Is the limited use of tourniquet during total knee arthroplasty more beneficial in contemporary enhanced recovery protocol? A prospective randomized controlled trial

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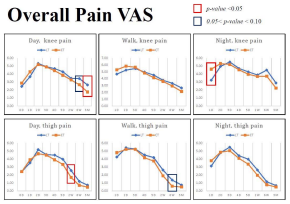
INTRODUCTION: This prospective randomized controlled trial aimed to determine whether the limited use of tourniquet during total knee arthroplasty (TKA) would be more beneficial under the contemporary enhanced recovery after surgery (ERAS) protocol than the conventional use of tourniquets.

METHODS: One hundred patients with knee osteoarthritis who underwent primary TKA were randomly assigned to the limited tourniquet (LT, n=51) and conventional tourniquet (CT, n=49) groups. Operation time, serial hemoglobin drops, calculated blood loss, transfusion rate, D-dimer levels, and the presence of deep vein thrombosis (DVT) were assessed. In addition, visual analog scale (VAS) scores for pain around the knee and thigh were separately measured during the daytime (resting), night, and ambulation. Opioid consumption, range of motion, knee circumference, and postoperative complications were also analyzed. Isokinetic muscle strength, knee injury and osteoarthritis outcome scores, and Euro-QoL-5D scores were also assessed before and 3 months after TKA.

RESULTS:

The average tourniquet time was 46.7 minutes in the CT group and 5.4 minutes in the LT group. The VAS score of knee pain on the first night after surgery was significantly higher in the CT group (3.22 vs. 4.61, p=0.033). However, the daytime VAS scores of the thigh at 2 weeks and the knee at 3 months after TKA were higher in the LT group than in the CT group (p=0.048 and p=0.036, respectively). The D-dimer level 3 months after TKA was also higher in the LT group than in the CT group (p=0.028), but there was no difference in DVT incidence between the two groups. Additionally, there were no significant differences in the other variables between the groups.

DISCUSSION AND CONCLUSION: Although the limited use of tourniquets did not increase the operation time, blood loss, and transfusion rate, this study found that the limited use of tourniquets would not provide additional meaningful benefit in reducing pain and functional restoration after TKA, to which the contemporary ERAS protocol has been applied.



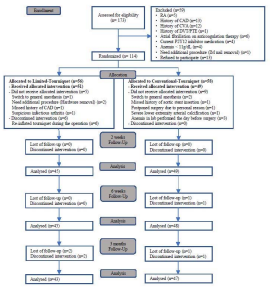


Table 1. Comparison of operation time and postoperative laboratory parameters between LT group and CT group

	LT Group	CT Group	P-value
Tourniquet time (min)	5.44 (1.37)	49.69 (7.10)	**<0.001**
Operation time (min)	61.09 (7.0)	63.13 (6.4)	0.143
Hb level (g/dL)			
Pre	13.07 (1.07)	13.35 (1.11)	0.227
2D	10.66 (0.93)	11.21 (1.04)	**0.008**
5D	10.72 (1.05)	11.28 (1.14)	**0.015**
6W	12.36 (0.99)	12.69 (1.17)	0.135
3M	13.18 (0.87)	13.42 (1.10)	0.271
Hb drop	2.69 (0.82)	2.40 (1.02)	0.133
Calculated blood loss (mL)	734.72 (224.93)	649.94 (276.18)	0.108
D-dimer			
Pre	0.53 (0.36)	0.59 (0.62)	0.564
2D	2.07 (0.97)	2.04 (1.01)	0.912
5D	3.57 (1.52)	3.29 (1.16)	0.318
6W	3.08 (1.31)	2.75 (1.24)	0.204
3M	1.70 (0.72)	1.38 (0.60)	**0.027**
CRP (SD)	4.79 (4.09)	4.14 (2.35)	0.358

Values are presented as mean (SD)
LT, limited tourniquet; CT, conventional tourniquet; Hb, Hemoglobin; CRP, C-reactive protein

Table 2. Comparison of preoperative and postoperative outcome score between LT and CT group.

	LT group	CT group	P-value
Preoperative			
KOOS			
Pain	40.1 (15.4)	44.8 (17.7)	0.189
Symptoms	50.4 (19.0)	50.8 (20.0)	0.927
ADL	39.3 (16.1)	43.3 (17.8)	0.169
Sports/recreation	13.6 (15.3)	10.7 (12.2)	0.321
QoL	27.6 (15.6)	27.2 (14.2)	0.901
EQ-5D	10.1 (1.5)	10.2 (1.6)	0.802
3 month postoperative			
KOOS			
Pain	65.7 (15.5)	68.5 (15.3)	0.403
Symptoms	65.5 (15.2)	65.8 (16.5)	0.508
ADL	66.3 (15.7)	68.1 (16.4)	0.603
Sports/recreation	25.3 (21.6)	29.4 (27.3)	0.438
QoL	47.3 (20.4)	48.5 (19.4)	0.772
EQ-5D	8.6 (1.5)	8.3 (1.3)	0.408

Values are presented as mean (SD)
LT, limited tourniquet; CT, conventional tourniquet