TREATMENT OF POSTOPERATIVE PAIN IN DAY SURGERY

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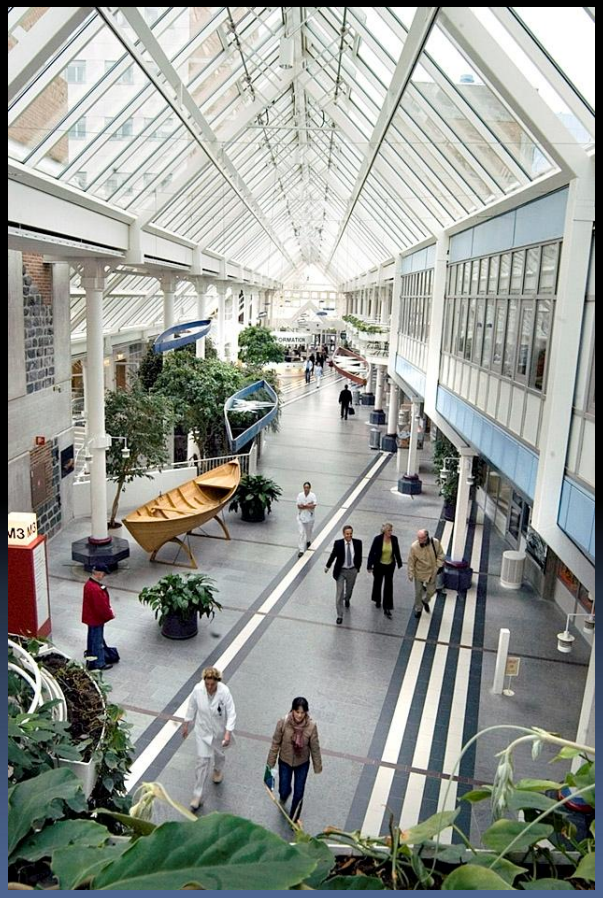
Sweden

University Hospital, Örebro



650 beds; Serving a population of ca 250.000 people; Medical education from 2011.

Operating Room, University Hospital, Örebro

“Production 2009”

14,000 anesthetics
24 operating rooms (OR)
(No neuro-surgery)

30 Anesthesiologists
20 Consultants
10 Residents
2-3 OR/doctor
62 Anesthetic nurses

All figures are approximate values !

Day Surgical Unit, University Hospital, Örebro

4000 Day cases/year
Dedicated staff
Mixed cases
7 am – 8 pm

ASA 1-3
BMI < 40
No upper age limits

Avoid spinals

Postoperative Pain

Introduction

Postoperative Pain

Poorly managed postoperative pain leads to

- Decreased patient satisfaction
- Increased risk for complications
- Delayed home discharge
- Chronic pain states

Better pain management results in improved patient-related outcomes

Improving Pain Management

- Pain should be made visible (documentation)
- Management of pain should be assessed periodically (evaluation)
- Results of pain management strategies should be quantified (analysis)
- Based on the results of the above, changes should be made (implementation)

Protocols for pain management need to be reviewed periodically

Painful procedures

- Orthopedic Surgery
  - ACL repair
  - Shoulder surgery
- Hand Surgery
  - Radius fracture (internal fixation)
- General surgery
  - Hemarrhoidectomy
  - Mastectomy
- ENT Surgery
  - Tonsillectomy

No ”cook-book” for pain management exists!
Each hospital should make its own!

Ideally, a ”procedure-specific” pain management algorithm should be used

Circumcision

- ”Trial and error” approach
  - Preoperative
    - Mixture Indomethacin
    - Mixture Paracetamol
  - Peroperative
    - Local anesthetic/penis block
    - Intranasal fentanyl

No IV needles; Rarely ever need analgesics postoperatively.
If children are ”unhappy”, clonidine 1 µg/kg intranasally

Why Opiates should be avoided?

- Side effects
  - PONV
  - Tiredness
  - Pruritus
  - Urinary retention
  - Constipation
  - Hyperalgesia

Often considered "minor" symptoms. However, they are very disturbing, specifically following Day Surgery!

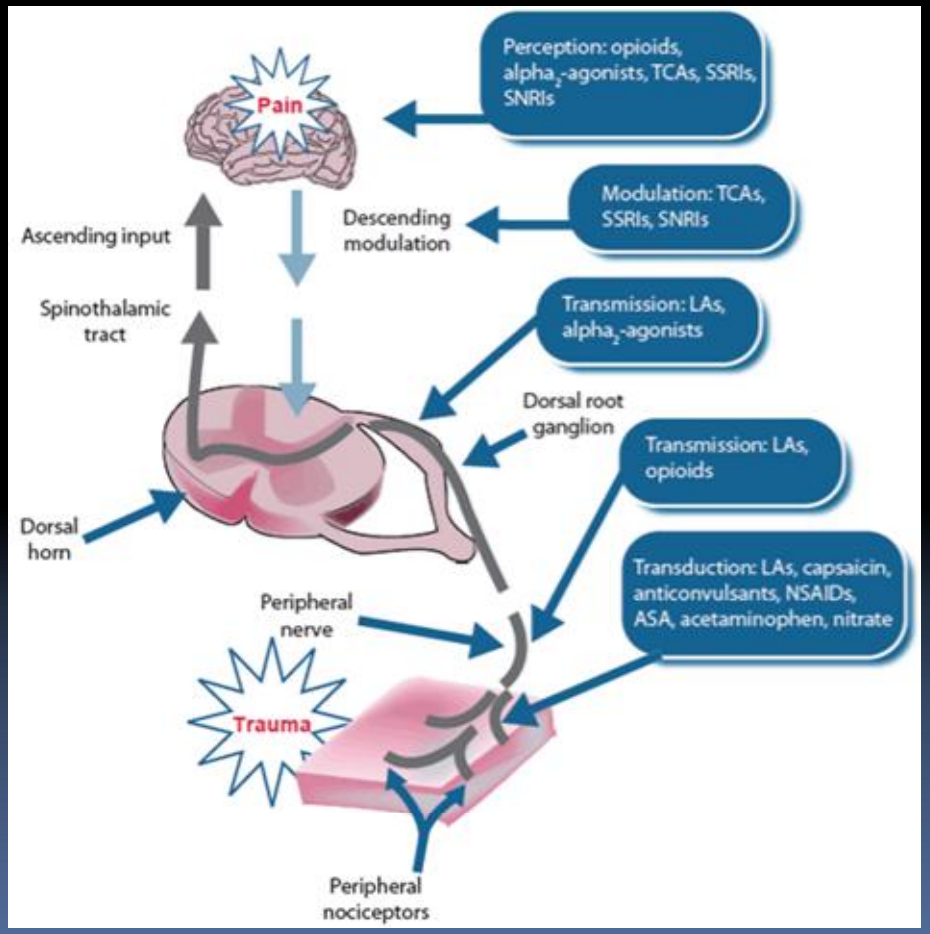
- Risk of cancer metastases*
  - Probably due to angiogenesis
  - A number of retrospective studies confirm this

"Major" benefit if confirmed in prospective studies

* Ambulatory breast cancer surgery – role of paravertebral blocks

Pain Management

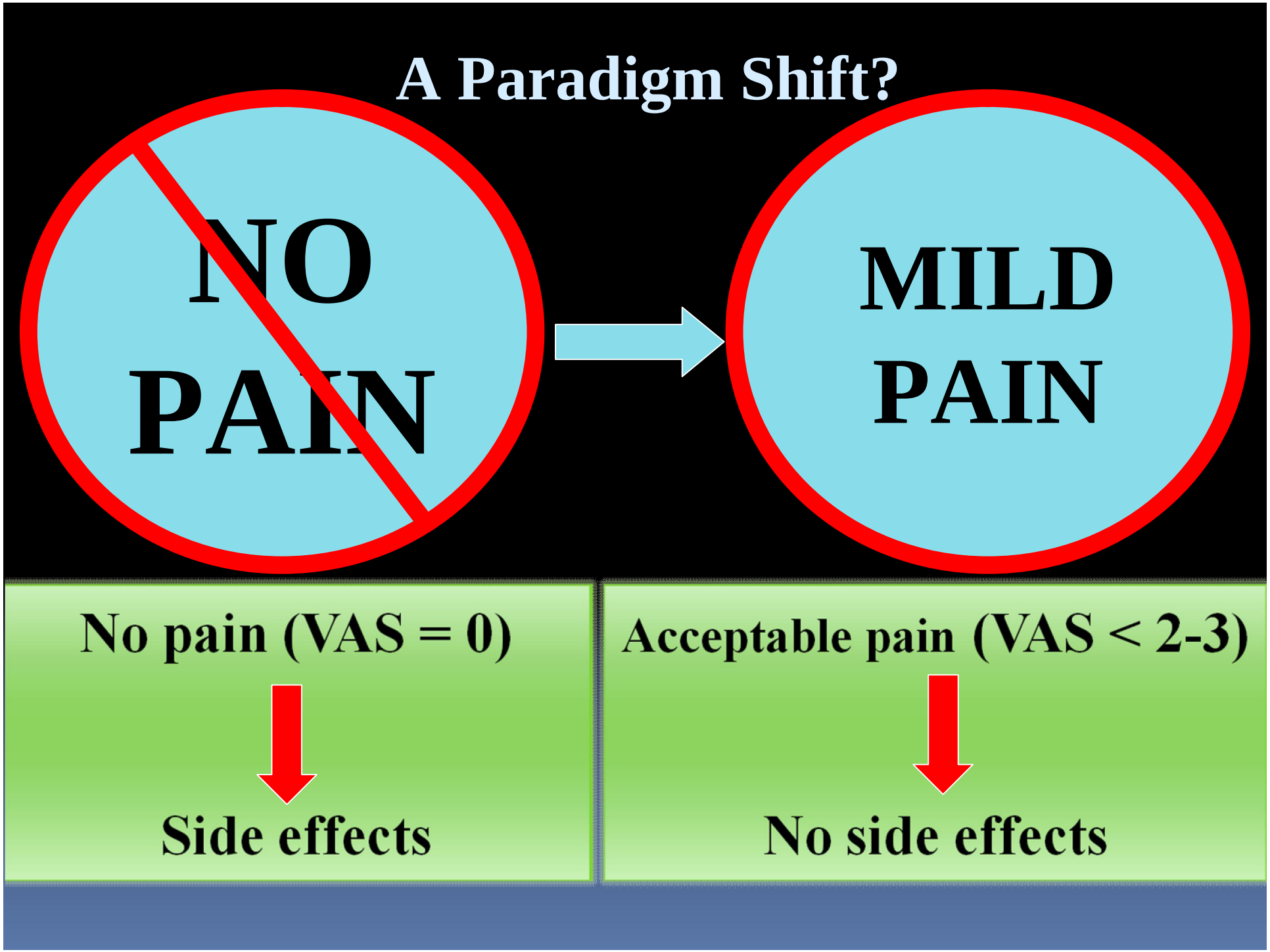
Multiple Pain Sites and Pain Mechanisms



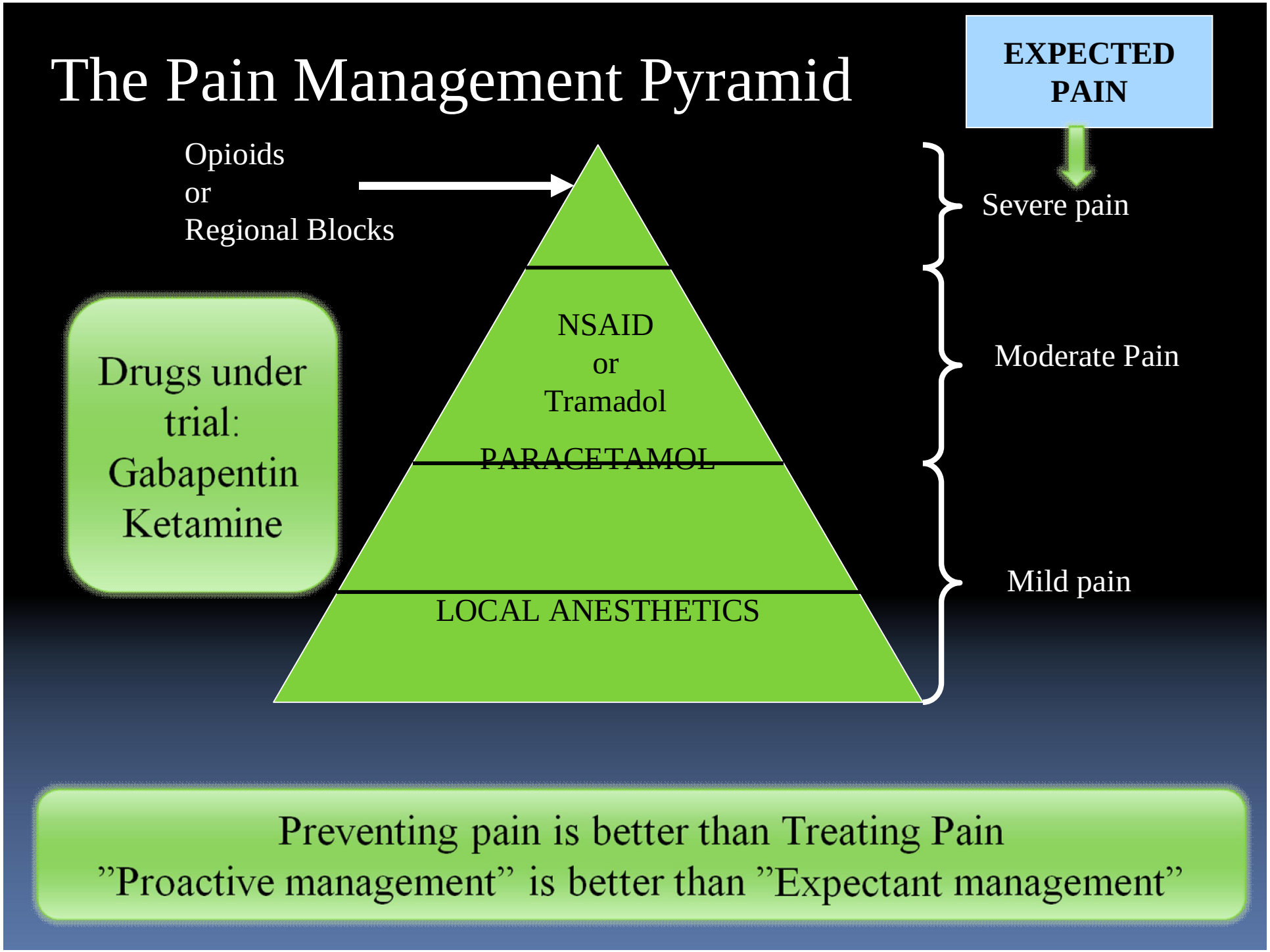
The intensity of perceived pain is related to:

* the type of surgery
* the intensity of trauma
* previous exposure to pain
* sex
* age
* degree of psycho-social preparation prior to the procedure.

The only factor that we can influence


A Paradigm Shift?
NO PAIN
MILD PAIN
No pain (VAS = 0)
Side effects
Acceptable pain (VAS < 2-3)
No side effects

The Pain Management Pyramid



Alternative treatment options

- Regional analgesia
- Multimodal analgesia
- Local infiltration analgesia
- Newer drugs and strategies

These pain management strategies are NOT mutually exclusive and need to be combined together

Regional analgesia

Regional Analgesia
Advantages

- Better postoperative pain relief
  - *Singelyn et al. A&A 1998*
  - *Capdevila et al. Anesthesiology 1999*
  - *Borgeat et al. Anesthesiology 1997*
- Improved perioperative outcome
  - *Capdevila et al. Anesthesiology 1999*
- Reduced risk of PONV
  - *Klein et al. A&A 2000*
  - *Wulf et al. A&A 1999*

Regional Analgesia
Advantages

- Decreased 'length of stay' in PACU
  - *Brown et al. Arthroscopy 1993*
  - *Pavlin et al. A&A 1998*
- Decreased unanticipated hospital admission
  - *D'Alessio et al. Regional Anesthesia 1995*
  - *Williams et al. Anesthesiology2000*
- Improved patient satisfaction
  - *Wu and Fleisher A&A 2000*
  - *Wu et al. Regional Anesthesia and Pain Medicine 2001*

Regional Analgesia
Advantages

- Decreased incidence of chronic pain syndromes (?)
  - *Brandsborg et al, Anesthesiology 2007*
- Redued risk of cancer recurrence (?)
  - *Biki et al Anesthesiology 2008*
  - *Exadaktylos et al, Anesthesiology 2006*

In experienced hands, RA techniques are safe, efficacious and associated with improved patient outcomes

Regional Analgesia
Disadvantages

- ”Block failure” resulting in longer anesthesia time and patient dissatisfaction (5 – 40%)
- Logistical problems in ensuring quick patient turnover
- Prolonged discharge times following spinal anesthesia
- Post-discharge sensory disturbances and motor block

In general, disadvantages are few and (often) of minor importance
Many disadvantages can be overcome by the use of Ultrasounds

Regional Analgesia for Hand Surgery

- Preoperative
  - Infraclavicular block – ropivacaine + mepivacaine
  - Catheter in situ
- Intraoperative
  - May require GA or sedation
- Postoperative
  - PCRA with ropivacaine for 24-48 h

Catheters *in situ* are used to prolong analgesia at home.
However, there is a risk of sensory-motor block.

Continuous Peripheral Nerve Blocks at Home: A Review

Brian M. Ilfeld, MD, and F. Kayser Enneking, MD

From the Departments of Anesthesiology and Orthopaedics and Rehabilitation, University of Florida, Gainesville, Florida

Postoperative analgesia is generally limited to 12–16 h or less after single-injection regional nerve blocks. Postoperative analgesia may be provided with a local anesthetic infusion via a perineural catheter after initial regional block resolution. This technique may now be used in the outpatient setting with the relatively recent introduction of reliable, portable infusion pumps. In this review article, we summarize the available published data related to this new analgesic technique and highlight important issues related specifically to perineural infusion provided in patients' own homes. Topics include infusion benefits and risks, indications and patient selection criteria, catheter, infusion pump, dosing regimen, and infusate selection, and issues related specifically to home-care.

(Anesth Analg 2005;100:1822–33)

Benefits of Continuous PNB for Ambulatory Surgery include:

1. Improved Analgesia
2. Lower risk for insomnia
3. Lower incidence of awakening due to pain
4. Lower analgesic consumption
5. Lower incidence of opioid-related side effects
6. Greater patient satisfaction
7. Improved quality of recovery

Postoperative analgesia is generally limited to 12 – 16 h or less after single injection regional nerve blocks

Safety of PNB

Outpatient Management of Continuous Peripheral Nerve Catheters Placed Using Ultrasound Guidance: An Experience in 620 Patients

Jeffrey D. Swenson, MD* **BACKGROUND:** Continuous peripheral nerve block (CPNB) is an optimal choice for

Interventions Required	26/620 (4.2%)
Patient education issues	9
Equipment malfunction	4
Inadequate pain control	13
Major Complications	
Nerve injuries*	2 (0.3%)
LA toxicity	0
Infections	0

* Resolved with time

Anesth Analg 2006

Summary – Regional analgesia

- Painful procedures can be effectively managed using regional analgesic techniques
- Using ultrasound (US), doses of LA and thereby side effects can be reduced. However, US technique requires an experienced anaesthesiologist
- Pain relief can be achieved at home using catheters placed around nerves. However, good pain relief may sometimes produce side effects

Use US-guided regional blocks and reduce doses of LA
Use catheters and ”home-pumps” to prolong analgesia at home
Select patients and procedures correctly

Multimodal analgesia

Multimodal analgesia

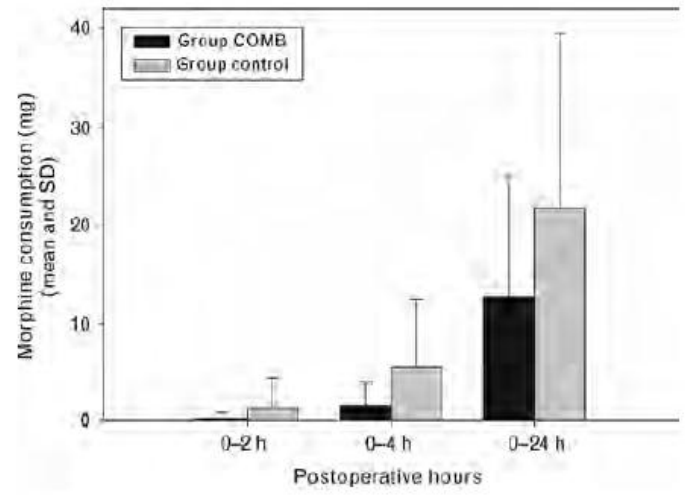
- Combination of drugs with different mechanisms of action to improve analgesia and reduce side effects
  - Local anesthetics
  - Paracetamol
  - NSAID/COX-2 inhibitors
  - α-2δ ligands (gabapentin, pregabalin)
  - α-2 agonists (clonidine)
  - NMDA-receptor antagonists (ketamine)
  - opioids

Multimodal analgesia with gabapentin, ketamine and dexamethasone in combination with paracetamol and ketorolac after hip arthroplasty: a preliminary study

Michael L. Rasmussen, Ole Mathiesen, Gerd Dierking, Birgitte V. Christensen, Karen L. Hilsted, Tommy K. Larsen and Joergen B. Dahl

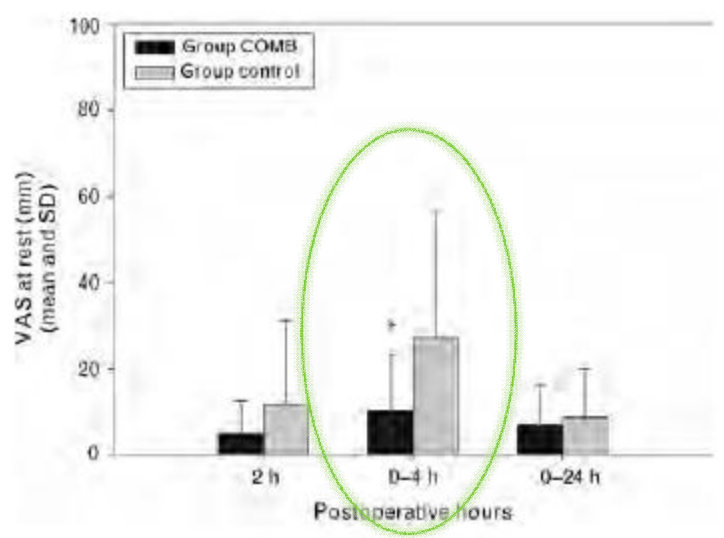
Control group: Paracetamol + ketorolac; COMB group: ++ gabapentin + ketamine

Fig. 1



Consumption of patient-controlled intravenous morphine (bolus 2.5 mg, lock-out time 10 min) from zero to 24 h postoperatively in the

Fig. 2



Visual analogue scale pain scores at rest at 2, 4 and 24 h

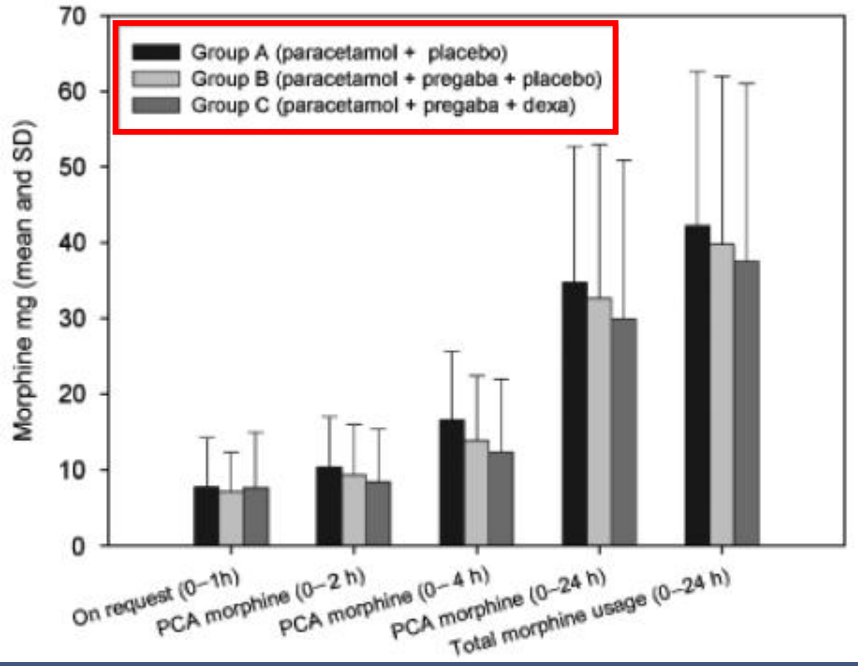
Conclusion

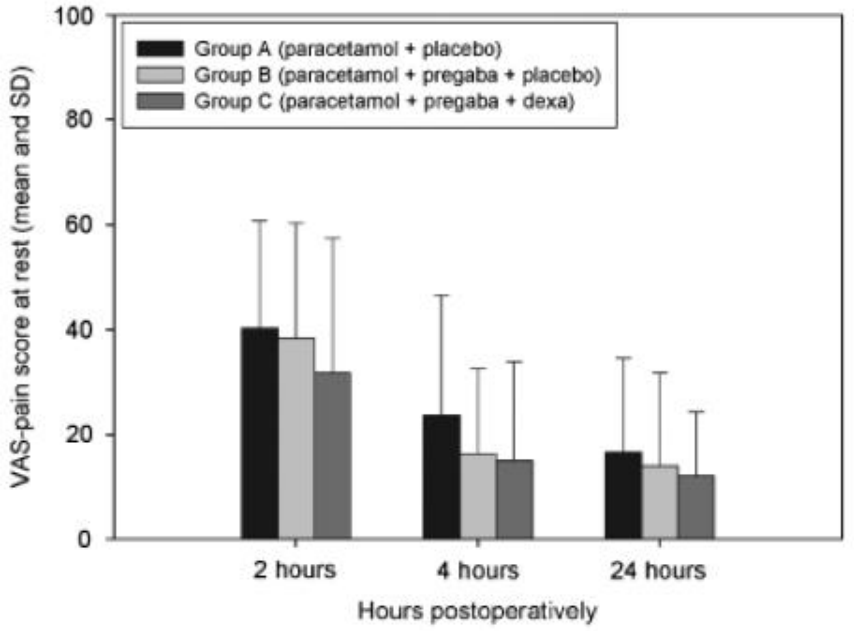
The combination of paracetamol, ketorolac, gabapentin, dexamethasone and low-dose ketamine reduced overall postoperative pain scores at rest and during mobilization in patients scheduled for total hip arthroplasty as compared with paracetamol and ketorolac alone. However,

Minor benefit 0-4 h postoperatively

Pregabalin and dexamethasone in combination with paracetamol for postoperative pain control after abdominal hysterectomy. A randomized clinical trial

O. Mathiesen[1], M. L. Rasmussen[2], G. Dierking[2], K. Lech[2], K. L. Hilsted[1], J. S. Fomsgaard[1], G. Lose[3] and J. B. Dahl[1]
[1]*Department of Anaesthesia, Copenhagen University Hospital, Glostrup, Denmark,* [2]*Department of Anaesthesia, Regional Hospital Herning, Herning, Denmark and* [3]*Department of Gynaecology, Copenhagen University Hospital, Glostrup, Denmark*





Conclusion: No benefit of the addition of pregabalin and dexamethasone to paracetamol for postoperative pain. Dexamethasone, however, reduces PONV.

The Prolonged Postoperative Analgesic Effect When Dexamethasone Is Added to a Nonsteroidal Antiinflammatory Drug (Rofecoxib) Before Breast Surgery

Hval Kjetil, MD*

Thagaard K. Sem, MD*

Schlichting Ellen, MD, PhD†

Raeder Johan, MD, PhD*

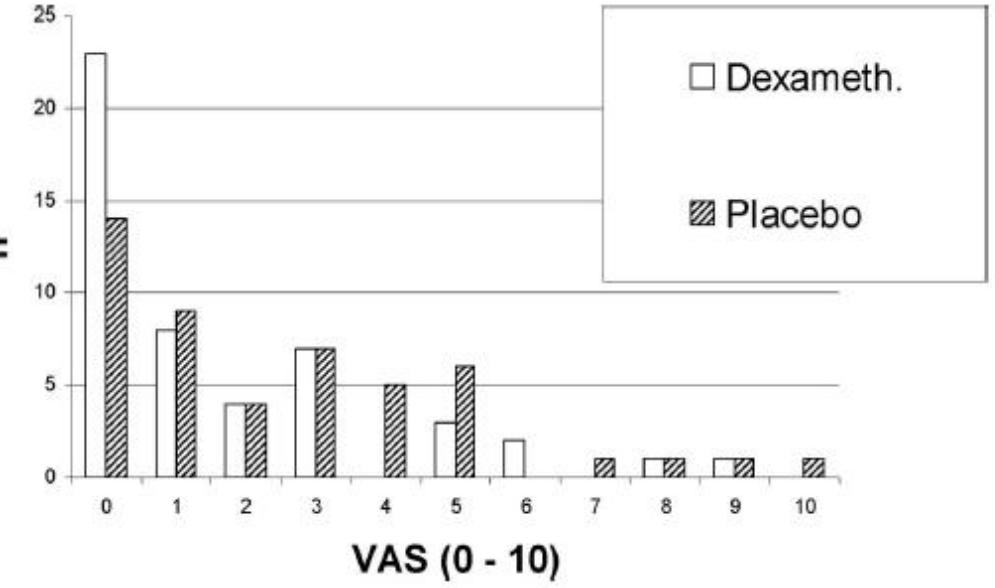
BACKGROUND: Glucocorticoids provide analgesia. In this study, we evaluated the effects of adding dexamethasone to a multimodal postoperative analgesic regimen, including a long-acting nonsteroidal antiinflammatory drug.

METHODS: One-hundred patients admitted for ambulatory breast cancer surgery were studied. They received paracetamol 2 g and rofecoxib 50 mg orally 1 h before start of general anesthesia with propofol and remifentanil. The patients were then randomized to receive, in a double-blind manner, either dexamethasone 16 mg IV or placebo. Both groups received fentanyl 1 μg/kg IV and 20–40 mL bupivacaine

Multimodal analgesia (all patients) : Paracetamol + Rofecoxib + LA

Randomized groups: dexamethasone (16 mg) or palcebo

Figure 4. Pain score during provocation (coughing, shoulder lift), 24–72 hrs. n = number of patients, VAS = visual analogue scale. p = 0.049 between group dexamethasone and placebo (MW-test).



The role of multimodal analgesia in pain management after ambulatory surgery

Ofelia L. Elvir-Lazo[a] and Paul F. White[b,c]

[a]Department of Anesthesia, Cedars Sinai Medical Center, Los Angeles, California, USA, [b]Director of Research, Policlinico Abano, Abano Terme, Italy and [c]Cedars Sinai Medical Center, Los Angeles, California, USA

Purpose of review

As outpatient (day-case) surgery had continued to grow throughout the world, many more complex and potentially painful procedures are being routinely performed in the ambulatory setting. Opioid analgesics, once considered the standard approach to

Current Opinion in Anesthesiology 2010, 23:697 – 703

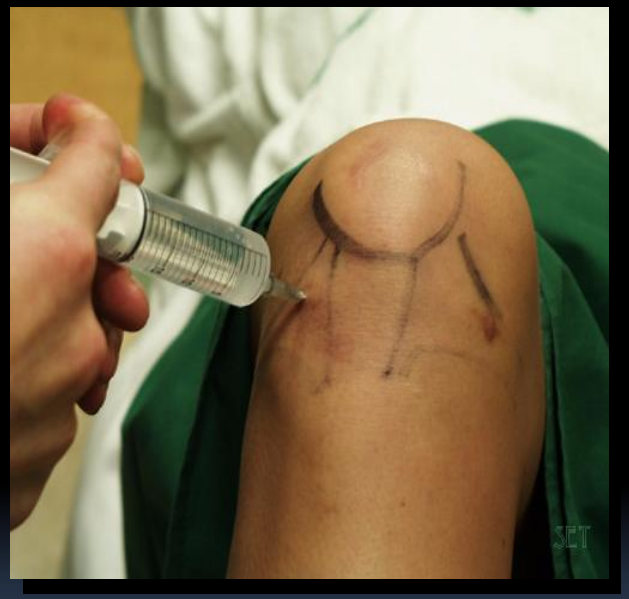
A preoperative single dose of dexamethasone, incisional local anesthetics (at the beginning and/or end of surgery), and continuous treatment with NSAIDs or COX-2 inhibitors during the first 3 – 4 postoperative days produced the best clinical outcome.
Anesthesiology 2006; 104:835–846

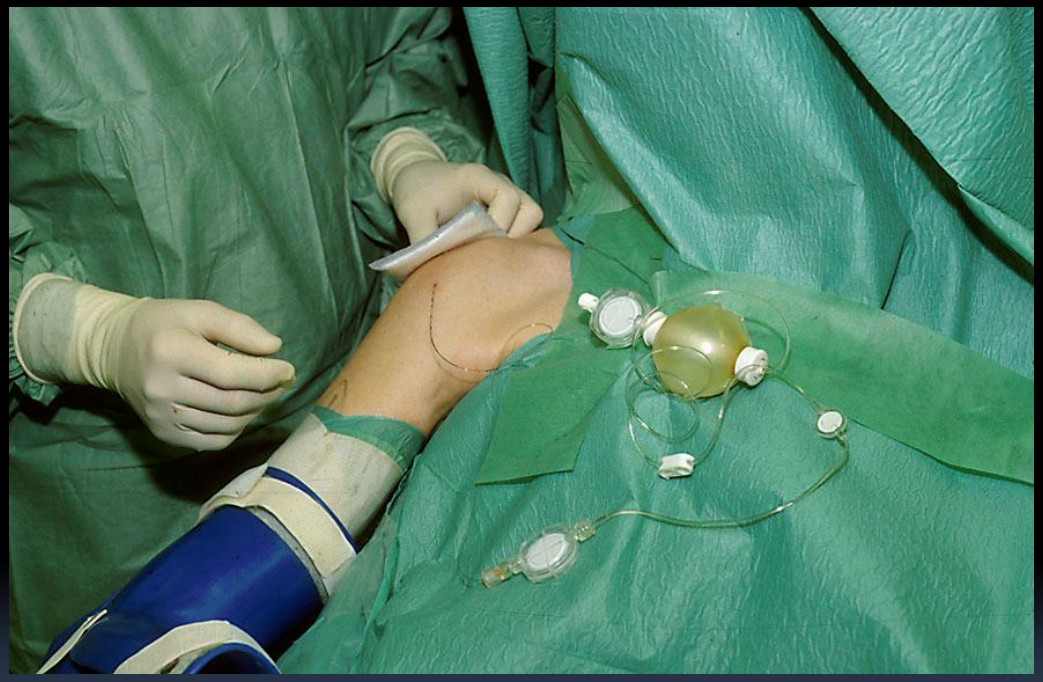
Summary - multimodal analgesia

- Drug combinations reduce pain intensity
- Reduction in pain intensity, although statistically significant, appears to be mild
- Cost-benefit analysis needs to be done
- The exact components of a multi-modal regime need to be better defined

Analgesic benefit of multimodal technique is, at best, mild

Local infiltration analgesia





Single injection analgesia

Catheter technique

Single dose infiltration

Local Anesthetics – systematic review

A qualitative systematic review of incisional local anaesthesia for postoperative pain relief after abdominal operations.

Conclusion:

Except for herniotomy, there was a lack of evidence for effect of incisional local anaesthesia on postoperative pain and further standardized studies are needed before recommendations can be made.

Br J Anaesth. 1998 Sep;81(3):377-83.

Intermittent injections of LA

Local Anesthetics

Postoperative Patient-Controlled Local Anesthetic Administration at Home

Narinder Rawal, MD, PhD*, Kjell Axelsson, MD, PhD*, Jan Hylander, RN*, Renée Allvin, CRNA*, Anders Amilon, MD†, Gunnar Lidegran, MD‡, and Jan Hallén, MD*

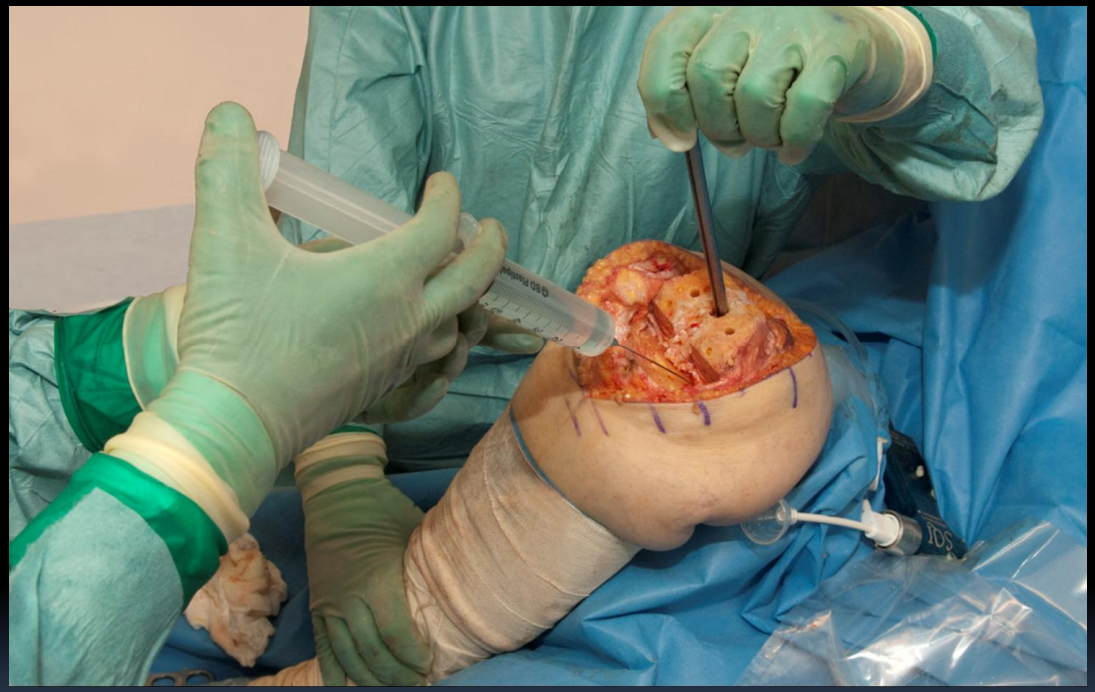
Departments of *Anesthesiology and Intensive Care, †Hand Surgery, and ‡Orthopedic Surgery, Örebro Medical Center Hospital, Örebro, Sweden

- Mixed surgery
- 70 patients studied
- Good analgesia 2 – 8 h duration
- Most patients required 2-4 doses/patient

Open study

Anesth Analg 1998

Local infiltration analgesia (LIA)



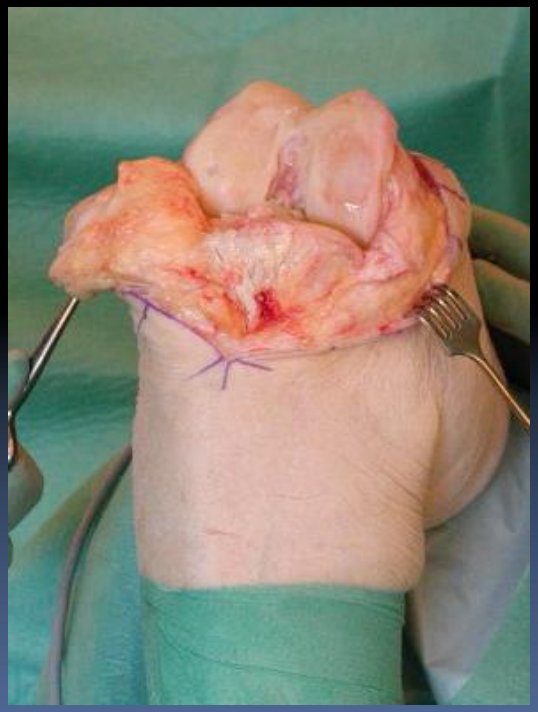
Knee surgery

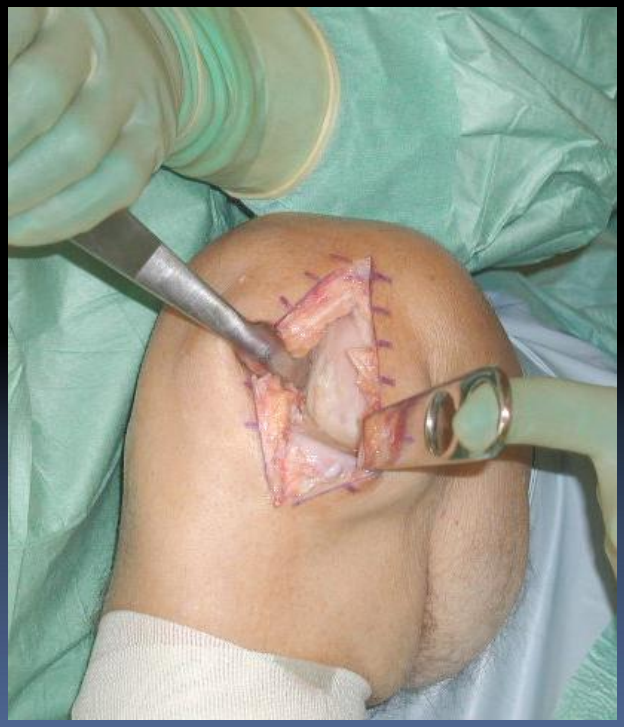
Local Anesthetic (ropivacaine) 200-400 mg
NSAID (ketorolac) 30 mg
Adrenaline 0.1-0.5 mg
Total volume: ca 120 ml

LIA during knee surgery

Inpatient

Ambulatory Surgery
(< 24 h)





Standard (TKA)

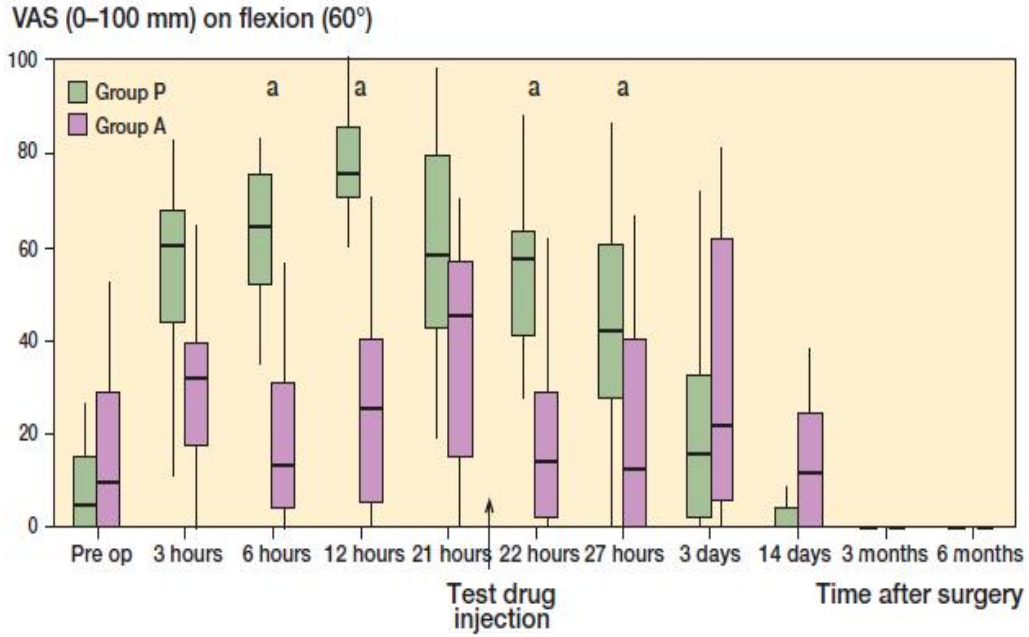
Unicompartmental

Knee Surgery (LIA)

Reduced hospital stay, morphine consumption, and pain intensity with local infiltration analgesia after unicompartmental knee arthroplasty

A randomized double–blind study of 40 patients

Per Essving[1,3], Kjell Axelsson[2], Jill Kjellberg[2], Örjan Wallgren[1], Anil Gupta[2,3], and Anders Lundin[1]

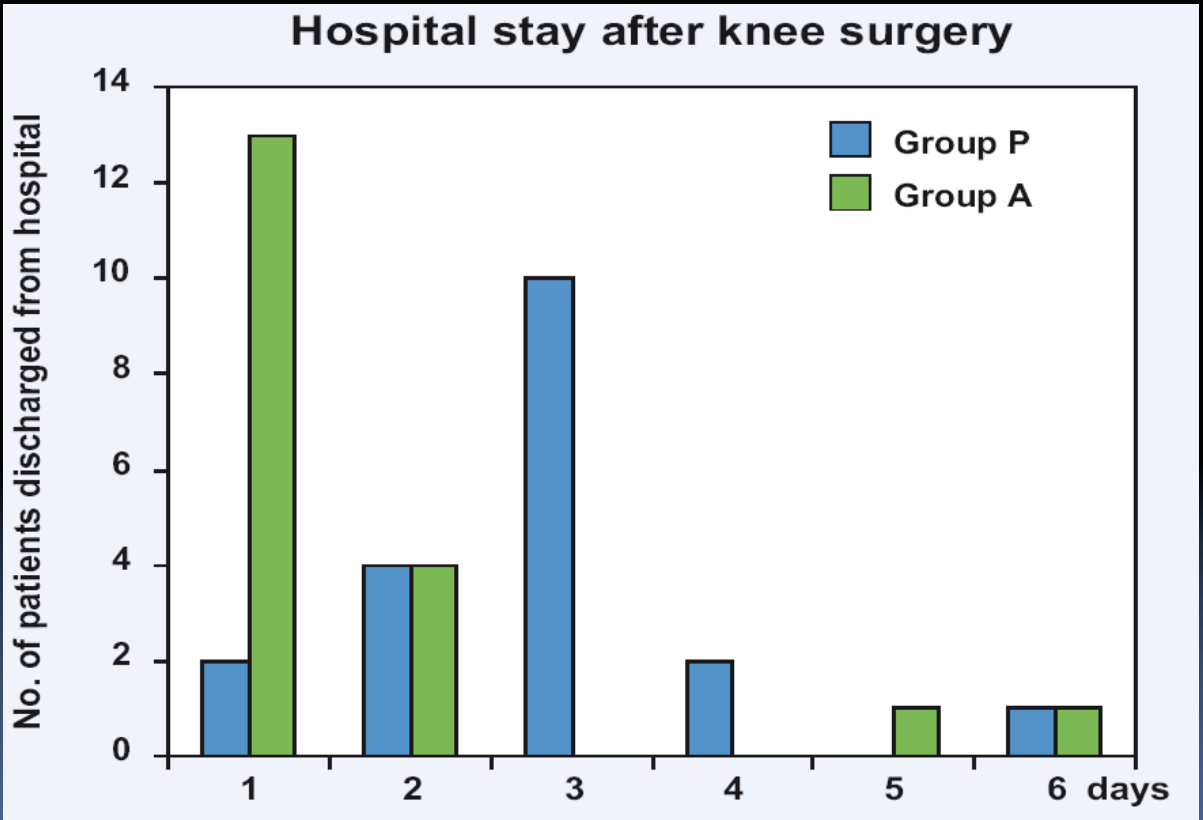


Group A : LIA
Group P: Placebo

LIA Group:
Lower pain intensity
Median postoperative hospital stay shorter in Group A vs. Group P:
1 (1–6) *vs.* 3 (1–6) days
($p < 0.001$).

Essving et al. Acta Orth Scand 2009

Discharge times following Unicompartmental Knee Surgery



Group A : LIA
Group P: Placebo

Essving et al. Acta Orth Scand 2009

Local Anesthetic Toxicity - Summary

LA	Dose	Surgery	Total concentration µg/ml	Free concentration µg/ml
Ropivacaine	225 mg	Shoulder	1.42	**0.08**
Ropivacaine	500 mg (1 h)	Subacromial decompression	2.23	**0.12**
Ropivacaine	225 mg + 900 mg/48 h	Shoulder –rotator cuff	–	< **0.6**
Lidocaine-adr Ropivacaine	400 mg 150 mg	Knee-arthroscopy	0.8 1.2	**0.2** **0.06**
Ropivacaine	200 mg	Knee-arthroscopy	1.29	**0.047**

Mild toxic symptoms: Free concentration 0.6 µg/mL

No study showed plasma concentrations above those known to produce clinical toxic symptoms in humans

Risk of infection

Control/LA	Surgery	Positive culture	Growth	Clinical wound infection
Saline	Subacromial decompression	30 %	Coagulase negative staphylococcus	Negative
Bupivacaine + fentanyl	Knee replacement	0.6 %	Streptococcus pneumoniae	Positive
Ropivacaine + morphine	Knee replacement	1 %	?	Deep infection
Ropivacaine + morphine	Anterior cruciate ligament repair	7.8 %	Staphylococcus epidermidis	Negative

Risk is LOW if the patient is managed correctly

Chondrolysis After Continuous Intra-Articular Bupivacaine Infusion: An Experimental Model Investigating Chondrotoxicity in the Rabbit Shoulder

Andreas H. Gomoll *et al.*

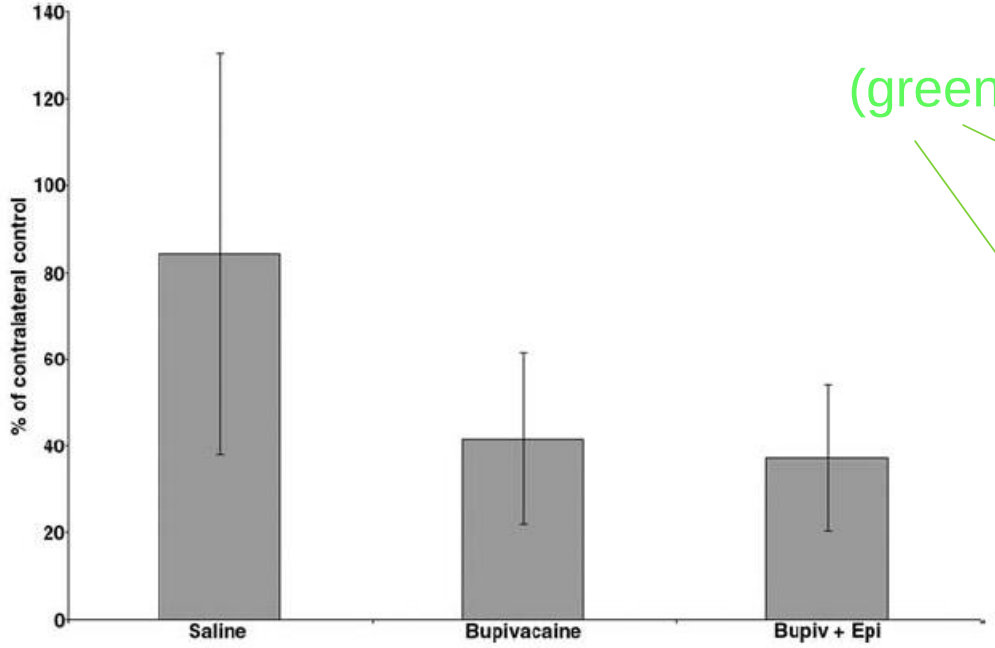


FIGURE 1. Results of sulfate uptake measurements in samples infused with saline solution, bupivacaine without epinephrine, and bupivacaine with epinephrine (Bupiv + Epi). The results are expressed as the relative difference between activity readings from

(green)

Dead cells (red)

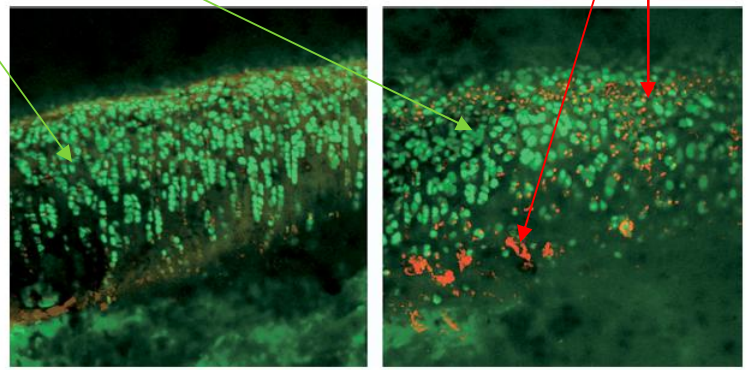
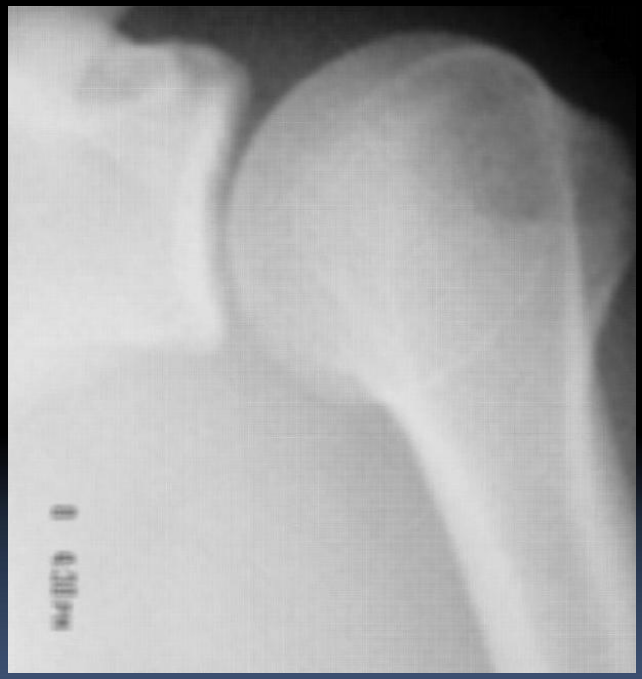


FIGURE 2. Confocal microscopy images depicting articular cartilage from control side (left) and after exposure to bupivacaine with epinephrine (right). Live cells stain green, whereas dead chondrocytes appear red. (Calcein-acetoxymethylester and ethidium homodimer, original magnification ×10.)

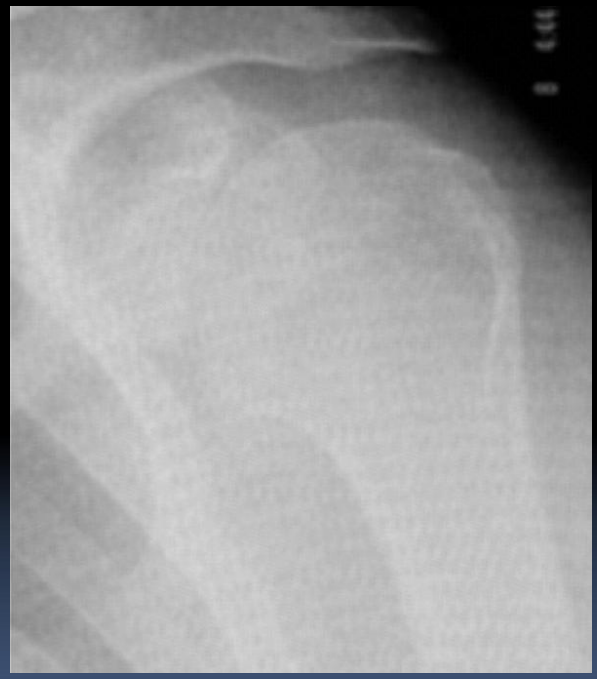
Arthroscopy 2006

Postarthroscopic Glenohumeral Chondrolysis

Brent P. Hansen,*† DO, Charles L. Beck,‡ MD, Elizabeth P. Beck,‡ RN,
and Robert W. Townsley,‡ PA-C
From †Advanced Joint Care and Orthopedic Sports Medicine, Glendale, Arizona, and ‡Center of Orthopedic and Rehabilitation Excellence, West Jordan, Utah



Before



After

We have identified a concerning and strong association between postarthroscopic chondrolysis and intra-articular pain pump catheter use with bupivacaine and epinephrine

Chondrotoxicity - Summary

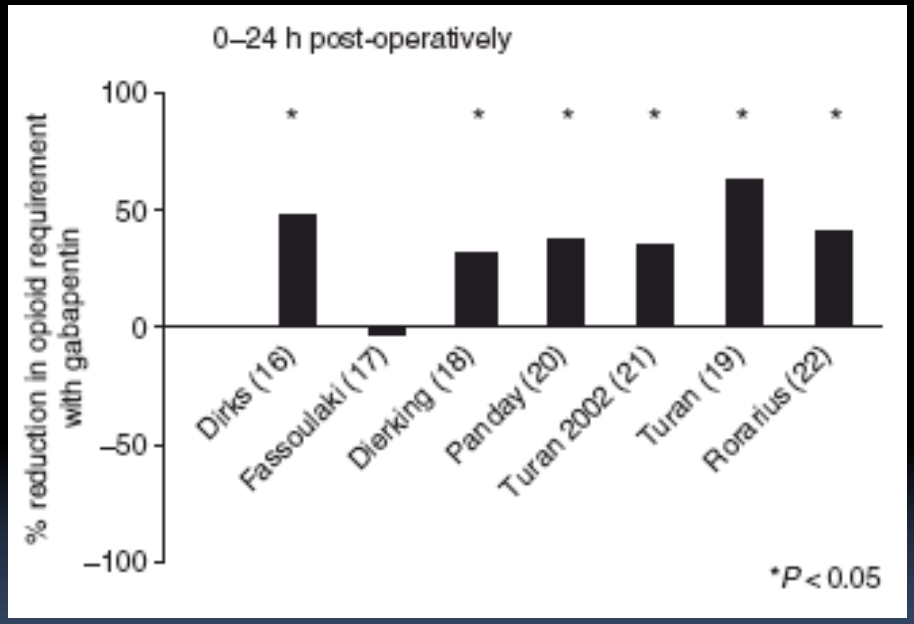
- Bupivacaine is more toxic than ropivacaine (no studies with ropivacaine have demonstrated chondrolysis)
- The higher the concentration of bupivacaine, the greater the risk of injury (0.5% > 0.25% > 0.125%)
- The longer the duration of exposure, the greater the risk of damage (1 week > 1 day > 60 min > 15 min)

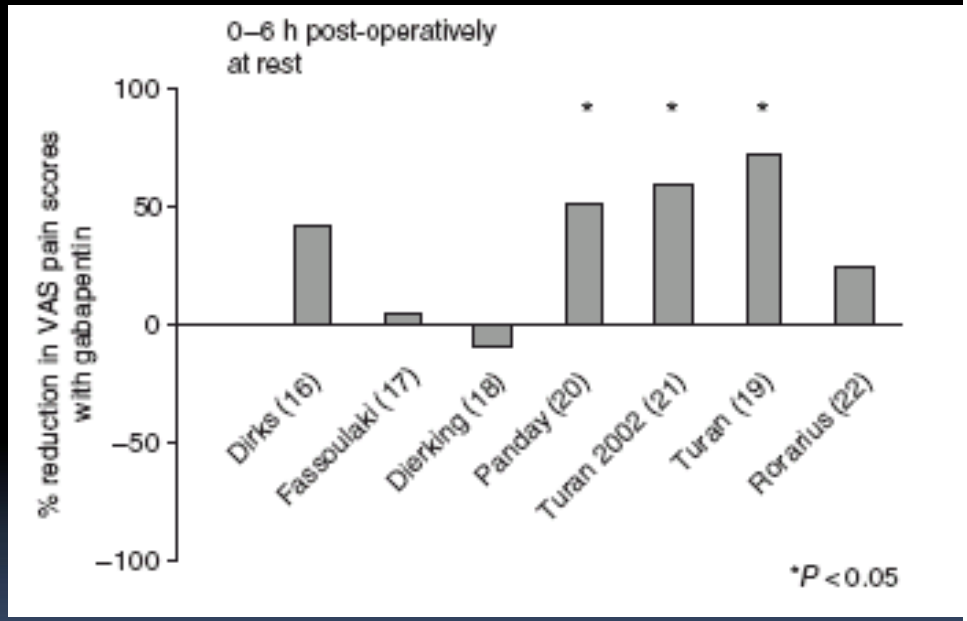
Use ropivacaine, in low concentrations and for short periods or intermittent injections over short time periods

Newer/Older Drugs

New drugs, old indications
Old drugs, new indications

Preoperative Gabapentin RCTs





% Reduction in opioid consumption

J.B. Dahl et al (2004) Acta Anaestheiol Scand 48:1130-36

Pain 126 (2006) 91–101

PAIN

www.elsevier.com/locate/pain

Gabapentin and postoperative pain – a systematic review of randomized controlled trials

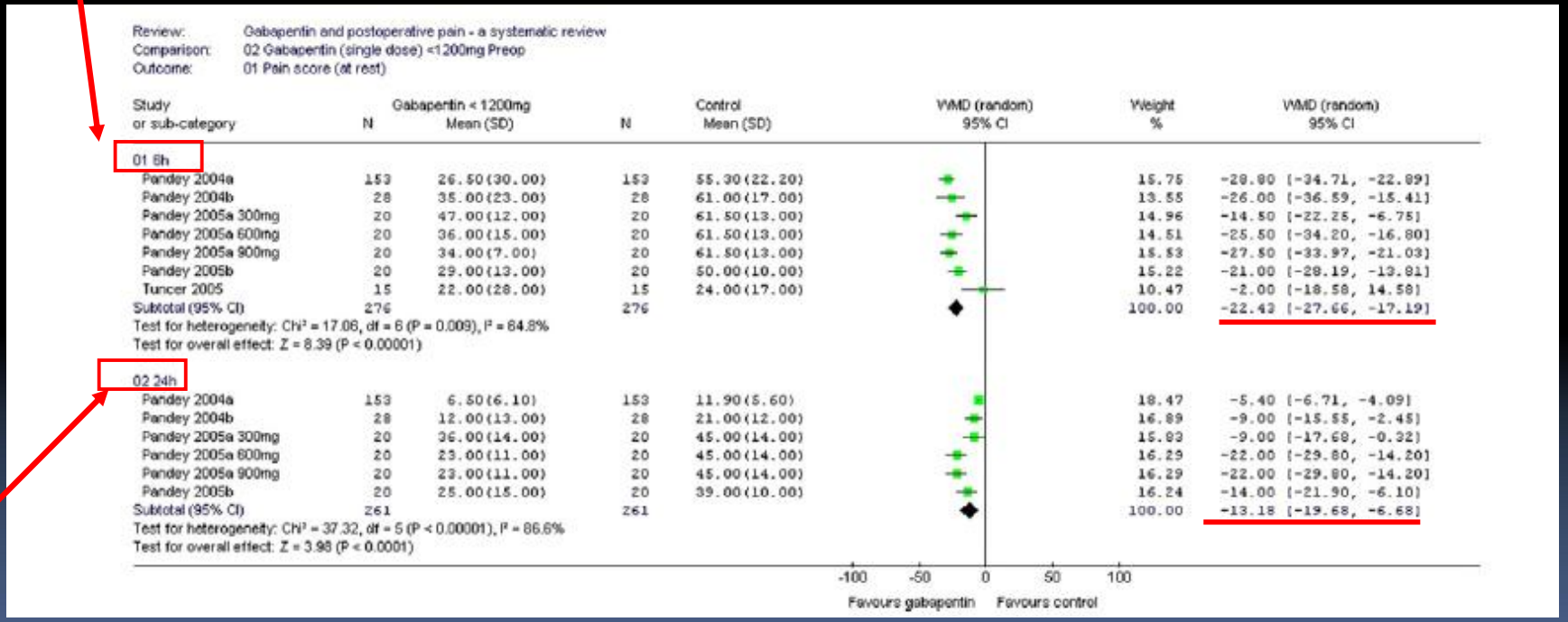
Kok-Yuen Ho *, Tong J. Gan, Ashraf S. Habib

Department of Anesthesiology, Duke University Medical Center, Box 3094, Durham, NC 27710, USA

Received 7 February 2006; received in revised form 13 May 2006; accepted 12 June 2006

6 hours

VAS: Pain intensity (single dose)



24 h

Summary: Significant reduction in pain intensity: 13 – 22 mm

Pain 126 (2006) 91–101

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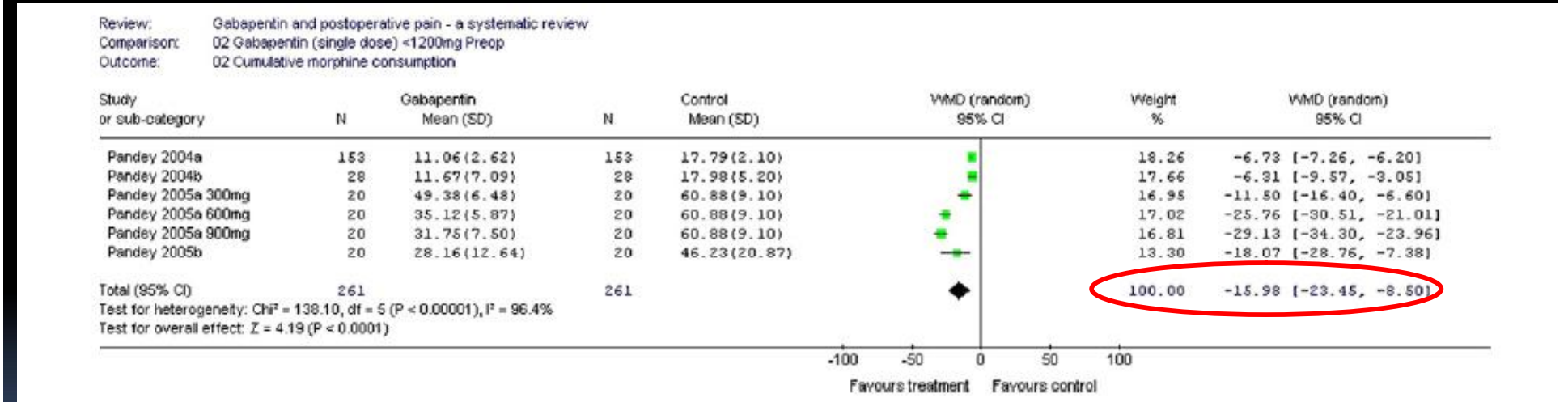

Fig. 7. Meta-analysis: 24 h cumulative morphine consumption (mg) in patients receiving single dose of gabapentin <1200 mg preoperatively. WMD, weighted mean difference; CI, confidence interval.

Summary: Significant reduction in 24-h morphine consumption: 16 mg (8 – 23 mg)

Summary - α_2-δ ligands

- None is registered today for the management of acute postoperative pain
- Efficacy in relation to placebo is documented for both gabapentin and pregabalin
- Probably equi-efficacious as NSAID's and better than paracetamol/tramadol
- Reduce opioid consumption but not opioid-related side effects
- Seems to be more efficacious in reducing 'dynamic' pain
- Side effects such as sedation and dizziness have been of some concern (incidence 10 – 30%).

Ketamine and postoperative pain – a quantitative systematic review of randomised trials

Pain 2005

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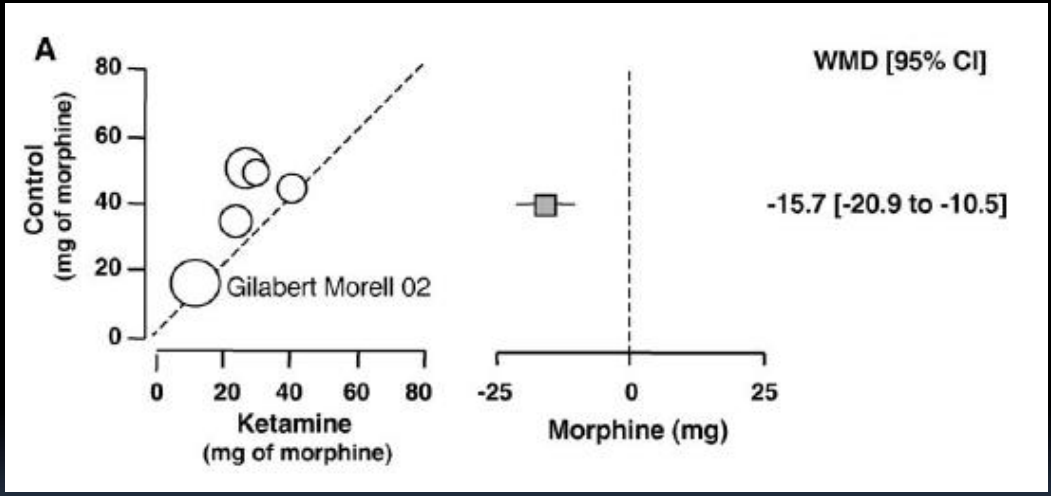


Dose: ca 0.1 - 0.2 mg/kg/h

Conclusions:

1. Slight reduction in pain at 6 h (1 cm; 20-25%)
2. Lower rescue analgesic consumption (16 mg; 32%)
3. Delay in first analgesic request (16 min)
4. No decrease in incidence of opioid-related side effects
5. Higher incidence of hallucinations in awake patients given ketamine

Ketamine

- Cochrane Review (2009)
  - Ketamine in sub-anesthetic doses (0.1 – 0.3 mg/kg) is effective in reducing postoperative morphine requirements
  - Adverse effects (in these doses) are mild or absent
  - Ketamine reduces PONV

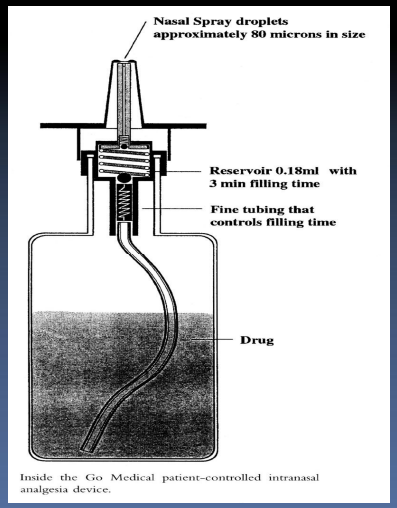
There was a significant heterogeneity between the studies

Summary - Ketamine

- A useful addition to conventional analgesic regimens, specifically in major surgery
- Pain reduction is, at best, mild
- Reduction in opioid consumption does not translate into reduction of opioid-related side effects
- Some evidence for reduced hyperalgesia at incision site after 6 months
- More studies needed in specific situations where hyperalgesia following major surgery could lead to chronic pain syndromes

Intranasal Fentanyl

- Postoperative pain management by intranasal demand-adapted fentanyl titration.
  - Good pain relief, comparable to i.v. Fentanyl
  - No complications in the intranasal group

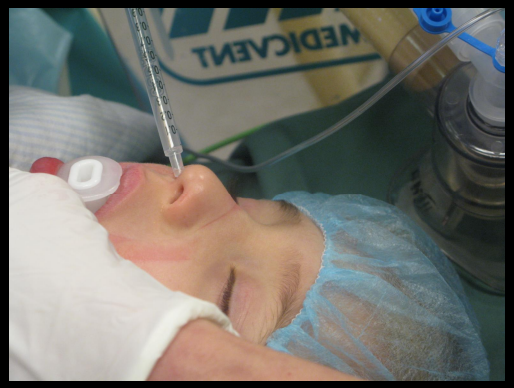


Inside the Go Medical patient-controlled intranasal analgesia device.

Striebel et al, Anesthesiology 1992

Intranasal *vs.* IV fentanyl

- 2 studies published
- Max effect i.n. : 5 min
- % Absorption i.n.: 71%



- Ca 25 µg fentanyl i.n. or i.v. every 5th min until VAS < 3 cm
- VAS < 3 after 30 min
- Mean number of doses: 3.7 – 3.9 (x 25 µg)
- No differences between i.n. and i.v. fentanyl except that dose of i.n. fentanyl greater in one study (73 *vs.*110 µg)

Routinely used in children at our hospital when no i.v. access*

* 1 µg/kg

Streibel 1992, 93

Intranasal Ketorolac for Postoperative Pain: A Phase 3, Double-blind, Randomized Study

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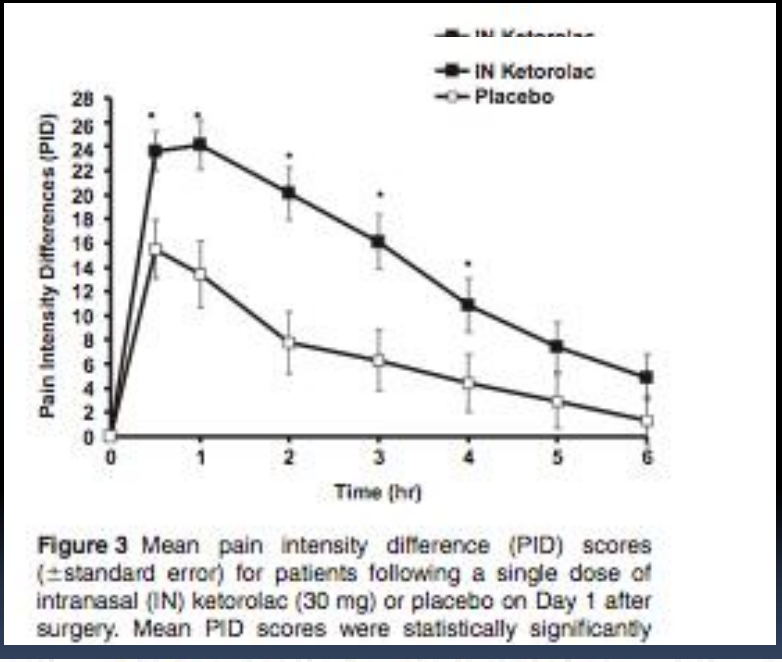


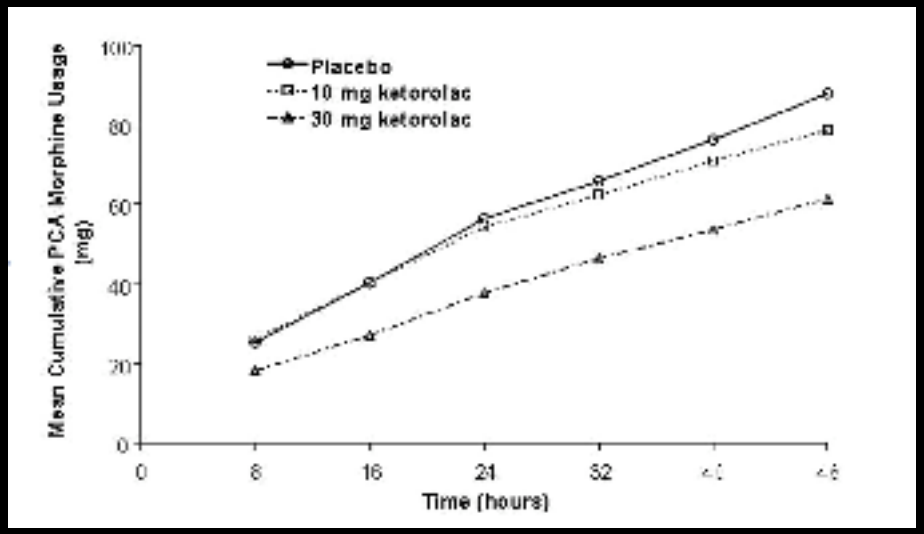
Figure 3 Mean pain intensity difference (PID) scores (±standard error) for patients following a single dose of intranasal (IN) ketorolac (30 mg) or placebo on Day 1 after surgery. Mean PID scores were statistically significantly

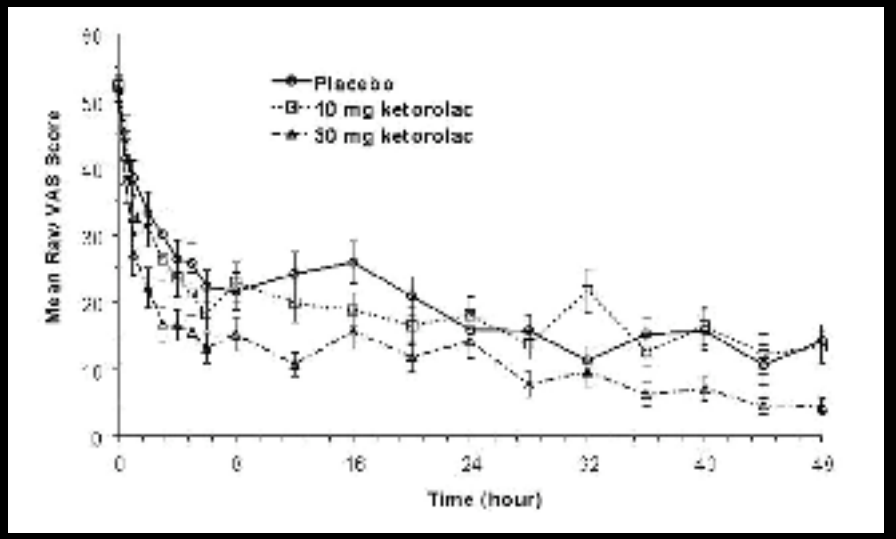
IN ketorolac provides a non-injection parenteral option for management of acute moderate-to-severe pain. This formulation may be particularly useful for ambulatory patients needing acute pain relief. Parenteral ketorolac

The Safety and Analgesic Efficacy of Intranasal Ketorolac in Patients with Postoperative Pain

John E. Moodie, MB, ChB, FRCA, FANZCA*

BACKGROUND: We evaluated the safety and efficacy of multiple doses of intranasal ketorolac tromethamine (ketorolac) for postoperative pain.
METHODS: This was a double-blind, placebo-controlled study in patients undergoing





In conclusion, this study demonstrated that intranasal ketorolac is well tolerated by patients with postoperative pain after major surgery, has good analgesic efficacy, and reduces the need for postoperative opioids.

A&A 2003

Clonidine

- Prolongs analgesia when administered
  - As adjuvant administered intrathecally
  - During intraveous regional analgesia
  - As adjuvant during nerve blocks
- Systemic effects
  - No systematic reviews available
  - Most studies published > 10 years ago
  - ’Analgesic’ effect could be an ’anxiolytic’ effect

Final Conclusions

- Pain management protocols should be incorporated into day surgical units. These should preferably be procedure-specific and, when needed, patient-specific
- The cycle of documentation-evaluation-analysis – implementation should be followed in each unit
- Day surgical procedures associated with severe pain require advanced management techniques e.g. ultrasound-guided blocks, and vice versa
- Good pain management is a multi-disciplinary team-work

Pain is easier PREVENTED than TREATED!

Monteray, CA, summer 2010

Thank you for your attention

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