

Effect of steroid in local infiltrative analgesia in one-stage bilateral total knee arthroplasty. A paired-randomized controlled study



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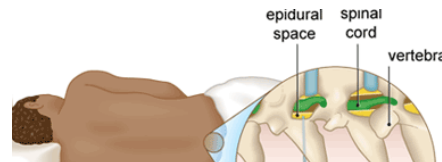
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Total Knee Arthroplasty

- Most successful for advanced OA knees
- Severe post-operative pain unresolved
- Multimodal, opioid sparing
- Options:



Local infiltrative analgesia (LIA)



Andersen. *Anaesthesia* 2009

Banerjee. *Orthopedic* 2013

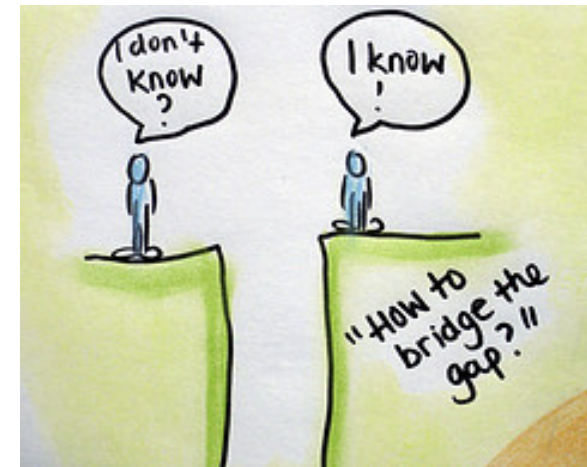
Kerr and Kohan *Acta Orthopaedica* 2008

LIA

- Intra-op peri-articular injection of:
 - Local anesthetic, adrenaline and NSAID
- Minimal side effects
- Proven effectiveness in multiple RCTs and meta-analysis

- **Limitations**

- Short duration
- Unclear role of individual components



Andersen and Kehlet. *Br J of Anaes* 2014

Xu. *The Knee* 2014

Ng. *JOA* 2012

Kerr and Kohan. *Acta Orthp* 2008

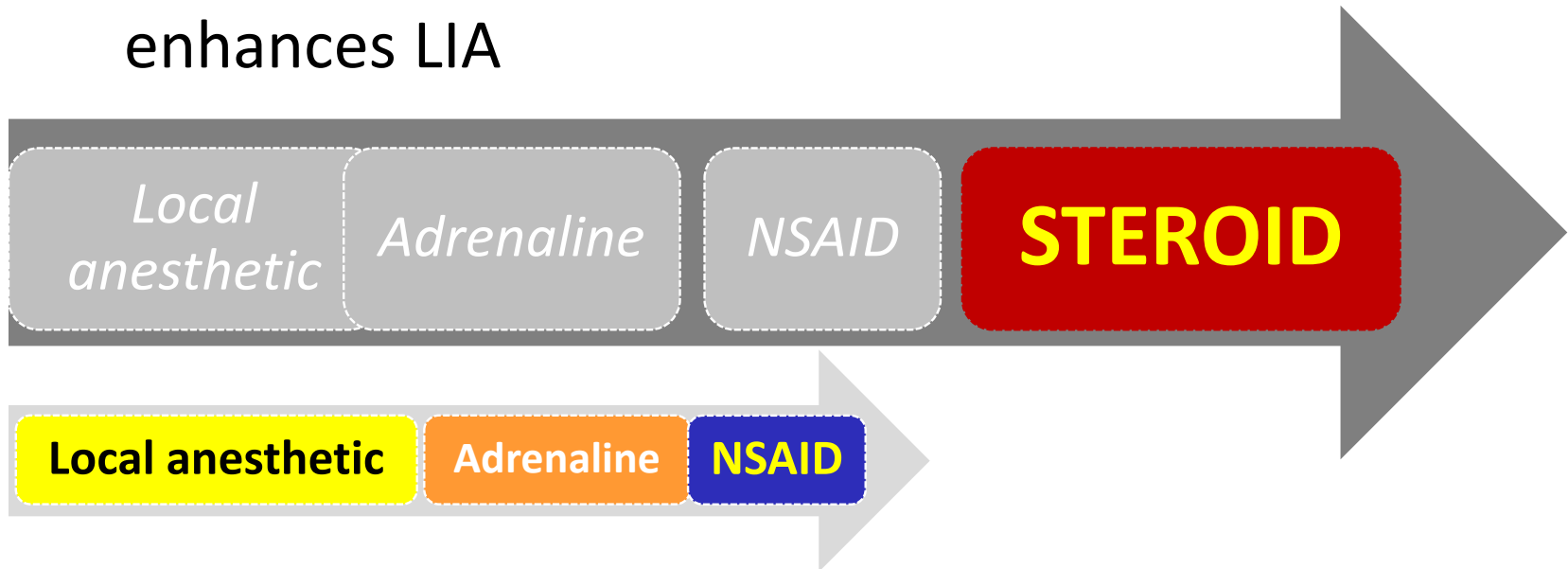
Study Aim and Hypothesis

- Aim

- Evaluate the role of steroid in LIA

- Hypothesis

- Potent and long acting anti-inflammatory enhances LIA





(n=26)

LIA without steroid
(n=26)

Deep

75mg Ropivacaine
7.5mg Ketorolac
0.5mg Adrenaline

Subcutaneous

75mg Ropivacaine
7.5mg Ketorolac

Randomization

**Standardized LIA
injections**

Avoid steroid in subcutaneous
tissue and tendon

LIA with steroid
(n=26)

Deep

75mg Ropivacaine
7.5mg Ketorolac
0.5mg Adrenaline

40mg Triamcinolone

Subcutaneous

75mg Ropivacaine
7.5mg Ketorolac

Follow-up at 6 weeks and 3 months



RESULTS



Department of Orthopaedics and Traumatology, The University of Hong Kong

香港大學矯形及創傷外科學系



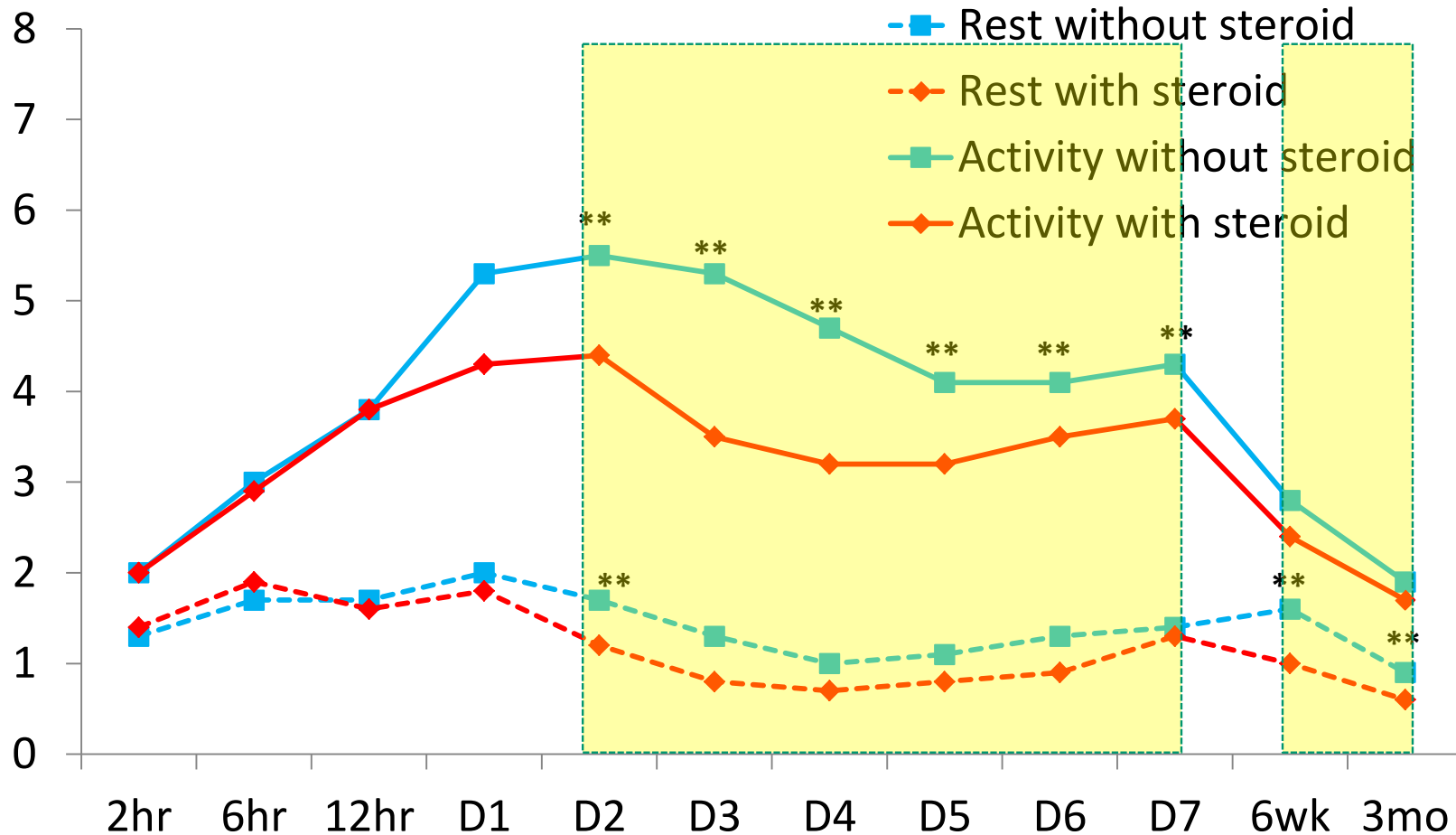
Baseline characteristics

	LIA without steroid (n = 26)	LIA with steroid (n = 26)	P-value
VAS at rest	1.4 ± 2.1	1.7 ± 2.3	0.30
VAS during activity	6.5 ± 2.0	6.4 ± 2.3	0.80

**Clinical, Radiological and Functional
*parameters are comparable***

Post-op MTFA	3.4 ± 3.7	3 ± 3.5	0.69
OT time (min)	73.2 ± 26	77 ± 30	0.24
Knee Society Score	41 ± 14	41 ± 13	0.62

VAS score at rest and during activity

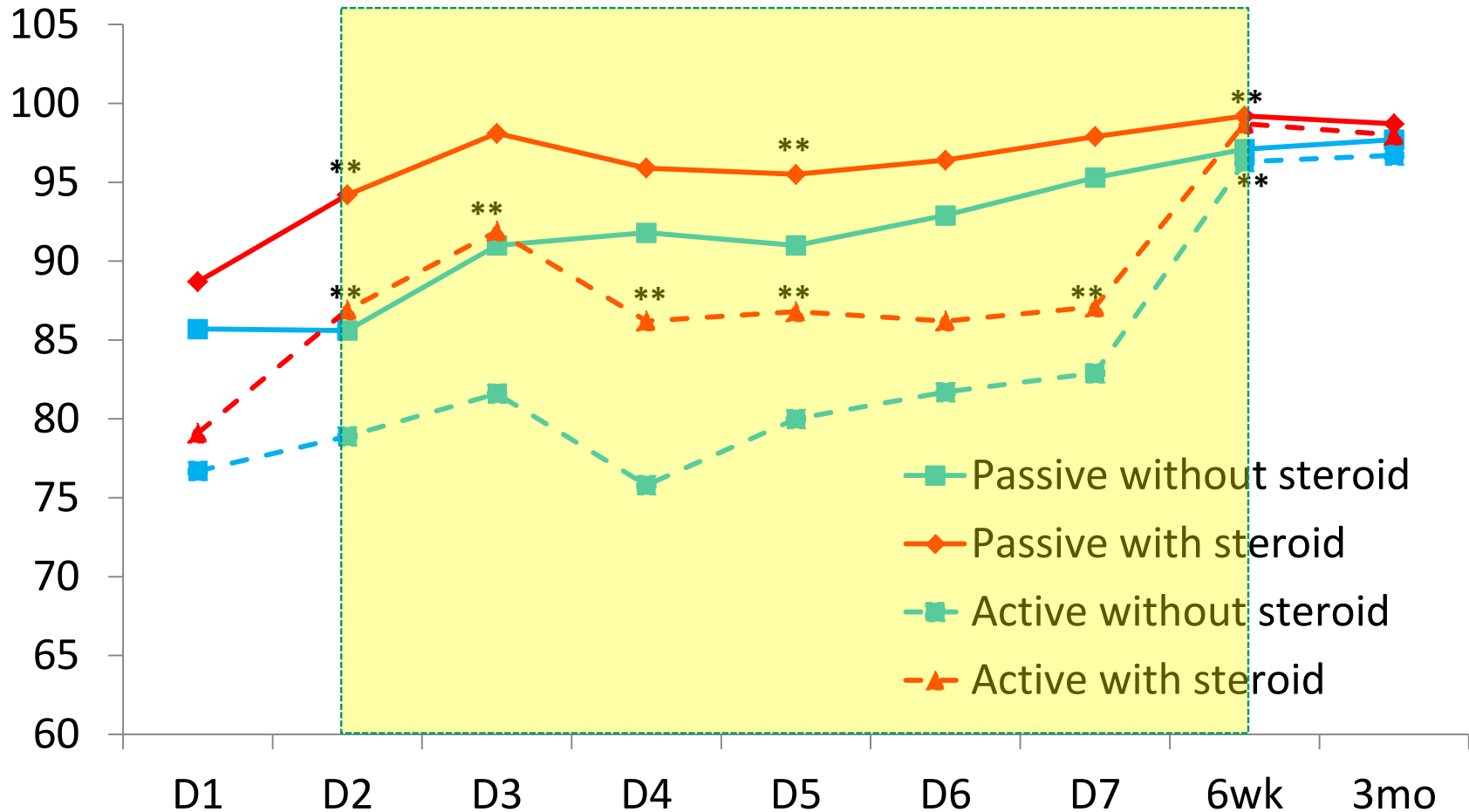


** denote p-value < 0.05



Active and passive ROM

Degrees



** denote p-value < 0.05

Post-operative parameters

	LIA without steroid (n = 26)	LIA with steroid (n = 26)	P-value
Time to achieve SLR	1.9 ± 1.7	1.2 ± 0.7	0.0067
Knee Society Score At 6 weeks	83.1 ± 10	82.6 ± 11	0.53
Knee Society Score At 3 months	89.8 ± 5.6	89.1 ± 5.6	0.80
Wound complications	0	0	1.0
Infections	0	0	1.0



DISCUSSION



Limitation of current evidence

- 7 RCTs on LIA with steroid
- **Methodological limitations**
 - Pre-op analgesics not controlled
 - Short outcome measurements
 - Variable controls (*NSAID/ adrenaline*)
 - Mental health, social status not men



Predictors of outcomes of total knee replacement surgery

Demographic and psychosocial predictors of acute perioperative pain for total knee arthroplasty

Maya L Roth MA¹, Dean A Tripp PhD², Mark H Harrison MD^{3,4}, Michael Sullivan PhD⁵, Patricia Carson BSc⁴

Does Preoperative Psychologic Distress Influence Pain, Function, and Quality of Life After TKA?

Alfonso Utrillas-Compared MD, PhD, Basilio J. De la Torre-Escuredo MD, PhD,
Ana J. Tebar-Martínez MD, MPH, Ángel Asúnsolo-Del Barco MD, PhD

Do Psychologists Undergoing

Yasser Khatib MB
Aman Madan BSc
Ian A. Harris MBI

PREDICTING THE OUTCOME OF TOTAL KNEE ARTHROPLASTY

BY ELIZABETH A. LINGARD, BPHY, MPhil, MPH, JEFFREY N. KATZ, MD, MS,
ELIZABETH A. WRIGHT, PhD, CLEMENT B. SLEDGE, MD, AND THE KINEMAX OUTCOMES GROUP*

Investigation performed at Brigham and Women's Hospital, Boston, Massachusetts

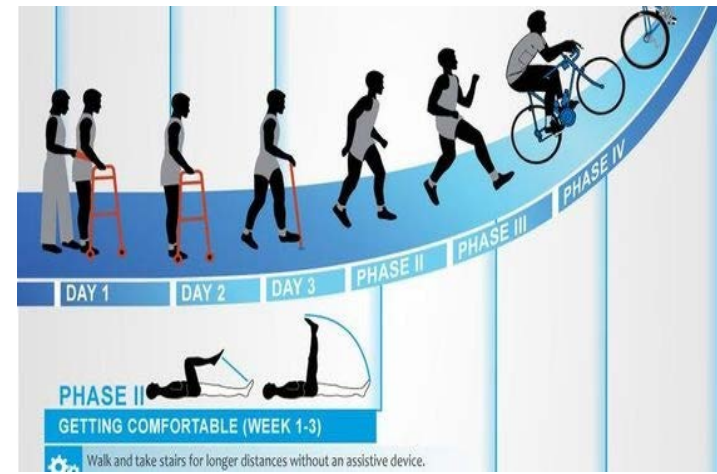


- ***First within subject study to investigate role of components in LIA***
- *Pain most subjective*
- Control confounders:
 - Pain perception
 - Peri-op analgesia
 - Psychological state
 - Social-economic backgrounds
- Increase statistical power
 - Paired t-test, Wilcoxon test
 - Reduce variance
 - Increase power (with same no. of subjects)



Conclusion

- LIA with steroid provides better pain relief and early rehabilitation outcomes after TKR



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THANK
YOU



Statistics

- **Power analysis** (alpha 0.5, power 0.8)
 - 25 patients to detect difference in 2 VAS (minimal clinical important difference)
- Paired t-test for parametric variables
- Wilcoxon test for non-parameteric variables
- Fisher's exact test for categorical variables
- GraphPad software, San Diego, CA, USA



Katz. *J or Ortho Surg and Res* 2015

Tubach. *Ann Rheum Dis* 2005

Farrar. *Pain* 2001



How does LIA with steroid work?

Surgical trauma and local inflammation

Corticosteroid

Nuclear steroid
receptors

Phospholipase

acid/ COX-2

NSAID

Inflammatory mediators (ie. Prostaglandins)

**Local
anesthetic**

~~Peripheral
nociceptors~~

PNS/CNS
Sensitization



Robbin and Cotran's. *Path Basis of Disease* 8th Ed. 2010

Clinical implication

- Readiness to discharge criteria
 - Stable medical and wound condition
 - Good pain control (VAS rest <3 ; activity < 5)
 - Physical (active flexion $\geq 90^\circ$)
 - Functional (self-care, independent walking)
- **Within subject comparison on POD 3**

Both knees pass	Both knees fail	No steroid knee passed only	Steroid knee passed only
9 (29%)	8 (26%)	0 (0%)	14 (45%)

With just HKD 26 !!!

Kehlet. *Acta Orthopaedica* 2011

Ng. *JOA* 2012

Chan. *Arthritis Care and Res* 2014

Egmond. *Acta Orthopaedica* 2015



Sensitization reduction

- Less rest pain at 6 weeks
 - Beyond action of triamcinolone (~14days)
- Acute pain can leads to chronic pain via *sensitization*
- Steroid blocks origin of inflammation and pain
- Reduces sensitization → prolong effect?

Table 5. Steroid Dosing and Equivalents

Steroid	Common concentration (mg per mL)	Common equivalent dose* (mg)	Approximate duration of action (days)
Methylprednisolone acetate (Depo-Medrol)	40 or 80	40	8
Triamcinolone acetonide (Kenalog)	10 or 40	40	14
Triamcinolone hexacetonide (Aristospan)	20	40	21
Dexamethasone acetate (Decadron-LA†)	8	8	8

Carr. *Lancet* 1999

Samad. *Nature* 2001

Stephens. *Am Fam Phys* 2008

Yue. *Chin Med Journal* 2013



Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale

John T. Farrar^{a,*}, James P. Young Jr.^b, Linda LaMoreaux^b, John L. Werth^b, R. Michael Poole^b

Determining the clinical importance of treatment benefits for interventions for painful orthopedic conditions

Evaluation of clinically relevant changes in patient reported outcomes in knee and hip osteoarthritis: the minimal clinically important improvement

Nathaniel P Katz^{1,2*}, Florence C Paillard¹ and Evan Ekman^{2,3}

F Tubach, P Ravaud, G Baron, B Falissard, I Logeart, N Bellamy, C Bombardier, D Felson, M Hochberg, D van der Heijde, M Dougados

- ***Minimal clinical important difference (MCID)***
 - *Smallest change in measured outcome perceived as beneficial (or detrimental) by the patient*
- 2pt changes in VAS (0 -10) is clinically important in OA knees



Katz. *J or Ortho Surg and Res* 2015
Tubach. *Ann Rheum Dis* 2005
Farrar. *Pain* 2001

Efficacy of steroid addition to multimodal cocktail periarticular injection in total knee arthroplasty: a meta-analysis

Xinyu Zhao, Jun Qin, Yang Tan, Rahul Mohanan, Dongcai Hu an



■ KNEE

The impact of including corticosteroid in a periarticular injection for pain control after total knee arthroplasty

A DOUBLE-BLIND RANDOMISED CONTROLLED TRIAL

- 7 RCT (345 LIA with steroid TKR)
- No differences in infection and wound complications
- No patella tendon rupture
- *Still underpowered*
- 3500 TKRs to detect 50% differences in infection rate

Zhao. *J or Ortho Surg and Res* 2015
Hoshino. *BJJ* 2015