

Long term effect of steroid in local infiltration analgesia after total knee arthroplasty. A paired- randomized controlled study.



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Total Knee Arthroplasty

- Most successful treatment for advanced OA knees
- Severe post-operative pain unresolved
- **Adequate pain control:**
 - Enhance rehabilitation
 - Minimize complications
 - Improve patient satisfaction
 - Reduce hospital stay and cost



Andersen. *Anaesthesia* 2009

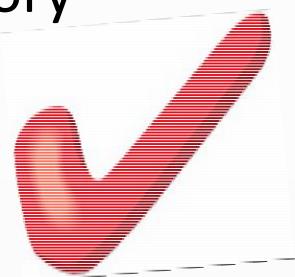
Banerjee. *Orthopedic* 2013

Kerr and Kohan *Acta Orthopaedica* 2008



Local infiltration analgesia (LIA)

- Intra-op peri-articular injection of:
 - Local anesthetic, adrenaline and anti-inflammatory
- Safe, *no motor blockage*
- Effectiveness proven in multiple RCTs



- **Knowledge gap**
- Duration – shortly post-op
- Combination – optimal mixture unknown

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

- Study the effect and safety of steroid in LIA

■ Hypothesis

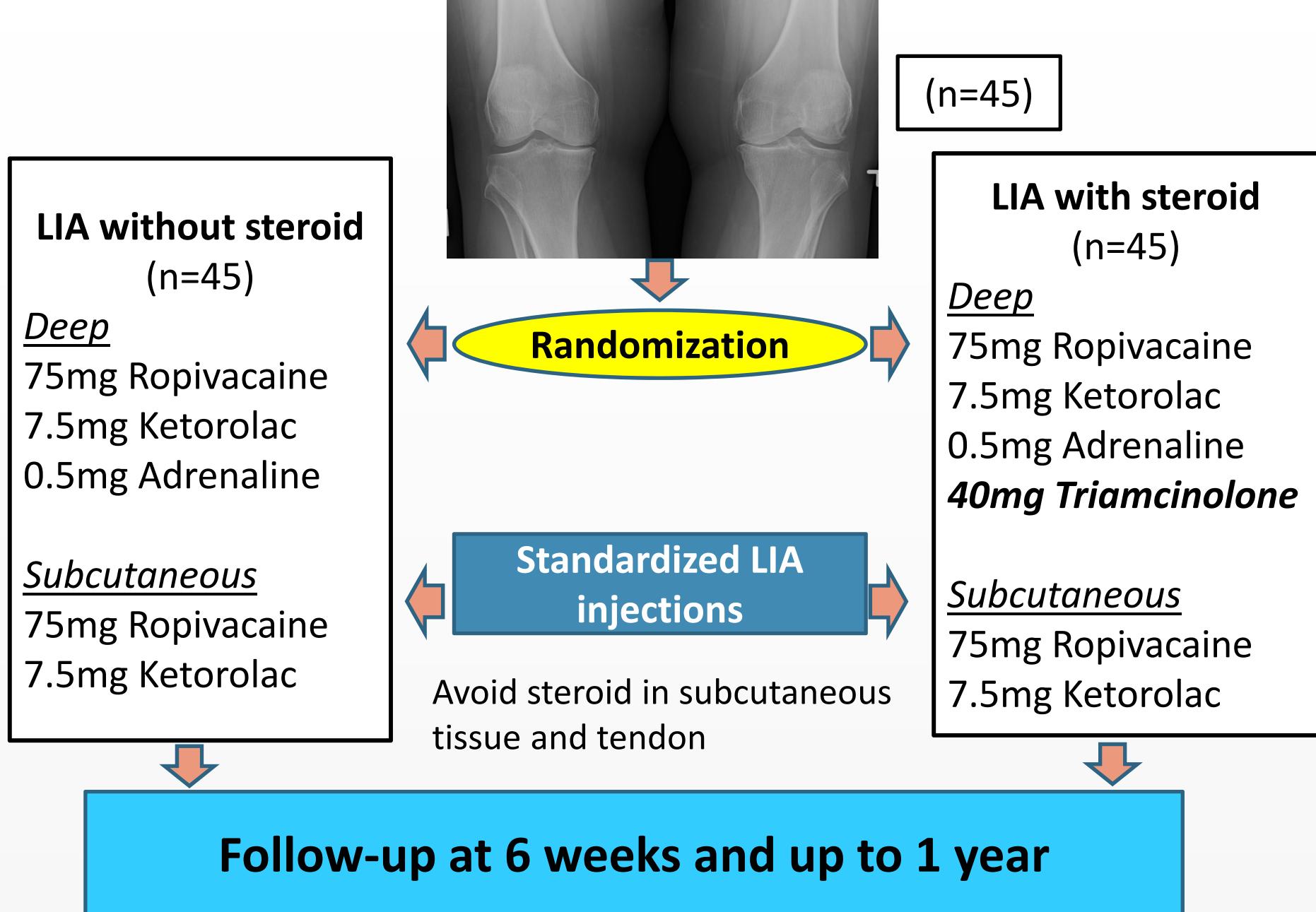
- LIA with steroid provide clinical benefit with no increase complications

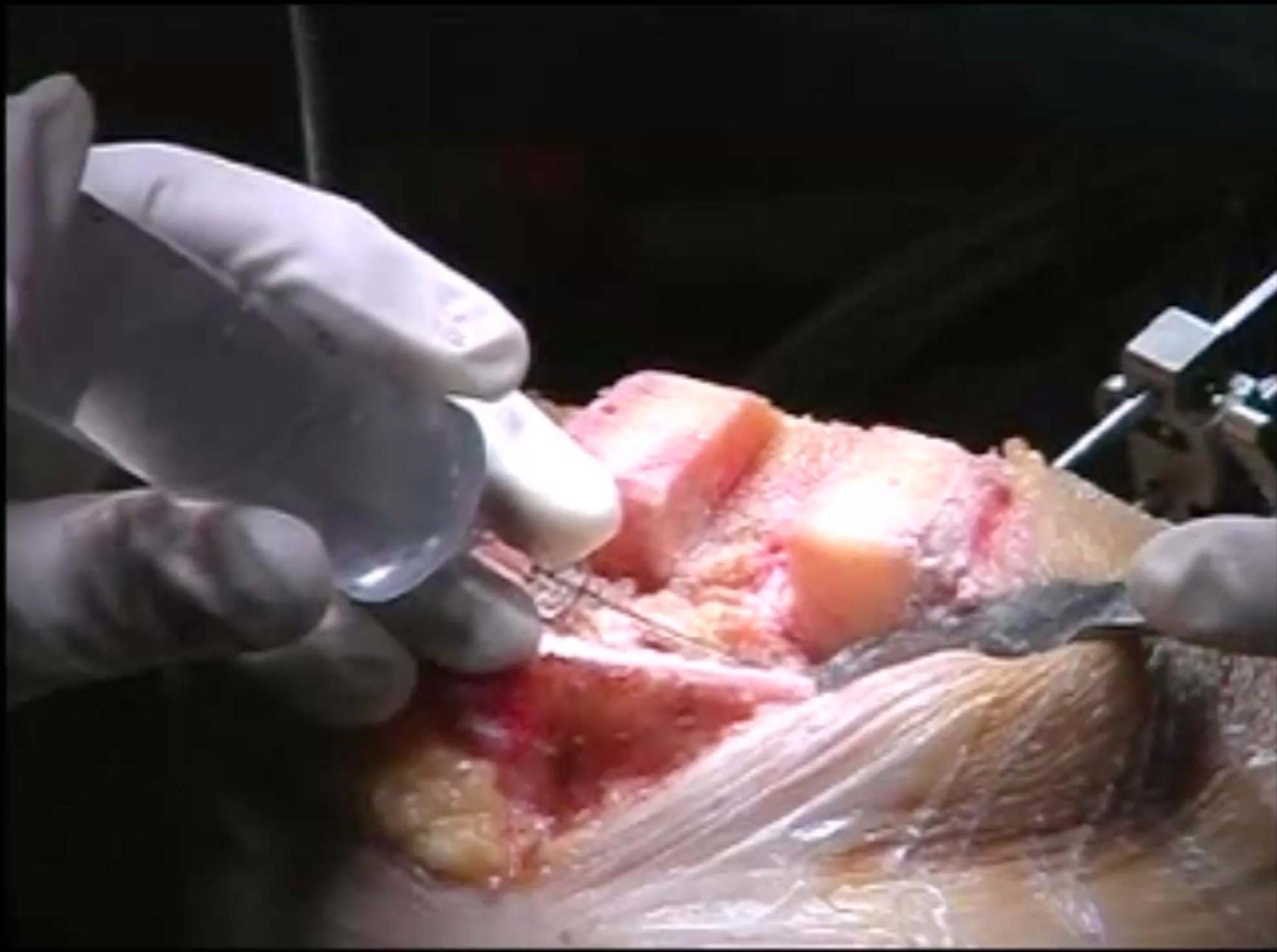


Material and Methods

- IRB approved
- **Double-blinded RCT (within-subject design)**
- Inclusion criterion
 - One-stage bilateral TKA for osteoarthritis
- Exclusion criteria
 - Allergies to LIA components
 - Immunocompromised, previous knee infections
 - Refuse to consent
- Peri-operative analgesics standardized
- No epidural infusion







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Outcome measures

- Pain score (*Ward nurses*)
 - VAS at rest and activity (0-10)
- Rehabilitation parameters (*PT*)
 - Time to achieve SLR, ROM
- Complications (*Surgeons*)
 - Wound complications, infection
- Patients, ward nurses, physiotherapists and surgeons at follow-up were blinded



Statistics

- **Power analysis** (alpha 0.5, power 0.8)
 - 25 patients to detect difference in 2 VAS (minimal clinical important difference)
- Repeated-measures ANOVA and paired t-test for parametric variables
- Wilcoxon test for non-parameteric variables
- Fisher's exact test for categorical variables
- IBM SPSS Statistics (version 23)

Katz. *J of Ortho Surg and Res* 2015

Tubach. *Ann Rheum Dis* 2005

Farrar. *Pain* 2001



RESULTS



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Baseline characteristics

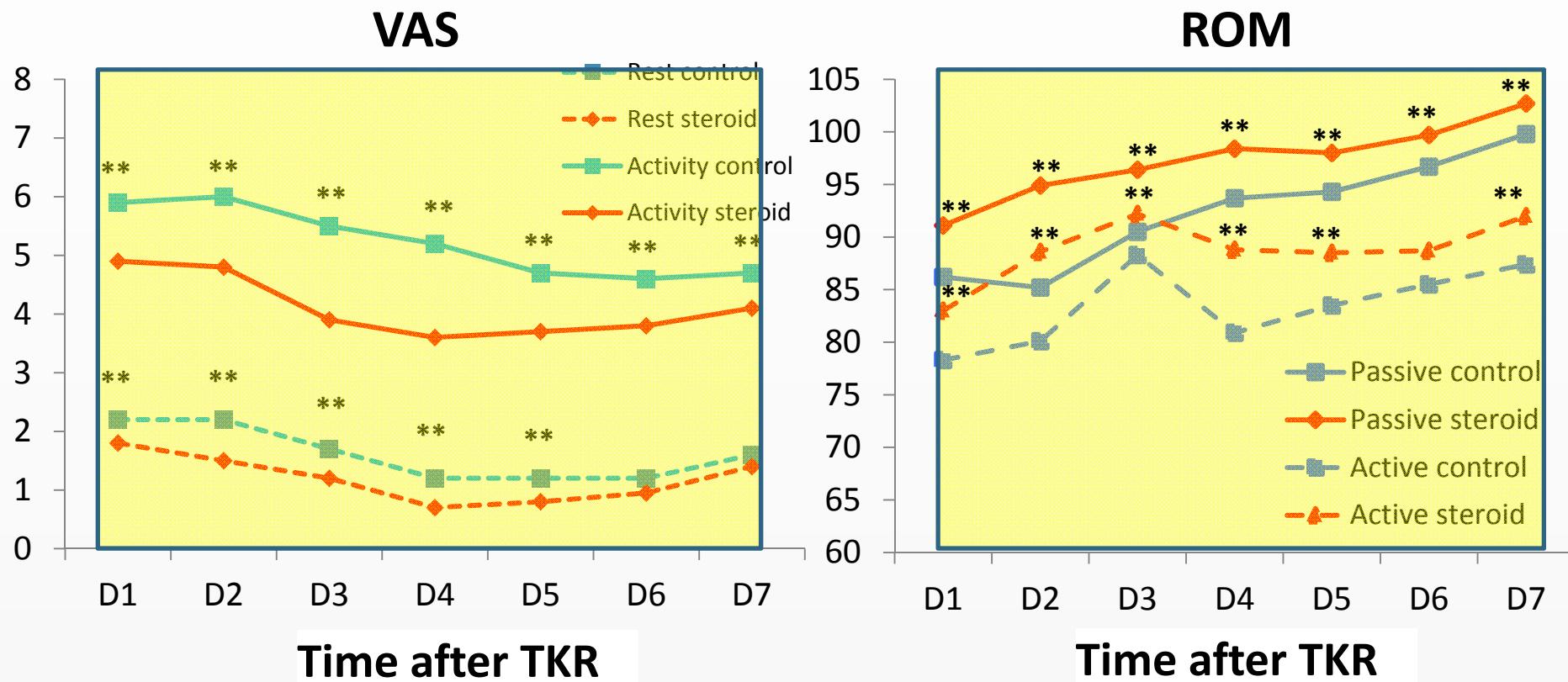
	LIA without steroid (n = 45)	LIA with steroid (n = 45)	P-value
VAS at rest	1.6 ± 2.2	1.7 ± 2.2	0.54
VAS during activity	6.3 ± 1.9	6.1 ± 2.4	0.43

Clinical, Radiological and Functional parameters are comparable

Post-op MTFA	2.0 ± 4	2.2 ± 3.3	0.48
OT time (min)	68 ± 23	72 ± 27	0.17
Knee Society Score	42 ± 15	43 ± 14	0.79



Early clinical outcome



** p-value <0.05



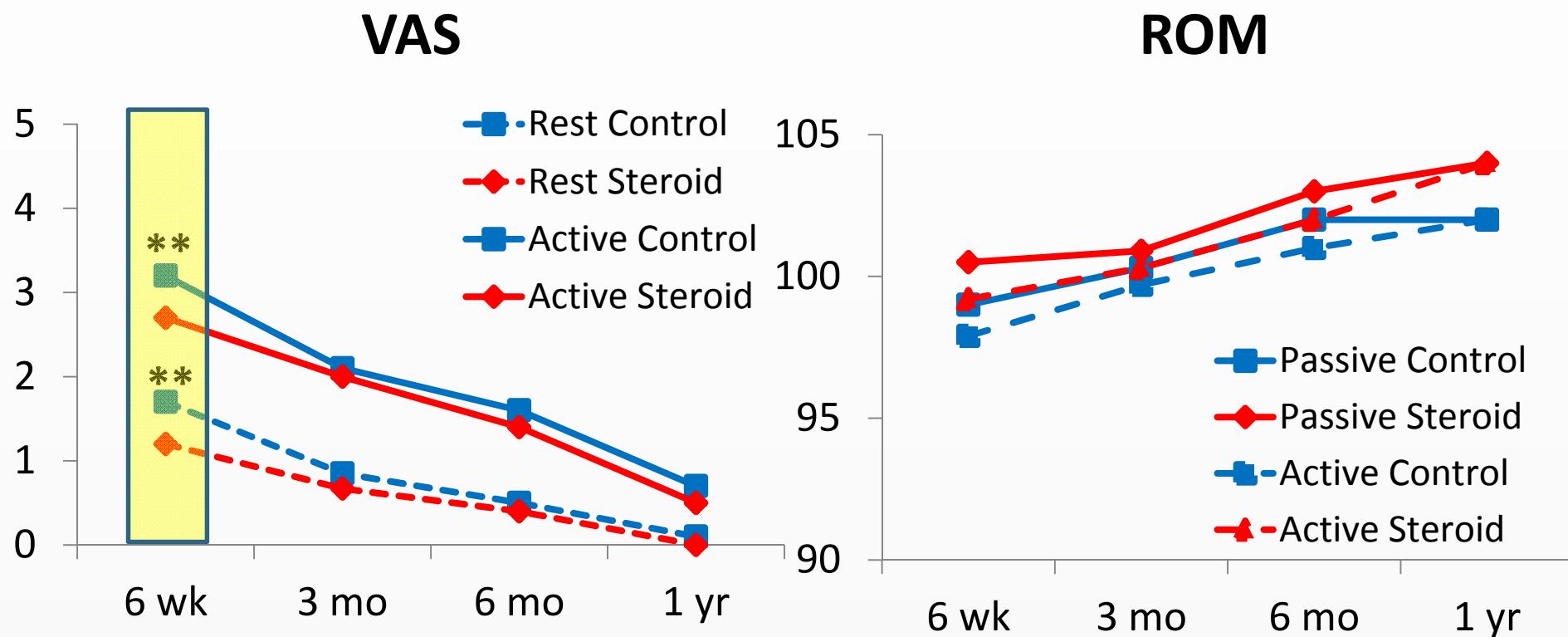
Early clinical outcome

	LIA without steroid (n = 45)	LIA with steroid (n = 45)	P-value
Time to achieve SLR	2 ± 1.8	1.2 ± 0.7	0.0022

LIA with steroid improve early post-op outcomes



1 year follow-up



No differences in knee pain and range at 1 year

** p-value <0.05



Complications

	LIA without steroid (n = 45)	LIA with steroid (n = 45)	P-value
Surgical site infection	0	0	1.0
Wound dehiscence	0	0	1.0
Patella tendon rupture	0	0	1.0
Implant loosening	0	0	1.0
Revision surgery	0	0	1.0

NO increase in complications with local steroid !!!





Discussions



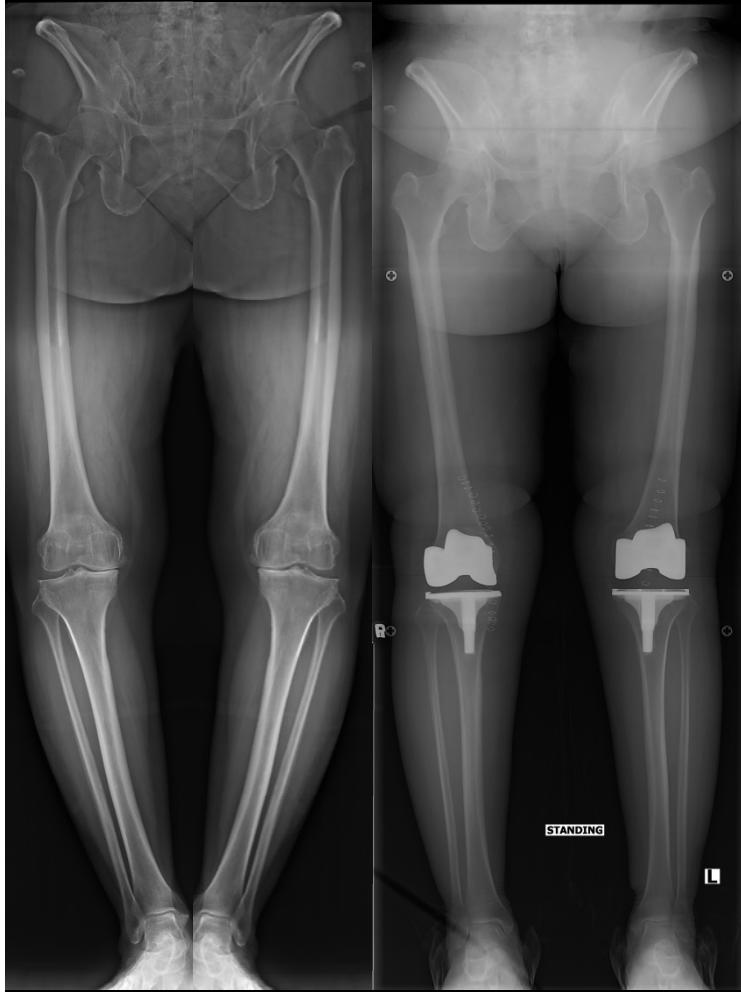
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Clinical implication

67 yrs, Female

Post-op Day 4



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Clinical implication

■ Readiness to discharge criteria

- Stable medical and wound condition
- Good pain control (VAS rest <3 ; activity < 5)
- Physical (active flexion ≥90deg)
- 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
11 (69%)	15 (33%)	0 (0%)	19 (42%)

With just HKD 26 !!!

Kehlet. *Acta Orthopaedica* 2011

Ng. *JOA* 2012

Chan. *Arthritis Care and Res* 2014

Egmond. *Acta Orthopaedica* 2015



Current evidence

- 7 RCTs on LIA with steroid
- 3 RCTs with >1 year follow-up
- **Meta-analysis**
 - 644 TKRs
 - No differences in infection
 - No differences in wound oozing
 - No tendon ruptures in all knees
- Further support LIA with steroid is safe

Author	Year	Follow-up
Christensen	2009	3 months
Seah	2011	2 years
Yue	2013	1 year
Chia	2013	3 months
Ikeuchi	2014	2 weeks
Kwon	2014	6 months
Hoshino	2015	1 year

Zhou. J Orth Surg Res 2015



- *First within-subject study to investigate components in LIA*
- Control confounders
- Pain is subjective
 - Pain perception and threshold
 - Psycho-social background
- Infection, wound healing affected by multiple factors
- Increase statistical power
 - Repeated-measure ANOVA, paired t-test, Wilcoxon test
 - Reduce variance
 - Increase power (with same no. of subjects)



Situation in Hong Kong



Efficiency is the key

人等完又等

*	換關節平均輪候(年)	合共要等(年)
	9.2	11.1
	5.5	8.9
	6.3	8.5
	5.5	7.3
	4.6	6.6
	4.3	6
	3	5.8

專科，首次會見骨科醫生
1日至本年3月31日
資料來源：醫院管理局

逸手術輪候時間

輪候時間(月)
2014年6月30日)

109

61

52

33

33

28

12

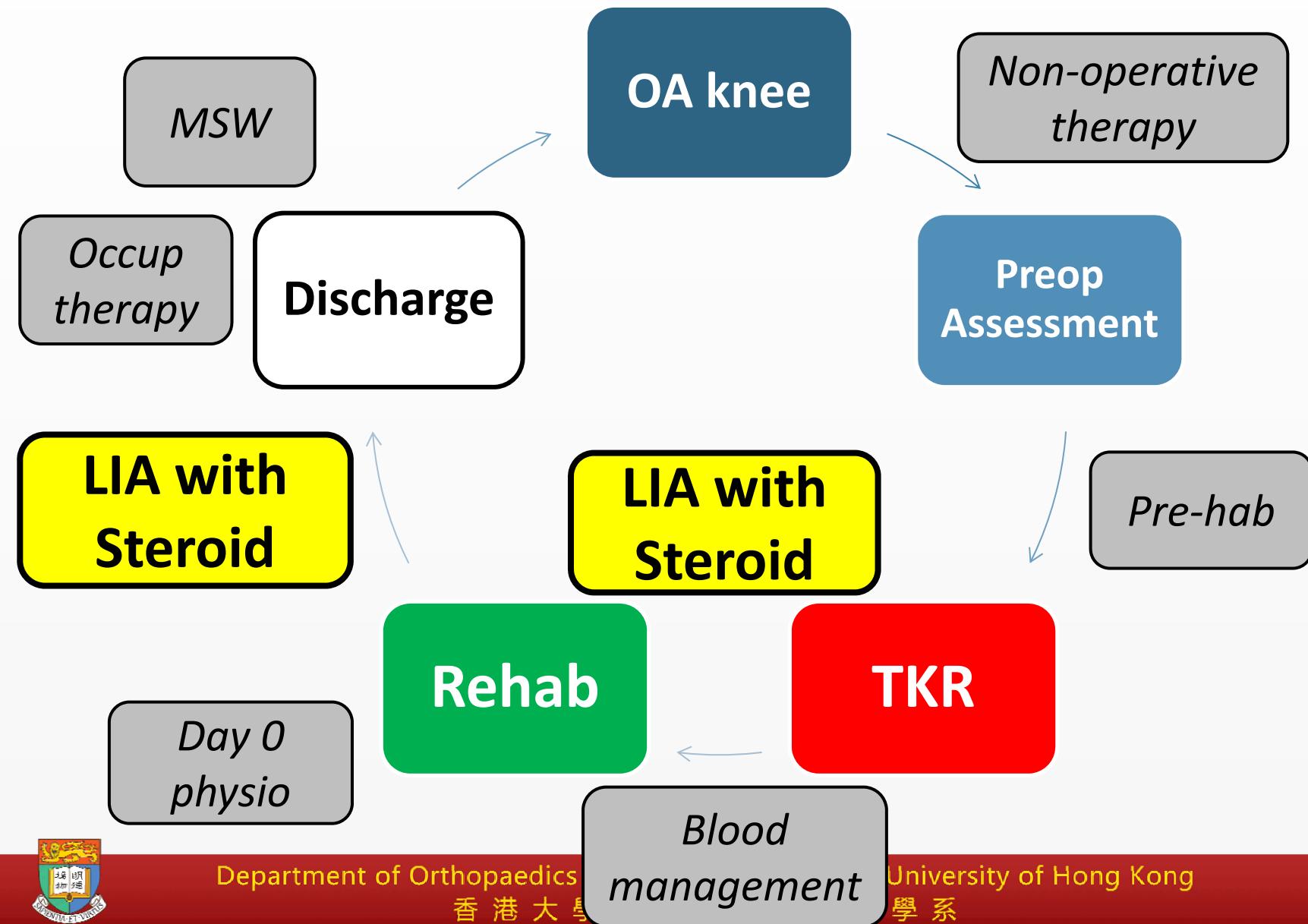


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九龍中

Fast-track arthroplasty



Applicability

- Easy to learn
- High applicability

THIS
IS
NOT
ROCKET
SCIENCE

How to mix?

Ropivacaine 0.75% x 40ml (2 ampoules)

+ 0.9%Normal Saline x 160ml

+ Ketorolac (30mg/ml) x 1ml

Draw up 100ml from the above mixture & label:

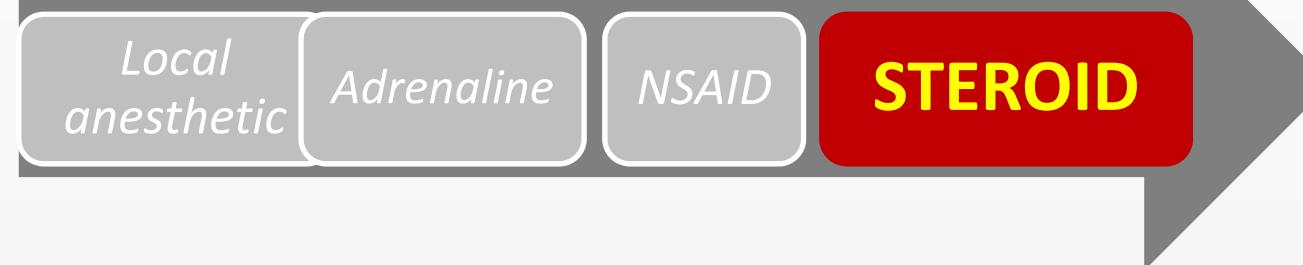
Skin (50ml for Left Knee) & Skin (50ml for Right Knee)

Intra-articular	101ml of the above mixture + Stacort-A 40mg/ml x 1ml + Adrenaline 1:1000 x 0.5ml	Left: 50ml	Right: 50ml
Skin	100ml of the above mixture	Left: 50ml	Right: 50ml



Conclusion

- LIA with steroid enhance rehabilitation with no increase in complications
- Easy technique, high applicability
- Improve efficiency of TKR



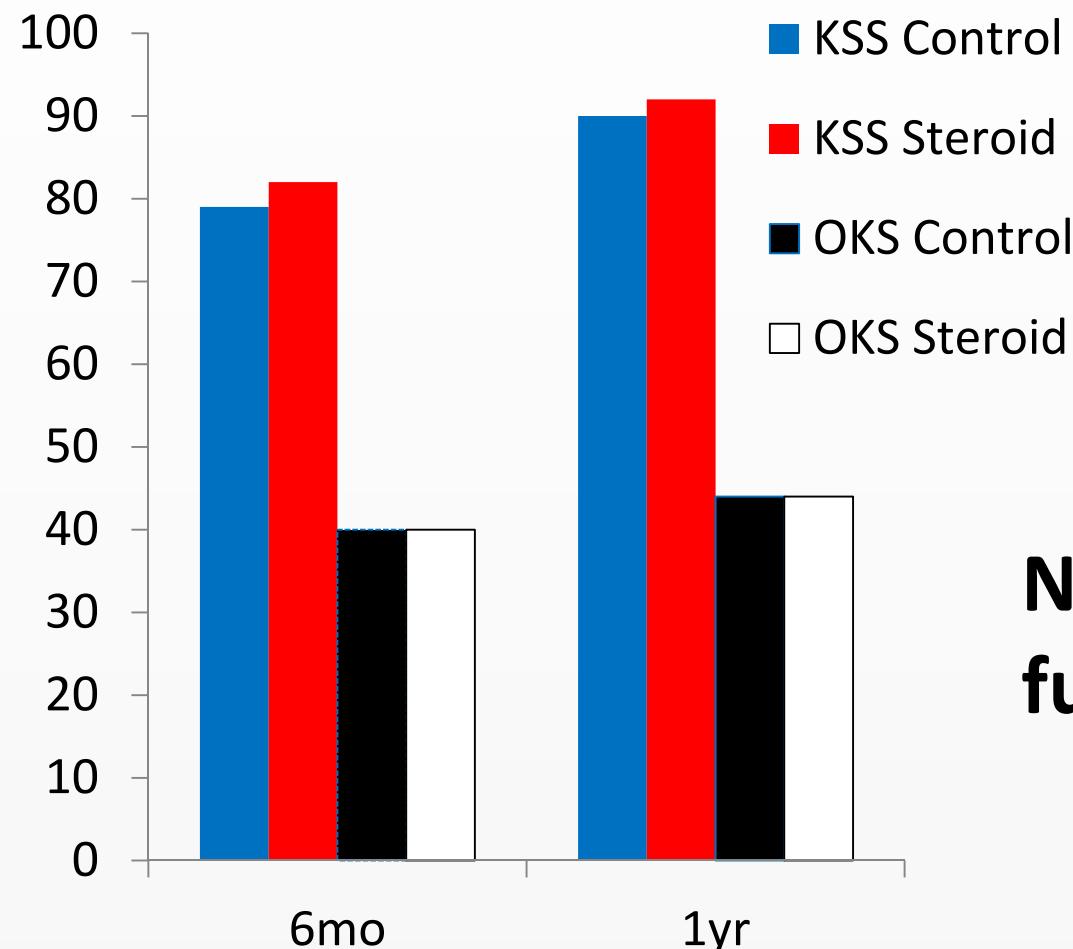
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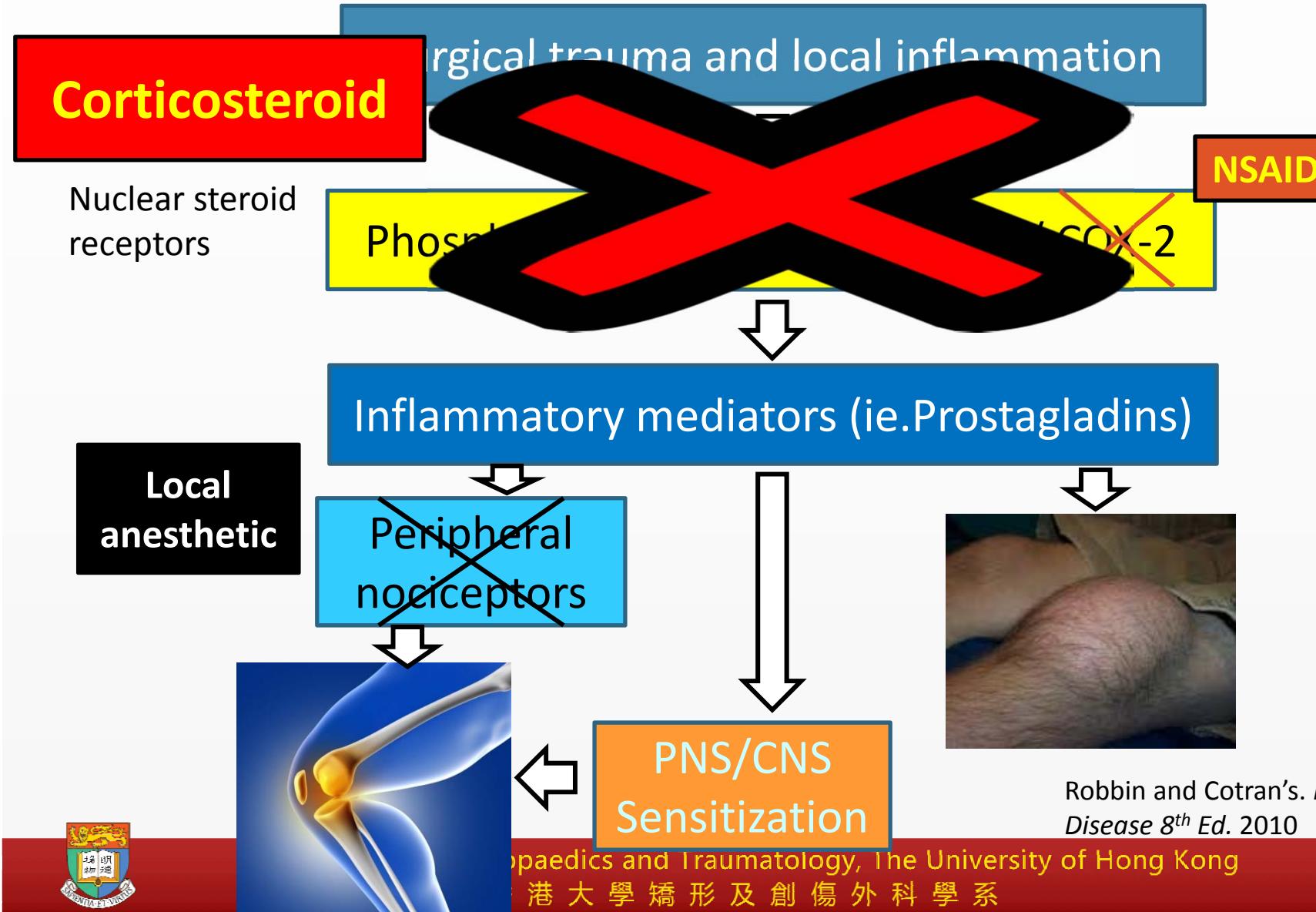
Functional scores



No differences in
functional score

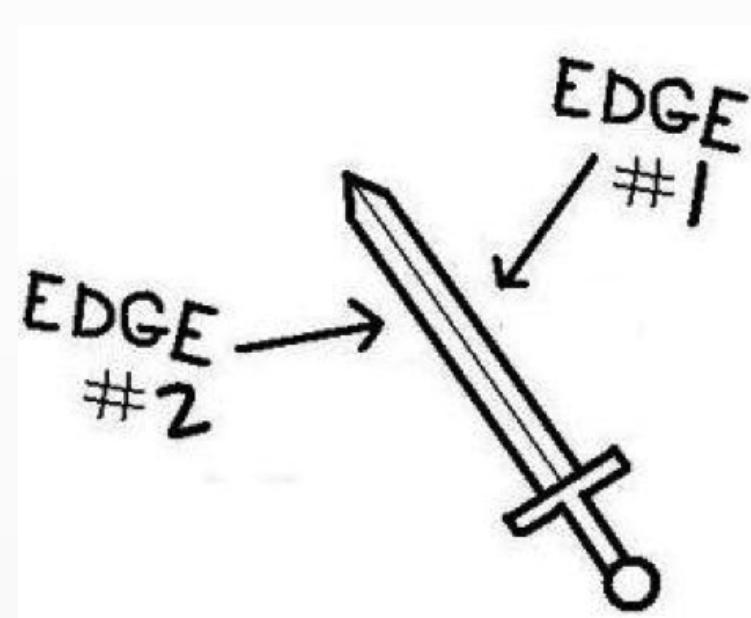


How does LIA with steroid work?



LIA with steroid

- Despite demonstrated clinical benefit, still not commonly used
- **Potential problems**
 - Increase infection
 - Wound healing problem
 - Patella tendon rupture
- **Double-edged sword?**



Wicke. *JAMA Surgery*. 2000
Halpern. *West J Med*. 1977
Laseter. *Med Sci Sports Ex*. 1991



Limitations

- Under-powered for infection and wound complications
- Need more RCTs and meta-analysis

