

**Would “adequate” analgesia
mask the postoperative
complication?
Risk and benefice.**

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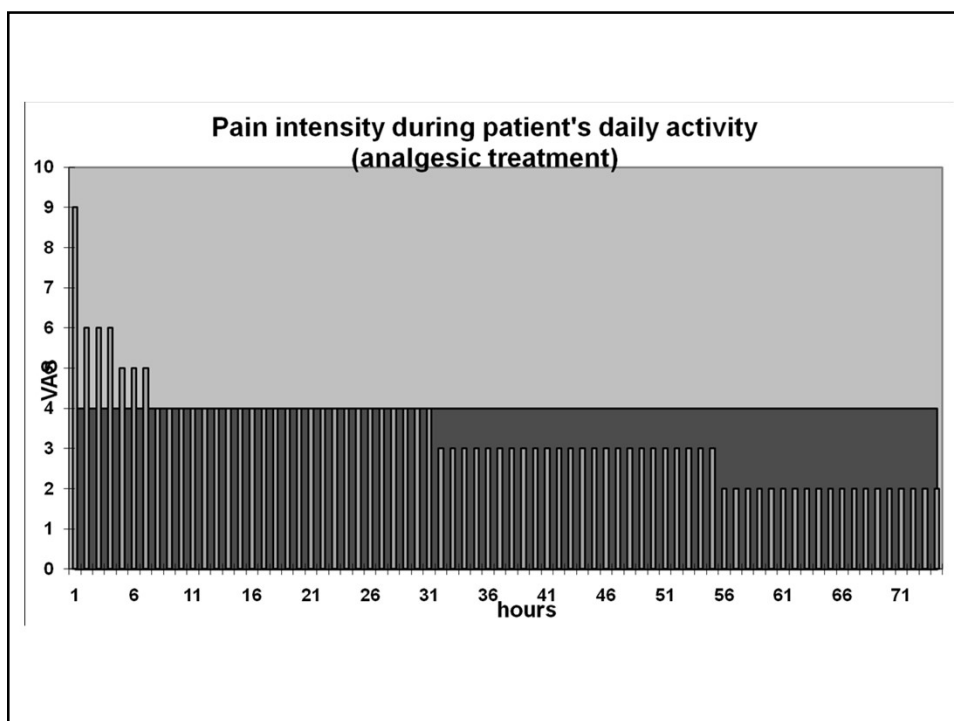
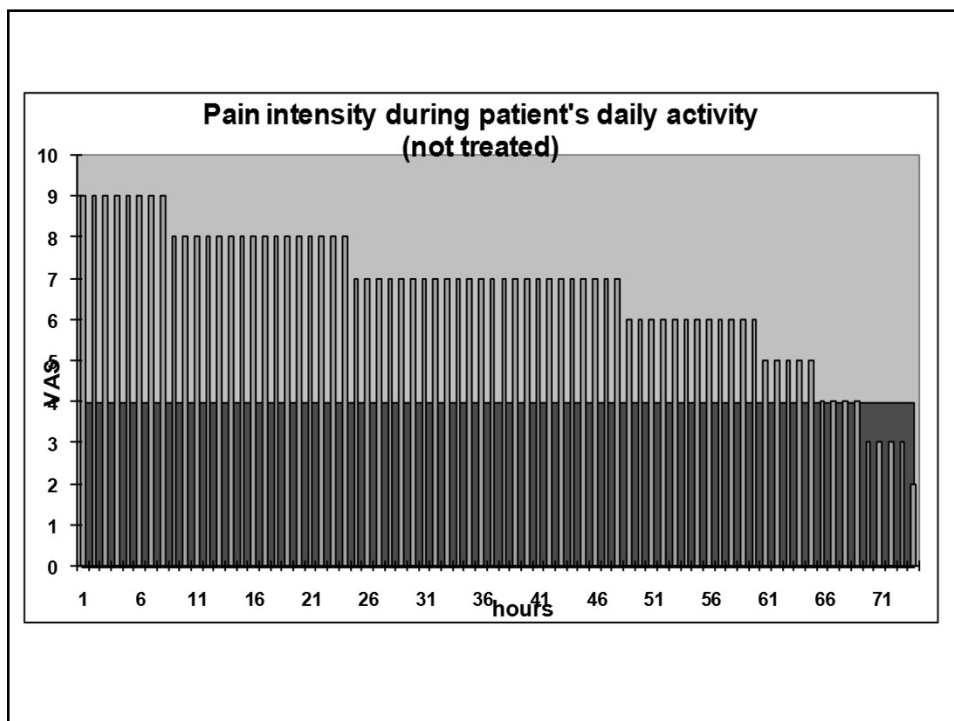
- Pain: friend or enemy?
 - *J Bone Joint Surg Am 2001*
- Pain: important clinical symptom?
- Postoperative analgesia could it mask certain surgical complications?

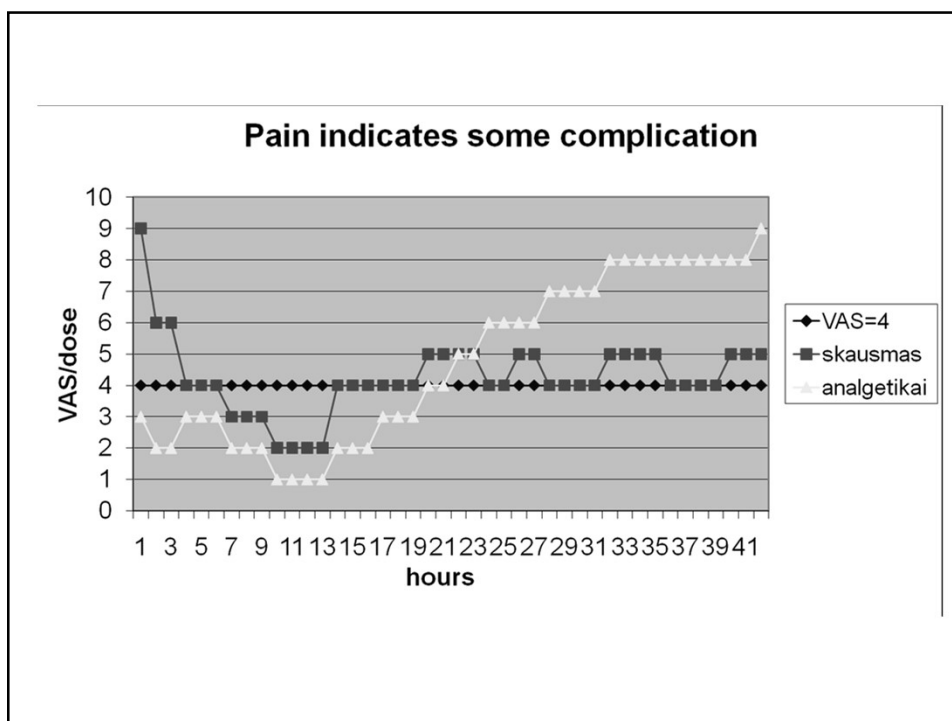
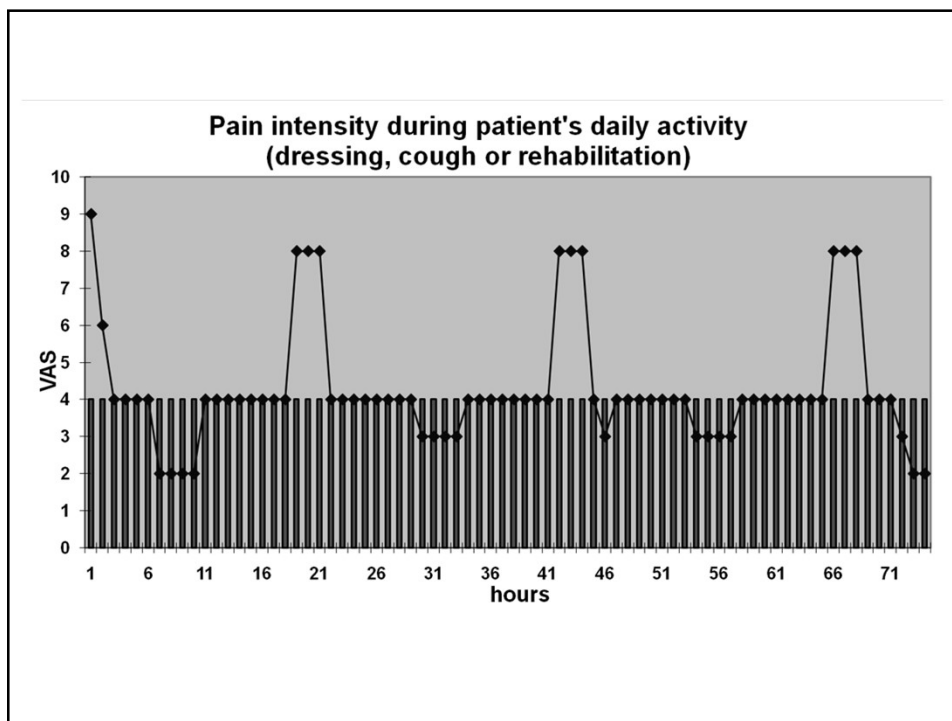
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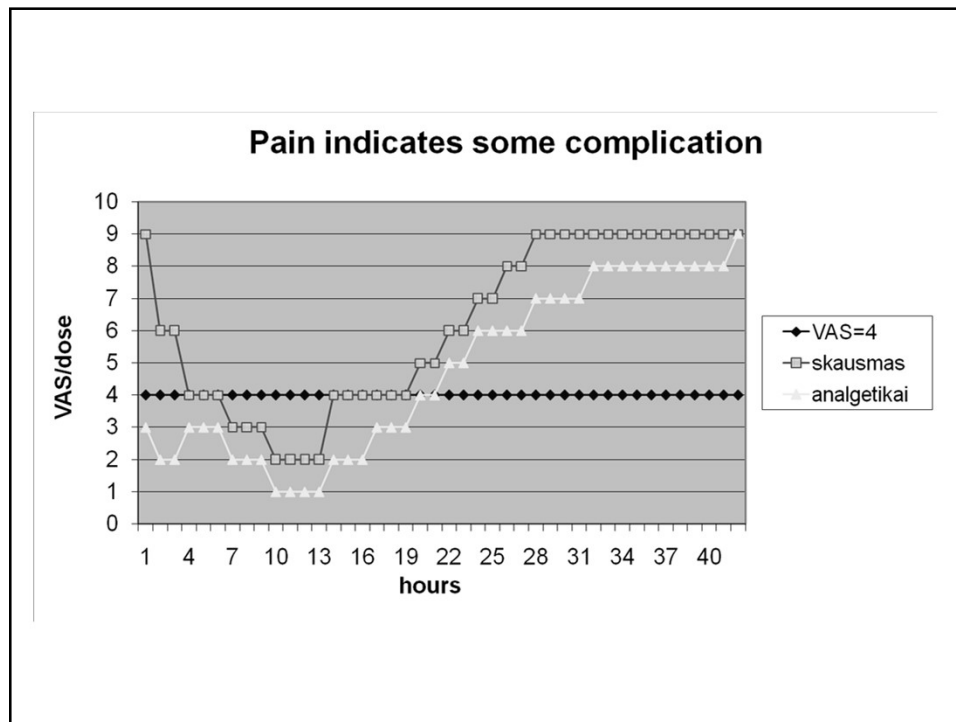
- Characteristics of postoperative pain
- Compartment syndrome
- Neuropathies
- Not included:
 - abdominal syndromes,
 - masked acute myocardial infarction symptoms

Pain intensity

- Postoperative pain is falling gradually
- Peaks of pain intensity show insufficient analgesia during the dressing, daily hygiene or rehabilitation
- Attention:
pain anomalies = postoperative complications
(*growing pain intensity or additional analgesics doses*)







Pain management

- Prevention of the repeatedly appeared pain:
 - systemic analgesia
 - using of analgesics with prolonged action
 - using of regional anesthesia, especially if pain with paroxysms (dressing, cough or rehabilitation...)
- Pain intensity depends on the site of surgery

Compartment syndrome

- overture diagnostic
- constitution of the irreversibles sequels

Ethiology

- Limb injury with/without fracture (especailly in crush situations)
- Vessels injury, hematomas, oedema
- High-degree burn
- Limb surgery (orthopedic constructions, tourniquets)
- Malpositioning in the operating theatre
- Systemic hypotension

Signs and symptoms

- Pain mainly over the affected compartment, worsened by passive stretching of the muscles
- Tense swelling over the compartment, with drum-tight fascia/skin
- Paraesthesia in the distribution of nerves traversing the compartment
- Coolness of affected limb
- Weakness or paralysis of the limb is a late sign
- Distal pulses are usually present

Pathophysiology

Tissue's tolerance depends on:

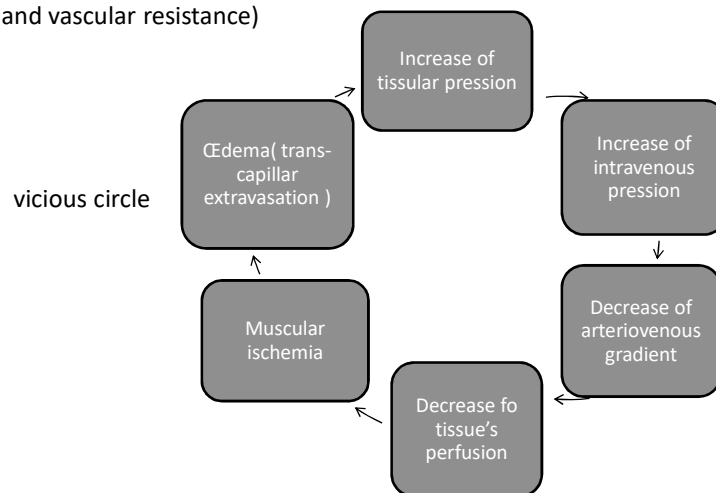
- absolute value of pressure
- duration of pressure's augmentation
- local arterial perfusion

Irreversible injuries if pressure > 45 mmHg,
after only 4 hours

Pathophysiology

Augmentation of local tissue's pression

(circulation in the compartment depends on local arteriovenous gradient and vascular resistance)



Treatment

- Early diagnosis and treatment are vital
- Urgent surgical fasciotomy will be required to save the limb
- Ensure the patient is well hydrated and has good urine output

Clinical case 1 – 12 years old patient

- History: genu valgus dex
- Actually: corrective osteotomy with external fixation
- General + epidural anesthesia (perop and postanesthesia care unit)

Continuation

- Right maleolar mobilisation – progressively painful
- Day 7 reoperation – suspicion of mechanical problem
- GA+EP – catheter for 3 days - Ropivacaine 0.2% 10mg/h (pain give up heavily)
- Maleolar oedeme, thumb's extensors do not work, hyperesthesia of shin
- Day 10 reoperation – finally aponeurotomy

- Neurological sequels during 2 years
 - * walking problems
 - * hyperesthesias
 - * depression
-

- Why it happened despite careful everyday examination?

Summary:

- Belated diagnostic
- Epidural analgesia absolutely unsuspected

Clinical case 2 – 14 years old patient

History: prolongation of *osis femoris sin et tibia*
dex with external fixation

Anesthesia: GA+EP perop – Ropivacaine 0.75%,
postop – Ropivacaine 0.2% 10-14 mg/h

Evening, Day 0:

- pain persists despite epidural analgesia
- sensory troubles in the right leg
- compartment tight and painful
- peripheral pulses +++

Continuation

- EP catheter eliminated in the evening Day 0
- Morning, Day 1 – examination and revision
(in general anesthesia)

Which diagnosis correspond to symptoms?
Was all done in time?

Consequently:

Compartment syndrome's diagnostic
- without retardation

Clinical case 3 – 54 years old patient

Co-exist: hypertension, smoking

History: inferior rectal resection

GA and postop pain prevention (Paracetamol, NSAid i/v)

Total surgery duration H7.5 (H4 unexplained tachycardia +20/min)

Postop care unit: - titration of morphine i/v (3+3+2 mg) –
somnolent but VAS at 9 all time
- more awaked after 30 min., indicates
strong pain of right shin (hot, firm, red, tumid)

Examination

- Echo-dopplerometry:
 - Day 0 no thrombosis, slight heterogenic hypertrophy of shin's posterior muscles (rhabdomyolysis?)
 - Day 10 no thrombosis, hypoechogenic aspect with hypervascularisation (compartment syndrome?)

EMG (Day 12) – slight axonal sensory impairment in the shin's posterior muscles level.

Continuation

- Pain relief after 1 week
 - No sequels
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What could be the reason of this slight transient compartment syndrome?

Summary:

Inaccuracy during installation, so malpositioning during longlasting operation.

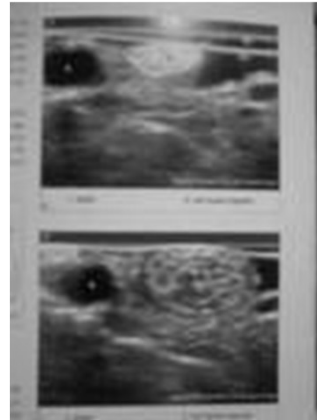
No need of surgical treatment.

Neurological disorders following regional blocks

- Frequency of neurological disorders after regional blocks varies from 0,3 - 1,9/10.000
- Complications can be classified into:
 - complications related with toxicity of applied local anesthetic agent;
 - complications related with regional anesthesia technique;

Neurological damage

- Ischemic, as a result of vascular compression by hematoma
- Mechanical direct, as a result of needle trauma



E. Eisenberg. Echographie en anesthésie régionale périphérique, p.23

Nerve injury

- Also can be related with:
 - ★ patient's installation during operation,
 - ★ surgical technique
 - ★ limb's tourniquet time
- Efficient analgesia can retard the diagnosis of postoperative complication.
- Early intervention leads to better outcome.

Exacerbating factors

- Diabetes
 - ★ risk of serious neurological disorders is about 0,4% after regional block with coexisting diabetic neuropathy
- Disseminated sclerosis
- Deep-seated neurological disorders, unsighted during the visit of anesthesiologist

Co-existing pathology (arteriopathy, neuropathy, diabetes, alcohol consumption, age, atherosclerosis, denutrition) influence the minimal stimulation, later sensory blockade onset and longer blockade duration

Neurological impairment should be immediately evaluated, since prompt diagnosis and treatment are essential to improving outcome.



Review of technical details and circumstances

- Used medication, dose, adrenaline, other adjuncts
- If no the fault of product
- Injection site, lumen puncture, response to stimulation, blood aspiration
- Appearance of paresthesias or pain: (association with needle, catheter or anesthetic's injection)
- experience of anesthesiologist
- patient's installation during operation
- Surgical dilators or other techniques (central venous catheterization, etc.)
- Suspended appearance of first symptoms

Evaluation

- Neurological examination by anesthesiologist and orthopedist (documented)
- Request of neurological consultation must be concentrated on a detail description of disorder, nerve by nerve:
 - sensory and/or motor injury
 - time of manifestation
 - level of injury

“General rules”

- Electrophysiological examination does not release from MRI
- These two examinations are the most important and urgent

Radiography

- In some cases the standard x-ray or sonography can detect a simple typical causes (bone's fragment, orthopedic constructions, hematoma), when usual intervention can improve a situation (no later than 8 hrs)
- Tomography is less informative and justifiable when MRI isn't available

Electro-diagnostic

- Electrophysiological examination – argument for mechanism of injury (traumatic, ischemic...)
- Not later than 1st – 3rd postoperative day
- If positive – we can suspect a preexisted neurological pathology
- Then 3 weeks after appearance of the symptoms

Management

- Moderate injury or deficiency (pain) – simple ambulatory observation - favorable prognosis
- Intense injury or deficiency (pain):
 - analgesics if needed (*non-steroidal anti-inflammatory, opiates*)
 - *Amitriptylinum* – if neuropathic or burning type of pain
 - *Clonazepamum* – if acute shooting or lightning pain (in evening, may cause a sleepiness)
 - decompression of the nerve
- Physiotherapy : immobilization, then passive and active mobilization

Case 4 – 68 years old patient

- Co-exist: hypertension, *diabetes melitus* type II, obesity. Blood exam – normal.
- Surgery: *arthrodesis talocruralis dex.*
- Anesthesia: SA + block *n.ischiadicus* with Bupivacaine 0.5 % 100 mg (technical difficulties during performance of block).
- Day 1 - sensory troubles in peripheral *n.ischiadicus* zone, no any pain at all. Normal vascular perfusion, no swelling or redness.

Follow-up

- Review of technical details and circumstances
- Consultation of neurologist
- No information about preexisted neurological pathology
- Electrophysiological examination or MRI were not performed.

- Day 2 - absolute sensory recuperation in damaged zone, also pain appearance in the site of surgery.
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What could be the probable causes of this temporary paresthesia?

- Suspicion of traumatic nerve injury (intraneural injection of local anesthetic) during regional block procedure.
- Merely - prolonged duration of blockade with high concentration of bupivacaine (diabetes, age).

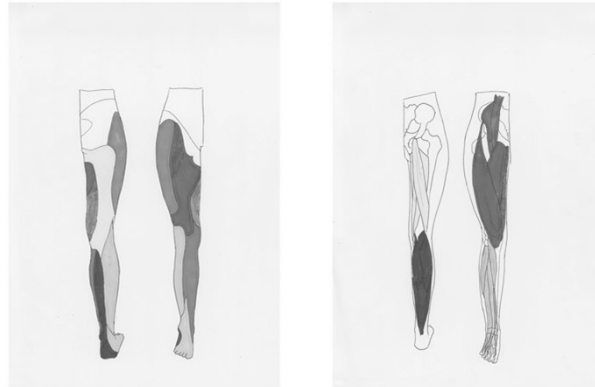
Clinical case 5 – 28 years old patient

- History: ASA I, arthroscopic anterior cruciate ligament repair surgery.
- Anesthesia: SA + *n. femoralis* block with Bupivacaine 0.5 % 100 mg.
- Technical problems during surgery, tourniquet time 1H40.
- Day 0 pain VAS 6 – 8, NSAId and opioids i/v.

Follow-up

- Day 1 – moderate pain of the knee, but complaint on paraesthesias in the operated leg.
- Neurological examination by anesthesiologist and orthopedist:
 - no motor or sensory block in femoral nerve zone
 - only sensory trouble in the anterior medial surface of the shin's skin observed

So, what happened?



- ✱ Diagnosis...

So, what happened?

- ✱ Mechanical compression of *n.saphenus* by tourniquet
- ✱ Day 2 – complete remission
- ✱ No need of surgical interference

Caution

- Avoid peripheral or epidural blocks if the patient is at risk of developing compartment syndrome as the analgesia will mask early signs.
- The cardinal symptom is pain, and this occurs early in the syndrome.
- The risk is especially high in tibial and forearm fracture, so be careful with blocks in these situations.

Message to take home

- However, the low concentrations of local anesthetics associated with opioids would not mask the first symptoms.
- Excellence of regional anesthesia practice – a way to keep the complication's frequency very low.

Risk or benefit?

- Pain: friend or enemy?
- Pain: important clinical symptom?
- Postoperative analgesia could it mask certain surgical complications?

✦ Your choice of anesthesia...

