

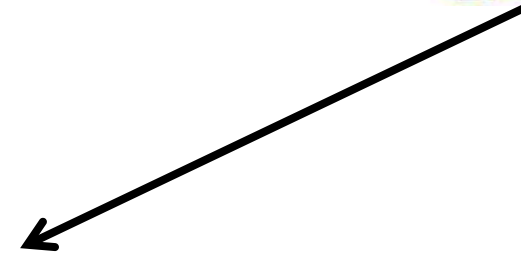
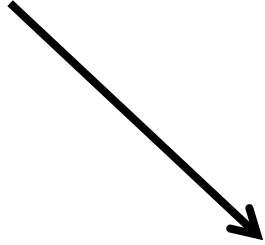
Optimizing the TKA patient journey peri-operatively

Jean-Noel Argenson,
Matthieu Ollivier, Xavier Flecher,
Damien Lami, Sebastien Parratte

Institute for Locomotion
Sainte Marguerite Hospital,
Marseille, France

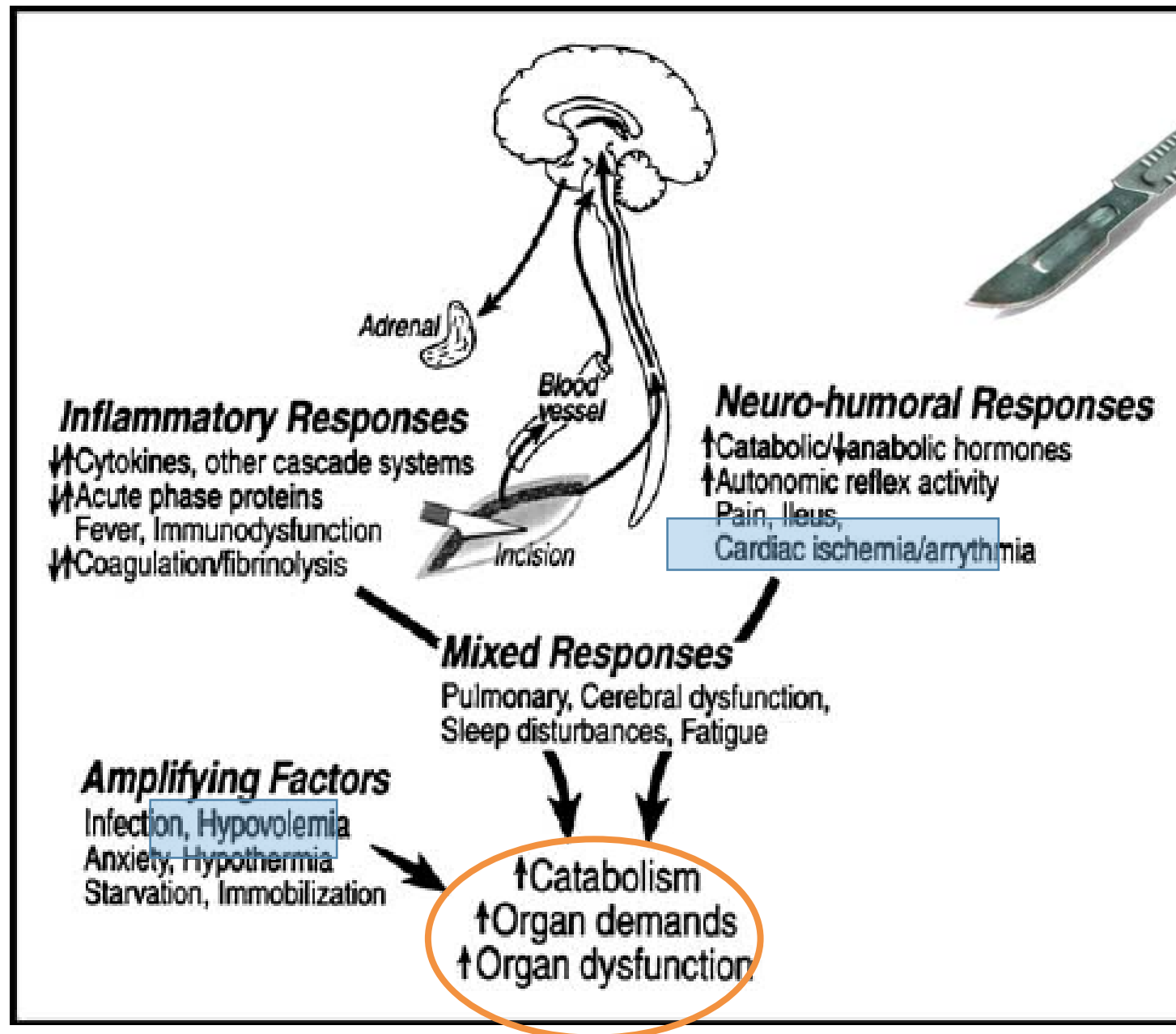


TKA

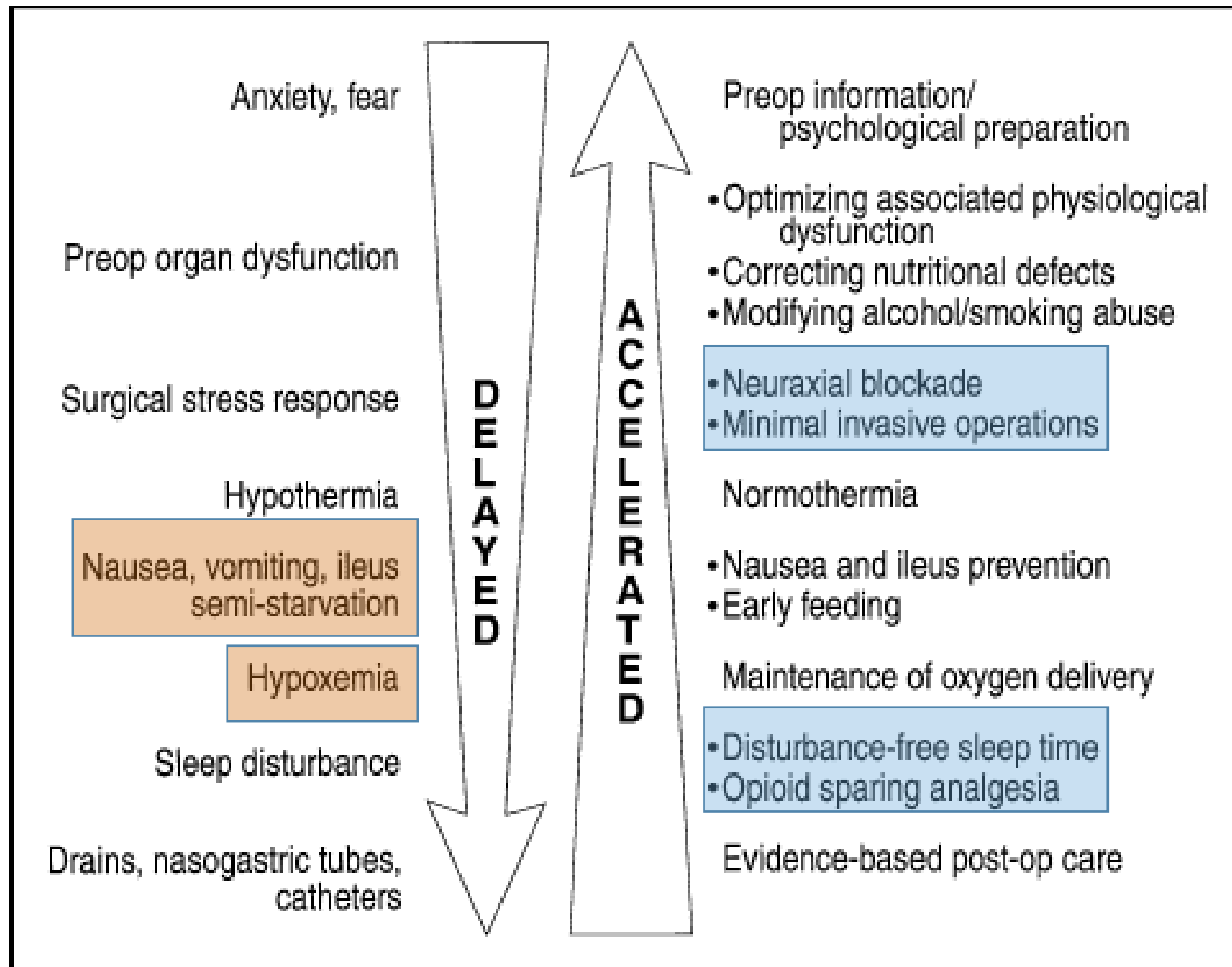


Surgical and anesthetic stress

1. Nociceptive Pain



1. Inflammatory Pain





➤ Patient information

Patient mental and physical preparation

Blood preservation strategy

Pain management

Tell them that it's a terribly painful operation

That we do our best to make it less painful but still terrible

Tell them that we need them to be ready mentally and physically like if they were doing the "World cup"

Category 1

The young, active
and
Healthy baby
boomer



They want to be the best of the ward, the day of surgery ...

Category 2

The low demand patient

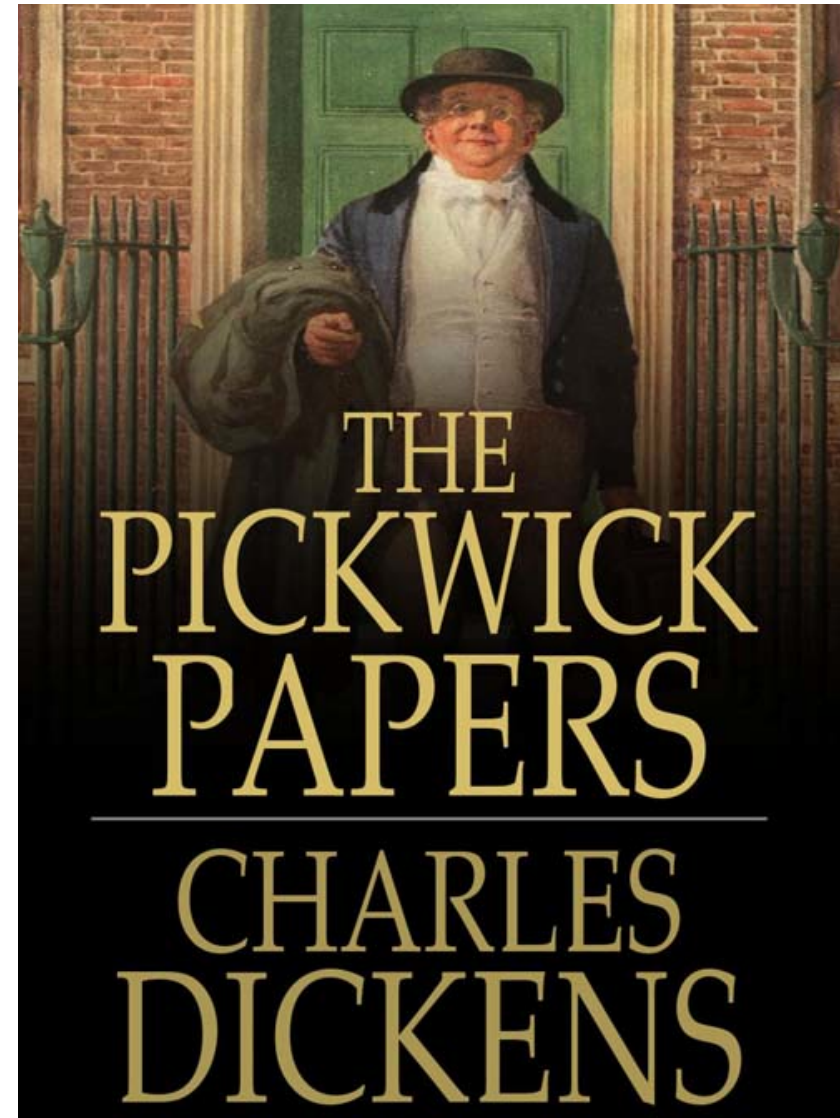


Fragile, risk of fall...

Category 3

The pink
and puffy »

They want to survive the
knee surgery



Category 4: « Bob Booth Criteria »

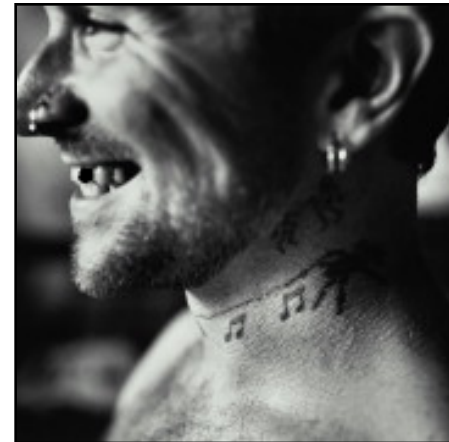
Female

- In between 2 husbands
- Fibromyalgia
- > 2 allergy
- >2 cats

Male

- Accompanied by mother
- Tattoo - to -Tooth Ratio
- Sun glasses indoor
- White shoes in Winter
- More than 2 gold chains

They do not know what
they want !



Patient information

➤ Patient mental and physical preparation

Blood preservation strategy

Pain management

- Information +++ from the nurses
- Organization of the post-op avoiding the “Jail “ with all these instruments of torture”

Translation : the rehab center with the CPM

- Pre-operative rehabilitation
- Stress management : specific nurse, hypnosis

Patient information

Patient mental and physical preparation

➤ Blood preservation strategy

Pain management

Limit blood loss



PREPARE: the prevalence of perioperative anaemia and need for patient blood management in elective orthopaedic surgery

A multicentre, observational study

Sigismond Lasocki, Rüdiger Krauspe, Christian von Heymann, Anna Mezzacasa, Suki Chainey and Donat R. Spahn

PREPARE

17 centers,
6 European countries
n = 1534 patients THA/
TKA

Eur J Anaesthesiol 2015; **32**:160–167

Post-op risk of Anemia after TKA/THA >80%

Risk Associated with Preoperative Anemia in Noncardiac Surgery

A Single-center Cohort Study

W. Scott Beattie, M.D., Ph.D., F.R.C.P.C.,* Keyvan Karkouti, M.D., M.Sc., F.R.C.P.C.,†
Duminda N. Wijeyesundera, M.D., F.R.C.P.C.,‡ Gordon Tait, Ph.D.§

Anesthesiology 2009; 110:574–81

Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study

Khaled M Musallam, Hani M Tamim, Toby Richards, Donat R Spahn, Frits R Rosendaal, Aida Habbal, Mohammad Khreiss, Fadi S Dahdaleh, Kaivan Khavandi, Pierre M Sfeir, Assaad Soweid, Jamal J Hoballah, Ali T Taher, Faek R Jamali

Lancet 2011; 378: 1396–407

Role of preoperative anemia for risk of transfusion and postoperative morbidity in fast-track hip and knee arthroplasty

Øivind Jans, Christoffer Jørgensen, Henrik Kehlet, and Pär I. Johansson on behalf of the
Lundbeck Foundation Centre for Fast-track Hip and Knee Replacement Collaborative Group*

TRANSFUSION 2014;54:717-726.

Preoperative Anemia Increases Postoperative Complications and Mortality Following Total Joint Arthroplasty



Jessica Viola, BS, Miguel M. Gomez, MD, Camilo Restrepo, MD, Mitchell G. Maltenfort, PhD, Javad Parvizi, MD, FRCS

The Rothman Institute at Thomas Jefferson University, Philadelphia, Pennsylvania

The Journal of Arthroplasty 30 (2015) 846–848

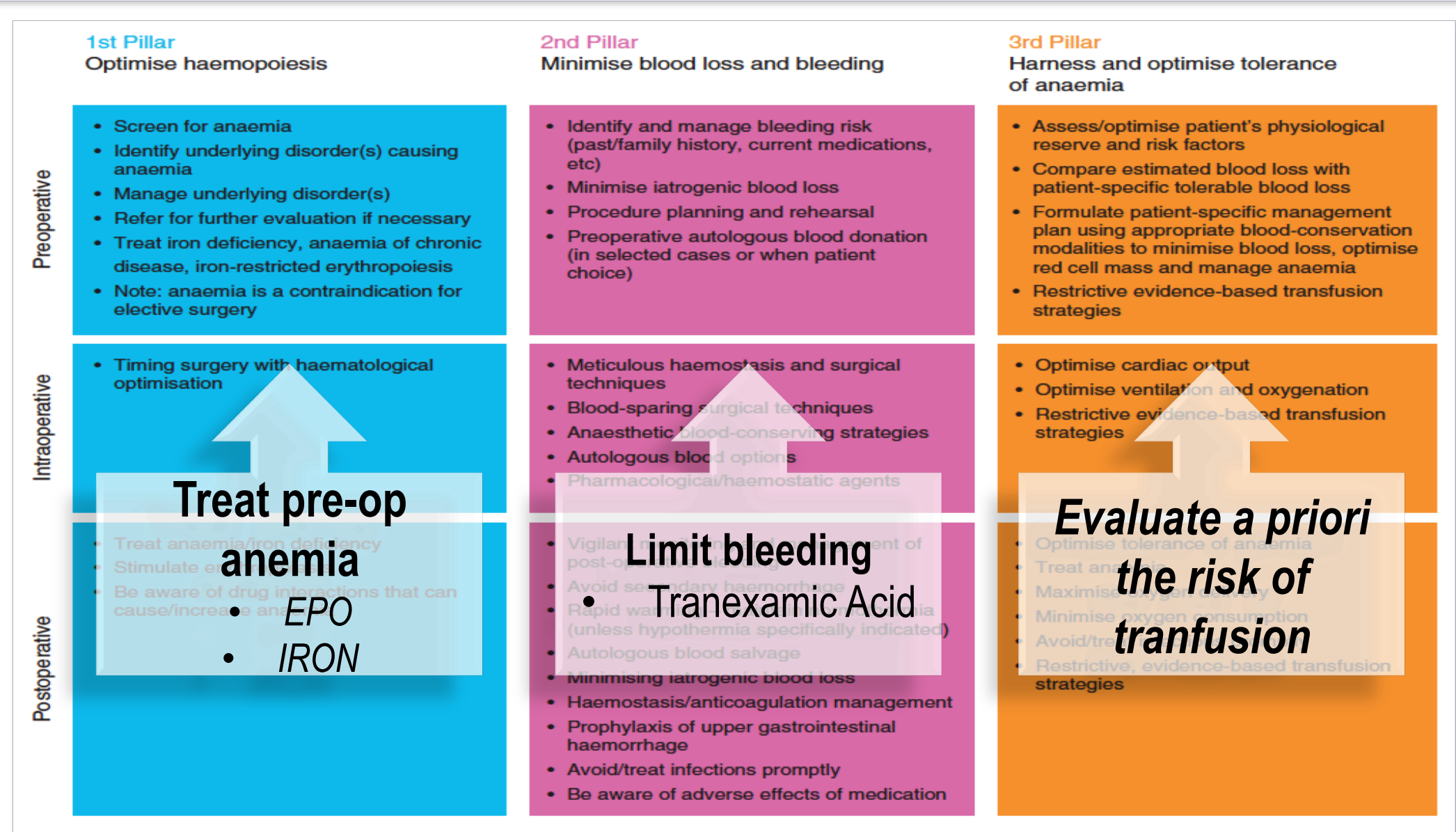


Fig 1 A multimodal approach to PBM (or blood conservation). Adapted from Hofmann and colleagues⁶² with permission. ESA, erythropoiesis-stimulating agents.

1.Treat Pre-op

British Journal of Anaesthesia 106 (1): 13–22 (2011)
doi:10.1093/bja/aeq361

BJA

Detection, evaluation, and management of preoperative anaemia in the elective orthopaedic surgical patient: NATA guidelines

L. T. Goodnough^{1*}, A. Maniatis², P. Earnshaw³, G. Benoni⁴, P. Beris⁵, E. Bisbe⁶, D. A. Fergusson⁷, H. Gombotz⁸, O. Habler⁹, T. G. Monk¹⁰, Y. Ozier¹¹, R. Slappendel¹² and M. Szpalski¹³

¹ Department of Pathology and Medicine, Stanford University School of Medicine, Pasteur Dr., Room H-1402, 5626, Stanford, CA 94305, USA

² Hematology Division, Henry Dunant Hospital, Athens, Greece

³ Department of Orthopaedics, Guy's and St Thomas' Hospital, London, UK

⁴ Department of Orthopedics, Malmö University Hospital, Malmö, Sweden

⁵ Department of Hematology, Geneva University Hospital, Geneva, Switzerland

⁶ Department of Anesthesiology, University Hospital Mar-Esperança, Barcelona, Spain

⁷ University of Ottawa Centre for Transfusion Research, Ottawa, Ontario, Canada

⁸ Department of Anesthesiology and Intensive Care, General Hospital Linz, Linz, Austria

⁹ Department of Anesthesiology, Surgical Intensive Care and Pain Control, Krankenhaus Nordwest GmbH, Frankfurt am Main, Germany

¹⁰ Department of Anesthesiology, Duke University Medical Center, Durham, NC, USA

¹¹ Department of Anesthesiology and Intensive Care, Cochin Hospital, Paris Descartes University, Paris, France

¹² Perioperative Medicine Consultancy, Nijmegen, The Netherlands

¹³ Department of Orthopedics, IRIS South Teaching Hospitals, Free University of Brussels, Brussels, Belgium

J-28

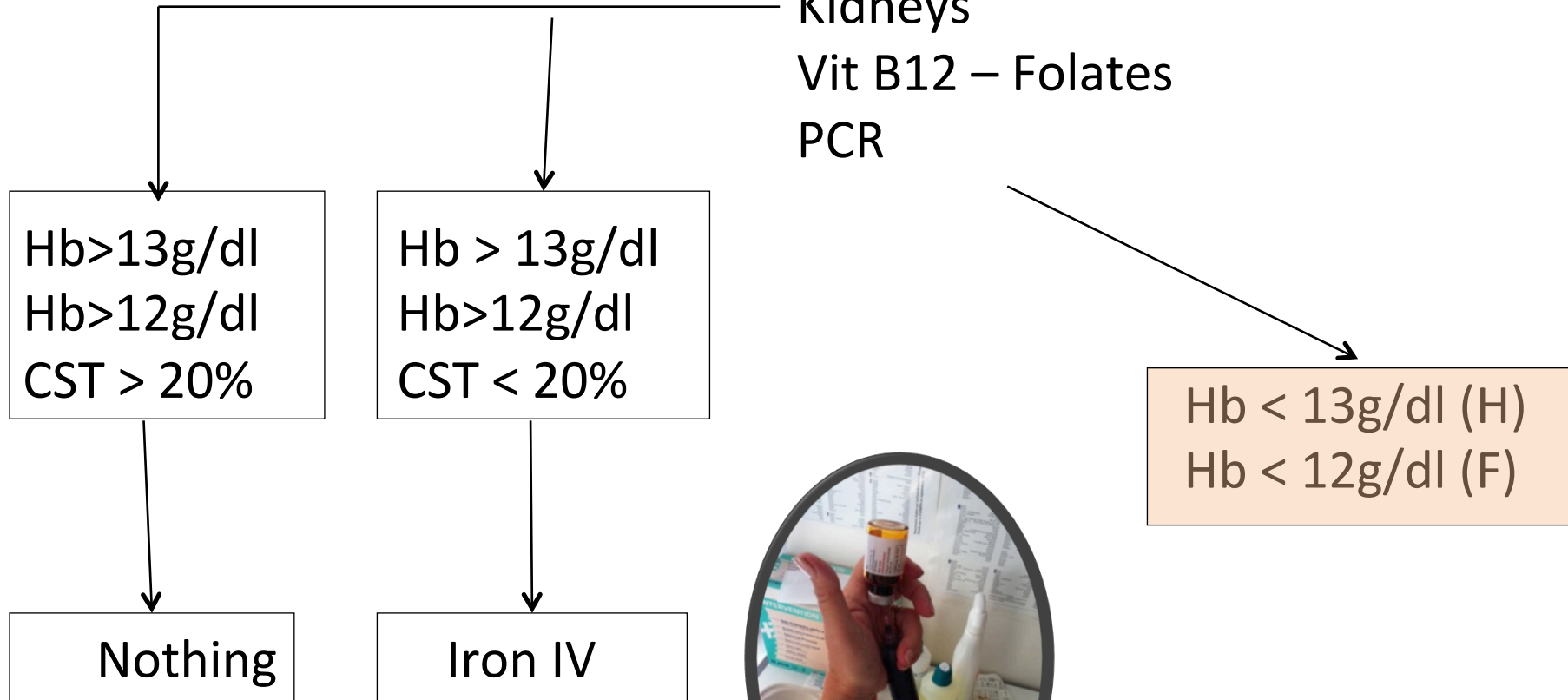
NFS-P-TP-TCA

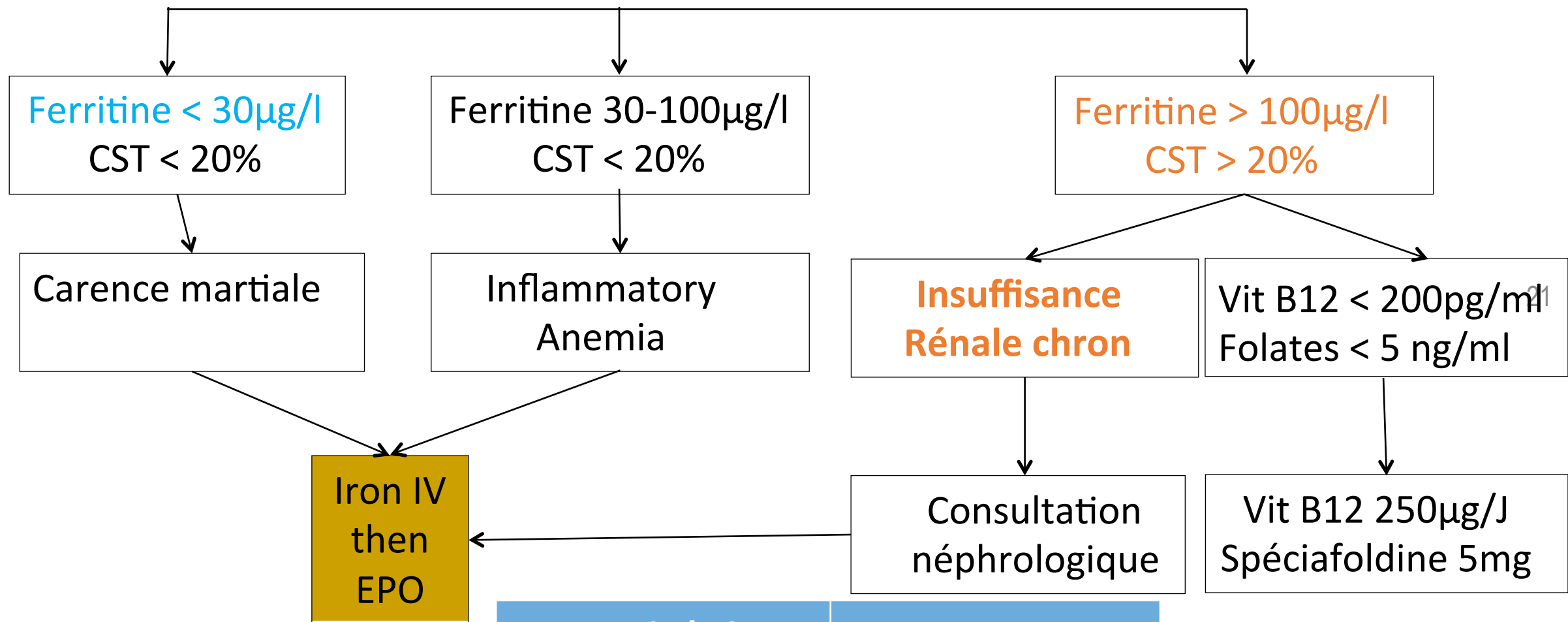
Iron level

Kidneys

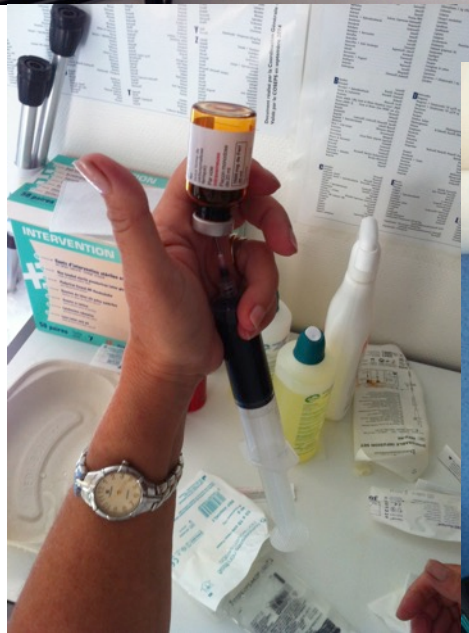
Vit B12 – Folates

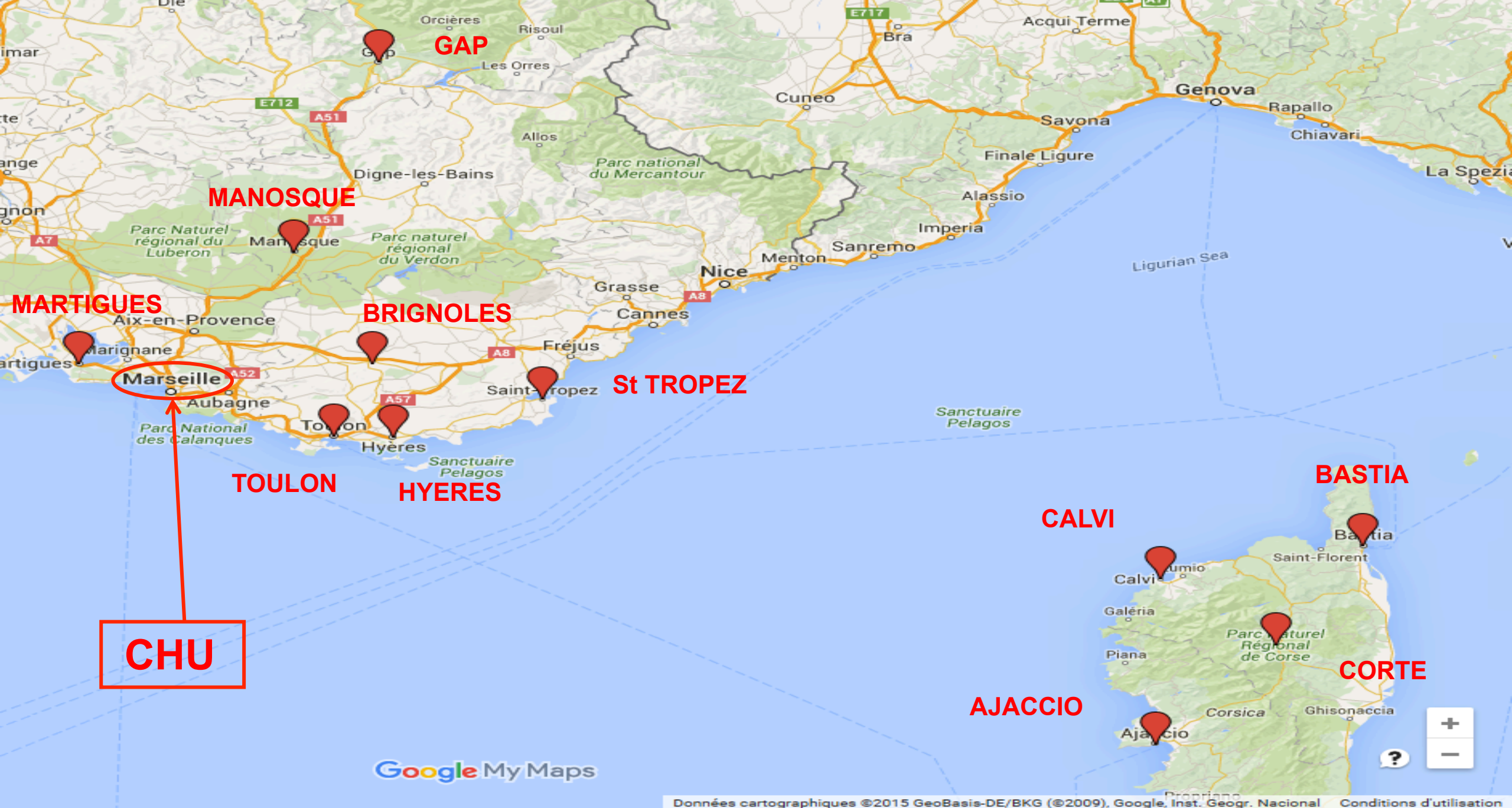
PCR





Hb (g/dl)	Injection EPO
10-11	4
11-12	3
12-13	2





Google My Maps

Données cartographiques ©2015 GeoBasis-DE/BKG (©2009), Google, Inst. Geogr. Nacional Conditions d'utilisation

FR

18:24
19/10/2015

2.Limit blood loss

Tranexamic Acid

Orthopaedics & Traumatology: Surgery & Research (2012) 98, 477–483



Available online at
SciVerse ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en



ORIGINAL ARTICLE

Tranexamic acid reduces blood loss and financial cost in primary total hip and knee replacement surgery

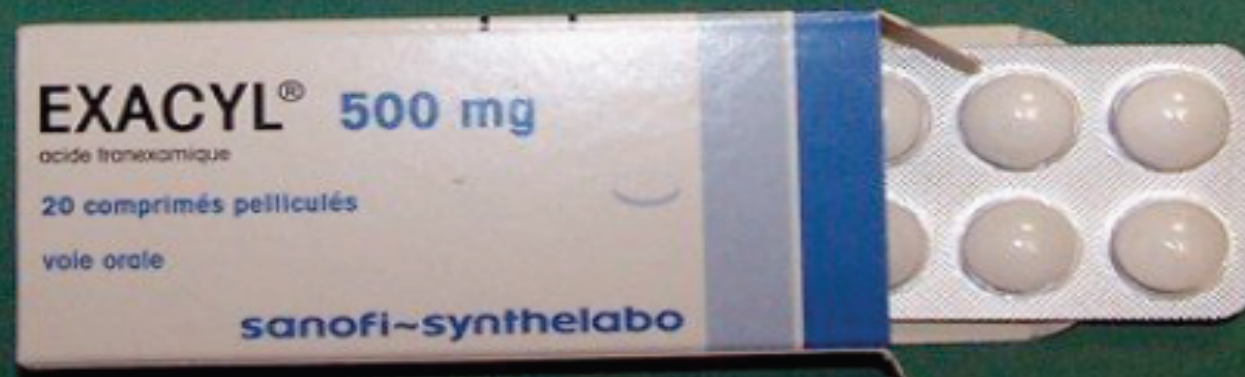
E. Irisson^{a,*}, Y. Hémon^a, V. Pauly^b, S. Parratte^c, J.-N. Argenson^c,
F. Kerbaul^{a,d}

Exacyl 15mg/kg 30min Incision and closure
15mg/kg ORAL/6h during 24h

TABLE 1. Comparison of intraarticular TXA versus IV TXA	TABLE 3. Comparison of intraarticular TXA versus IV TXA	versus control	
Characteristics		control (n = 207)	p value
Age (years)	Overall, this study has demonstrated a significant benefit from the routine use of TXA for total knee arthroplasty and is one of the first studies to demonstrate a <u>small but significant benefit for IV administration in comparison to intraarticular administration.</u> The routine use of TXA as an integral part of a comprehensive PBMP also provides significant cost savings due to the reduction in transfusion rates and in our study a decrease in LOS. Furthermore, based on the 9.4% decrease in Hg drift, IV TXA was more cost effective than intraarticular TXA. It has become a standard part of our protocol for total knee arthroplasty at our institution.	± 11.1	0.1634
Sex			0.7922
Female		(68.6)	
Male		(31.4)	
ASA		2.46	0.005
Hb (g/dL)		± 1.6	0.0002
Preoperative		± 1.4	<0.0001
Postoperative		± 1.2	<0.0001
Nadir		± 1.1	0.0743
Discharge		± 1.1	0.0005
Drift		± 1.8	<0.0001
LOS			<0.0001
Transfusion		(40.6)	
Yes		(59.4)	
No			

1A 500mg = 0,39€

1cp 500mg = 0,20€



A Randomized Controlled Trial of Oral and Intravenous Tranexamic Acid in Total Knee Arthroplasty: The Same Efficacy at Lower Cost?

Yale A. Fillingham, MD ^{a,*}, Erdan Kayupov, MSE ^a, Darren R. Plummer, MD, MBA ^a, Mario Moric, MS ^b, Tad L. Gerlinger, MD ^a, Craig J. Della Valle, MD ^a

The Journal of Arthroplasty xxx (2016) 1–5

Conclusion

Proper dosing of oral TXA provides an equivalent reduction in hemoglobin and blood loss compared to IV drug administration in the setting of primary TKA. Given the current practice trends demand treatments to be both clinically and cost effective, the lower price of oral TXA makes it a superior alternative to IV TXA.

Post-op transfusion

If we did a bad job

We have to follow the French recommendations

HAS 2014

B	Les seuils transfusionnels suivants d'hémoglobine au cours de la période périopératoire sont recommandés : <ul style="list-style-type: none">• 7 g/dl chez les personnes sans antécédents particuliers ;
	<ul style="list-style-type: none">• 10 g/dl chez les personnes ne tolérant pas cliniquement les concentrations d'hémoglobine inférieures ou atteintes d'insuffisance coronarienne aiguë ou d'insuffisance cardiaque avérée ou bêta-bloquées.
AE	Il est recommandé, au cours de la période périopératoire, de privilégier un seuil transfusionnel de 8-9 g/dl chez les personnes ayant des antécédents cardio-vasculaires.

Patient information

Patient mental and physical preparation

Blood preservation strategy

➤ Pain management



The KEY :

Happy anesthesiologists



Multimodal and pre-emptive anesthesia

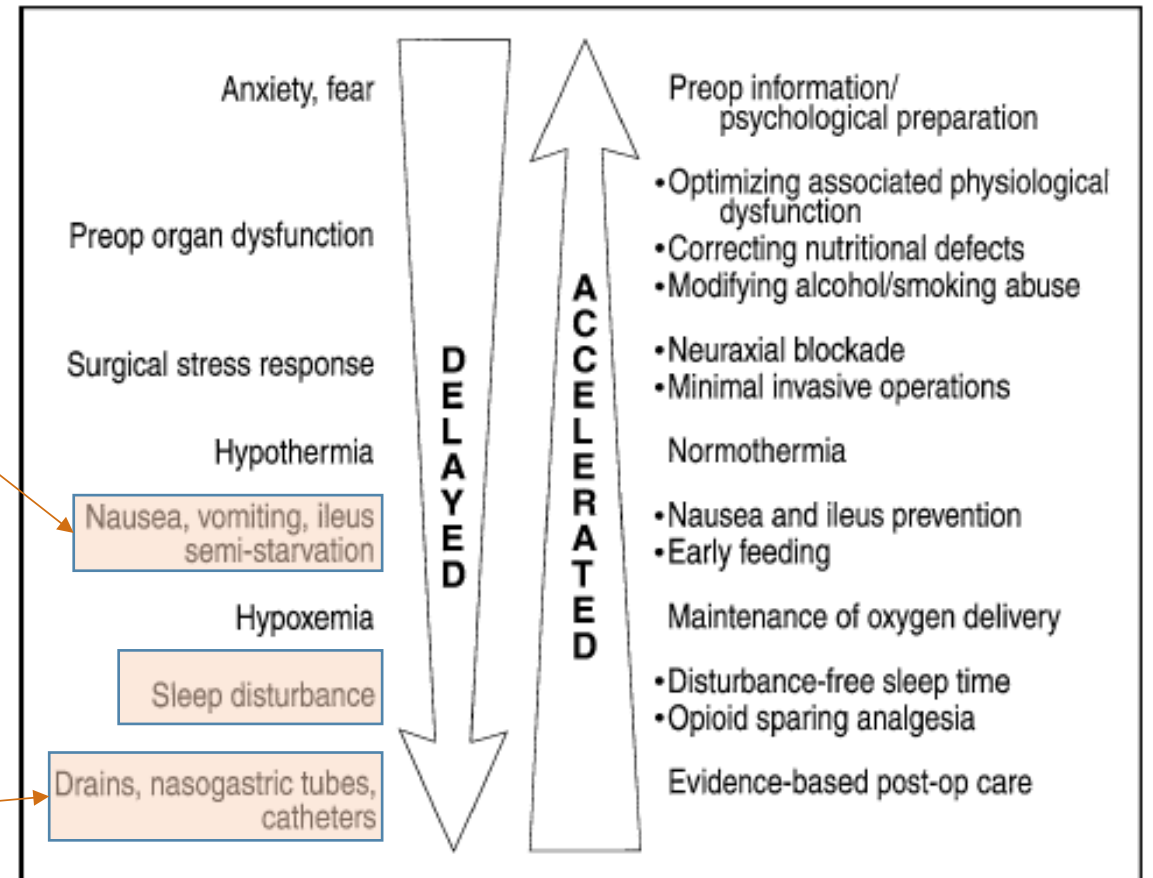
Numerous strategies :

- Premedication
- GA vs Spinal vs Loco-regional vs LOCA
- Local or Loco-regional single-shot vs
- Continuous

Associations

Morphin free

ORAL



Premedication

Effect of Sedative Premedication on Patient Experience After General Anesthesia A Randomized Clinical Trial

Axel Maurice-Szamburski, MD; Pascal Auquier, MD, PhD; Véronique Viarre-Oreal, PhD; Philippe Cuvillon, MD, PhD; Michel Carles, MD, PhD; Jacques Ripart, MD, PhD; Stéphane Honore, MD; Thibaut Triglia, MD; Anderson Loundou, PhD; Marc Leone, MD, PhD; Nicolas Bruder, MD, PhD; for the PremedX Study Investigators

CONCLUSIONS AND RELEVANCE Among patients undergoing elective surgery under general anesthesia, sedative premedication with lorazepam compared with placebo or no premedication did not improve the self-reported patient experience the day after surgery, but was associated with modestly prolonged time to extubation and a lower rate of early cognitive recovery. The findings suggest a lack of benefit with routine use of lorazepam as sedative premedication in patients undergoing general anesthesia.

Analgesic and sedative effects of perioperative gabapentin in total knee arthroplasty: a randomized, double-blind, placebo-controlled dose-finding study

Troels Haxholdt Lunn^{a,b,*}, Henrik Husted^{b,c}, Mogens Berg Laursen^{b,d}, Lars Tambour Hansen^{b,e}, Henrik Kehlet^{b,f}

Abstract

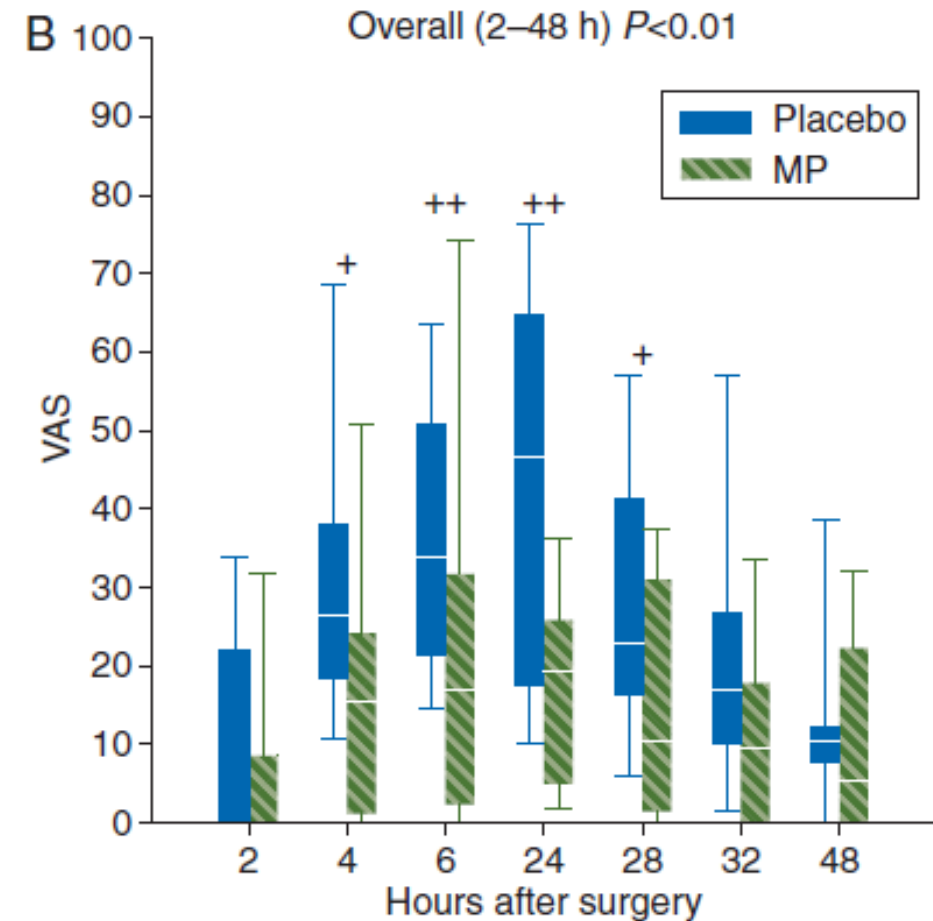
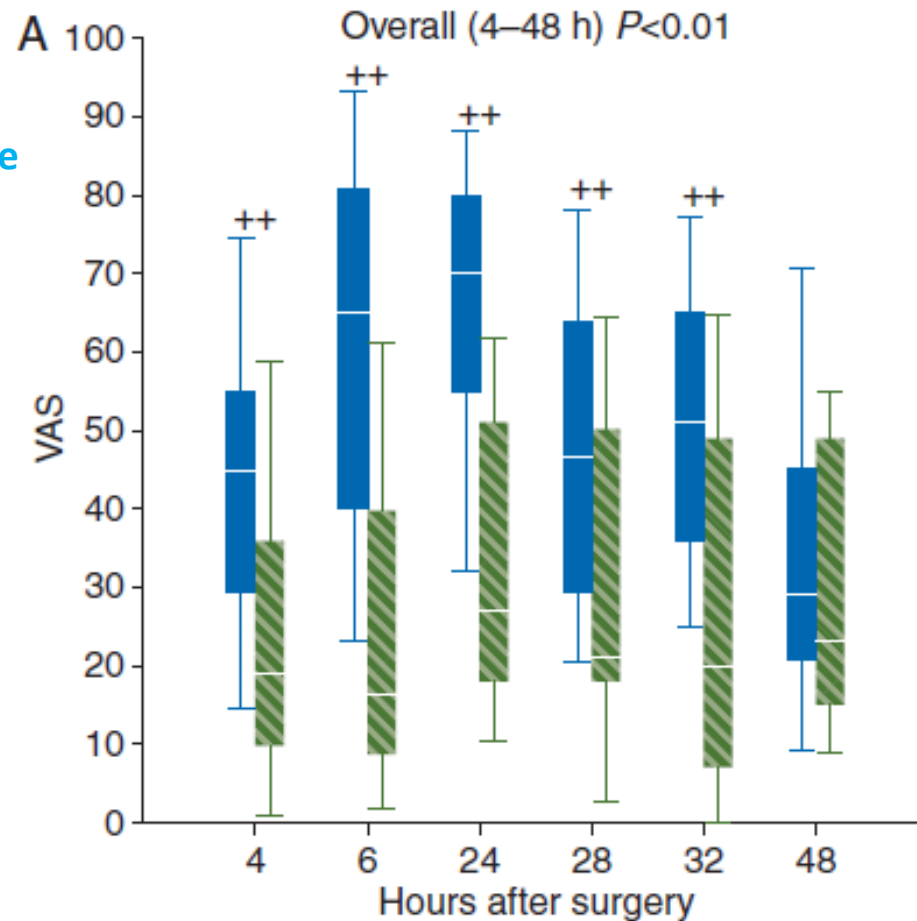
Gabapentin has shown acute postoperative analgesic effects, but the optimal dose and procedure-specific benefits vs harm have not been clarified. In this randomized, double-blind, placebo-controlled dose-finding study, 300 opioid-naïve patients scheduled for total knee arthroplasty were randomized (1:1:1) to either gabapentin 1300 mg/d (group A), gabapentin 900 mg/d (group B), or placebo (group C) daily from 2 hours preoperatively to postoperative day 6 in addition to a standardized multimodal analgesic regime. The primary outcome was pain upon ambulation 24 hours after surgery, and the secondary outcome was sedation 6 hours after surgery. Other outcomes were overall pain during well-defined mobilizations and at rest and sedation during the first 48 hours and from days 2-6, morphine use, anxiety, depression, sleep quality, and nausea, vomiting, dizziness, concentration difficulty, headache, visual disturbances, and adverse reactions. Pain upon ambulation (visual analog scale, mean [95% confidence interval]) 24 hours after surgery in group A vs B vs C was as follows: 41 [37-46] vs 41 [36-45] vs 42 [37-47], $P = 0.93$. Sedation (numeric rating scale, median [range]) 6 hours after surgery was as follows: 3.2 [0-10] vs 2.6 [0-9] vs 2.3 [0-9], the mean difference A vs C being 0.9 [0.2-1.7], $P = 0.046$. No between-group differences were observed in overall pain or morphine use the first 48 hours and from days 2-6. Sleep quality was better during the first 2 nights in group A and B vs C. Dizziness was more pronounced from days 2-6 in A vs C. More severe adverse reactions were observed in group A vs B and C. In conclusion, gabapentin may have a limited if any role in acute postoperative pain management of opioid-naïve patients undergoing total knee arthroplasty and should not be recommended as a standard of care.

Effect of high-dose preoperative methylprednisolone on pain and recovery after total knee arthroplasty: a randomized, placebo-controlled trial

British Journal of Anaesthesia 106 (2): 230–8 (2011)

T. H. Lunn^{1,2*}, B. B. Kristensen^{1,2}, L. Ø. Andersen^{1,2}, H. Husted^{2,3}, K. S. Otte^{2,3}, L. Gaarn-Larsen^{1,2} and H. Kehlet^{2,4}

125mg MPrédnisolone



Pain (A) during walking (5 m), (B) at rest (supine), (C) upon 45° flexion of the hip with straight leg, and (D) upon 45° knee flexion

Post-op Nausea and vomiting

Risk factors	Points
Female gender	1
Nonsmoker	1
History of PONV	1
Postoperative opioids	1
Total	0-4

PONV: Postoperative nausea and vomiting

Methylpredisolone limit PO nausea and vomiting after THA and TKA

Miyagawa et al. J Clin Pharm Therap 2010

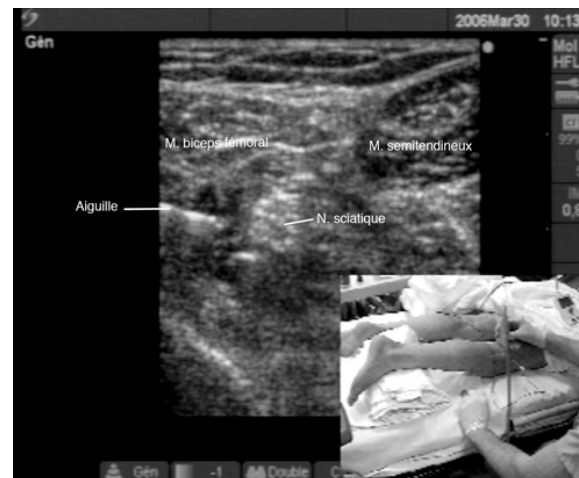
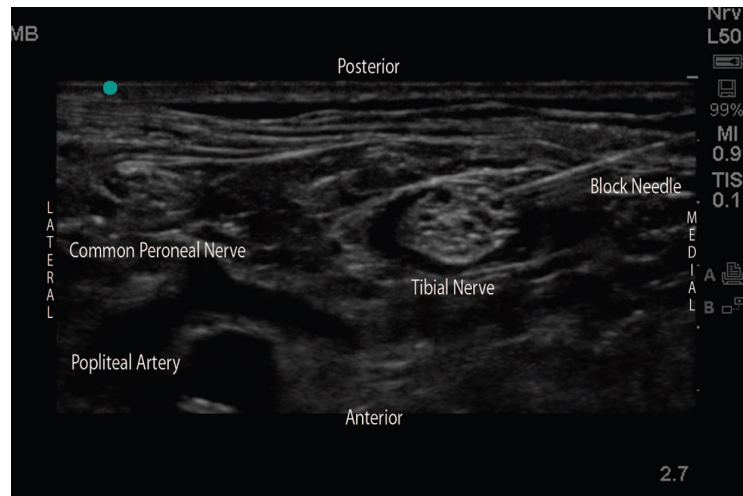
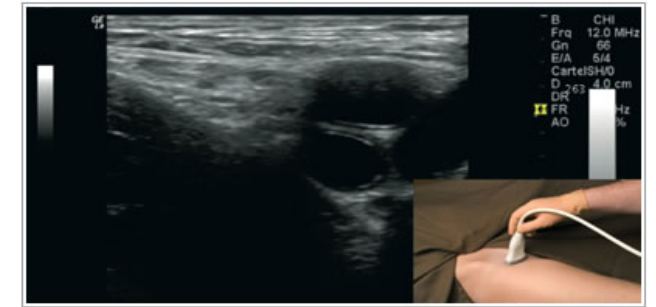
J0 – go down stand-up and dressed



- **First Knee Flexion: J0 evening**
- **Key is pain control**



VARIOUS OPTIONS



Comité douleur-anesthésie locorégionale et le comité d

Il n'est pas recommandé d'utiliser les blocs périphériques sont des surfaces, mais ils ont des effets indésirables.

Pour l'analgésie post-opératoire après chirurgie invasive du genou, telle que la prothèse totale de genou, il est recommandé d'utiliser un cathéter fémoral. Le bloc du nerf fémoral en injection unique est également recommandé en complément du bloc du nerf fémoral. Pour la chirurgie ligamentaire du genou,



Regional or general anesthesia for fast-track hip and knee replacement - what is the evidence? [version 1; referees: 2 approved]

Henrik Kehlet^{1,2}, Eske Kvanner Aasvang³

F1000Research 2015, 4(F1000 Faculty Rev):1449

Type of regional anesthesia

Epidural analgesia should not be used routinely in fast-track total hip arthroplasty (THA) or total knee arthroplasty (TKA) because of the limited analgesic effect, especially in comparison with local wound infiltration (local infiltration analgesia, or LIA) in TKA¹⁶ combined with the potential for adverse effects such as urinary retention, pruritus, hypotension, and motor blockade^{17,18}, all of which delay recovery.

Recovery after total intravenous general anaesthesia or spinal anaesthesia for total knee arthroplasty: a randomized trial[†]

A. Harsten^{1*}, H. Kehlet^{2,3} and S. Toksvig-Larsen⁴

British Journal of Anaesthesia 111 (3): 391–9 (2013)

Results. GA resulted in shorter LOS (46 vs 52 h, $P<0.001$), and less nausea and vomiting (4 vs 15, $P<0.05$) and dizziness (VAS 0 mm vs 20 mm, $P<0.05$) compared with SA. During the first 2 postoperative hours, GA patients had higher pain scores ($P<0.001$), but after 6 h the SA group had significantly higher pain scores ($P<0.001$). Subjects in the GA group used fewer patient-controlled analgesia doses and less morphine ($P<0.01$), and were able to walk earlier compared with the SA group ($P<0.001$). Subjects receiving SA would request a change in the method of anaesthesia in the event of a subsequent operation more often than the GA subjects ($P<0.05$).

Anesthesia Technique and Mortality after Total Hip or Knee Arthroplasty (ANESTHESIOLOGY 2016; 125:724-31)

A Retrospective, Propensity Score-matched Cohort Study

Anahi Perlas, M.D., F.R.C.P.C., Vincent W. S. Chan, M.D., F.R.C.P.C., F.R.C.A.,

Methods: All patients who had hip or knee arthroplasty between January 1, 2003, and December 31, 2014, were evaluated. The principal exposure was spinal *versus* general anesthesia. The primary outcome was 30-day mortality. Secondary outcomes were (1) perioperative myocardial infarction; (2) a composite of major adverse cardiac events that includes cardiac arrest, myocardial infarction, or newly diagnosed arrhythmia; (3) pulmonary embolism; (4) major blood loss; (5) hospital length of stay; and (6) operating room procedure time. A propensity score-matched-pair analysis was performed using a nonparsimonious logistic regression model of regional anesthetic use.

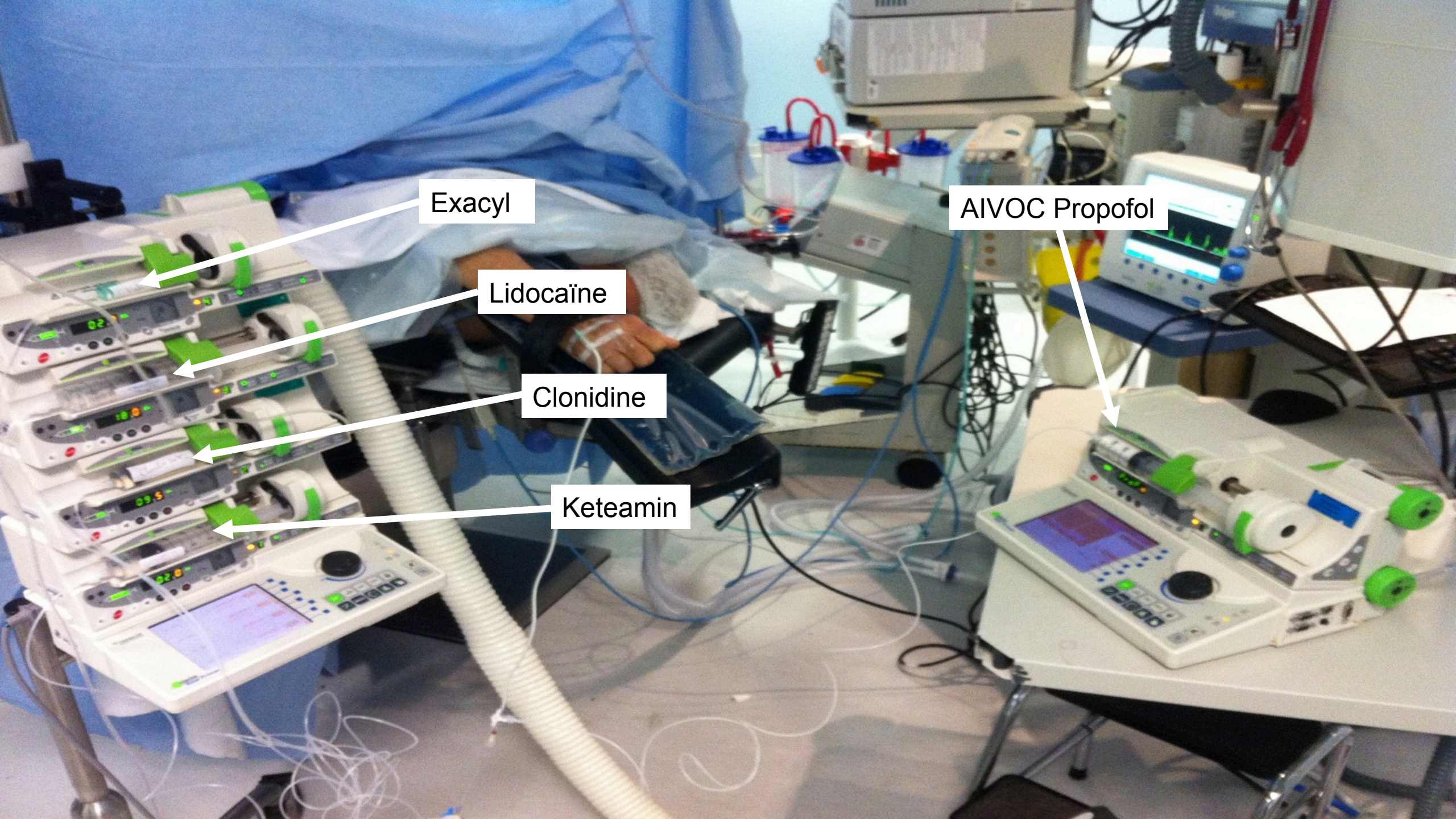
Results: We identified 10,868 patients, of whom 8,553 had spinal anesthesia and 2,315 had general anesthesia. Ninety-two percent ($n = 2,135$) of the patients who had general anesthesia were matched to similar patients who did not have general anesthesia. In the matched cohort, the 30-day mortality rate was 0.19% ($n = 4$) in the spinal anesthesia group and 0.8% ($n = 17$) in the general anesthesia group (risk ratio, 0.42; 95% CI, 0.21 to 0.83; $P = 0.0045$). Spinal anesthesia was also associated with a shorter hospital length of stay (5.7 *vs.* 6.6 days; $P < 0.001$).

Conclusions: The results of this observational, propensity score-matched cohort study suggest a strong association between spinal anesthesia and lower 30-day mortality, as well as a shorter hospital length of stay, after elective joint replacement surgery.



- Spinal anesthesia+++
 - Bupivacaïne HB + sufenta
- If C-I or failure : GA
 - Clonidine 1gamma/kg en 30min puis 1gamma/kg/h.
 - Lidocaïne 2mg/kg IVD puis 2mg/kg/h (Stop en fin d'intervention).
 - Kétamine 0,2mg/kg IVD puis 0,2 mg/kg/h.
 - AIVOC Propofol.
 - +/- curares
 - Masque Laryngé





Exacyl

Lidocaïne

Clonidine

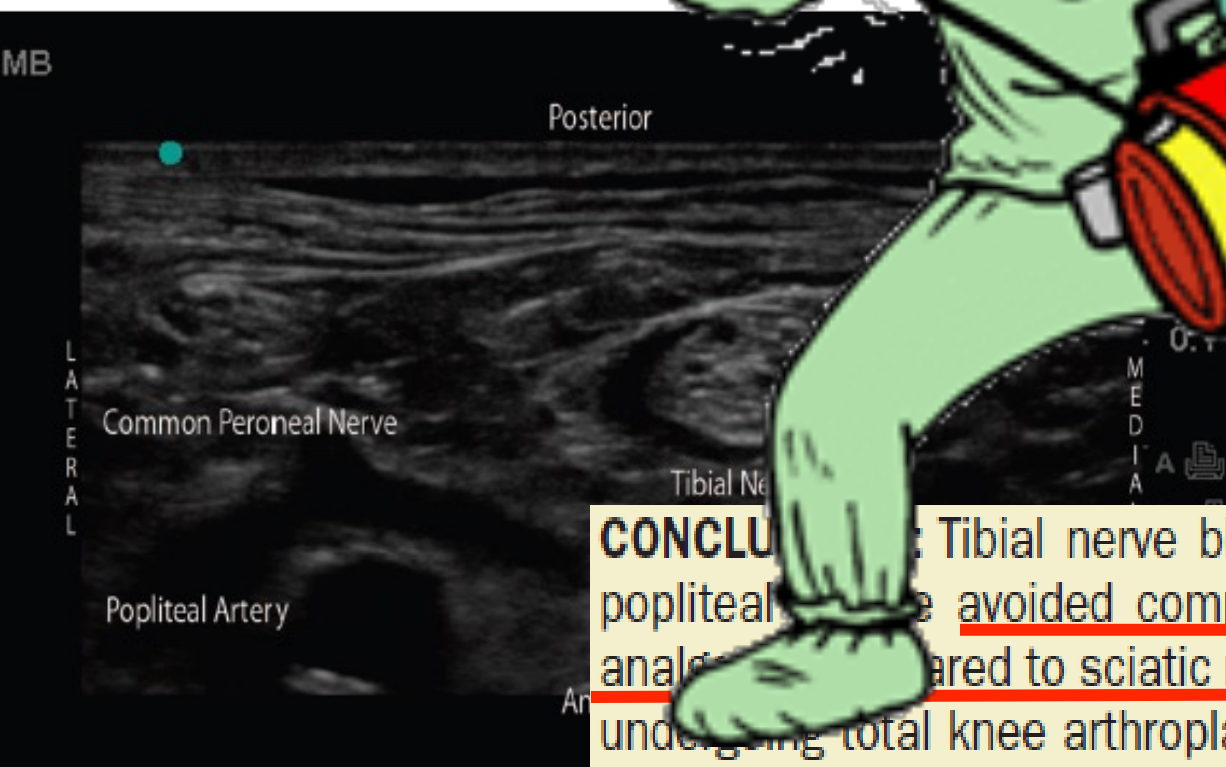
Keteamin

AIVOC Propofol

Femoral Nerve Block With Selective Tibial Nerve Block Provides Effective Analgesia Without Foot Drop After Total Knee Arthroplasty: A Prospective, Randomized, Observer-Blinded Study

(Anesth Analg 2012;115:202–6)

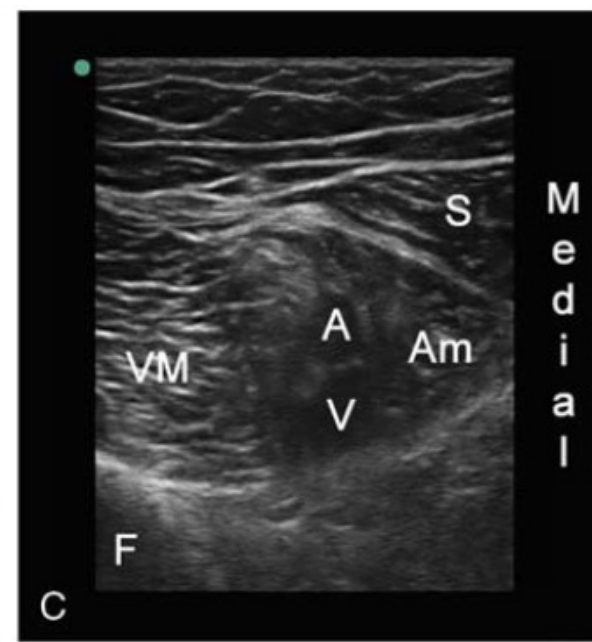
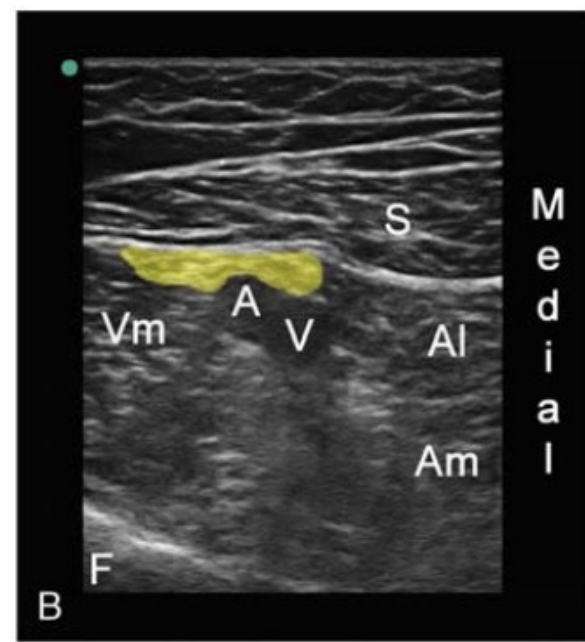
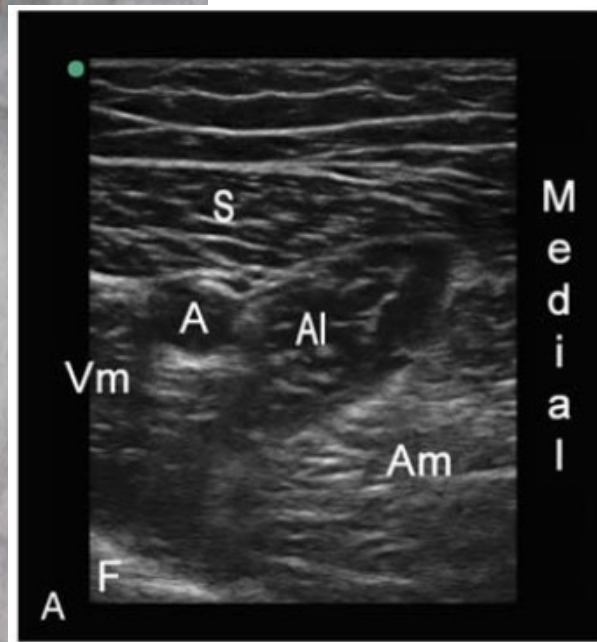
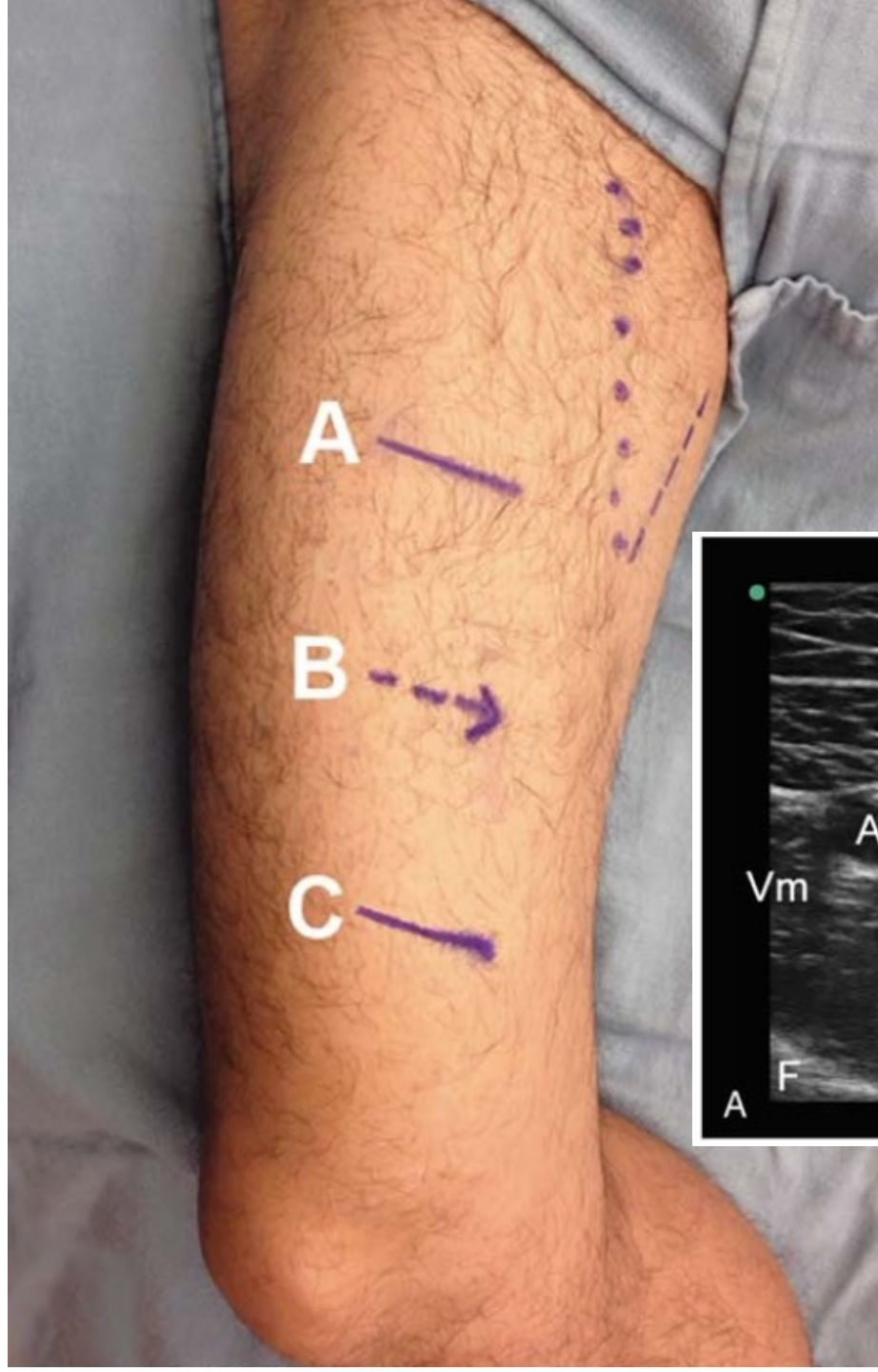
Sanjay K. Sinha, MB, BS,* Ananthil Arumugam, MB, BS,*
John D'Alessio, MD,* David C. Reardon, MD,* and S. Weller, MD†



CONCLUSION: Tibial nerve block placed in the popliteal fossa in close proximity to the popliteal artery avoided complete tibial motor block and provided similar postoperative analgesia compared to sciatic nerve block combined with femoral nerve block for patients undergoing total knee arthroplasty. (Anesth Analg 2012;115:202–6)



Nerve to Vastus Medialis **Nerve to Vastus Intermedius**
Medial Femoral Cutaneous Nerve **Saphenous Nerve**
Anterior Femoral Cutaneous Nerve



Adductor Canal Block Versus Femoral Canal Block for Total Knee Arthroplasty: A Meta-Analysis

What Does the Evidence Suggest?

Nasir Hussain, MSc, MD (Cand), Thomas Gerald Ferreri, MD (Cand),* Parker Joseph Prusick, MD (Cand),*
Laura Banfield, MLIS, MHSc,† Bradley Long, MSLS,* Vincent Roger Prusick, MD,*
and Mohit Bhandari, MD, PhD, FRCSC‡*

CONCLUSIONS

(Reg Anesth Pain Med 2016;41: 314–320)

The success of TKA is currently measured by the rapid return to normal ambulatory function. Most successful rehabilitative programs include immediate postoperative weight bearing and active and passive full range of motion, which require the patient to have full motor control. Adductor canal block remains an attractive alternative to FNB for pain control and motor strength preservation after TKA; however, the anatomical location of the adductor canal needs to be better defined to ensure little consistency in the type of block performed. Until this fact is completely understood, we cannot safely suggest that an ACB provides optimal outcomes in comparison to FNB for TKA.

Continuous Saphenous Nerve Block as Supplement to Single-Dose Local Infiltration Analgesia for Postoperative Pain Management After Total Knee Arthroplasty

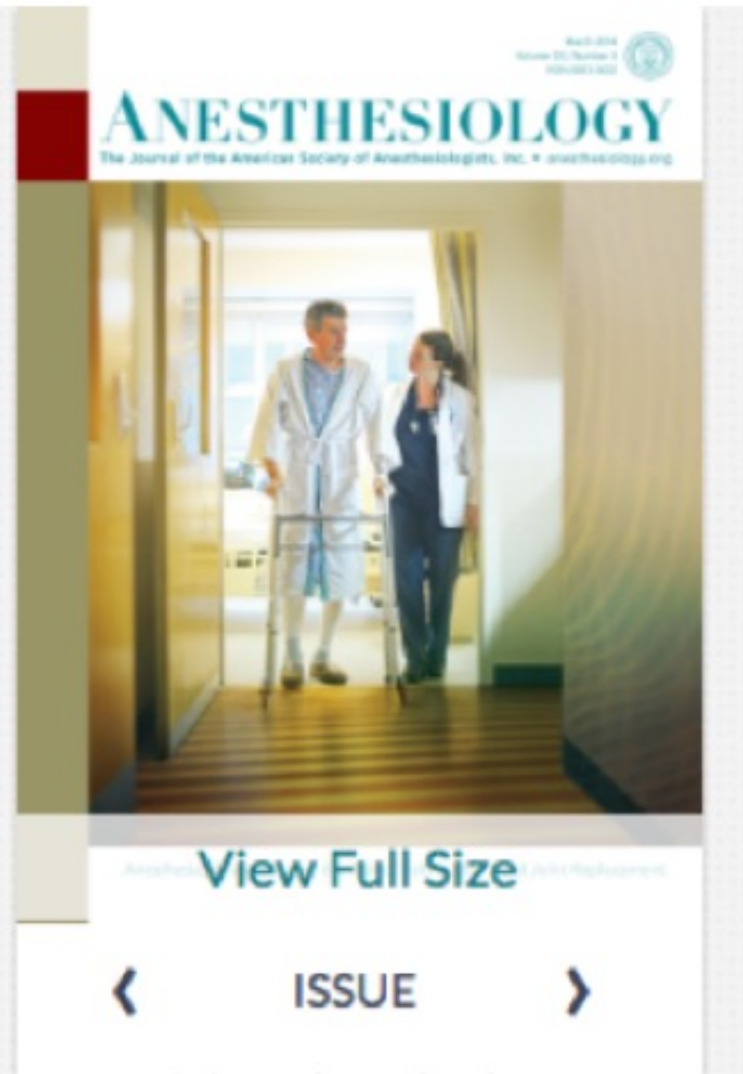
Henning Lykke Andersen, MD, Jens Gyrn, MD,* Lars Møller, MD,† Bodil Christensen, RN,* and Dusanka Zaric, MD, PhD**

(Reg Anesth Pain Med 2013;38: 106–111)



Conclusions: The combination of a saphenous nerve block with single-dose LIA offered better pain relief on the day of surgery than LIA alone.

140 cc Ropivacaine 2mg/cc



FREE

Perioperative Medicine | March 2014

Inpatient Falls after Total Knee Arthroplasty: The Role of Anesthesia Type and Peripheral Nerve Blocks

Stavros G. Memtsoudis, M.D., Ph.D., F.C.C.P.; Thomas Danninger, M.D.; Rehana Rasul, M.P.H., M.A.; Jashvant Poeran, M.D., Ph.D.; Philipp Gerner, B.S.; Ottokar Stundner, M.D.; Edward R. Mariano, M.D., M.A.S.; Madhu Mazumdar, Ph.D., M.A., M.S.

N=190 000 TKA – 400 Hospitals
Falls = 1,6%

Conclusion

- Treat pre-op Anemia
- EPO + IRON
- Tranexamic acid
 - 15mg/kg IV Inc. And Iron and oral 24h
- Less than 2% of transfusion

Anemia kill



Multimodal Pain Control

➤ Limit nausea

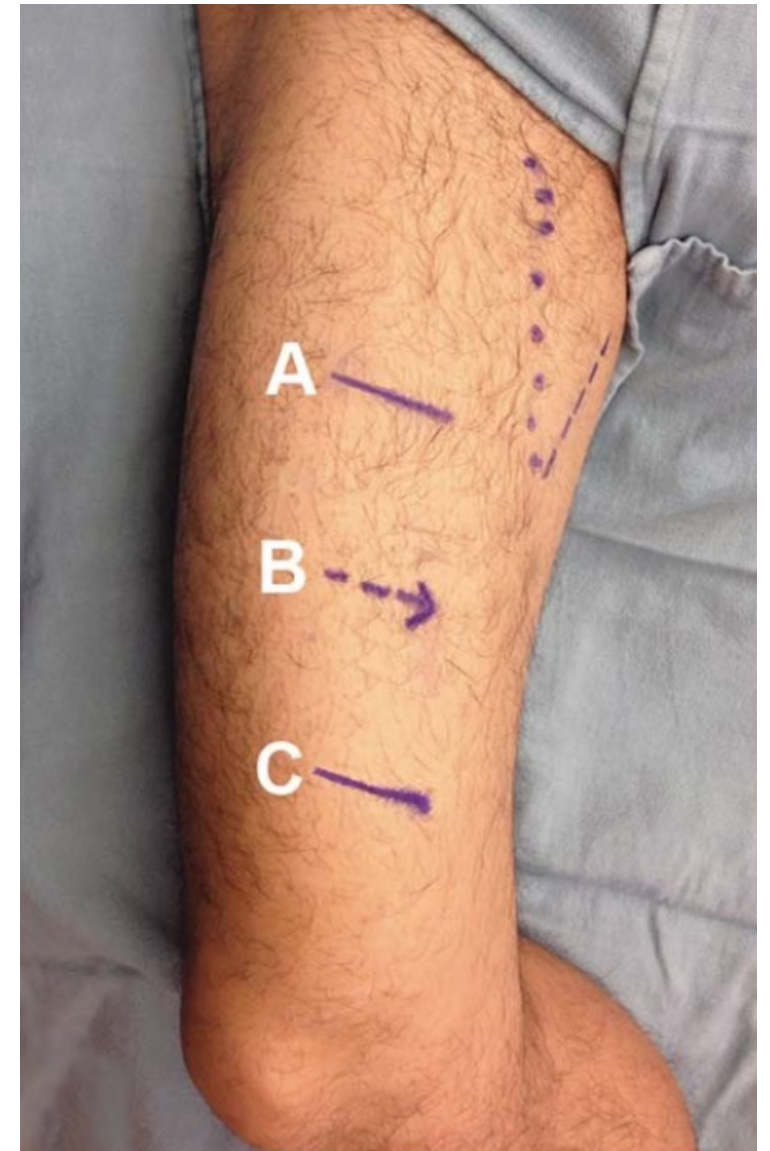
Limit morphinic

Mprednisolone

➤ GA or spinal A++

➤ Adductor canal catheter + LIA
or

Femoral catheter + selective tibial nerve block



TEAM SPIRIT

- Nurse
- Anaesthesiologist
- Physiotherapist
- Surgeon...

