Intra- and postoperative blood loss with and without use of tourniquet in knee arthroplasty

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COI Disclosure Information
Presenter: Kengo Kaji

I have no financial relationships to disclose.

Pros and Cons of Torniquet use

■ EDITORIAL

Tourniquet use in knee surgery: is it time to move on?

A. A. Magan,
F. S. Haddad

The use of tourniquets to stop haemorrhage dates back to the Battle of Flanders in 1674.[1] With the passage of time they came to be used in elective surgery. There have been two main reasons for using a tourniquet in surgery: to reduce blood

Johnson et al[26] summarize the difficulties that a tourniquet can create for healing, including lack of oxygenation and perhaps lack of circulating antibiotic at the time of surgery.[27] It would appear that pain, reduced range of motion, and

Magan, A. A. & Haddad, F. S. *Bone Joint J* **103-B**, 805–806 (2021).

Reason for Using a Tourniquet

- Habit
- Clear surgical field
- Shorter operation time

- Decreased oxygen supply
- Reduced circulation of antibiotocs

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- Ischemic tissue damege
- pain
- Limited range of motion
- Infection
- deep pain thrombosis

Yi, S., et al.. *Arch Orthop Trauma Surg* **134**, 1469–1476 (2014).
Clarke, et al. *J Bone Joint Surg Br* **83**, 40–44 (2001).

The usefulness of tourniquet use in knee arthroplasty remains controversial

Objective

We evaluated the effects of tourniquet use on postoperative hemoglobin (Hb) levels, creatine phosphokinase (CPK) levels, intraoperative blood loss, total blood loss (TBL), and hidden blood loss (HBL) in knee arthroplasty cases

METHOD

Subjects:

83 knees that underwent knee arthroplasty in our department from 2022 to 2024

Male/Female： 31/60

Mean age： 74.2±8.45

operation： TKA/UKA：23 cases/68cases

Group classification:

Tourniquet group （T group）： **59cases**

Non-tourniquet group （NT group）： **32cases**

Comparative Parameters:

- **Hb and CPK on POD 1 and 7**
- **ΔHb**、**ΔCPK** (post-op minus pre-op values)
- Total Blood Loss (TBL) Calculated using Gross's formula
- Hidden Blood Loss (HBL) TBL minus Intraoperative Blood Loss

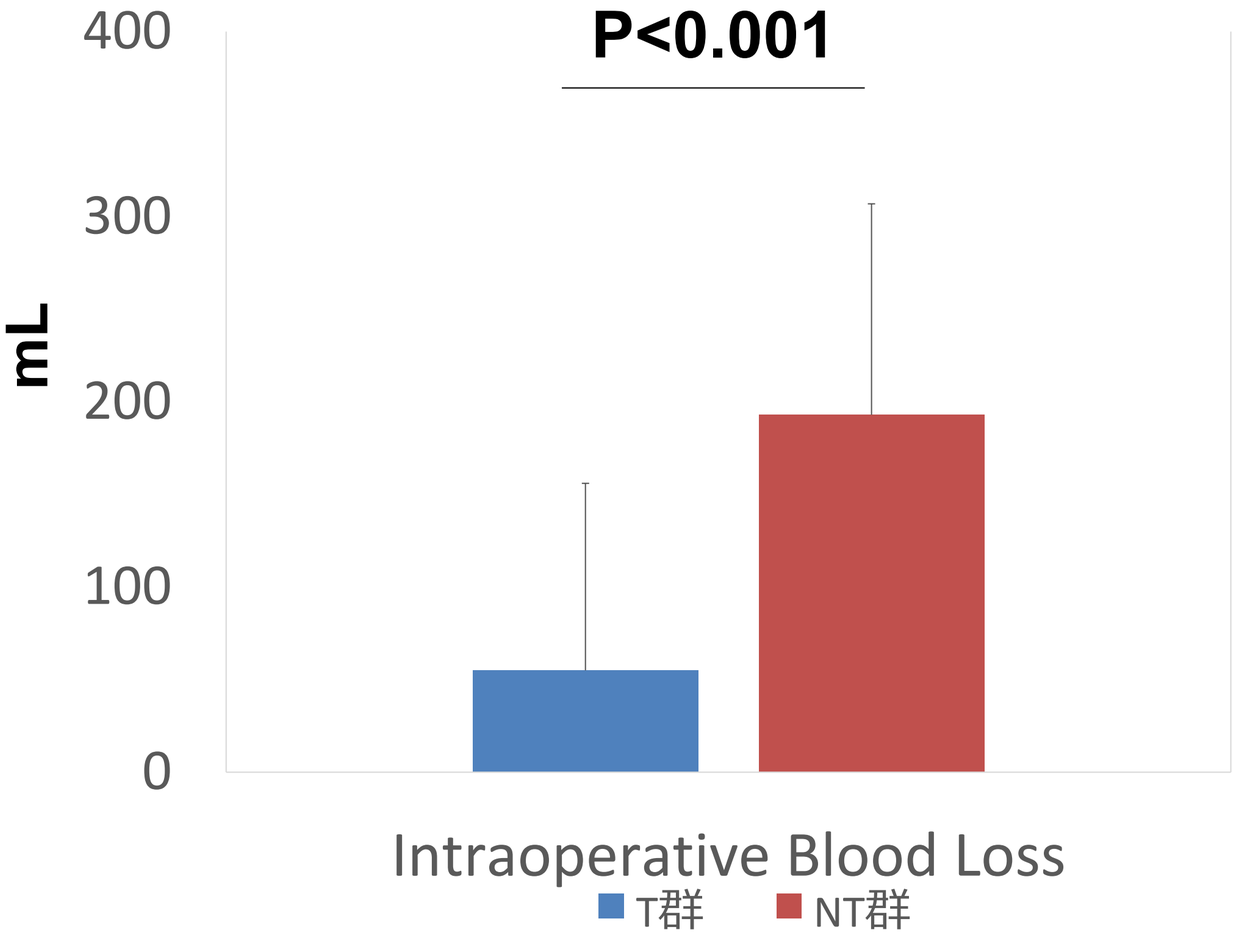
Results

Patient Characteristics

	T 群	NT群	*p*-values
Gender(M/F)	22/37	9/23	
TKA/UKA	17/42	6/26	
Age	74. 3 ±9.5	74.6±7.5	0.91
Body Weight	60.7±12.3	60.3±11.6	0.89
BMI	25.4±3.9	25.3±3.1	0.96
Pre Hb	12.8±1.5	12.9±1.1	0.86
Pre CPK	121.5±74.6	117.7±63.2	0.79

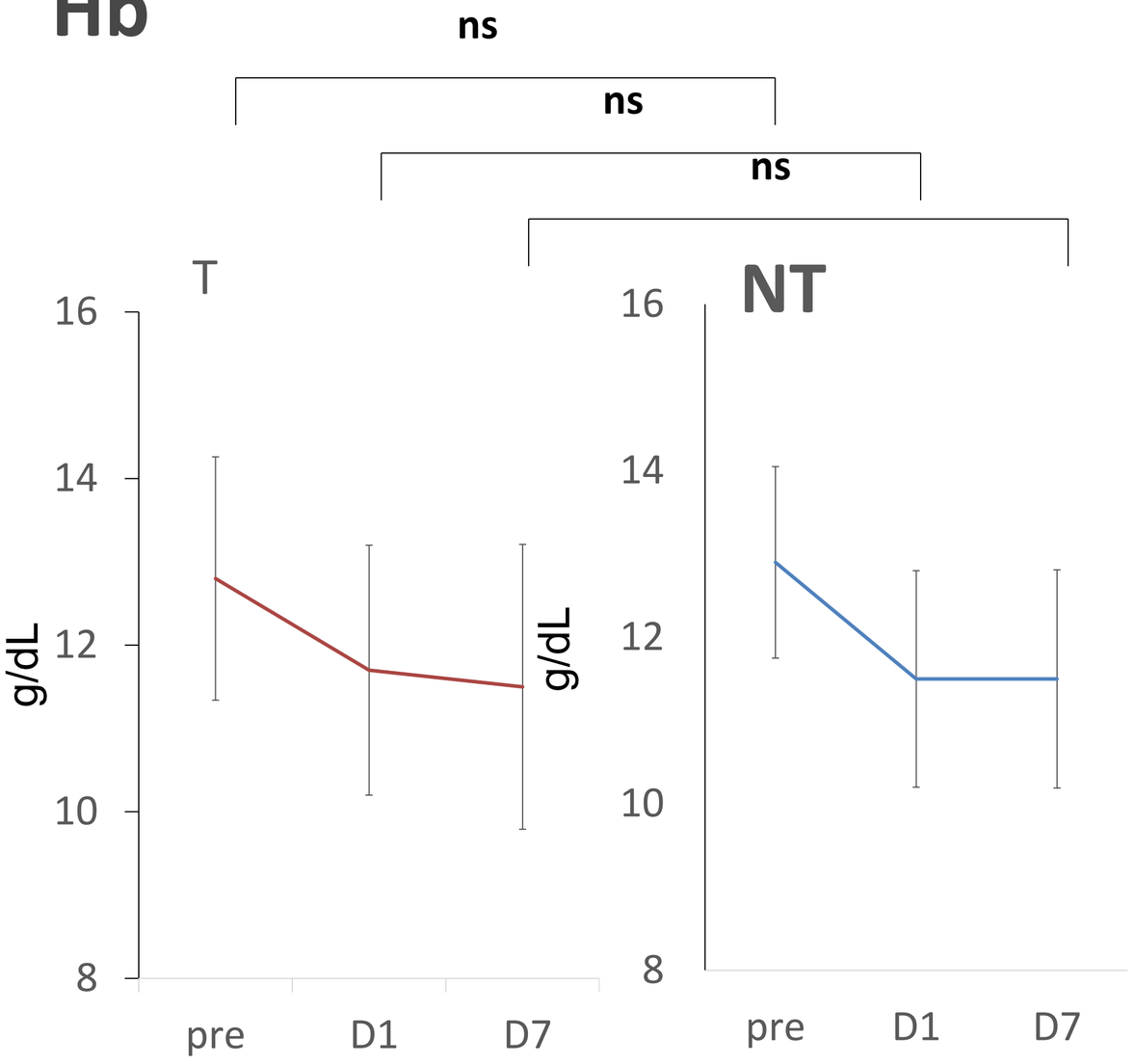
No significant difference

Intraoperative Blood Loss

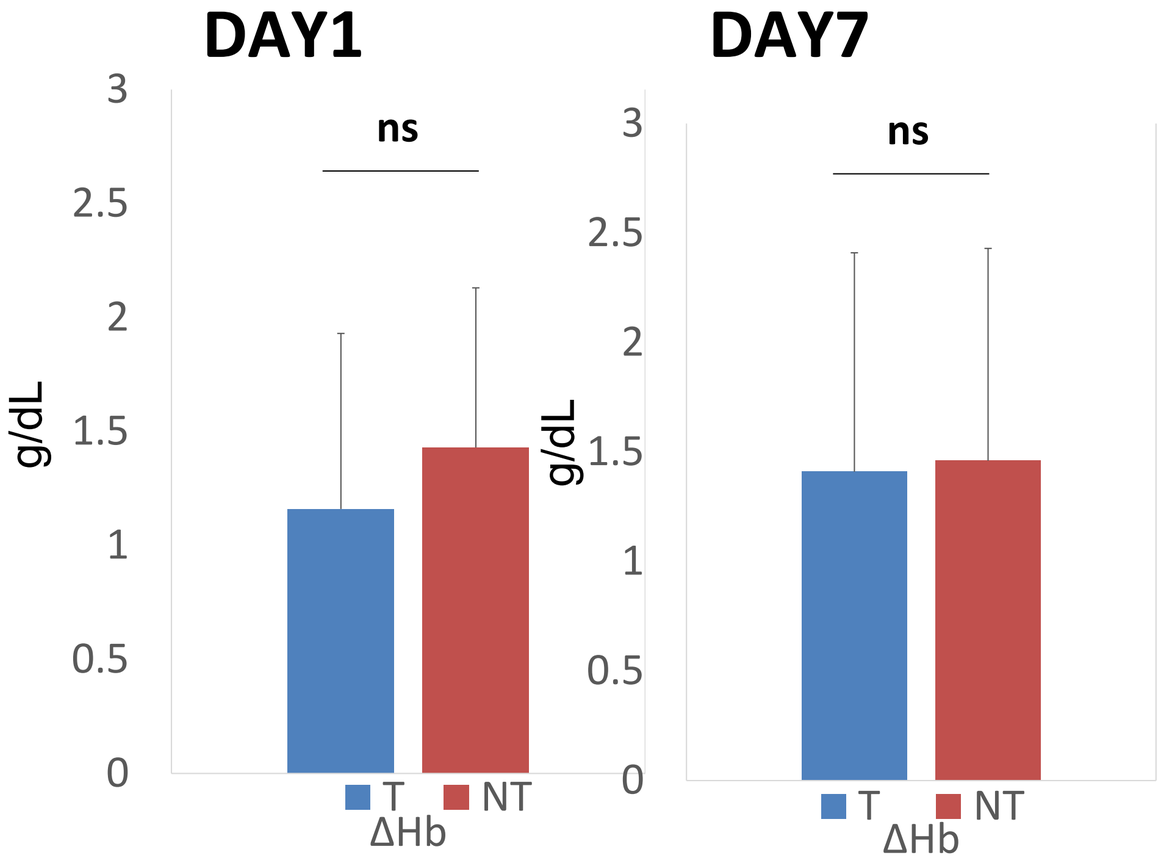


T < NT

Hb

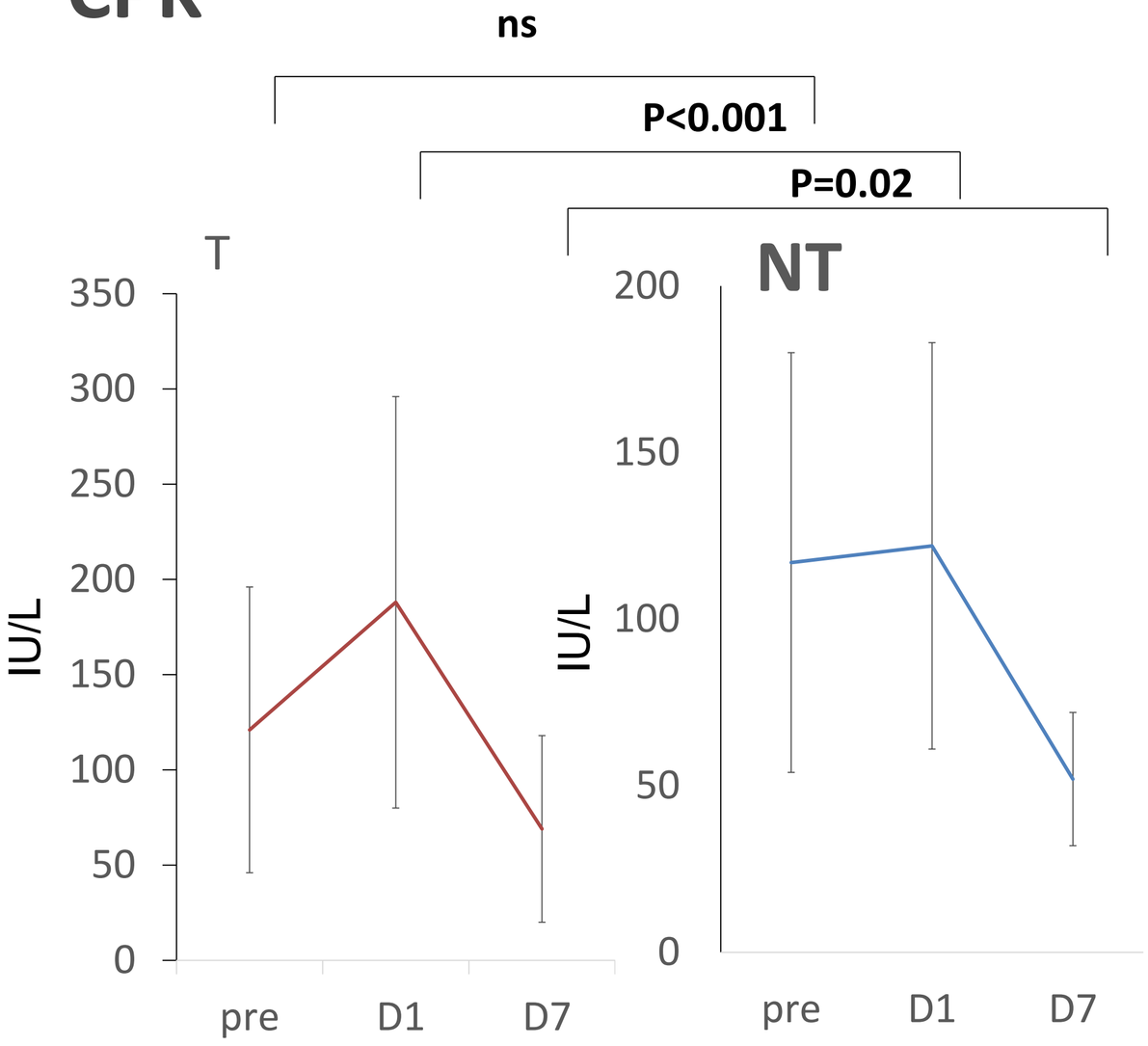


ΔHb



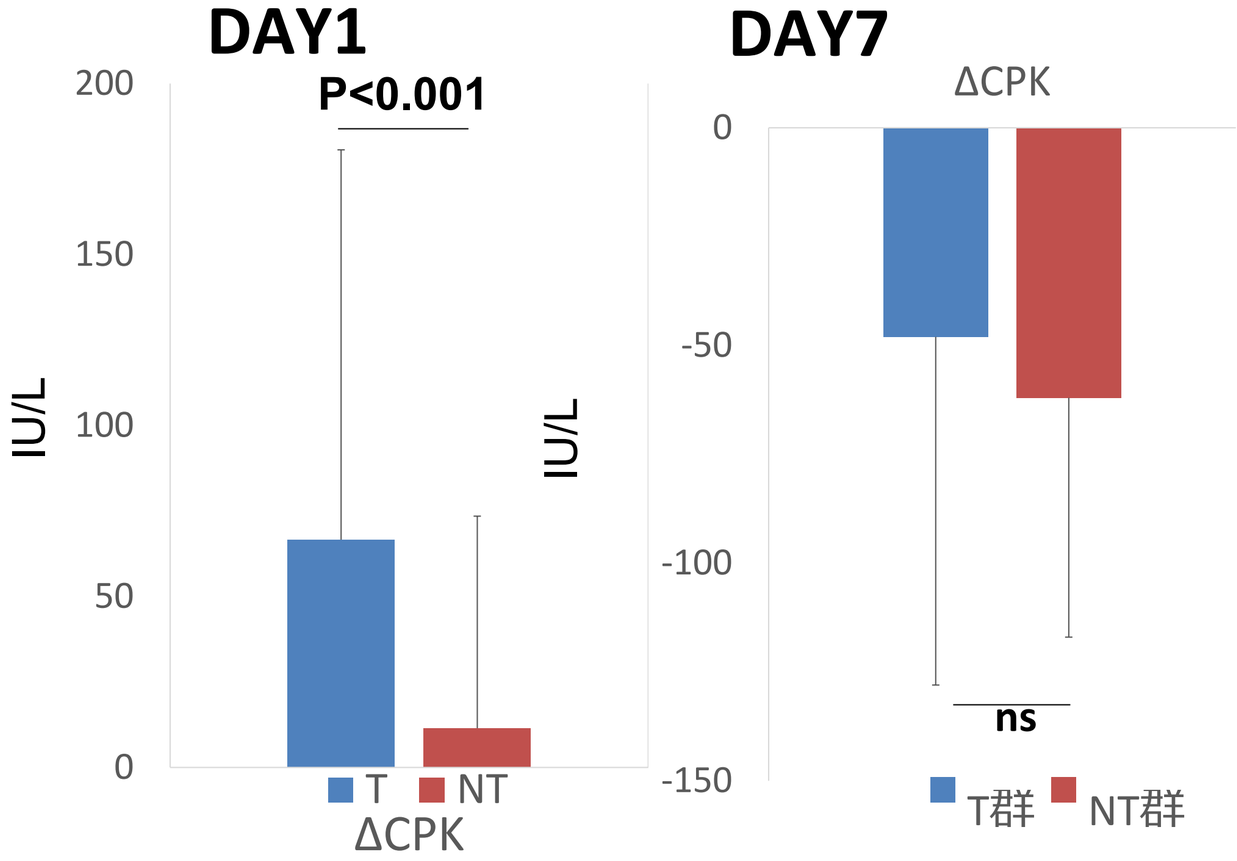
No significant difference

CPK



D1, D7 T > NT

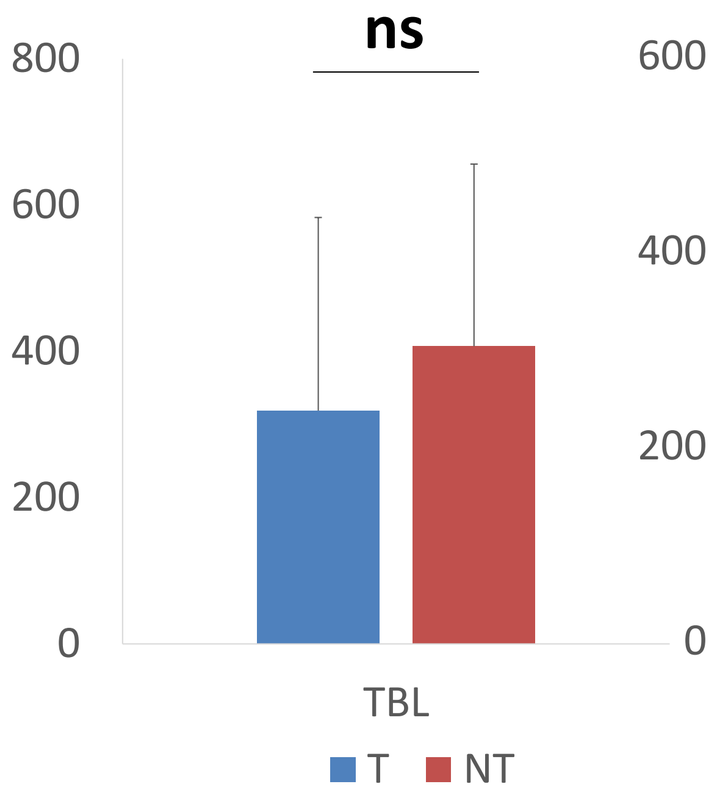
ΔCPK

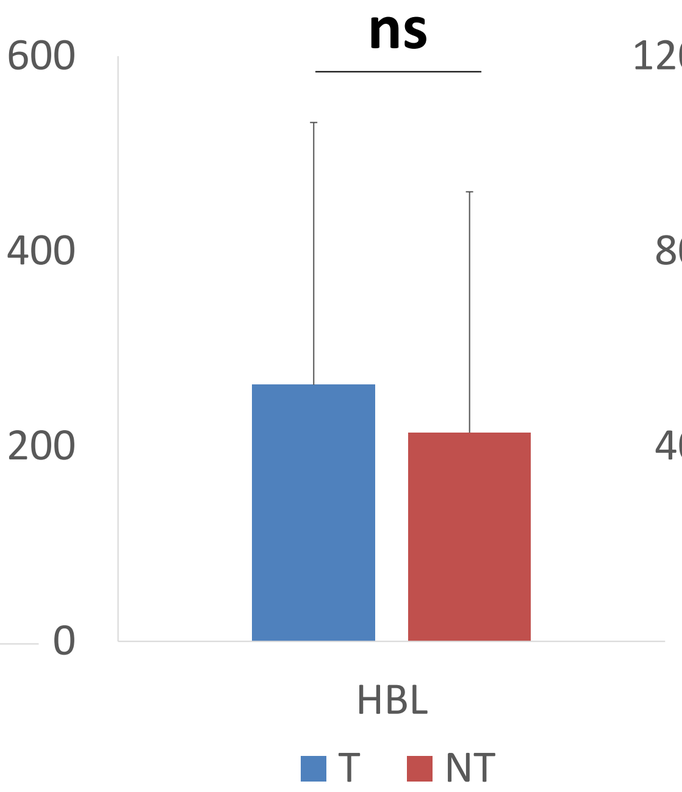


D1 T > NT

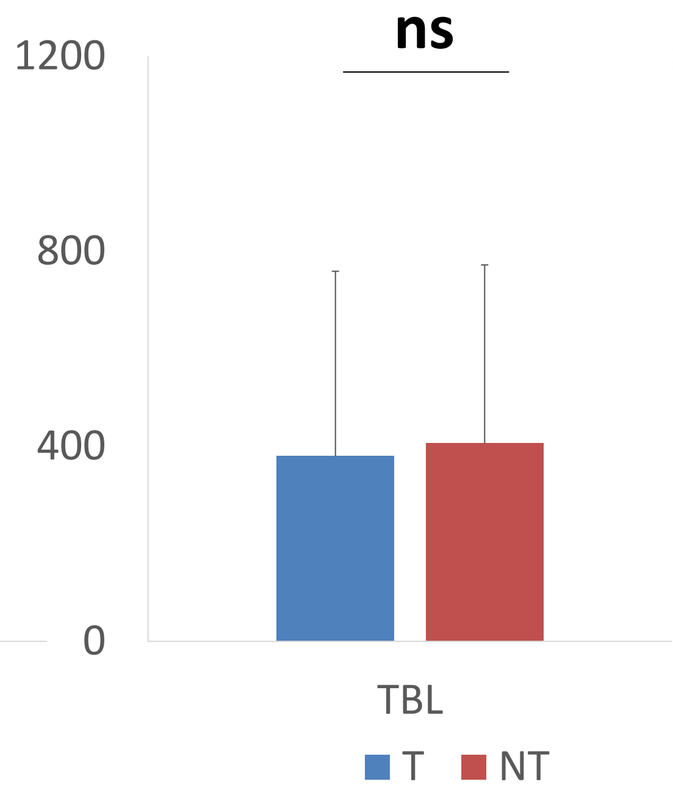
TBL/HBL

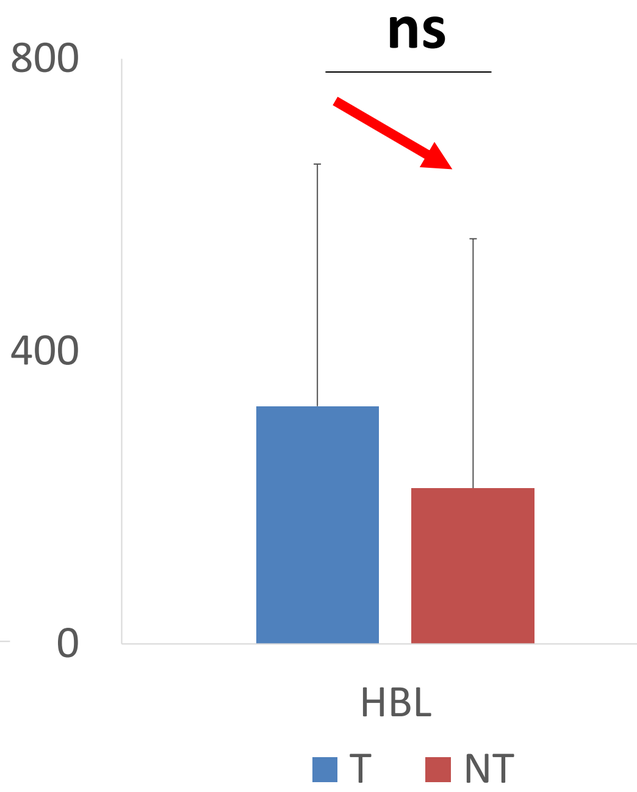
DAY1





DAY7





No significant difference

DISCUSSION

Tourniquet use and blood loss

Knee Surg Sports Traumatol Arthrosc (2011) 19:1121–1130
DOI 10.1007/s00167-010-1342-7

KNEE

Tourniquet use in total knee arthroplasty: a meta-analysis

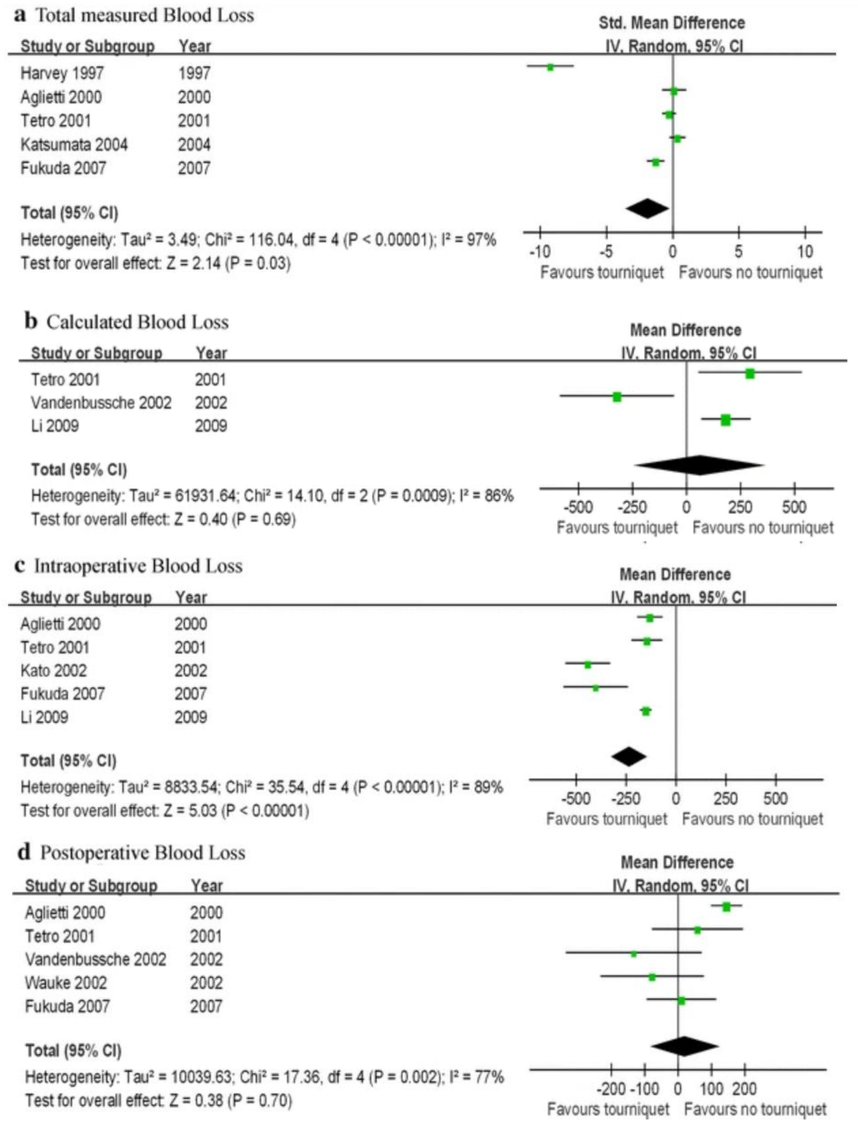
Ta-Wei Tai · Chii-Jeng Lin · I-Ming Jou ·
Chih-Wei Chang · Kuo-An Lai · Chyun-Yu Yang

Tai, T.-W. *et al. Knee Surg Sports Traumatol Arthrosc* **19**, 1121–1130 (2011).

Meta-analysis

subjects: RCT×8、 prospective studies×3 634 knees

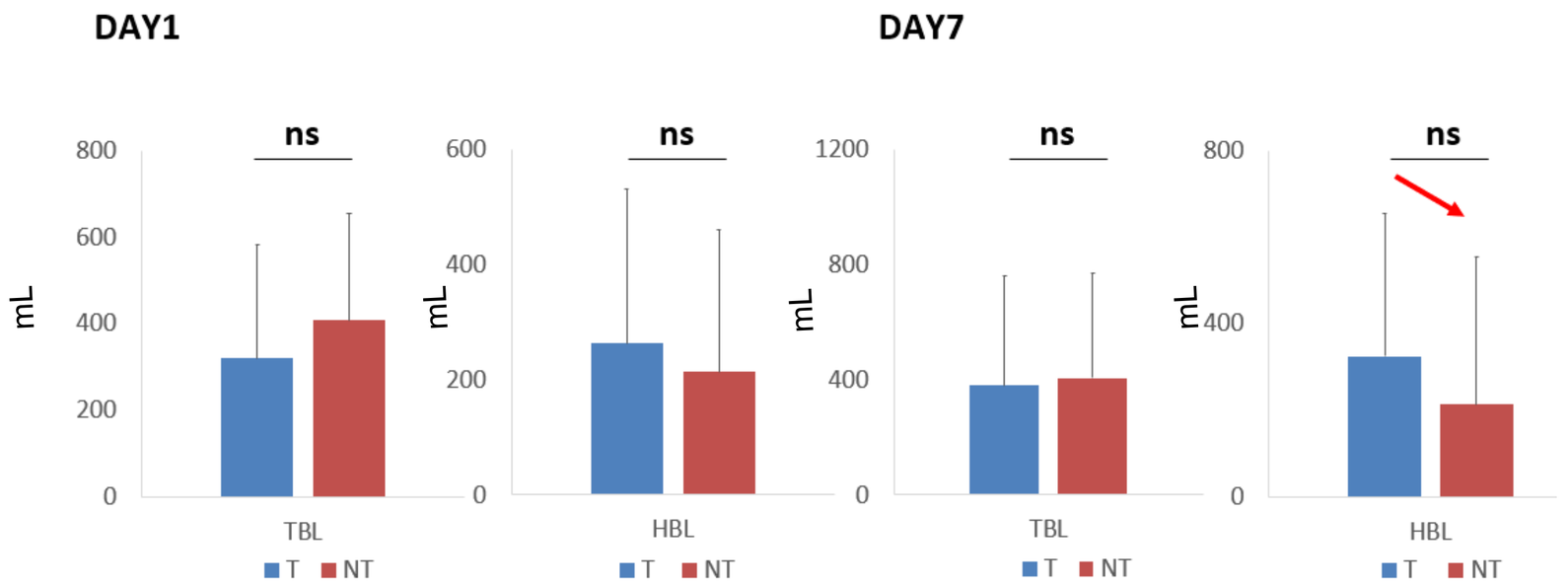
Intraoperative blood loss : **T < NT**
Total blood loss : **ns**
Hidden blood loss : **ns**
Postoperative blood drainage : **T > NT**



Tourniquet use could not reduce the actual blood loss

Our findings

- **Intraoperative blood loss: T<NT**
- **ΔHb : ns**
- **TBL : ns**
- **HBL : ns**



No difference in perioperative blood loss

Tourniquet and CPK

Non-Tourniquet → **CPK elevation is mild**

Tourniquet use

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CPK↑ = Muscle damage

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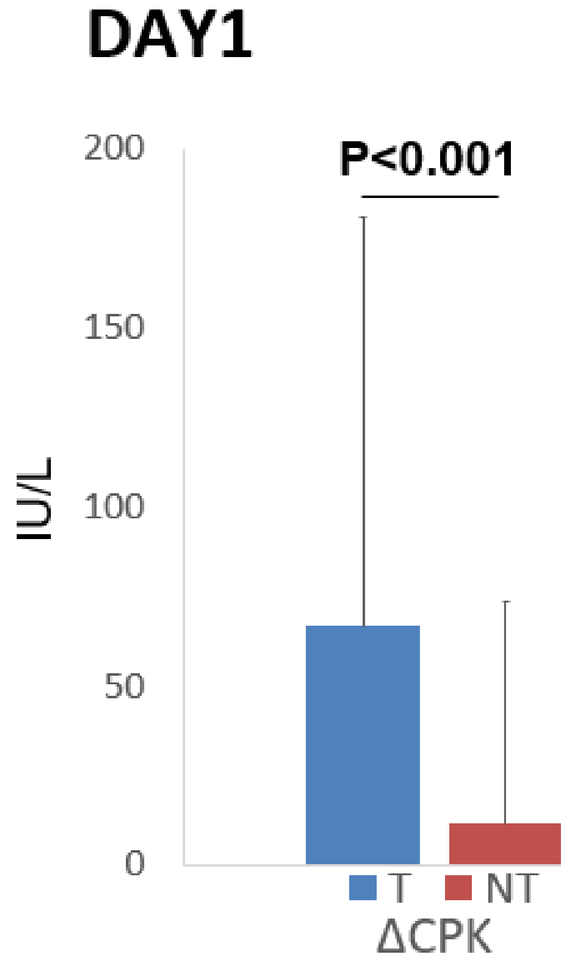
- **Postoperative Pain**
- **Prolonged hospital stay**
- **Delayed achievement of SLR**



Lai, Y. *et al. Journal of Orthopaedic Surgery and Research* 2022

Less Muscle Damage Enables

Better Perioperative Care and Rehabilitation

ERAS concept?

Conclusion

Tourniquet-less arthroplasty increased intraoperative blood loss, however, postoperative blood loss volume and degree of anemia were not significantly different.

References:

Magan, A. A. & Haddad, F. S. *Bone Joint J* .2021
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Lai, Y. *et al. Journal of Orthopaedic Surgery and Research* 2022
Yi, S., et al.. *Arch Orthop Trauma Surg.* 2014
Tai, T.-W. *et al. Knee Surg Sports Traumatol Arthrosc*. 2011