	79.8N $\pm$ 15.8	0.43
		80m test	61.7s $\pm$ 5.1	89.7s $\pm$ 15.7	0.28
Intra-operation	ROM	Flexion	120.8° $\pm$ 4.5	103.5° $\pm$ 5.0	0.03
		Flexion contracture	0° $\pm$ 0	1.25° $\pm$ 1.3	0.26
	Gap balance	Extension gap	13.0mm $\pm$ 0.7	13.8mm $\pm$ 1.2	0.53
		Flexion gap	16.8mm $\pm$ 1.2	17.1mm $\pm$ 1.7	0.81
	Operation	Operation time	92.8min $\pm$ 4.5	92.8min $\pm$ 5.8	1
Post-operation	Muscle strength	Blood loss	590.4ml $\pm$ 134.4	442.5ml $\pm$ 80.0	0.73
		Hamstring	108.3N $\pm$ 7.6	116.2N $\pm$ 17.9	0.28
		Quadriceps	110.0N $\pm$ 14.4	121.5N $\pm$ 23.2	0.62
	80m test	55.5s $\pm$ 3.2	76.3s $\pm$ 11.6	0.15	
Hospitalization	Days	37.6 $\pm$ 4.0	59.3 $\pm$ 14.0	0.03	

p-value: Wilcoxon rank sum test

### Categorical Factors affecting the Outcome

	Poor Outcome		
	p-value	Odds ratio	95%CI
Haemophilia A/B	1	1.4	0.11-18.6
Inhibitor +/-	0.1089	11	0.93-130
Use of cane	0.0648	9	1.14-71.0

p-value: Fisher's exact test (two-sided)

The outcome was not statistically significant by the type of haemophilia nor the presence of inhibitors. However, the odds ratio were high for inhibitor positive patients and patients using cane.

Factors affecting the outcome were preoperative ADL, pre- and intra-operative ROM. Hospital stay was significantly shorter for those with better ROM. Neither the gap balance nor muscle strength had correlation with the final outcome.

## CONCLUSIONS

The study findings show that the mobility of the patient, and pre- and intra-operative ROM are the important factors determining the outcome, which gives us suggestions on the timing of TKAs to haemophilic patients. Operations should be carried out while the patients and their knees are mobile.

