Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

- Tipos de complicaciones:
  - Propias del paciente y de la comorbilidad asociada.
  - Propias de la técnica anestésica.
  - Propias de la cirugía.

Complicaciones Propias del Paciente y sus comorbilidades

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Complicaciones propias del paciente y sus comorbilidades

- Enfermedad cardiovascular
- Enfermedades respiratorias
- Obesidad
- Diabetes
- Artritis reumatoidea y otras enfermedades reumatológicas

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias del paciente y sus comorbilidades

Valoración preanestésica

Beta-Bloqueantes

Estatinas

Monitorización intraoperatoria

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Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias del paciente y sus comorbilidades

Recommendations on β-blockers[a]

Recommendations	Class[b]	Level[c]
β-Blockers are recommended in patients who have known IHD or myocardial ischaemia according to pre-operative stress testing[a]	I	B
β-Blockers are recommended in patients scheduled for high-risk surgery[a]	I	B
Continuation of β-blockers is recommended in patients previously treated with β-blockers because of IHD, arrhythmias, or hypertension	I	C
β-Blockers should be considered for patients scheduled for intermediate-risk surgery[a]	IIa	B
Continuation in patients previously treated with β-blockers because of chronic heart failure with systolic dysfunction should be considered	IIa	C
β-Blockers may be considered in patients scheduled for low-risk surgery with risk factor(s)	IIb	B
Perioperative high-dose β-blockers without titration are not recommended	III	A
β-Blockers are not recommended in patients scheduled for low-risk surgery without risk factors	III	B

[a]Treatment should be initiated optimally between 30 days and at least 1 week before surgery. Target: heart rate 60–70 beats/min, systolic blood pressure >100 mmHg.
[b]Class of recommendation.
[c]Level of evidence.
IHD = ischaemic heart disease.

Recommendations on statins

Recommendations	Class[a]	Level[b]
It is recommended that statins be started in high-risk surgery patients, optimally between 30 days and at least 1 week before surgery	I	B
It is recommended that statins be continued perioperatively	I	C

[a]Class of recommendation.
[b]Level of evidence.

European Heart Journal (2009) 30, 2769–2812
doi:10.1093/eurheartj/ehp337

ESC GUIDELINES

Guidelines for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery

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Complicaciones propias del paciente y sus comorbilidades

- Enfermedad cardiovascular
- Enfermedades respiratorias
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Complicaciones propias del paciente y sus comorbilidades

- Infecciones respiratorias agudas
- EPOC
- Asma
- Apnea obstructiva del sueño

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Valencia 27 de Junio de 2010

Complicaciones propias del paciente y sus comorbilidades

- Enfermedad cardiovascular
- Enfermedades respiratorias
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Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias del paciente y sus comorbilidades

- Obesidad
- Posicionamiento
- Manejo de la vía aérea
- Dificultad en las técnicas de bloqueo regional

Am Acad Orthop Surg, Vol 14, No 7, July 2006, 425-432.

Perioperative Management of the Obese Orthopaedic Patient

Daniel Guss, MD and Timothy Bhattacharyya, MD

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Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias del paciente y sus comorbilidades

Table 47-3 Medical Consequences of Obesity

SYSTEM	PATHOLOGY
Respiratory	Obstructive sleep apnea, obesity-hypoventilation syndrome, asthma, pulmonary hypertension
Cardiovascular	Dysrhythmias, atherosclerosis, cardiac failure, coronary artery disease, peripheral vascular disease, sudden cardiac death, systemic hypertension, thromboembolism, varicose veins
Gastrointestinal	Colon cancer, gallbladder disease, gastroesophageal reflux disease, hernias, nonalcoholic fatty liver disease, nonalcoholic steatohepatitis
Endocrine/metabolic	Diabetes mellitus, dyslipidemia, hyperinsulinemia, hypothyroidism, insulin resistance, metabolic syndrome
Genitourinary	End-stage renal disease, macrosomia, menorrhagia, preeclampsia and eclampsia, prostate cancer, urinary incontinence
Neurologic	Carpal tunnel syndrome, pseudotumor cerebri, stroke
Hematology	Hypercoagulability, polycythemia
Musculoskeletal	Acanthosis nigricans, gout, osteoarthritis, rheumatoid arthritis
Psychology/psychiatry	Depression, reduced self-esteem, social stigma

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Valencia 27 de Junio de 2010

Complicaciones propias del paciente y sus comorbilidades

- Enfermedad cardiovascular
- Enfermedades respiratorias
- Obesidad
- Diabetes
- Artritis reumatoidea y otras enfermedades reumatológicas

Complicaciones propias del paciente y sus comorbilidades

- Diabetes Mellitus:
  - > riesgo de infecciones
  - > riesgo de infecciones de herida quirúrgica
  - > tiempo de cicatrización
  - > riesgo de IM perioperatorio y ACV

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias del paciente y sus comorbilidades

- Plan with the surgeon to schedule the surgery as the first case of the day to prevent prolonged fasting.
- As a general rule, oral hypoglycemic agents are held on the day of surgery to avoid reactive hypoglycemia. The exception is metformin, which should be held for at least 24 hours preoperatively to avoid the risk drug-induced lactic acidosis.
- Insulin should be continued through the evening before surgery, including the usual dose of insulin glargine (Lantus).
- Patients should be counseled to take a glucose tablet or clear juice if hypoglycemia occurs prior to arrival at the hospital, in order to prevent delay of the surgery.
- Schedule the patient to arrive without having ingested anything by mouth in early morning and check blood glucose, electrolytes, and ketones.
- Type 1 diabetics should be continued on basal insulin replacement even while nothing by mouth status to prevent ketoacidosis. Administer half the usual morning dose of intermediate- or long-acting insulin after arrival to the surgery center, but hold the usual dose of rapid- or short-acting insulin.
- Patients on insulin pumps may be managed by continuing the pump for short surgeries, or changing over to an intravenous insulin infusion for moderate or major surgeries.
- Use the patient's own sliding scale to administer a short-acting insulin subcutaneously to maintain the glucose between 100 and 200 mg/dL prior to the scheduled surgery.

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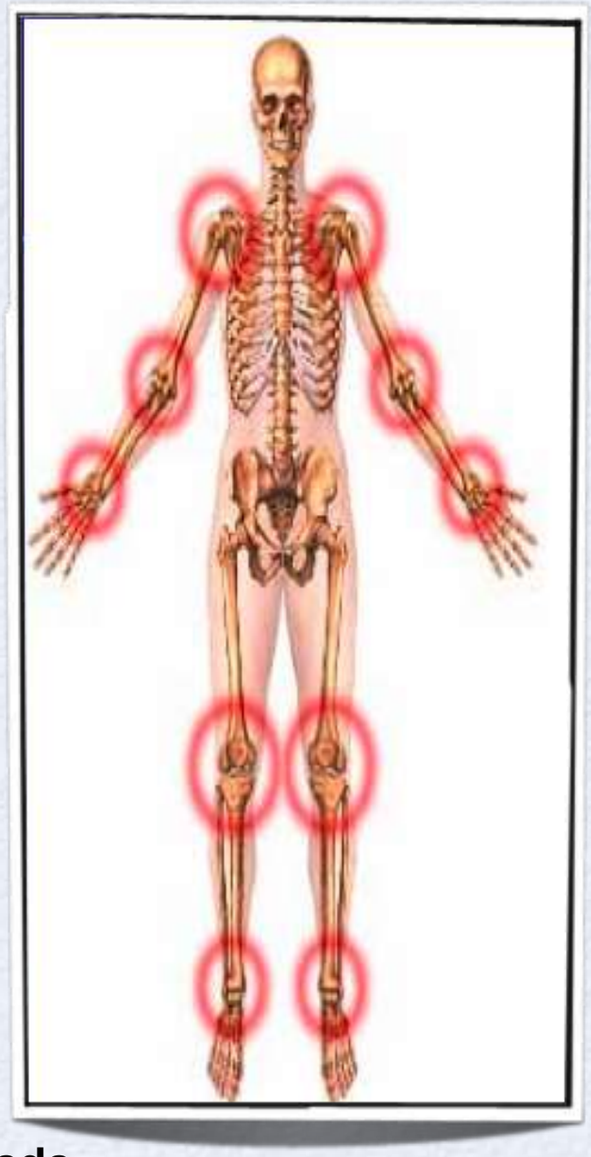
Valencia 27 de Junio de 2010

Complicaciones propias del paciente y sus comorbilidades

- Enfermedad cardiovascular
- Enfermedades respiratorias
- Obesidad
- Diabetes
- Artritis reumatoidea y otras enfermedades reumatológicas

Complicaciones propias del paciente y sus comorbilidades

- Artritis reumatoidea
  - Deformidad articular
  - Técnicas locorregionales
  - Posición quirúrgica
  - Afectación sistémica



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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias del paciente y sus comorbilidades

Table 25-12 Extra-Articular Manifestations of Rheumatoid Arthritis

Skin
- Raynaud phenomenon
- Digital necrosis

Eyes
- Scleritis
- Corneal ulceration

Lung
- Pleural effusion
- Pulmonary fibrosis

Heart
- Pericarditis
- Cardiac tamponade
- Coronary arteritis
- Aortic insufficiency

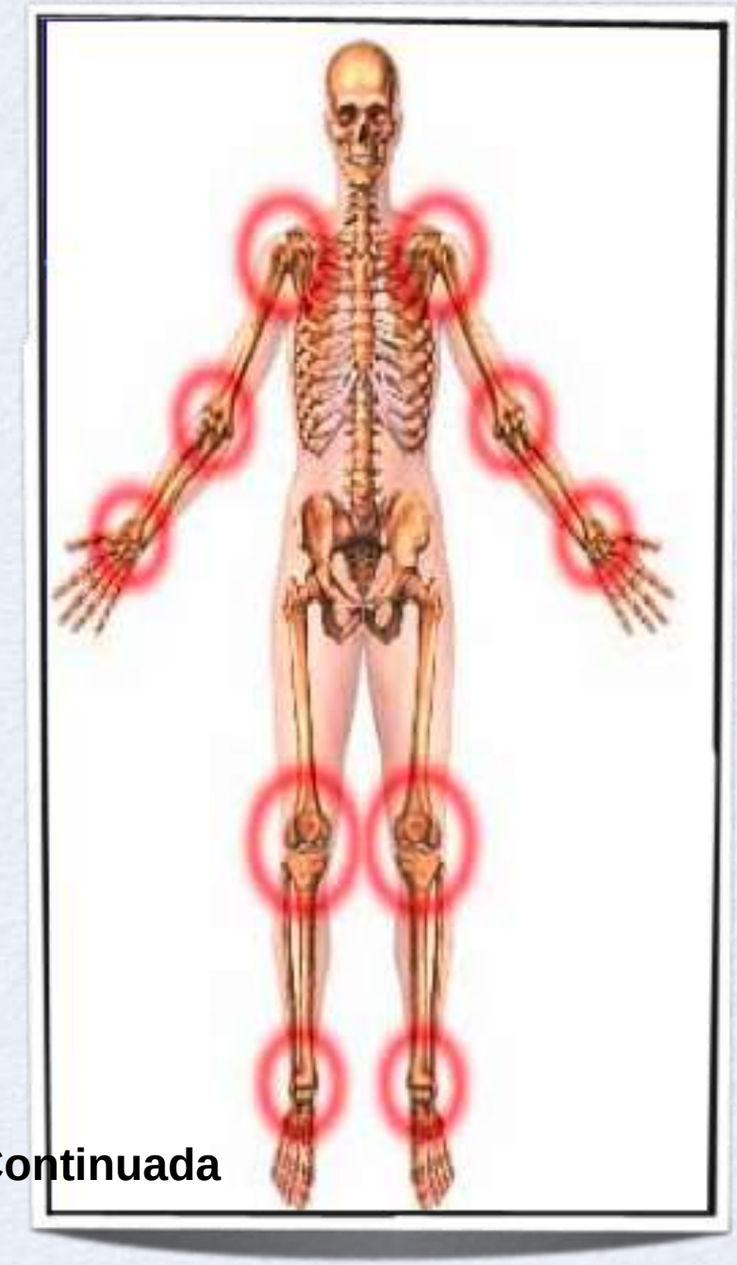
Kidney
- Interstitial fibrosis
- Glomerulonephritis
- Amyloid deposition

Peripheral Nervous System
- Compression syndromes
- Mononeuritis

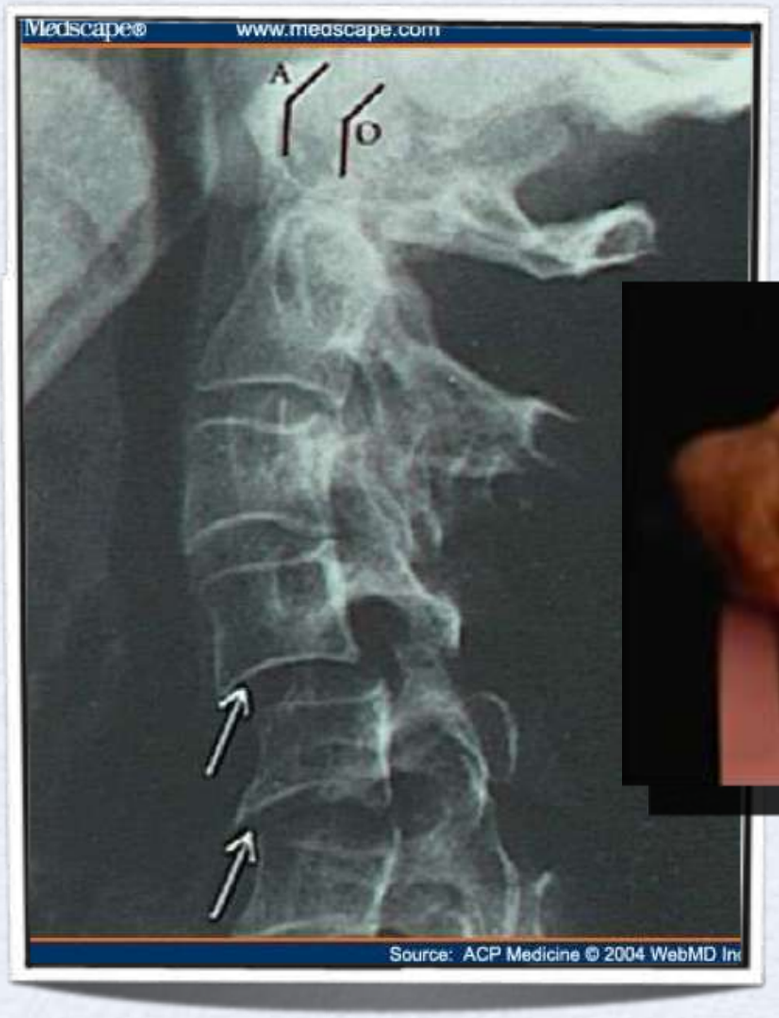
Central Nervous System
- Dural nodules
- Necrotizing vasculitis

Liver
- Hepatitis

Blood
- Anemia
- Leukopenia



Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica



- Dificultad en el manejo de la vía aérea.
- Anquilosis columna cervical
- Inestabilidad cervical
- Hipoplasia mandibular
- Desviación de la laringe

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Valencia 27 de Junio de 2010

complicaciones Propias de la tecnica anestésica

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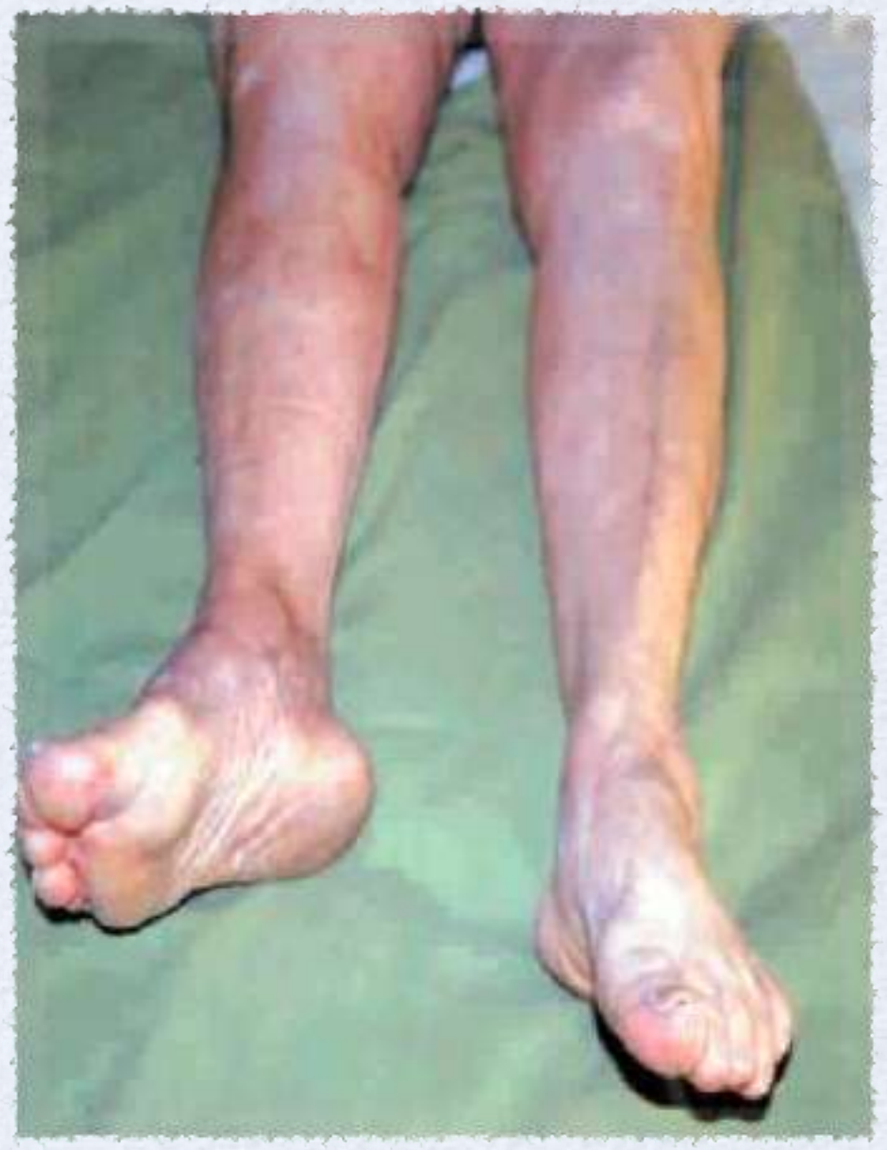
Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Toxicidad por anestésicos locales
- Complicaciones infecciosas
- Complicaciones por bloqueos neuroaxiales
- Complicaciones por bloqueos periféricos



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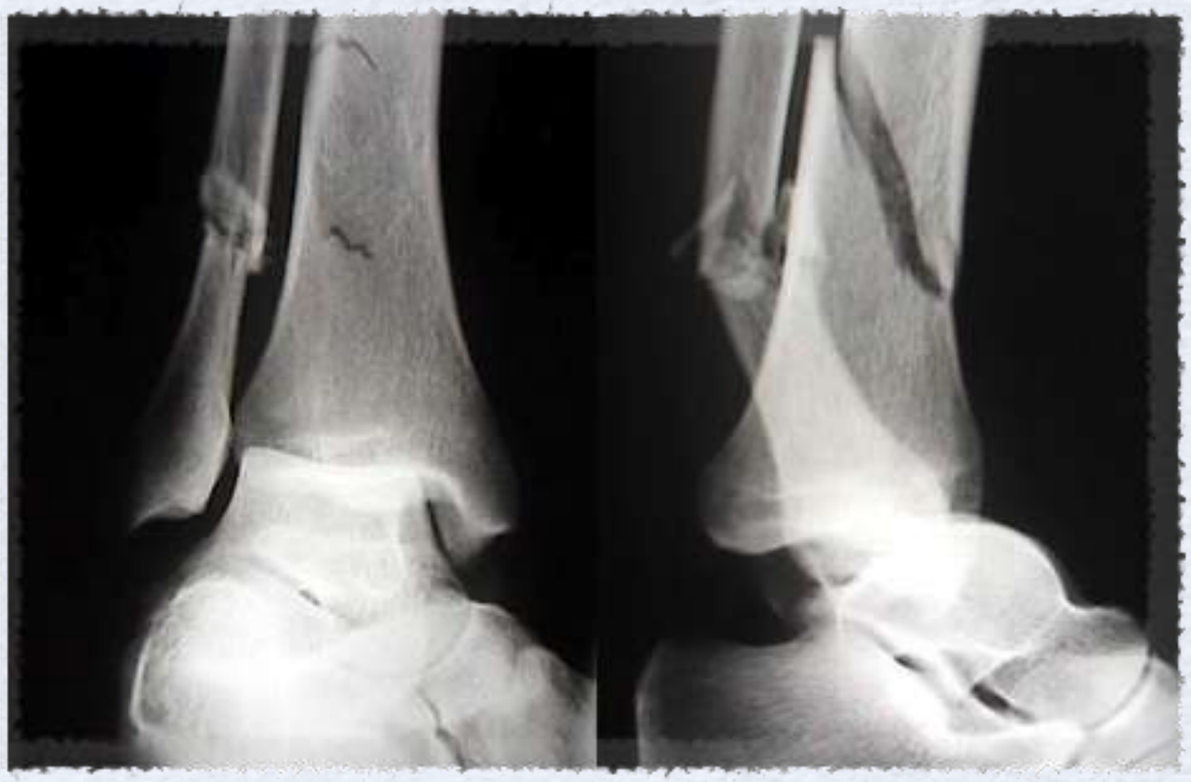
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Toxicidad por anestésicos locales
  - Tipo de fármaco
  - Dosis administrada
  - Factores anatómicos
  - Patología asociada



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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

Table 21-9 Clinical Profile of Local Anesthetics

LOCAL ANESTHETIC	CONCENTRATION (%)	CLINICAL USE	ONSET	DURATION (hr)	RECOMMENDED MAXIMUM SINGLE DOSE (mg)
AMIDES					
Bupivacaine	0.25	Infiltration	Fast	2–8	175/225 + epinephrine
Levobupivacaine	0.25–0.5	Peripheral nerve block	Slow	4–12	150
	0.5–0.75	Epidural anesthesia	Moderate	2–5	150
	0.03–0.25	Epidural analgesia	NA	NA	NA
	0.5–0.75	Spinal anesthesia	Fast	1–4	20

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Lidocaine	0.5–1	Infiltration	Fast	1–4	300/500 + epinephrine
	0.25–0.5	IV regional anesthesia	Fast	0.5–1	300
	1–1.5	Peripheral nerve block	Fast	1–3	300/500 + epinephrine
	1.5–2	Epidural anesthesia	Fast	1–2	300/500 + epinephrine
	1.5–5	Spinal anesthesia	Fast	0.5–1	100
	4	Topical	Fast	0.5–1	300
Mepivacaine	0.5–1	Infiltration	Fast	1–4	400/500 + epinephrine
	1–1.5	Peripheral nerve block	Fast	2–4	400/500 + epinephrine
	1.5–2	Epidural anesthesia	Fast	1–3	400/500 + epinephrine
	2–4	Spinal anesthesia	Fast	1–2	100

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

Ropivacaine	0.2–0.5	Infiltration	Fast	2–6	200
	0.5–1	Peripheral nerve block	Slow	5–8	250
	0.5–1	Epidural anesthesia	Moderate	2–6	200
	0.05–0.2	Epidural analgesia	NA	NA	NA

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Valencia 27 de Junio de 2010

Complicaciones propias de la técnica anestésica

- Tipo de anestésico local
- Tipo de bloqueo

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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Table 21-8 Relative Potency for Systemic Central Nervous System Toxicity by Local Anesthetics and Ratio of Dosage Needed for Cardiovascular System: Central Nervous System (CVS:CNS) Toxicity

AGENT	RELATIVE POTENCY FOR CNS TOXICITY	CVS:CNS
Bupivacaine	4.0	2.0
Levobupivacaine	2.9	2.0
Chloroprocaine	0.3	3.7
Etidocaine	2.0	4.4
Lidocaine	1.0	7.1
Mepivacaine	1.4	7.1
Prilocaine	1.2	3.1
Procaine	0.3	3.7
Ropivacaine	2.9	2.0
Tetracaine	2.0	

Data from Liu SS: Local Anesthetics and Analgesia, The Management of Pain. Edited by Ashburn MA, Rice LJ. New York, Churchill Livingstone, 1997, pp 141; and Groban L: Central nervous system and cardiac effects from long-acting amide local anesthetic toxicity in the intact animal model. Reg Anesth Pain Med 2003; 28: 3.

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Table 21-6 Typical C_{max} After Regional Anesthetics with Commonly Used Local Anesthetics

LOCAL ANESTHETIC	TECHNIQUE	DOSE (mg)	C_{max} (μg/mL)	T_{max} (min)	TOXIC PLASMA CONCENTRATION (μg/mL)
Bupivacaine	Brachial plexus	150	1.0	20	3
	Celiac plexus	100	1.50	17	
	Epidural	150	1.26	20	
	Intercostal	140	0.90	30	
	Lumbar sympathetic	52.5	0.49	24	
	Sciatic femoral	400	1.89	15	
Levobupivacaine	Epidural	75	0.36	50	4
	Brachial plexus	250	1.2	55	
Lidocaine	Brachial plexus	400	4.00	25	5
	Epidural	400	4.27	20	
	Intercostal	400	6.8	15	
Mepivacaine	Brachial plexus	500	3.68	24	5
	Epidural	500	4.95	16	
	Intercostal	500	8.06	9	
	Sciatic/femoral	500	3.59	31	
Ropivacaine	Brachial plexus	190	1.3	53	4
	Epidural	150	1.07	40	
	Intercostal	140	1.10	21	

C_{max}, peak plasma levels; T_{max}, time until C_{max}.

Data from Liu SS: Local anesthetics and analgesia, The Management of Pain. Edited by Ashburn MA, Rice LJ. New York, Churchill Livingstone, 1997, pp 141. Berrisford RG: Plasma concentrations of bupivacaine and its enantiomers during continuous extrapleural intercostal nerve block. Br J Anaesth 1993; 70: 201. Kopacz DJ: A comparison of epidural levobupivacaine 0.5% with or without epinephrine for lumbar spine surgery. Anesth Analg 2001; 93: 755. Crews JC: Levobupivacaine for axillary brachial plexus block: A pharmacokinetic and clinical comparison in patients with normal renal function or renal disease. Anesth Analg 2002; 95: 219.

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

CLÍNICA

NEUROLÓGICA

- Dosis bajas: depresión SNC
- Dosis medias: Excitabilidad del SNC
- Dosis altas: Convulsiones y coma

CARDIOVASCULAR

Leve: Hipotensión, Bradicardia e Hipoxia

Severa: Colapso cardiovascular, arritmias ventriculares.

ASRA Practice Advisory on Local Anesthetic Systemic Toxicity

Joseph M. Neal, MD, Christopher M. Bernards, MD,* John F. Butterworth, IV, MD,†*
Guido Di Gregorio, MD,‡ Kenneth Drasner, MD,§ Michael R. Hejtmanek, MD, Michael F. Mulroy, MD,**
Richard W. Rosenquist, MD,|| and Guy L. Weinberg, MD‡

TABLE 3. Recommendations for Diagnosing LAST

- Classic descriptions of LAST depict a progression of subjective symptoms of CNS excitement (agitation, auditory changes, metallic taste or abrupt onset of psychiatric symptoms), followed by seizures then CNS depression (drowsiness, coma, or respiratory arrest). Near the end of this continuum, initial signs of cardiac toxicity (hypertension, tachycardia, or ventricular arrhythmias) are supplanted by cardiac depression (bradycardia, conduction block, asystole, decreased contractility). However, there is substantial variation in this classic description, including:
  - Simultaneous presentation of CNS and cardiac toxicity
  - Cardiac toxicity without prodromal signs and symptoms of CNS toxicity
  - Thus, the practitioner must be vigilant for atypical or unexpected presentation of LAST (I; B).
- The timing of LAST presentation is variable. Immediate (<60 s) presentation suggests intravascular injection of local anesthetic with direct access to the brain, whereas presentation that is delayed 1–5 mins suggests intermittent intravascular injection, lower extremity injection, or delayed tissue absorption. Because LAST can present >15 mins after injection, patients that receive potentially toxic doses of local anesthetic should be closely monitored for at least 30 mins after injection (I; B).
- Case reports associate LAST with underlying cardiac, neurologic, pulmonary, renal, hepatic, or metabolic disease. Heightened vigilance may be warranted in these patients, particularly if they are at the extremes of age (IIa; B).
- The overall variability of LAST signs and symptoms, timing of onset, and association with various disease states suggests that practitioners should maintain a low threshold for considering the diagnosis of LAST in patients with atypical or unexpected presentation of CNS or cardiac signs and symptoms after receiving more than a minimal dose of local anesthetic (IIa; B).

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Valencia 27 de Junio de 2010

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Table 21-11 Dose-Dependent Systemic Effects of Lidocaine

PLASMA CONCENTRATION (µg/mL)	EFFECT
1–5	Analgesia
5–10	Lightheadedness Tinnitus Numbness of tongue
10–15	Seizures Unconsciousness
15–25	Coma Respiratory arrest
>25	Cardiovascular depression

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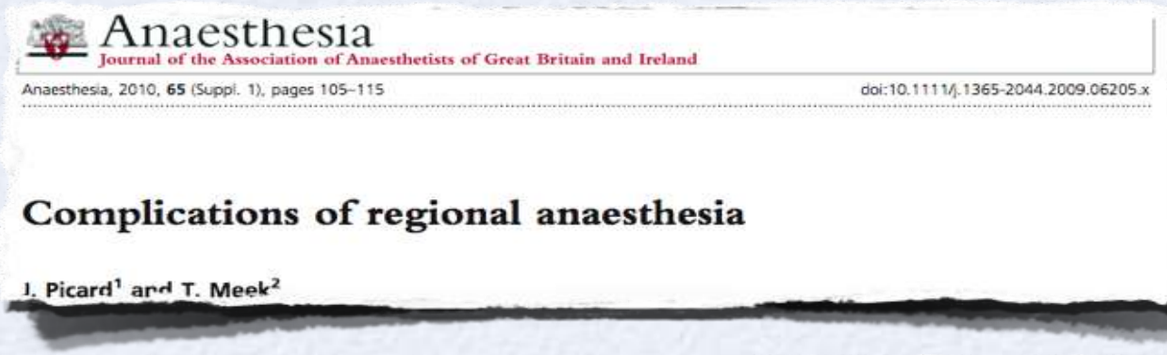
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

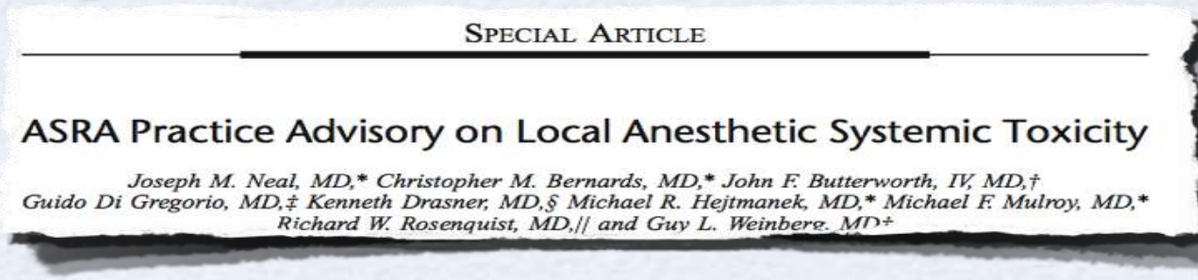
- Tratamiento de la intoxicación


Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland

Anaesthesia, 2010, **65** (Suppl. 1), pages 105–115 doi:10.1111/j.1365-2044.2009.06205.x

Complications of regional anaesthesia

J. Picard[1] and T. Meek[2]


SPECIAL ARTICLE

ASRA Practice Advisory on Local Anesthetic Systemic Toxicity

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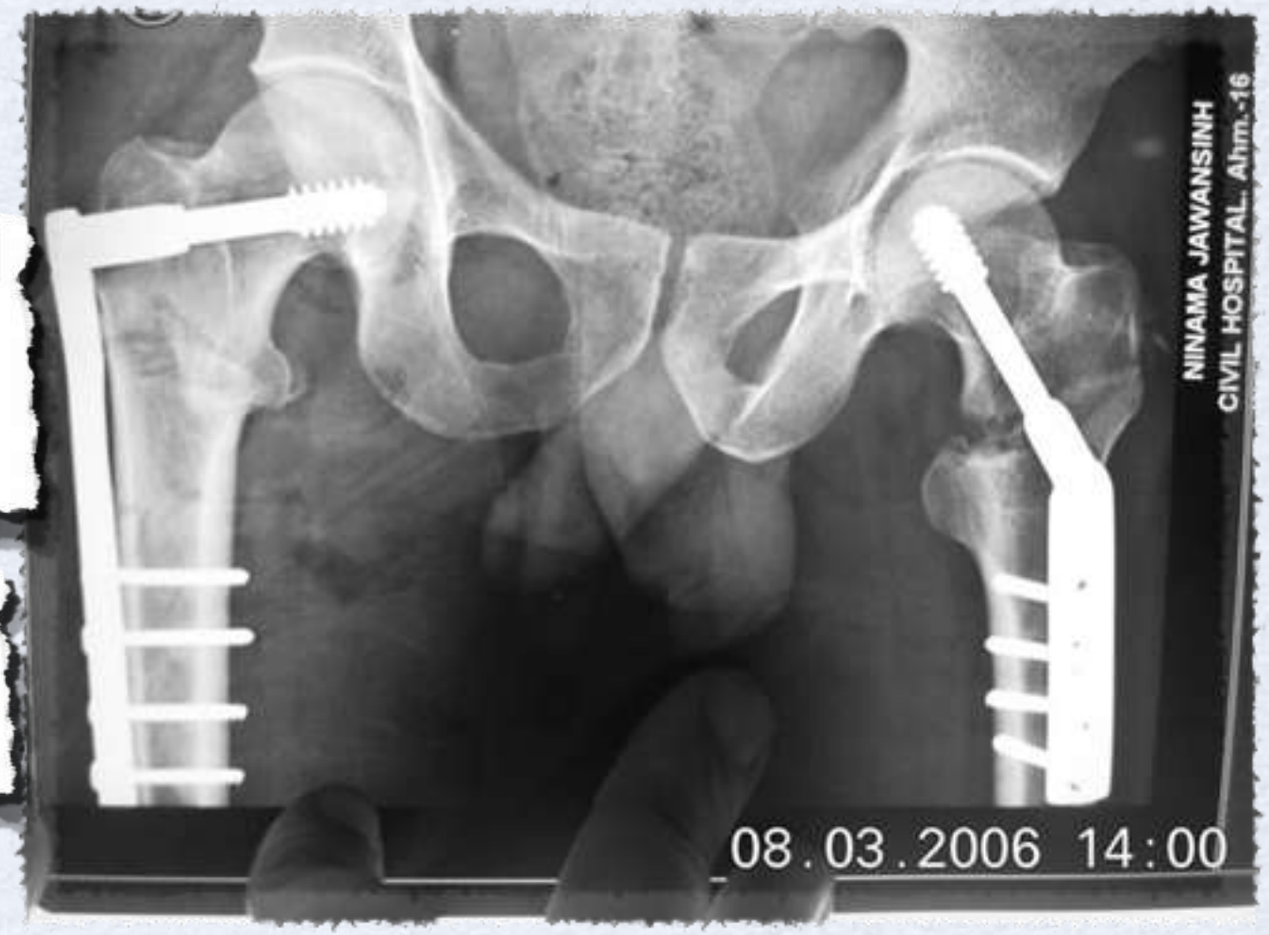

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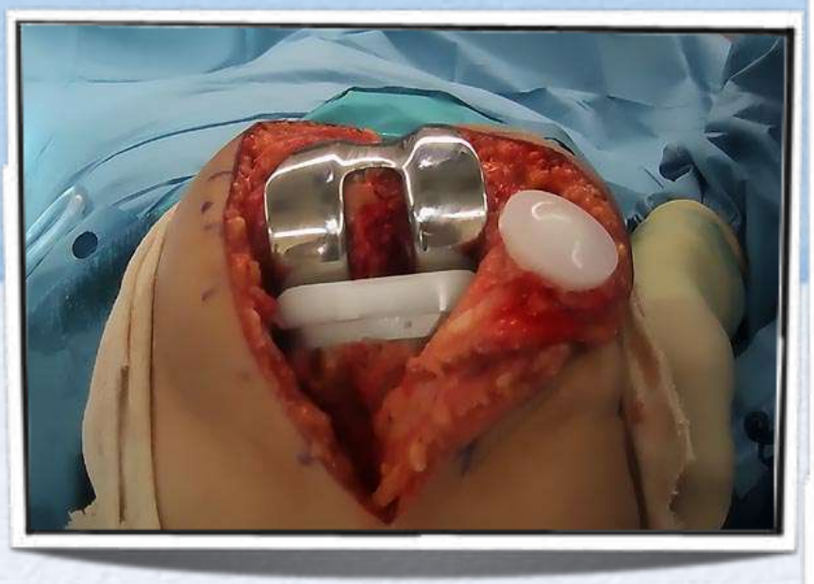

TABLE 4. Recommendations for Treatment of LAST

- If signs and symptoms of LAST occur, prompt and effective airway management is crucial to preventing hypoxia and acidosis, which are known to potentiate LAST (I; B).
- If seizures occur, they should be rapidly halted with benzodiazepines. If benzodiazepines are not readily available, small doses of propofol or thiopental are acceptable. Future data may support the early use of lipid emulsion for treating seizures (I; B).
- Although propofol can stop seizures, large doses further depress cardiac function; propofol should be avoided when there are signs of CV compromise (III; B). If seizures persist despite benzodiazepines, small doses of succinylcholine or similar neuromuscular blocker should be considered to minimize acidosis and hypoxemia (I; C).
- If cardiac arrest occurs, we recommend standard Advanced Cardiac Life Support with the following modifications:
  - If epinephrine is used, small initial doses (10–100 μg boluses in the adult) are preferred (IIa; C)
  - Vasopressin is not recommended (III; B)
  - Avoid calcium channel blockers and β-adrenergic receptor blockers (III; C)
  - If ventricular arrhythmias develop, amiodarone is preferred (IIa; B); treatment with local anesthetics (lidocaine or procainamide) is *not* recommended (III; C)
- Lipid emulsion therapy (IIa; B):
  - Consider administering at the first signs of LAST, after airway management
  - Dosing:
    - 1.5 mL/kg 20% lipid emulsion bolus
    - 0.25 mL/kg per minute of infusion, continued for at least 10 mins after circulatory stability is attained
    - If circulatory stability is not attained, consider rebolus and increasing infusion to 0.5 mL/kg per minute
    - Approximately 10 mL/kg lipid emulsion for 30 mins is recommended as the upper limit for initial dosing
- Propofol is not a substitute for lipid emulsion (III; C).
- Failure to respond to lipid emulsion and vasopressor therapy should prompt institution of cardiopulmonary bypass (CPB) (IIa; B). Because there can be considerable lag in beginning CPB, it is reasonable to notify the closest facility capable of providing it when CV compromise is first identified during an episode of LAST.

The class of recommendation and level of evidence for each intervention are given in parenthesis (Table 1).

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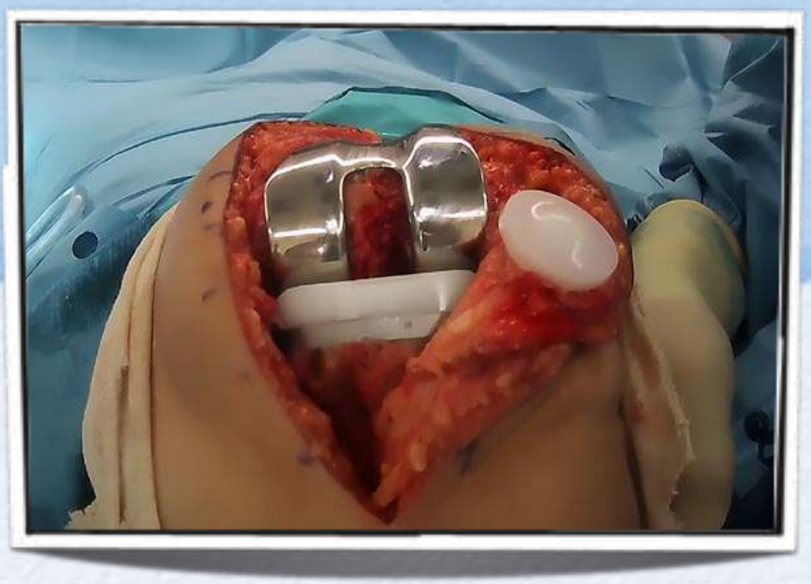

Intralipid 20% 1-2ml/Kg x 1 min

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Identificacion pacientes alto riesgo TAL

Trastornos conducción cardiaca

Cardiopatía isquémica

Edades extremas de vida <4 />70

PREVENCION

Minimas dosis totales AL (Volumen X concentración).

Inyección AL fraccionada 3-5 ml e intervalo de 1T circulación entre dosis(30-45seg).

Aspiraciones repetidas (falso - 2%).

Uso potenciales dosis tóxicas añadir A puede ser útil (controvertido).

Uso US reduce incidencia punción vascular/ no existe evidencia de disminuir intoxicación AL.

TRATAMIENTO

1.Asegurar vía aérea: evitar hipoxia y acidosis.

2.En caso convulsiones: BZA fármaco de elección, y dosis bajas de propofol o thiopental.

3.En caso parada cardiaca:

-Aplicar protocolos PCR + soporte vital avnazado.

-Si administración de A se recomiendan dosis algo menores 10-100µg iv.

-Evitar Ca-antagonistas/B-Bloqueantes.

-Si arritmias ventriculares amiodarona es fármaco de elección.

4.Terapia emulsión lipídica.

-Dosis inicio: 1,5 ml/Kg 20% en bolus.

-Dosis mantenimiento 0,25ml/Kg/min .Dosis máximas: 10ml/Kg/30 minutos.

5.En caso de fracaso de anteriores medidas se recomienda Derivación cardiopulmonar.

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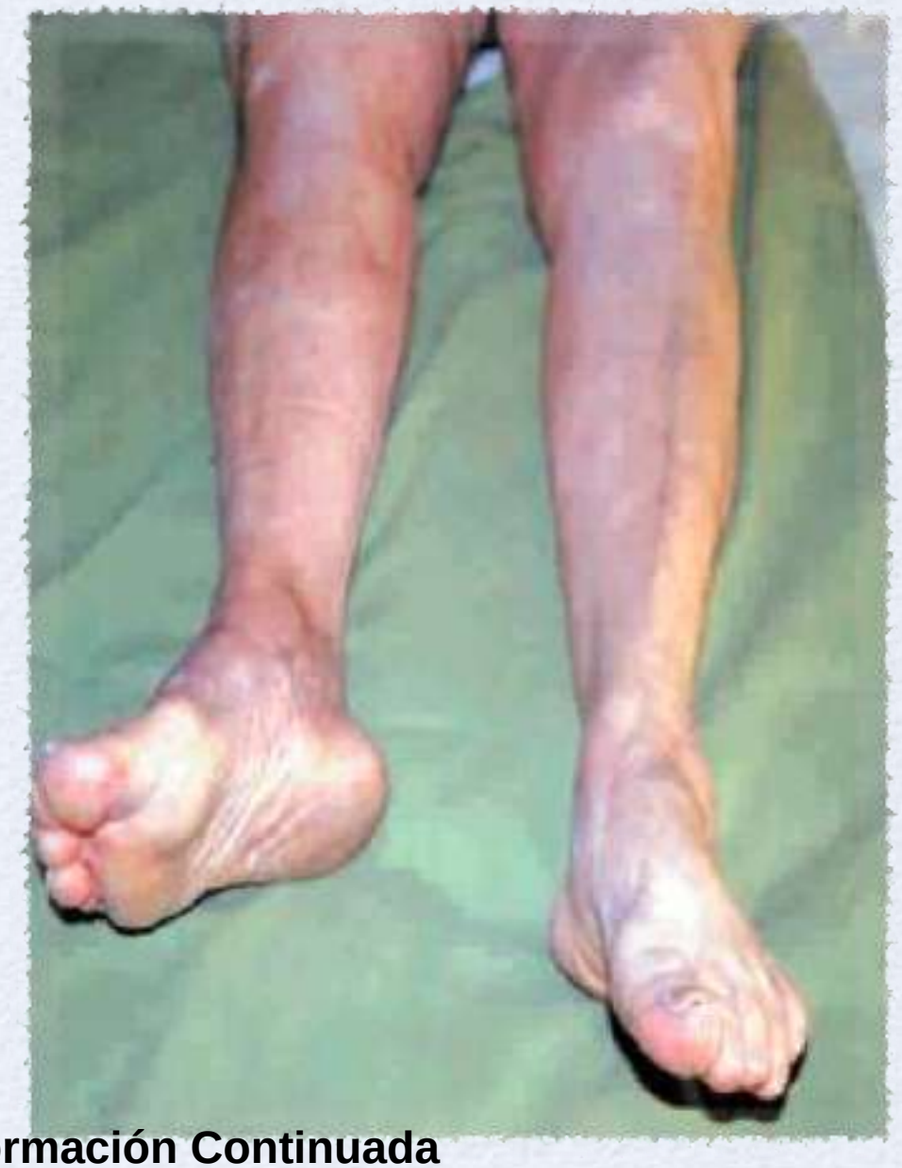
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Toxicidad por anestésicos locales
- Complicaciones infecciosas
- Complicaciones hemorrágicas
- Complicaciones por bloqueos neuroaxiales
- Complicaciones por bloqueos periféricos



Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

British Journal of Anaesthesia 96 (3): 292–302 (2006)
doi:10.1093/bja/ael006 Advance Access publication January 23, 2006

BJA

REVIEW ARTICLE

Epidural abscesses

S. Grewal[1]*, G. Hocking[1] and J. A. W. Wildsmith[2]

(i) *Compromised immunity*: diabetes mellitus, steroid or other immunosuppressive therapy, malignancy, pregnancy, HIV infection, alcoholism and cirrhosis.[108 135]

(ii) *Disruption of the spinal column*: degenerative disease and disruption by trauma, surgery or instrumentation, including discography, chemonucleosis and central neuraxial block, the latter also providing a direct portal for organisms. Even temporally distant blunt trauma is a risk factor.[29]

(iii) *Source of infection*: respiratory, urinary and minor soft tissue infections may all act as primary sources of haematogenous spread; i.v. drug abusers are constantly at risk, as are patients with indwelling vascular catheters.

ıflammation and infection complications of 2285 perineural catheters: a prospective study

M. Neuburger [1], J. Büttner [1], S. Bluventhal [2], J. Breitbarth [1] A. Borgeat [2]
[1] *Department of Anesthesiology, Berufsgenossenschaftliche Unfallklinik Murnau, Germany and* [2] *Department of Anesthesiology, Orthopedic University Hospital Balgrist, Zurich,*

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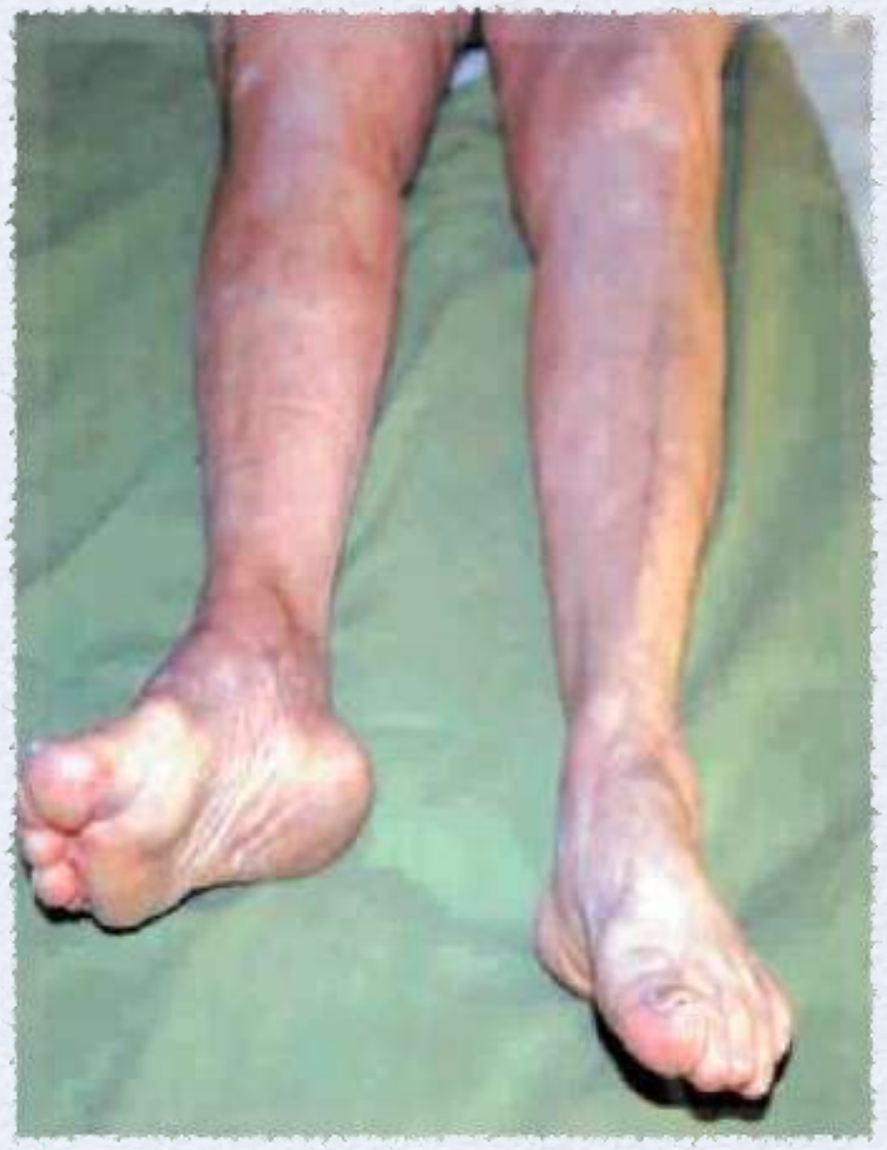
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Toxicidad por anestésicos locales
- Complicaciones infecciosas
- Complicaciones hemorrágicas
- Complicaciones por bloqueos neuroaxiales
- Complicaciones por bloqueos periféricos



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Valencia 27 de Junio de 2010

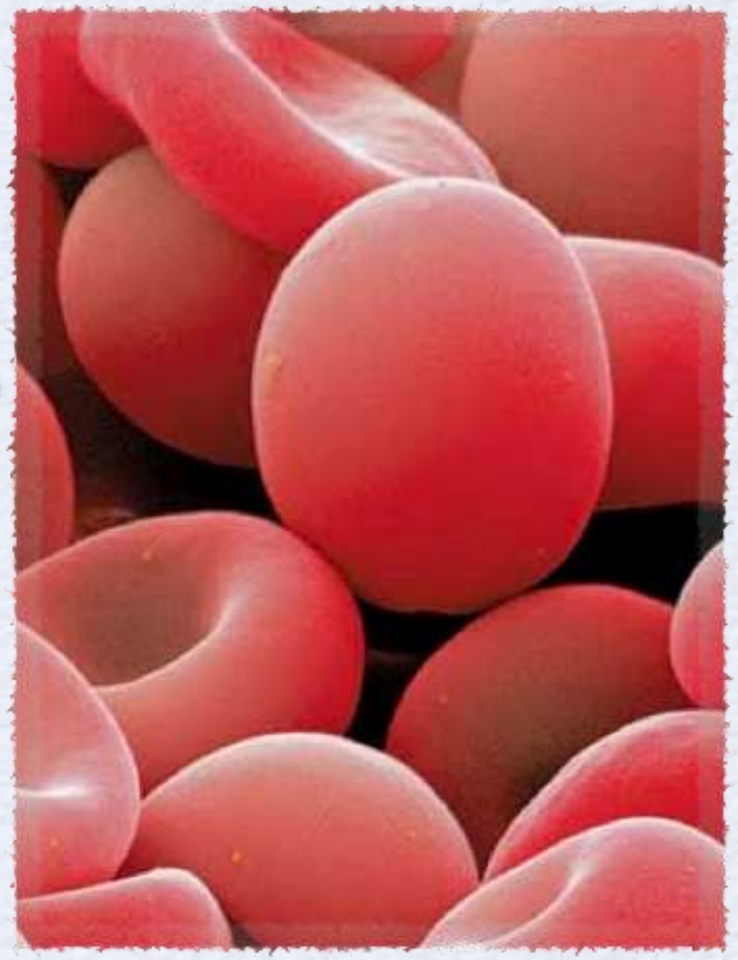
Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

ASRA Practice Advisory

Regional Anesthesia in the Patient Receiving Antithrombotic or Thrombolytic Therapy

American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (Third Edition)



- Complicaciones hemorrágicas
  - Localización del bloqueo
  - Medicación habitual

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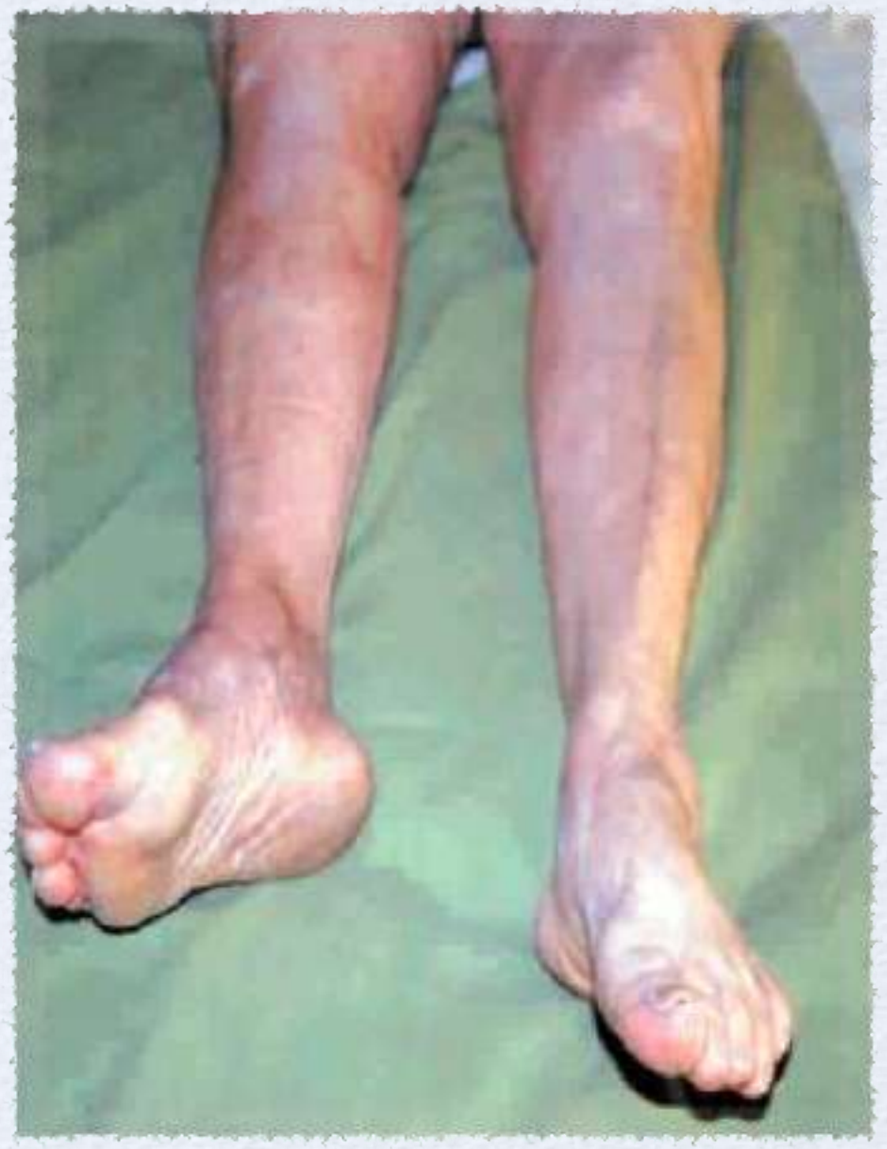
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Toxicidad por anestésicos locales
- Complicaciones infecciosas
- Complicaciones por bloqueos neuroaxiales
- Complicaciones por bloqueos periféricos



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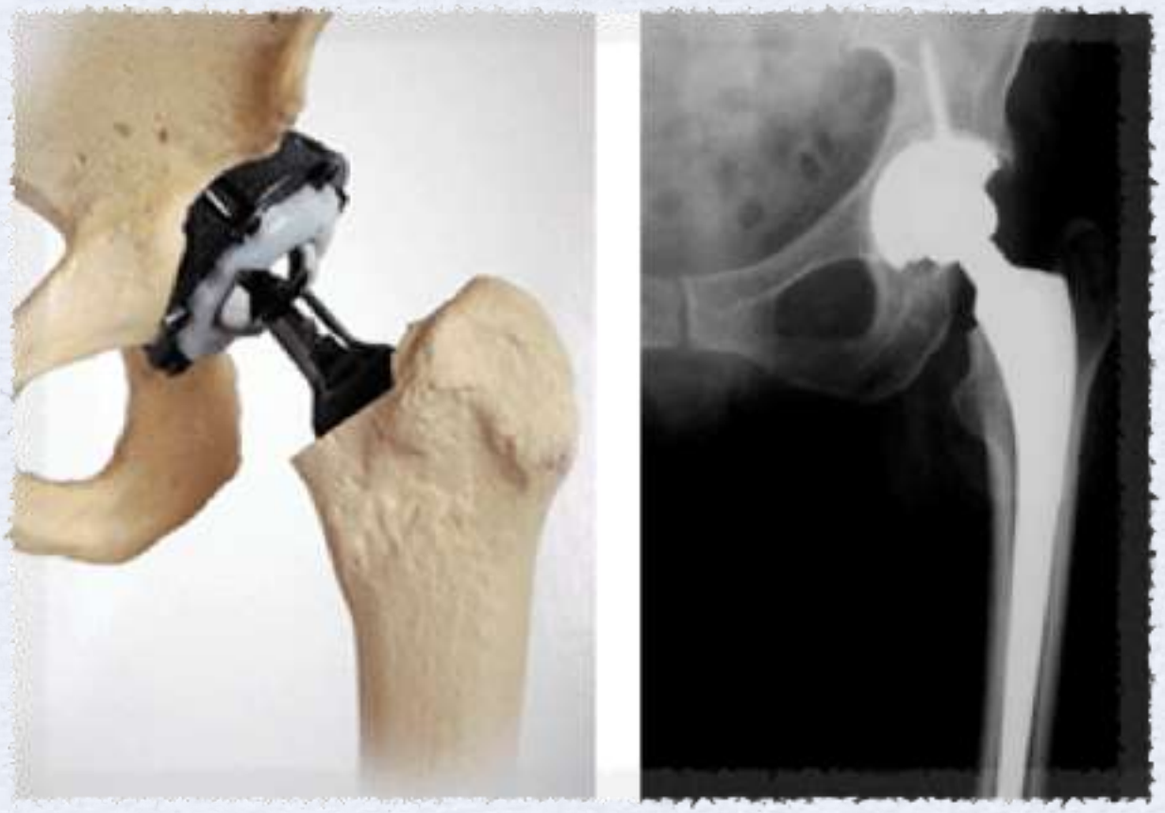
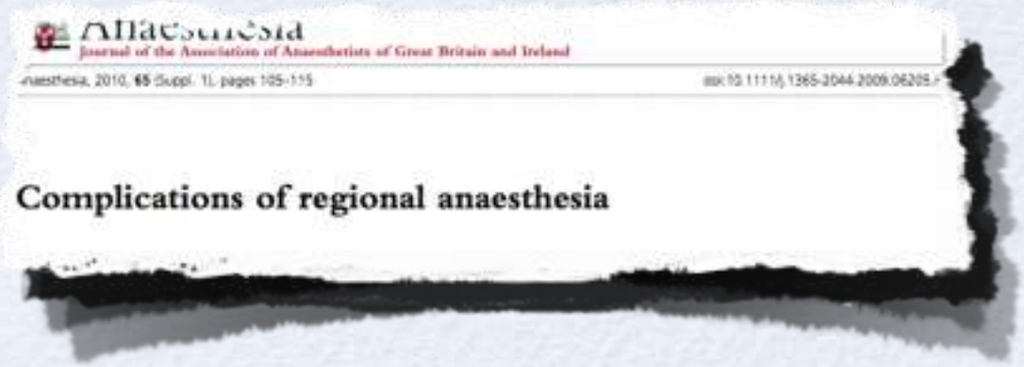
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Bloqueos neuroaxiales:
  - Bloqueo simpático
  - Anestesia espinal total
  - Hematoma epidural
  - Síntomas neurológicos transitorios
  - Punción dural accidental y CPPD





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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

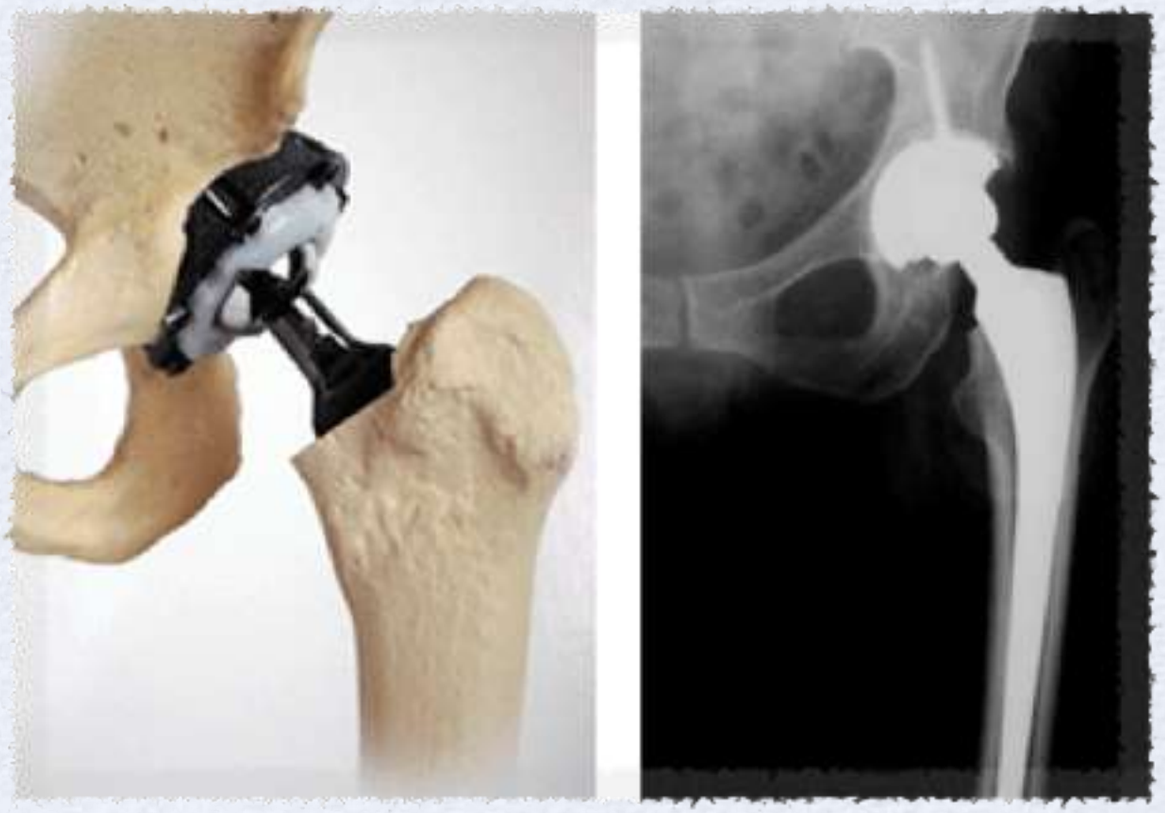
Complicaciones propias de la técnica anestésica

- Bloqueos neuroaxiales:

- **Bloqueo simpático:**

- Síntomas: Hipotensión y bradicardia.

- Tto: Fármacos vasomotores.



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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

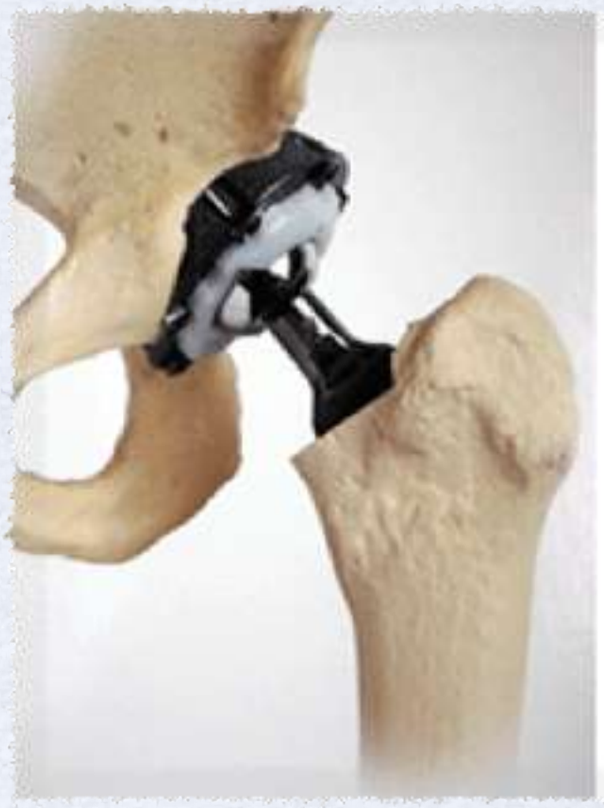
- Bloqueos neuroaxiales:

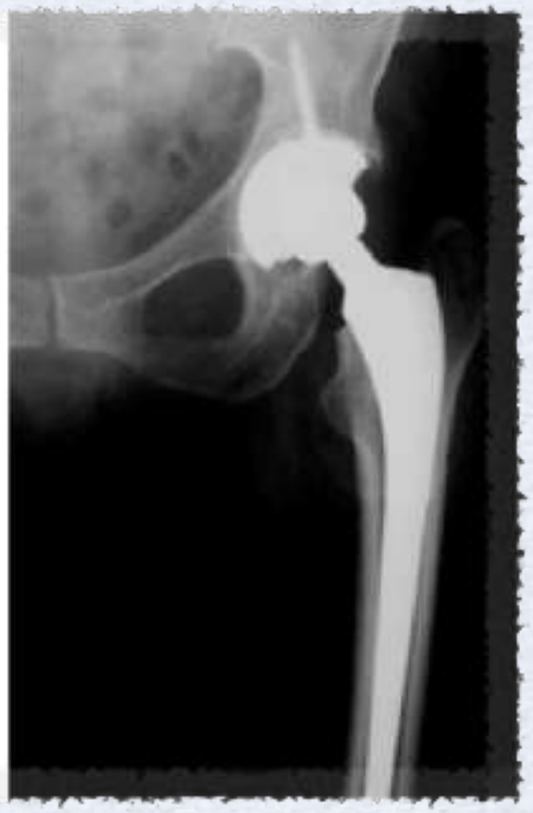
- **Anestesia espinal total**

Dosis test y aspirar antes de colocar AL

- Síntomas: Disnea o apnea, nauseas, hipotensión y/o bradicardia.

- Tto: Actuar rápido-- Soporte ventilatorio y fármacos vasopresores





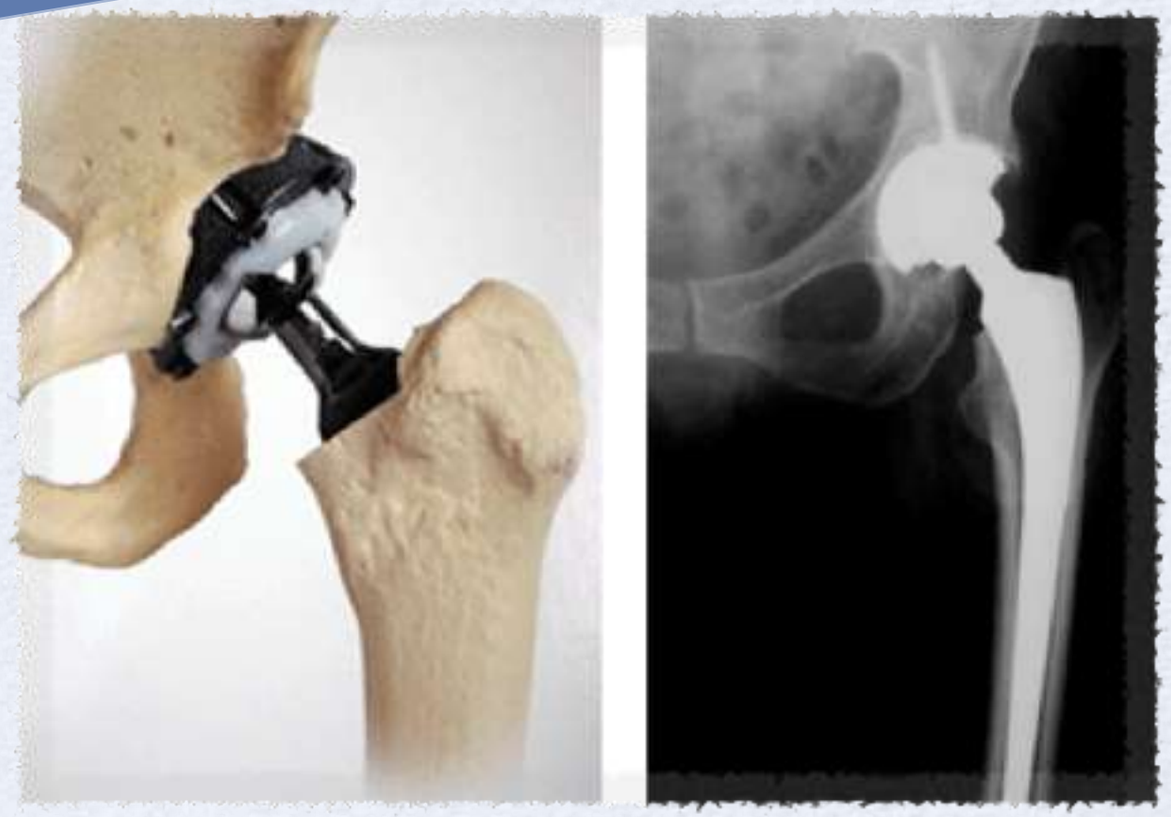
SARTD-CHGUV Sesión de Formación Continuada
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Bloqueos neuroaxiales:
- **Hematoma epidural**

Descompresión en 6 a 8 h



- Síntomas: Dolor de espalda irradiado a piernas, debilidad motora y disfunción de esfínteres
- Manejo: TAC o RMN de urgencia y valoración por NUC

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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Table 2. Recommendations: Limiting, Diagnosing, and Treating Neuraxial Injury

Limiting injury

- Misidentification of vertebral level, unrecognized lateral needle placement or deviation, abnormal caudad termination of the spinal cord, or failure of the ligamentum flavum to fuse in the midline may contribute to direct needle injury to the spinal cord. Clinicians are advised to be aware of these anatomic conditions, particularly in patients with challenging surface anatomy. (Class I)
- Clinicians are advised to be aware of and to avoid conditions that have been linked to the formation of epidural hematoma or epidural abscess, as noted in previous ASRA Practice Advisories. Such conditions include concurrent or imminent anticoagulation, the use of multiple anticoagulants, improper aseptic technique, and needle placement during untreated active infection.[1,3] (Class I)
- Patients with known tumor in the epidural space should undergo neuraxial imaging studies to define the extent of tumor mass. If the tumor is close to the planned site of epidural solution injection, alternative methods of anesthesia or analgesia should be considered. (Class II)
- Surgical positioning and specific space-occupying extradural lesions (e.g., severe spinal stenosis, epidural lipomatosis, ligamentum flavum hypertrophy, or ependymoma) have been associated with temporary or permanent spinal cord injury in conjunction with neuraxial regional anesthetic techniques. These conditions are particularly relevant when they coexist with an epidural hematoma or abscess. Awareness of these conditions should prompt consideration of risk vs. benefit when contemplating neuraxial regional anesthetic techniques. (Class II)
- Initial dosing or redosing of subarachnoid local anesthetic in excess of the maximum recommended dose may increase the risk of spinal cord or spinal nerve root neurotoxicity and should be avoided. (Class I)
- Epidural anesthetic procedures using the thoracic approach are neither safer nor riskier than using the lumbar approach. (Class I)
- The use of local anesthetic and/or opioid during neuraxial block for chronic pain treatments in the ambulatory setting should be accompanied by the same close monitoring and ability to perform resuscitative maneuvers that are available to those patients receiving neuraxial local anesthetic and/or opioid in the operating room. (Class I)

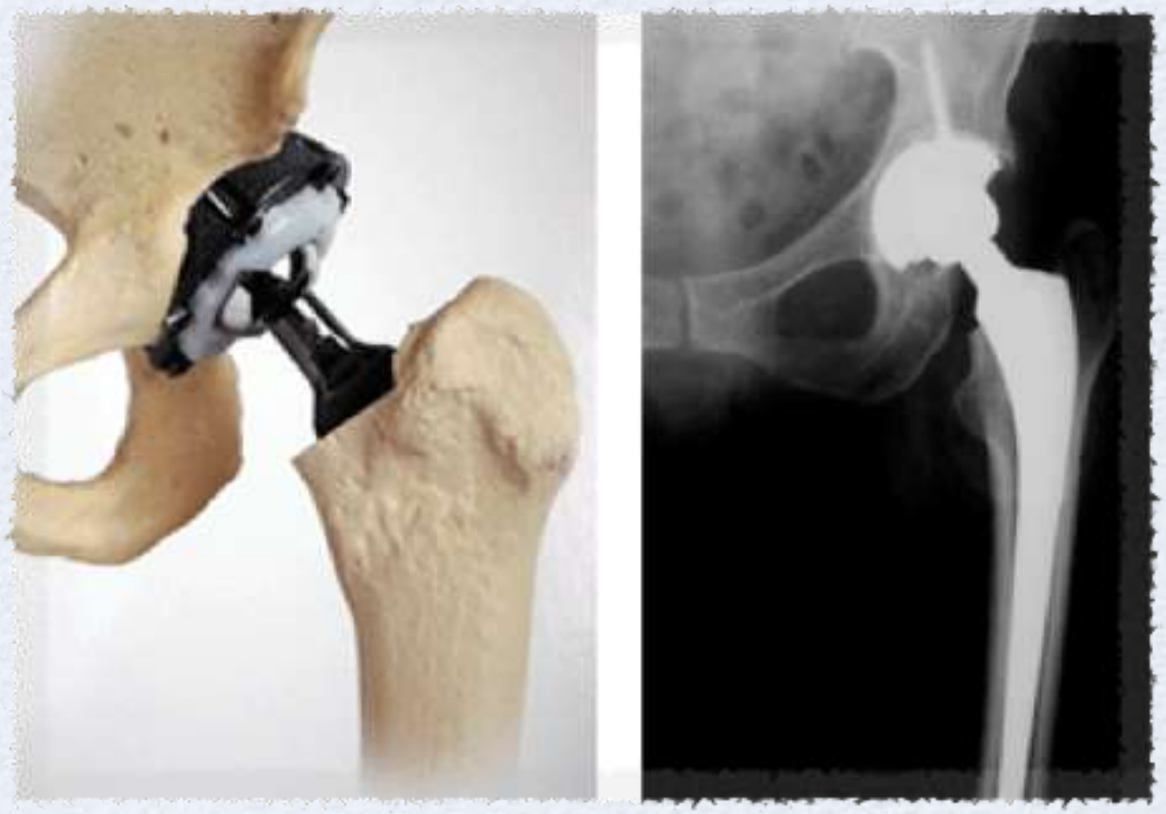
Diagnosis and treatment

- Magnetic resonance imaging (MRI) is the diagnostic modality of choice for suspected neuraxial lesions. Computed tomography (CT) should be used for rapid diagnosis if MRI is not immediately unavailable, especially when neuraxial compression injury is suspected. (Class I)
- Diagnosis of a compressive lesion within or near the neuraxis demands immediate neurosurgical consultation for consideration of decompression. (Class I)

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Bloqueos neuroaxiales:
  - Síntomas neurológicos transitorios
  - Punción dural accidental y cefalea postpuncion dural accidental



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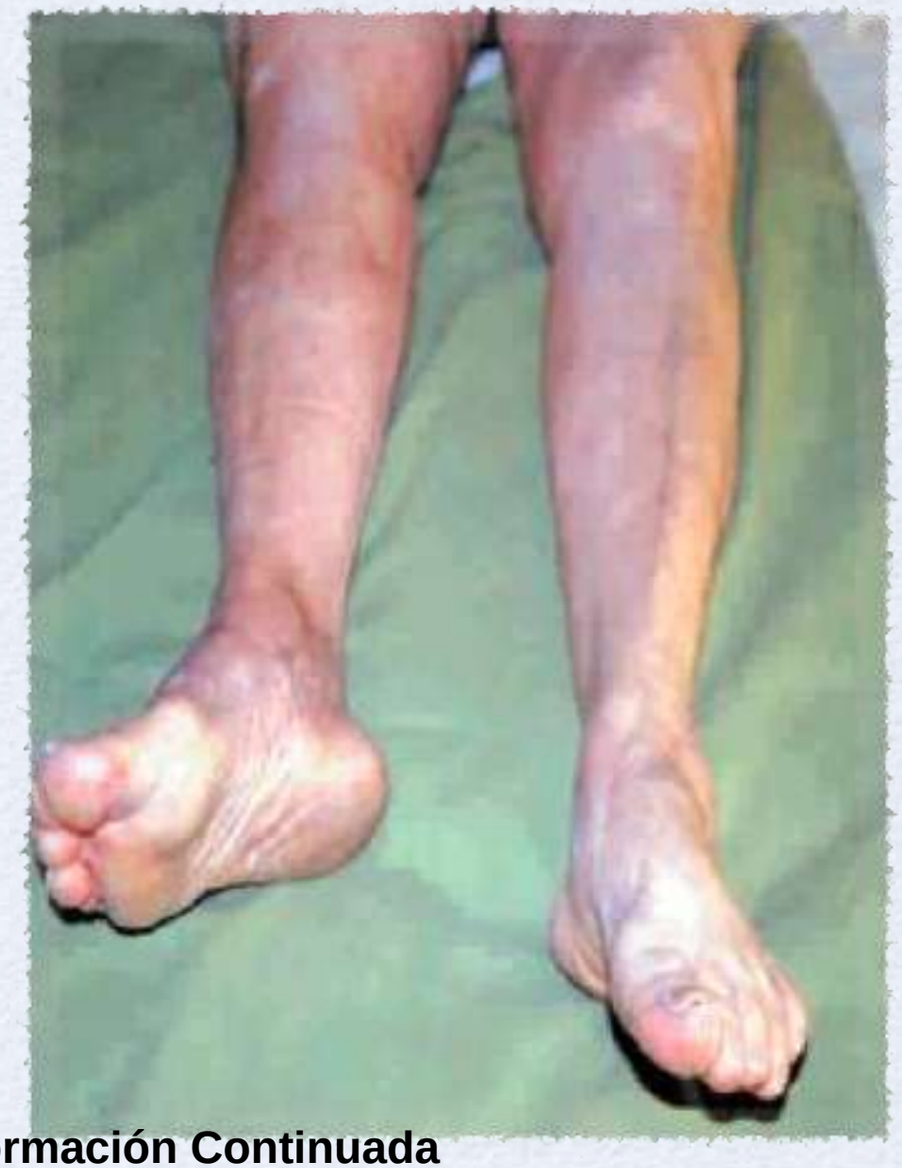
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la técnica anestésica

- Toxicidad por anestésicos locales
- Complicaciones infecciosas
- Complicaciones por bloqueos neuroaxiales
- Complicaciones por bloqueos periféricos



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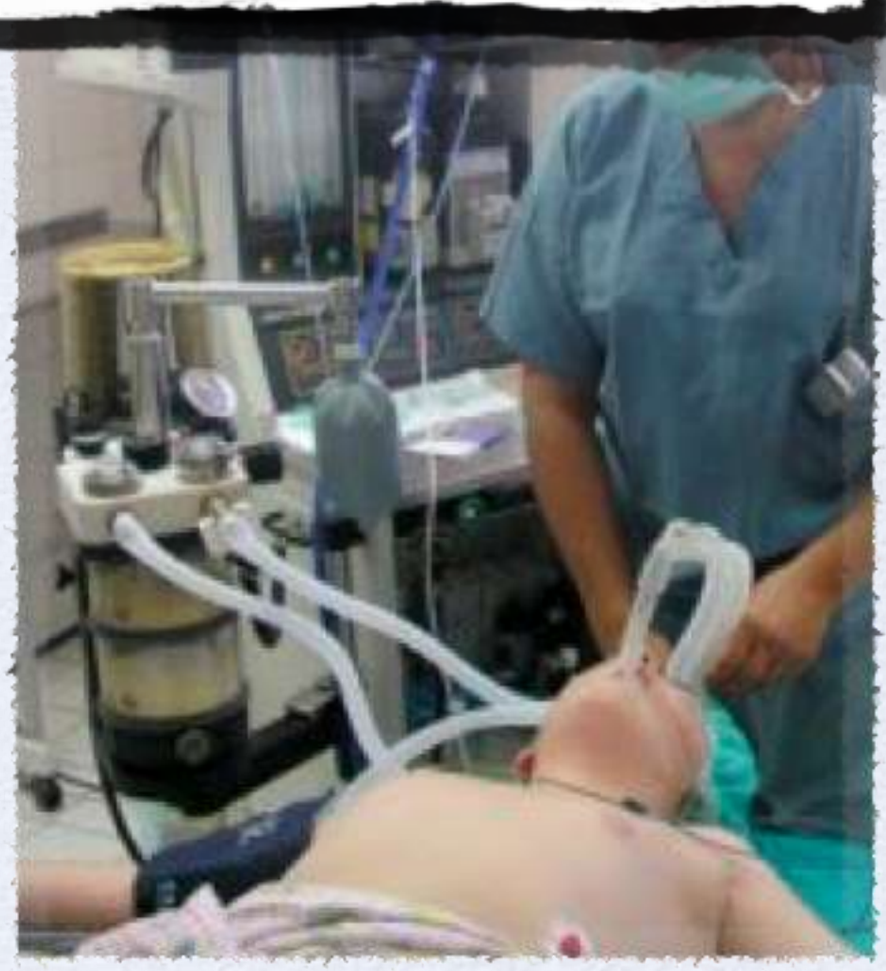
Valencia 27 de Junio de 2010

Complicaciones propias de la técnica anestésica

- **Neurological Complications After Regional Anesthesia: Contemporary Estimates of Risk**



- Difusión espinal
- Lesiones neurológicas
- Otros: Paresia hemidiafragmática, neumotórax...

Marnie B. Welch, M.D.,* Chad M. Brummett, M.D.,† Terrence D. Welch, M.D.,‡ Kevin K. Tremper, Ph.D., M.D.,§
Amy M. Shanks, M.S.,‖ Pankaj Guglani, M.D.,† George A. Mashour, M.D., Ph.D.#

Con[illegible]

cirugía ortopédica y traumatológica

Table 3. Recommendations: Limiting, Diagnosing, and Treating Peripheral Nerve Injury

Limiting injury

- There are no animal or human data to support the superiority of one nerve localization technique—paresthesia, nerve stimulation, ultrasound—over another with regards to reducing the likelihood of nerve injury. (Class I)
- Animal data have linked high injection pressures to subsequent fascicular injury, but there are no human data that confirm or refute the effectiveness of injection pressure monitoring for limiting nerve injury. (Class II)
- There are no human data to support the superiority of one local anesthetic or additive over another with regards to reducing the likelihood of neurotoxicity. (Class I)
- Patients with diseased or previously injured nerves (e.g., diabetes mellitus, severe peripheral vascular disease, or chemotherapy) may theoretically be at increased risk for block-related nerve injury. Although isolated case reports have described new or progressive neurologic deficits after regional anesthetic techniques in patients with multiple sclerosis or previous exposure to chemotherapy, clinical experience can neither refute nor confirm these concerns. Based on limited animal data, consideration may be given to avoiding more potent local anesthetics, reducing local anesthetic dose and/or concentration, and avoiding or limiting vasoconstrictive additives in these patients. (Class II)
- If damage to protective tissue barriers such as the perineurium is suspected from an abnormally painful paresthesia or pain on injection of local anesthetic, further injection should be halted immediately, and the needle repositioned. (Class I) Consideration may be given to aborting the block procedure so as to avoid further deposition of local anesthetic and additive. (Class III)

Diagnosis and treatment

- Complete absence of nerve function beyond the duration of the anesthetic or the progression of neurologic deficit(s) should prompt urgent neurological or neurosurgical consultation and evaluation. (Class I)
- Incomplete lesions associated with moderate-to-severe neural deficit should prompt neurologic consultation and evaluation for consideration of electrophysiological studies and/or radiologic imaging. Consideration should be given to bilateral examination and early studies to establish baseline, pre-existing lesions, and prognosis. (Class I)
- Nerve lesions that fail to resolve 2 to 5 months after initial neurological evaluation should prompt consideration of neurosurgical consultation. (Class II)

J. Picard[1] and T. Meek[2]

complicaciones Propias de la cirugía

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Valencia 27 de Junio de 2010

Complicaciones propias de la cirugía

- Dependientes de la posición
- Debidas al torniquete
- Sd cementación ósea
- Embolia grasa y gaseosa
- TVP y TEP

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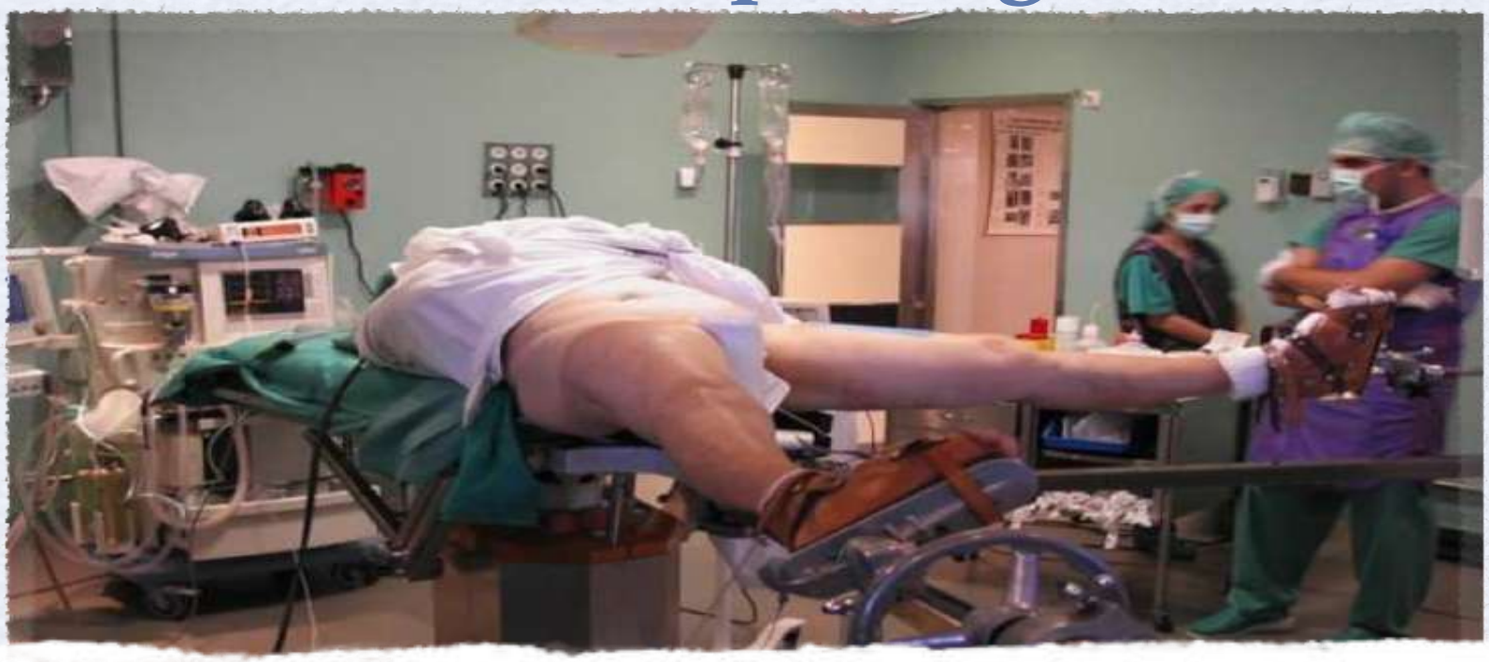
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía

Posición quirúrgica



Anesthesiology 2009; 111:490–7

Perioperative Peripheral Nerve Injuries

A Retrospective Study of 380,680 Cases during a 10-year Period at a Single Institution

Marnie B. Welch, M.D., Chad M. Brummett, M.D.,† Terrence D. Welch, M.D.,‡ Kevin K. Tremper, Ph.D., M.D.,§ Amy M. Shanks, M.S.,‖ Pankaj Guglani, M.D.,† George A. Mashour, M.D., Ph.D.#*

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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía

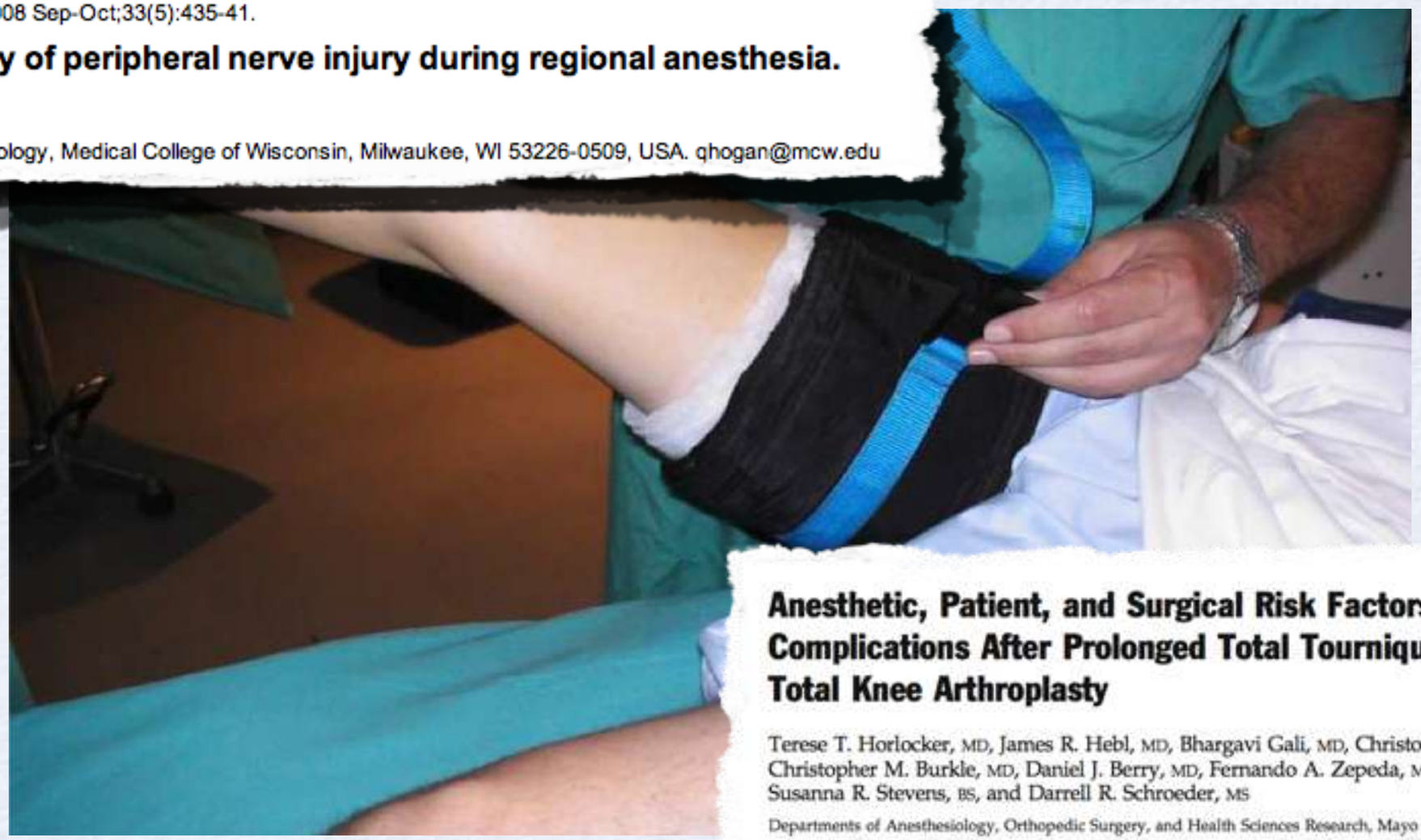
Torniquete de isquemia

Reg Anesth Pain Med. 2008 Sep-Oct;33(5):435-41.

Pathophysiology of peripheral nerve injury during regional anesthesia.

Hogan QH.

Department of Anesthesiology, Medical College of Wisconsin, Milwaukee, WI 53226-0509, USA. qhogan@mcw.edu



Anesthetic, Patient, and Surgical Risk Factors for Neurologic Complications After Prolonged Total Tourniquet Time During Total Knee Arthroplasty

Terese T. Horlocker, MD, James R. Hebl, MD, Bhargavi Gali, MD, Christopher J. Jankowski, MD, Christopher M. Burkle, MD, Daniel J. Berry, MD, Fernando A. Zepeda, MD, Susanna R. Stevens, BS, and Darrell R. Schroeder, MS

Departments of Anesthesiology, Orthopedic Surgery, and Health Sciences Research, Mayo Clinic, Rochester, Minnesota

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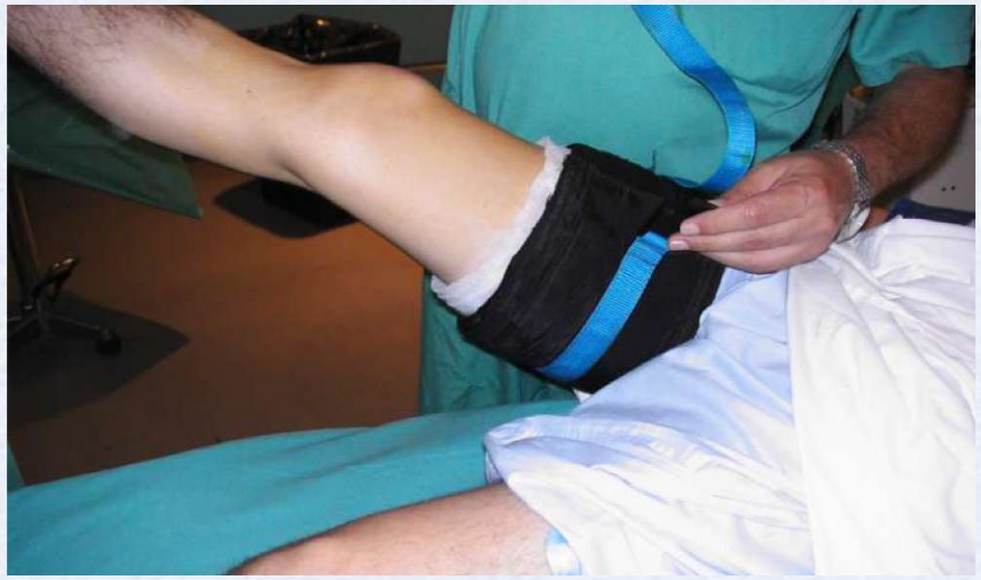
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía



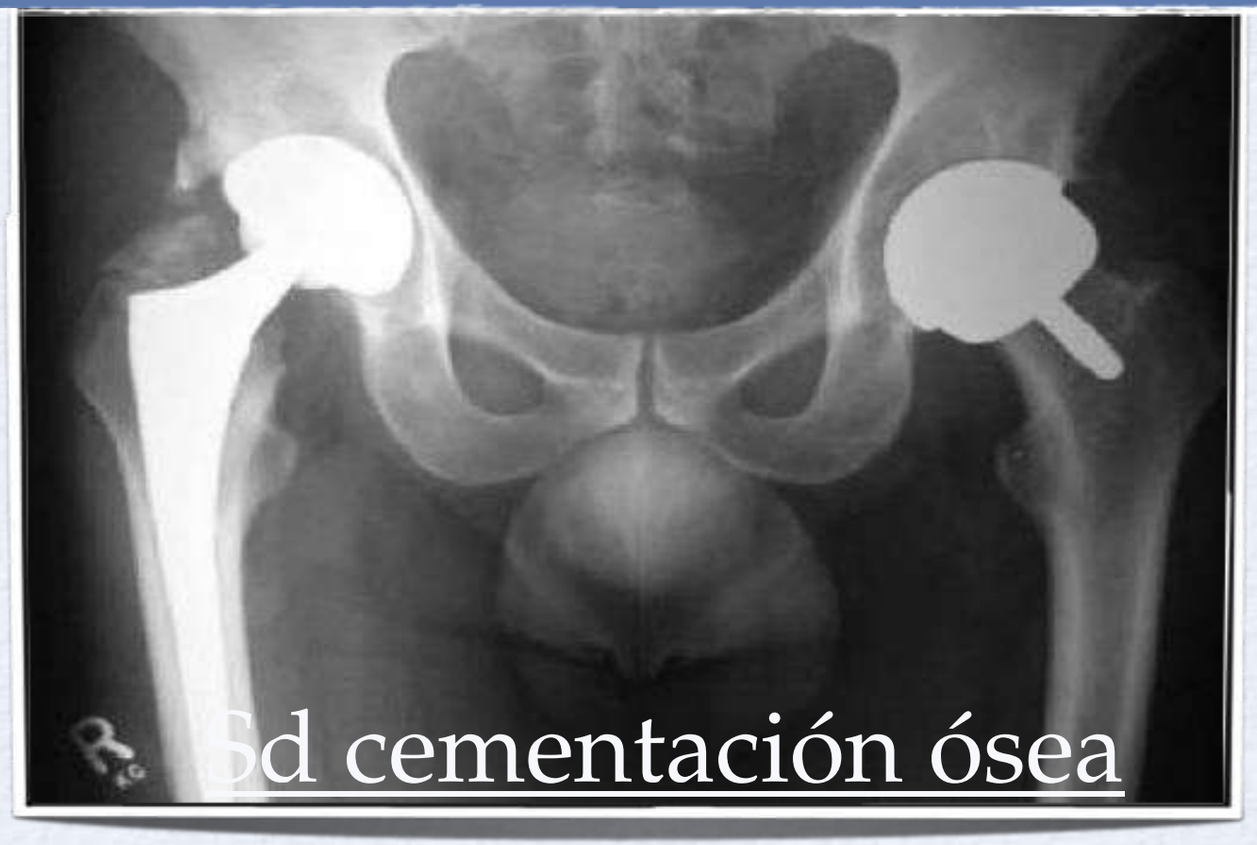
Torniquete de isquemia

- Acidosis metabólica
- ↑ FC
- ↑ PaCO2
- ↑ Potasio
- Embolismo cerebral

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía

Conjunto de síntomas que pueden incluír: Hipoxia, hipotensión, arritmias y/o incremento de la resistencia vascular pulmonar



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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

British Journal of Anaesthesia **102 (1):** 12–22 (2009)
doi:10.1093/bja/aen328

BJA

Bone cement implantation syndrome

A. J. Donaldson[1], H. E. Thomson[1], N. J. Harper[2]* and N. W. Kenny[3]

Grado	Clínica
1	Hipoxia moderada (SatO2 mayor 94%) o Hipotensión (caída TAS mayor 20%)
2	Hipoxia severa (SatO2 menor 88%) o Hipotensión (caída TAS mayor 40%) o pérdida de la conciencia
3	Colapso cardiovascular que requiere RCP

SARTD-CHGUV Sesión de Formación Continuada
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

British Journal of Anaesthesia **102** (1): 12–22 (2009)
doi:10.1093/bja/aen328

BJA

Bone cement implantation syndrome

A. J. Donaldson[1], H. E. Thomson[1], N. J. Harper[2]* and N. W. Kenny[3]

Etiología y Fisiopatología

MM Plasmático

Vasodilatación por monómeros plasmáticos de MM

Otros

-Histamina e hipersensibilidad
-Activación del complemento
-Mediadores inflamatorios

Embolismo

Demostración de lluvia de émbolos por ecocardiografía

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Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía

Table 4 Significant risk factors for developing BCIS

Pre-existing disease
Pre-existing pulmonary hypertension
Significant cardiac disease
New York Heart Association class 3 or 4
Canadian Heart Association class 3 or 4
Surgical factors
Pathological fracture
Inter-trochanteric fracture
Long-stem arthroplasty

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Valencia 27 de Junio de 2010

Complicaciones propias de la cirugía

Table 53-4 Criteria for Diagnosis of Fat Embolus Syndrome[a]

MAJOR

Axillary/subconjunctival petechiae
Hypoxemia (Pao_2 <60 mm Hg; FIO_2 <0.4)
Central nervous system depression (disproportionate to hypoxemia)
Pulmonary edema

Embolia grasa

MINOR

Tachycardia (>110 beats/min)
Hyperthermia
Retinal fat emboli
Urinary fat globules
Decreased platelets/hematocrit (unexplained)
Increased erythrocyte sedimentation rate
Fat globules in sputum

[a]Diagnosis of fat embolus syndrome requires at least one sign from the major and four signs from the minor criteria categories.
From Gurd AR: Fat embolism: An aid to diagnosis. J Bone Joint Surg Br 1970; 52: 732, with permission.

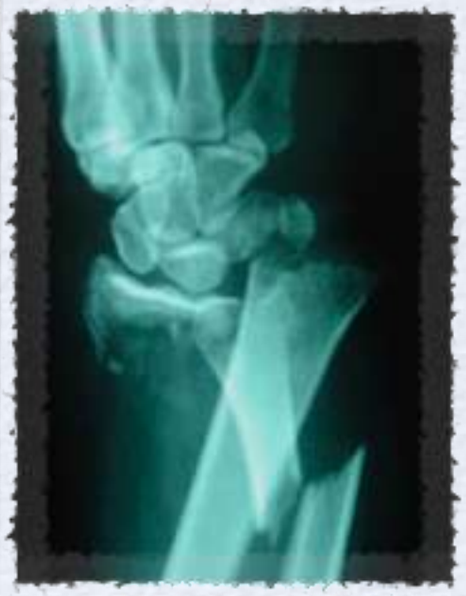
Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía: TVP y TEP

Table 8—*VTE Prevalence After Major Orthopedic Surgery (Section 3.0)**

Procedures	DVT, %		PE, %	
	Total	Proximal	Total	Fatal
Hip arthroplasty	42–57	18–36	0.9–28	0.1–2.0
Knee arthroplasty	41–85	5–22	1.5–10	0.1–1.7
HFS	46–60	23–30	3–11	0.3–7.5

*DVT rates are based on the use of mandatory venography in prospective clinical trials published between 1980 and 2002 in which patients received either no thromboprophylaxis or placebo. PE rates were derived from prospective studies that may have used thromboprophylaxis. From Geerts et al.[1]



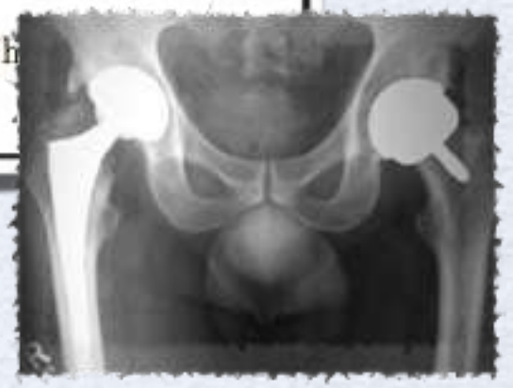
Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica

Complicaciones propias de la cirugía: TVP y TEP

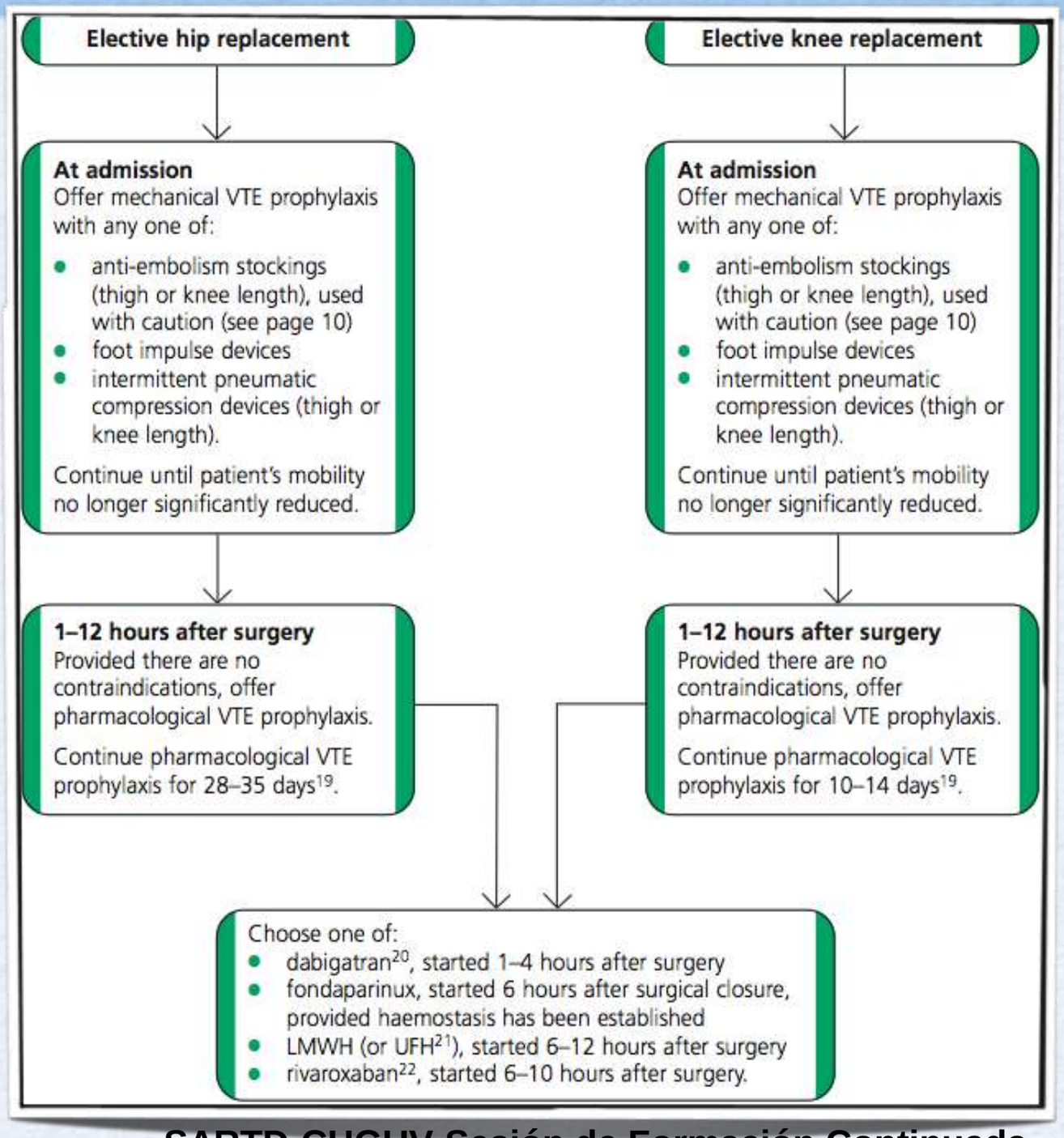
Table 5—*Levels of Thromboembolism Risk and Recommended Thromboprophylaxis in Hospital Patients (Section 1.3)**

Levels of Risk	Approximate DVT Risk Without Thromboprophylaxis, %†	Suggested Thromboprophylaxis Options‡
Low risk		
Minor surgery in mobile patients	< 10	No specific thromboprophylaxis
Medical patients who are fully mobile		Early and "aggressive" ambulation
Moderate risk		
Most general, open gynecologic or urologic surgery patients	10–40	LMWH (at recommended doses), LDUH bid or tid, fondaparinux
Medical patients, bed rest or sick		
Moderate VTE risk plus high bleeding risk		Mechanical thromboprophylaxis§
High risk		
Hip or knee arthroplasty, HFS	40–80	LMWH (at recommended doses), fondaparinux, oral vitamin K antagonist (INR 2–3)
Major trauma, SCI		
High VTE risk plus high bleeding risk		Mechanical thromboprophylaxis§

*The descriptive terms are purposely left undefined to allow individual clinician interpretation.
†Rates based on objective diagnostic screening for asymptomatic DVT in patients not receiving thromboprophylaxis.
‡See relevant section in this chapter for specific recommendations.
§Mechanical thromboprophylaxis includes IPC or VFP and/or GCS; consider switch to anticoagulant thromboprophylaxis when h
decreases.



Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica



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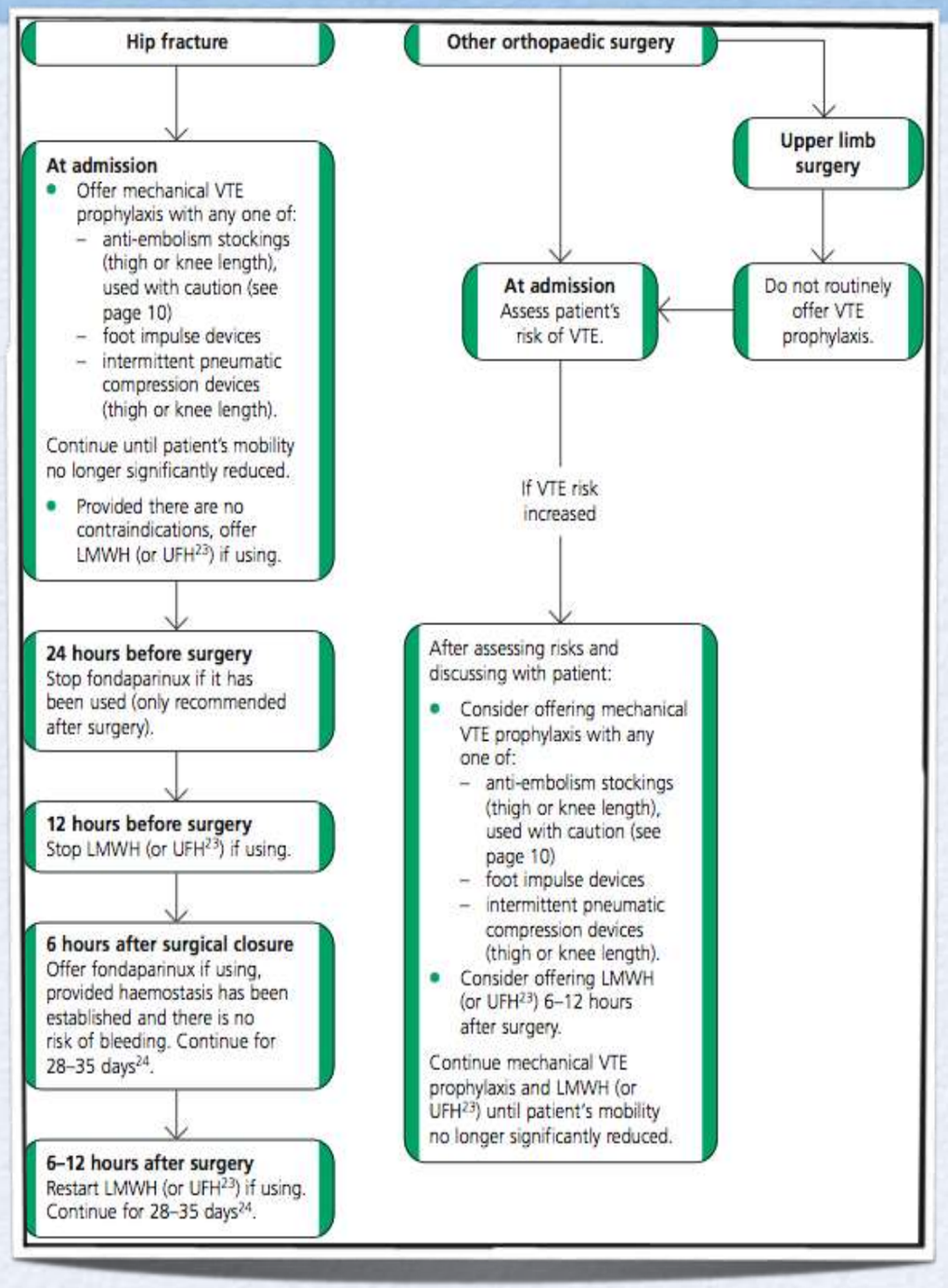
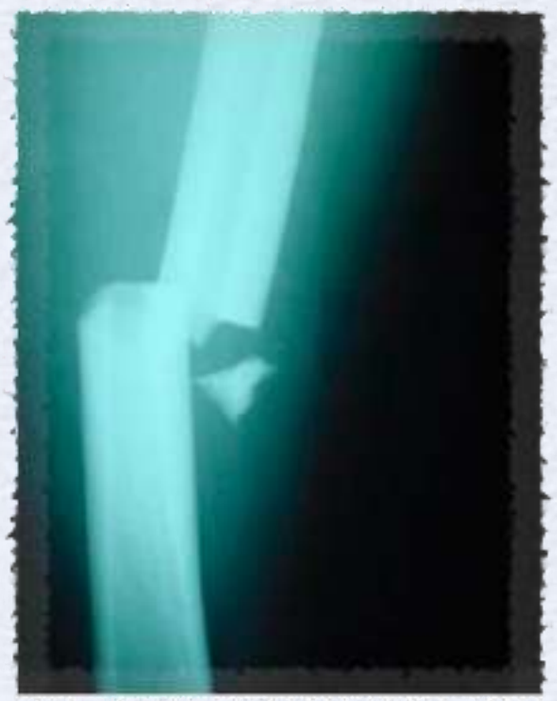
Valencia 27 de Junio de 2010

Complicaciones intraoperatorias y postoperatorias de la cirugía ortopédica y traumatológica





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Gracias!!!

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Valencia 27 de Junio de 2010