Ultraljudsguidade approacher till lumbal och sacral plexus för höftkirurgi

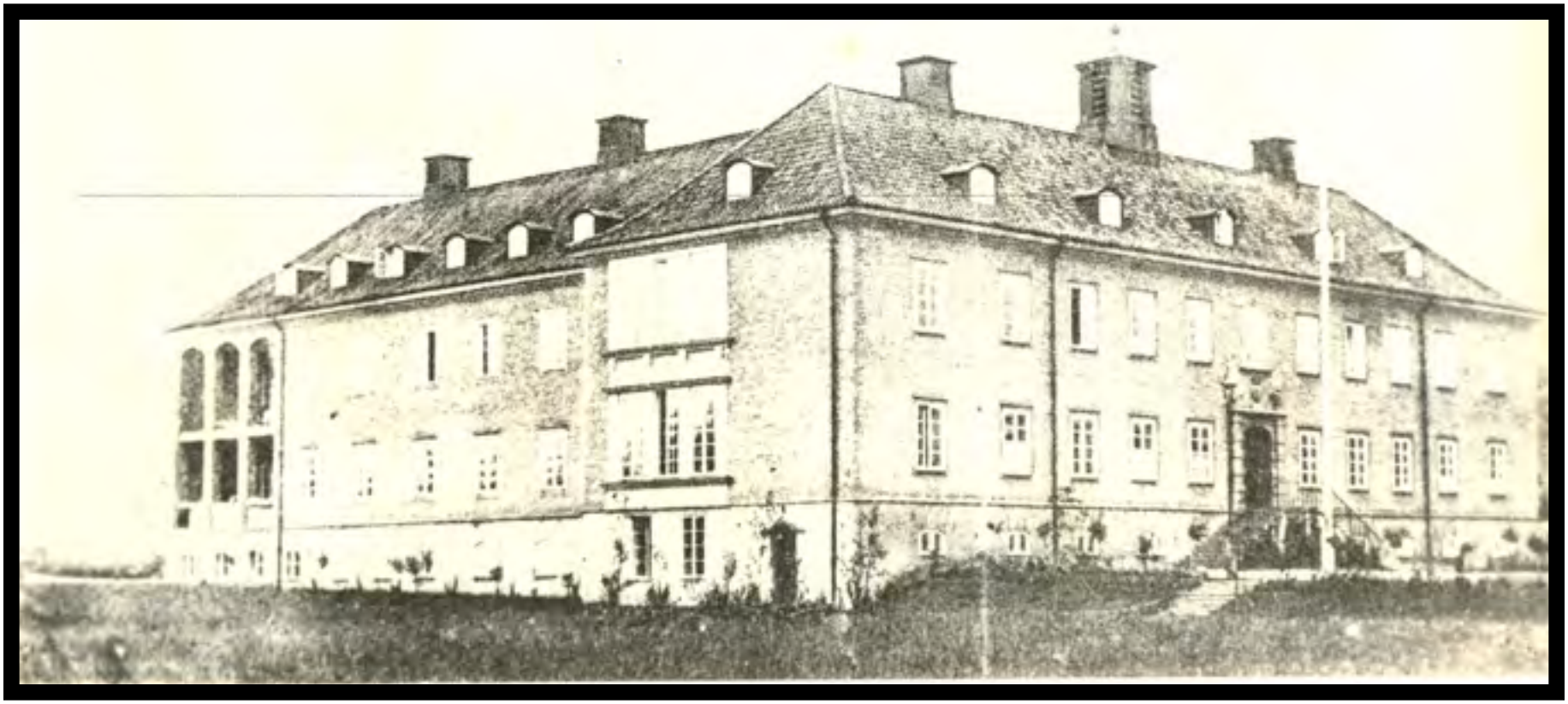
Auris Pelanis, Mölndal

VÄSTRA GÖTALANDSREGIONEN
SAHLGRENSKA UNIVERSITETSSJUKHUSET

Sahlgrenska University Hospital (SU)

- ✓ Since 2005 Mölndal hospital /SU (Sahlgrenska University), Gothenburg, Sweden
- ✓ Is the biggest orthopedic hospital in Scandinavian countries 14 000 Op/year

Mölndals sjukhus/ 1924



SU/Mölndal 2014

Akuta höftfrakturer, Mortalitet

Bakgrund:

SU/M, >1000 akuta höftoperationer årligen

- ✓ Akut höftfraktur (SU/M)
  - ✓ 80 år och 2/3 är kvinnor
  - ✓ >55% är multisjuka
  - ✓ ASA III eller sämre
- ✓ 30-dagars-mortaliteten
  - ✓ 7.0 % (2011)
  - ✓ 8.9 % (2012)

Akuta höftfrakturer, Mortalitet

- *ASA II* 5,4% 30-dagars-mortalitet
- *ASA III* 12,0% 30-dagars-mortalitet
- *ASA IV* 20,0% 30-dagars-mortalitet

Tid trauma till operationsstart > 48 h;

- ✓ *ASA III* 18,9 % 30-dagars-mortalitet
- ✓ *ASA IV* 33,3 % 30-dagars-mortalitet

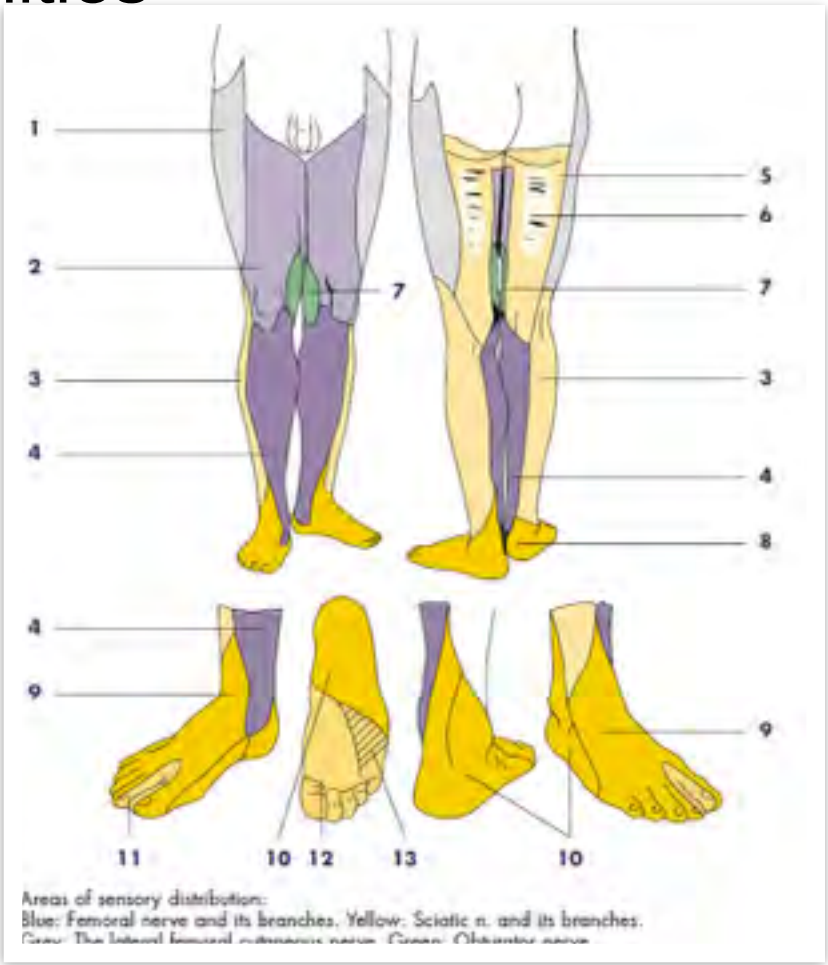
Fungerande regionalanestesi

Blockader

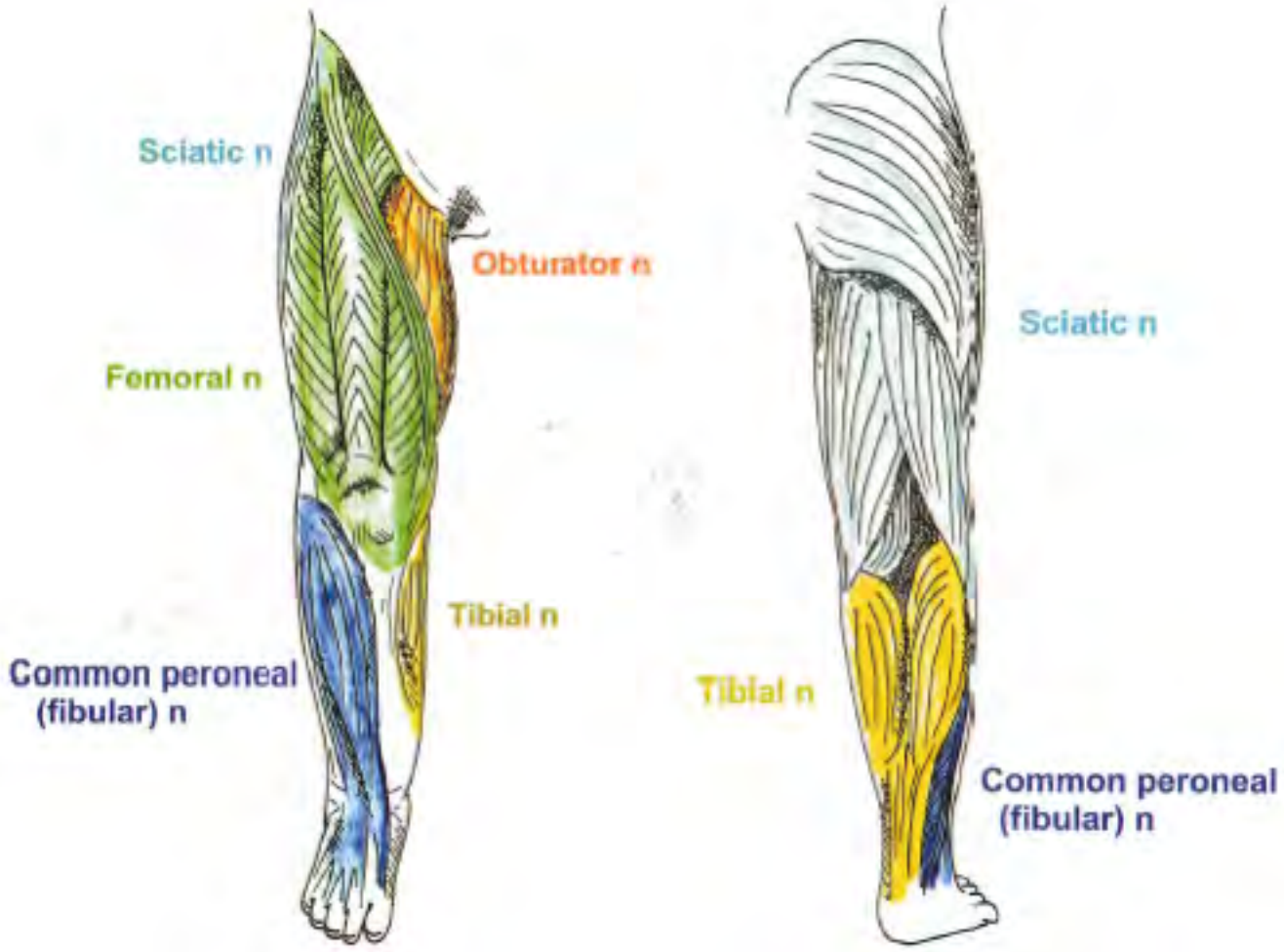
- Lumbar plexus block
- Sacral plexus block
- Lumbosacral plexus block
- Fascia transversalis plane block
  - Quadratus lumborum block
- Lateral femoral cutaneous nerve block
- Fascia Iliaca Compartment blockad

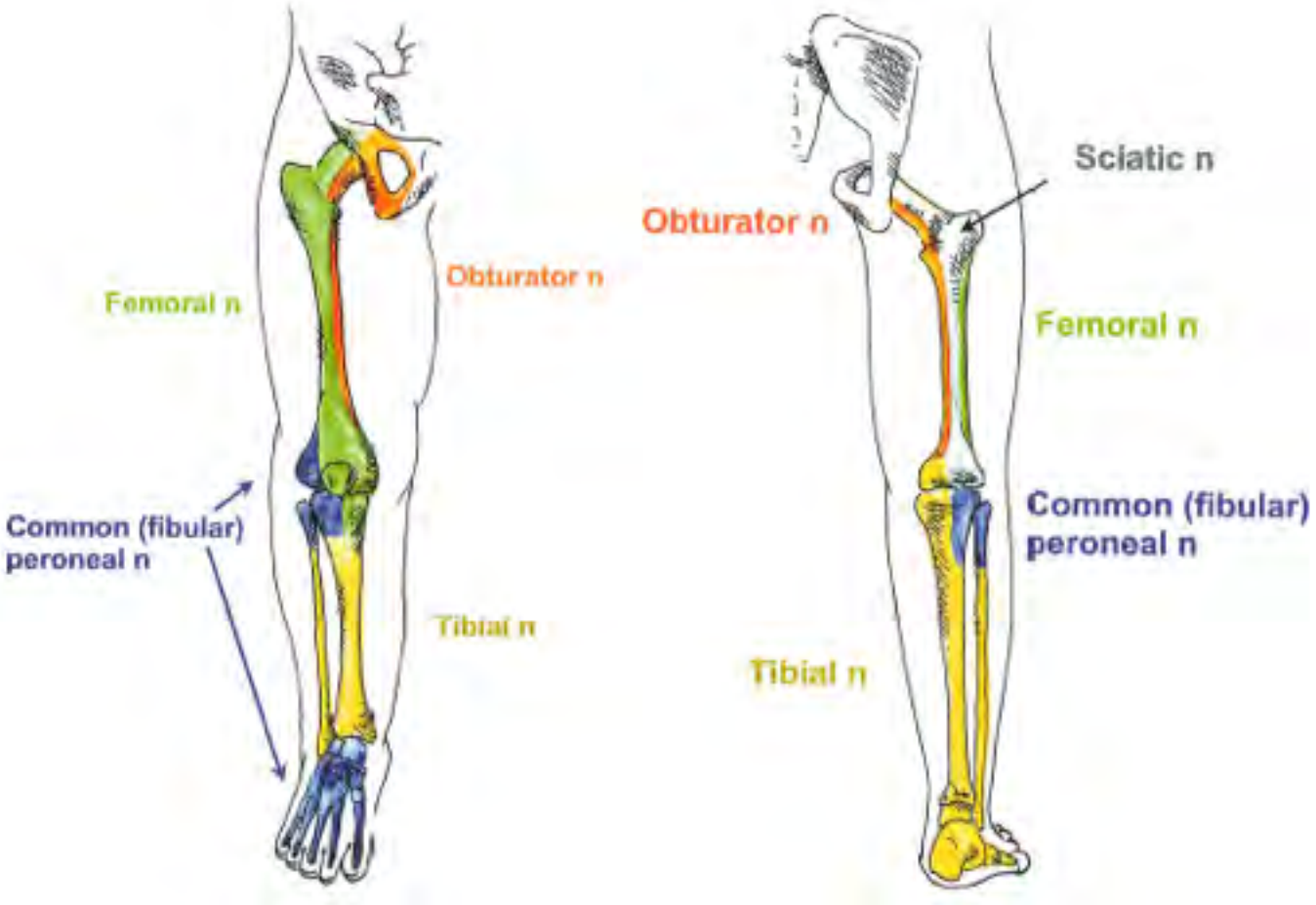
Sensory supply of the lower extremitiesof the lower extremities

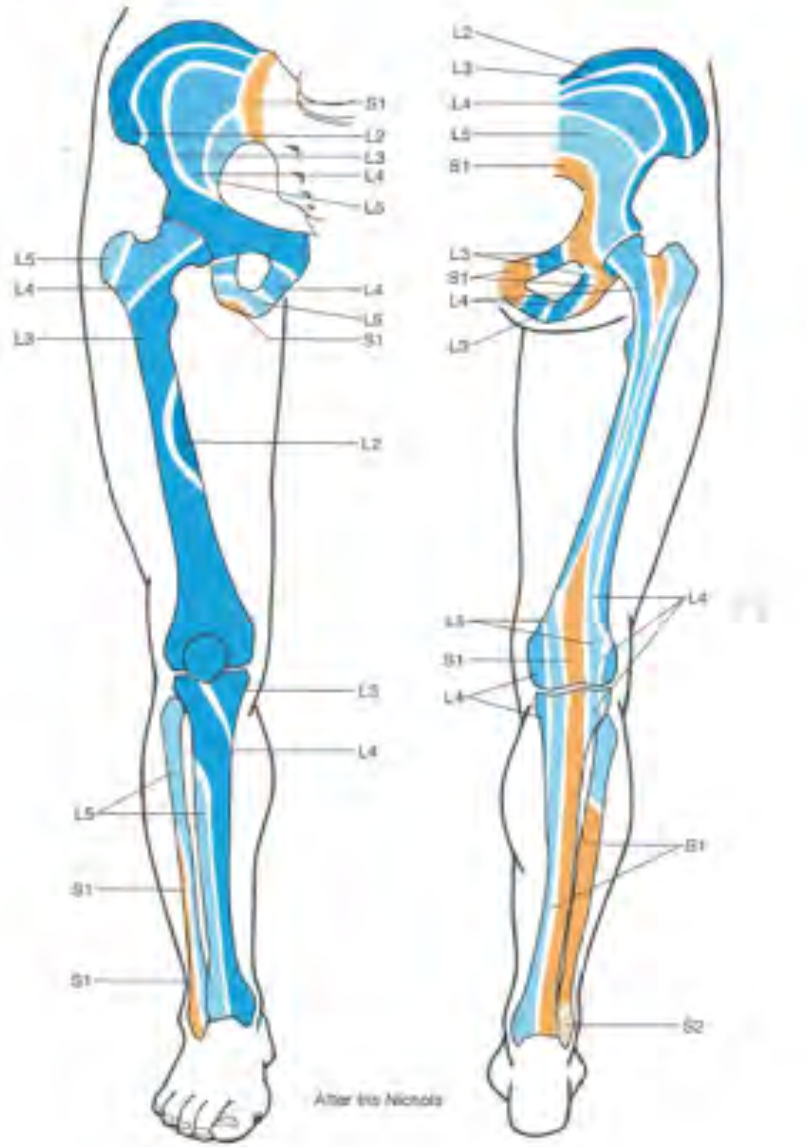
1. lateral femoral cutaneous n.
2. femoral n.
3. peroneal n.
4. saphenous n.
5. sciatic n.
6. posterior femoral cutaneous n.
7. obturator n.
8. posterior tibial n.
9. superficial peroneal n.
10. sural n.
11. deep peroneal n.
12. medial plantar n.
13. lateral plantar n. (tibial n.)



Areas of sensory distribution:
Blue: Femoral nerve and its branches. Yellow: Sciatic n. and its branches.


Sciatic n
Obturator n
Femoral n
Tibial n
Common peroneal
(fibular) n
Sciatic n
Tibial n
Common peroneal
(fibular) n


Femoral n
Obturator n
Common (fibular) peroneal n
Tibial n
Obturator n
Sciatic n
Femoral n
Common (fibular) peroneal n
Tibial n


S1
L2
L3
L4
L5
L5
L4
L3
L4
L5
S1
L2
L5
L4
L5
S1
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L2
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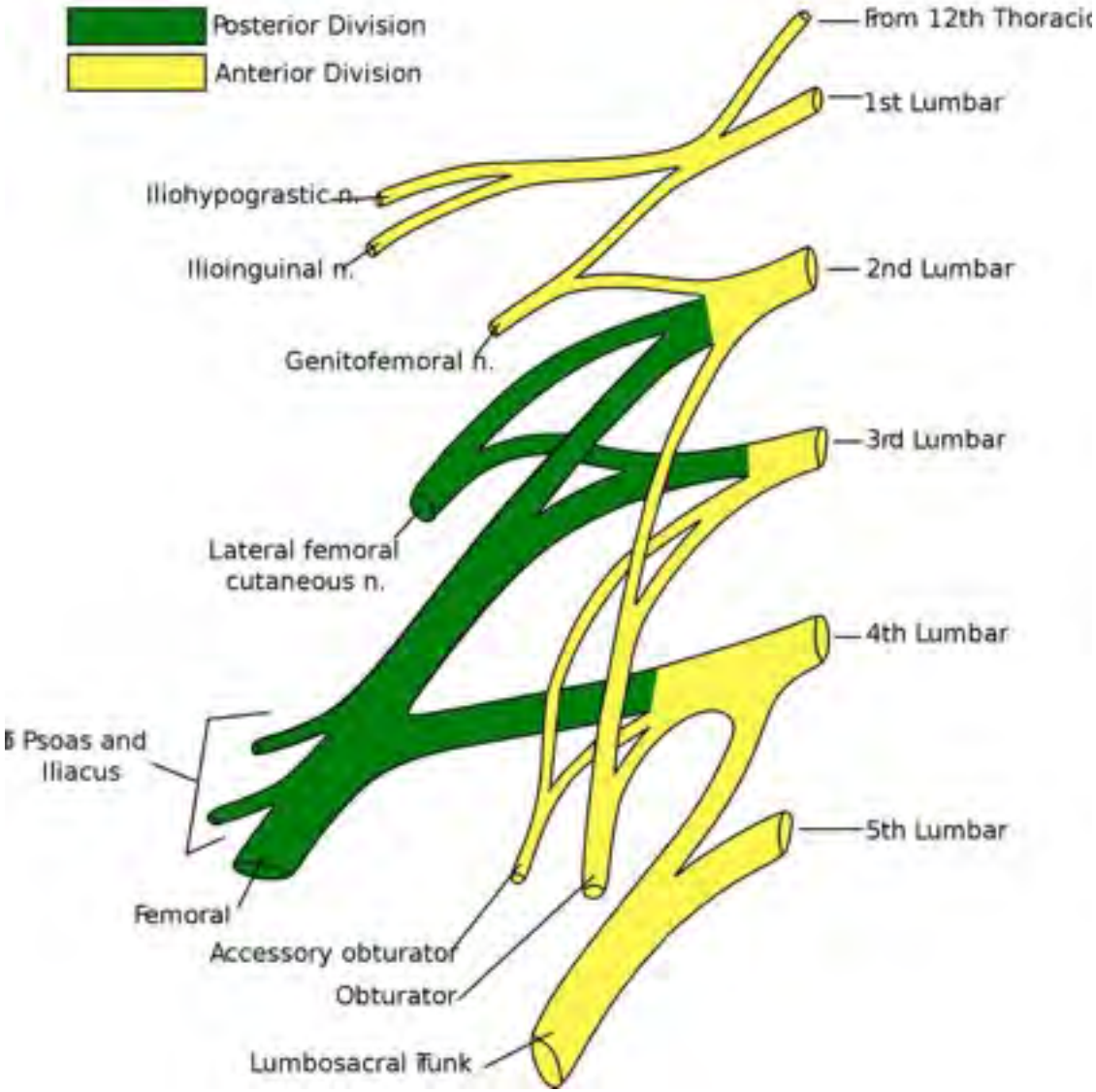
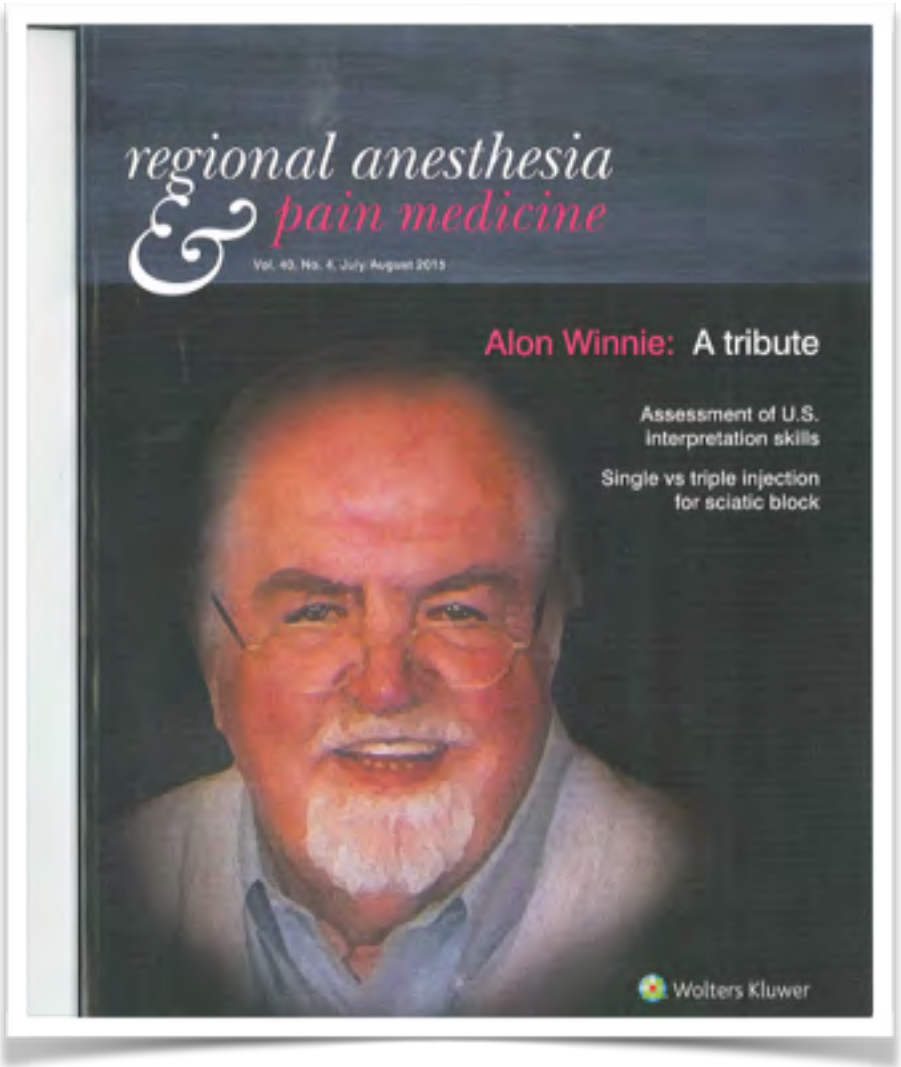
S1
L4
L3
L4
L5
S1
L4
S1
S2
After Iris Nichols


Posterior Division
Anterior Division
From 12th Thoracic
1st Lumbar
Iliohypograstic n.
Ilioinguinal n.
2nd Lumbar
Genitofemoral n.
3rd Lumbar
Lateral femoral
cutaneous n.
4th Lumbar
Psoas and
Iliacus
5th Lumbar
Femoral
Accessory obturator
Obturator
Lumbosacral Trunk

Lumbal plexus

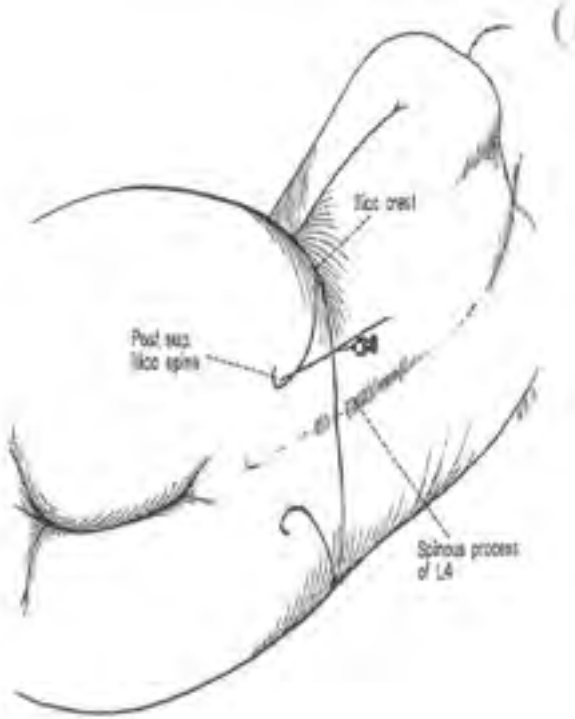


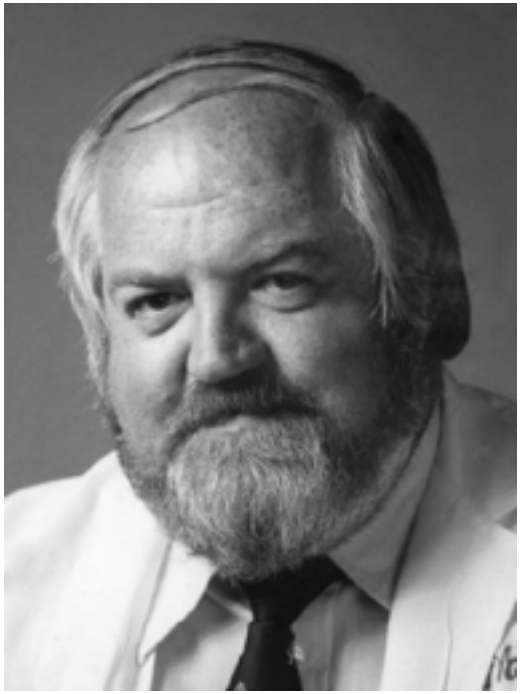
ANESTHESIOLOGY REVIEW • JULY 1974

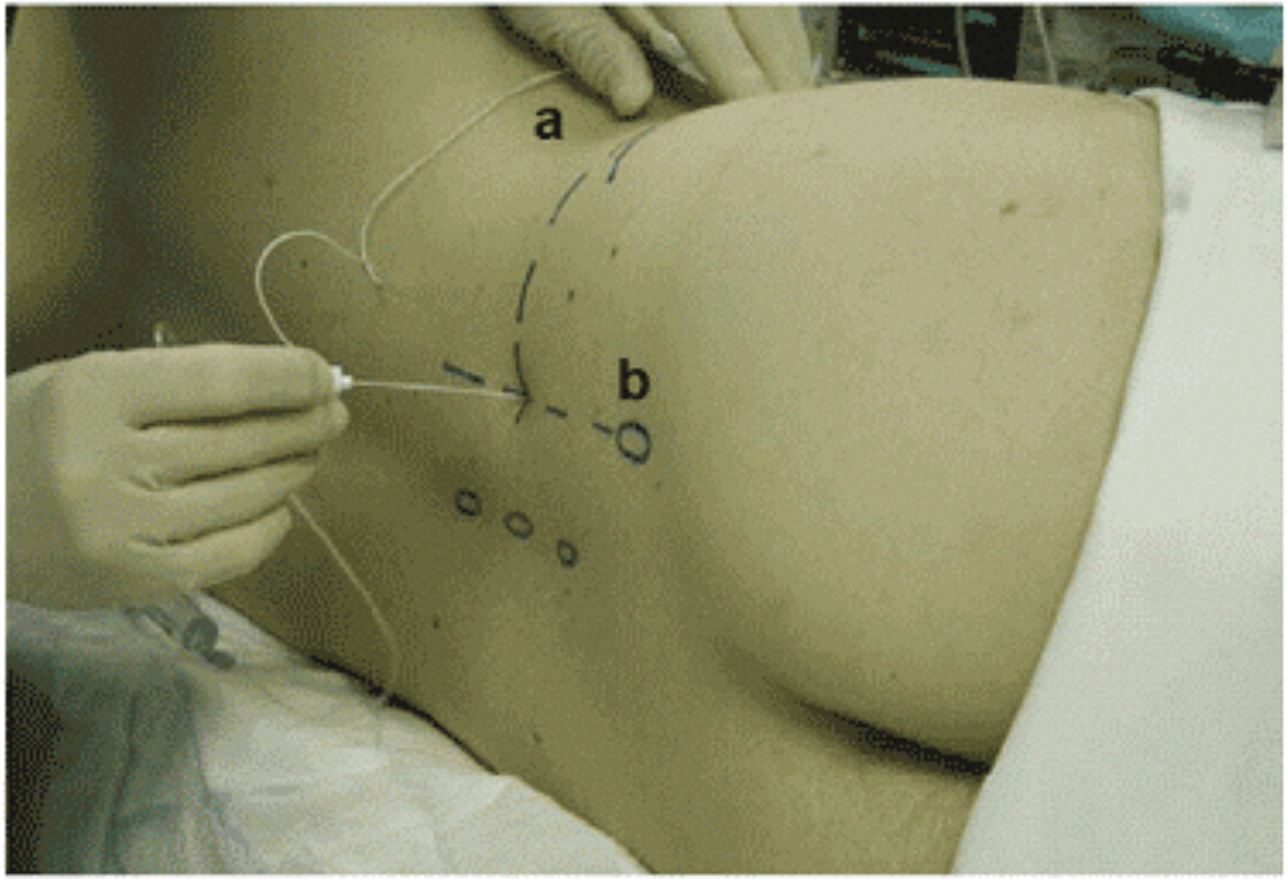
Plexus Blocks For Lower Extremity Surgery

New Answers to Old Problems

A. P. Winnie, M.D., S. Ramamurthy, M.D.
Z. Durrani, M.D., R. Radonjic, M.D.

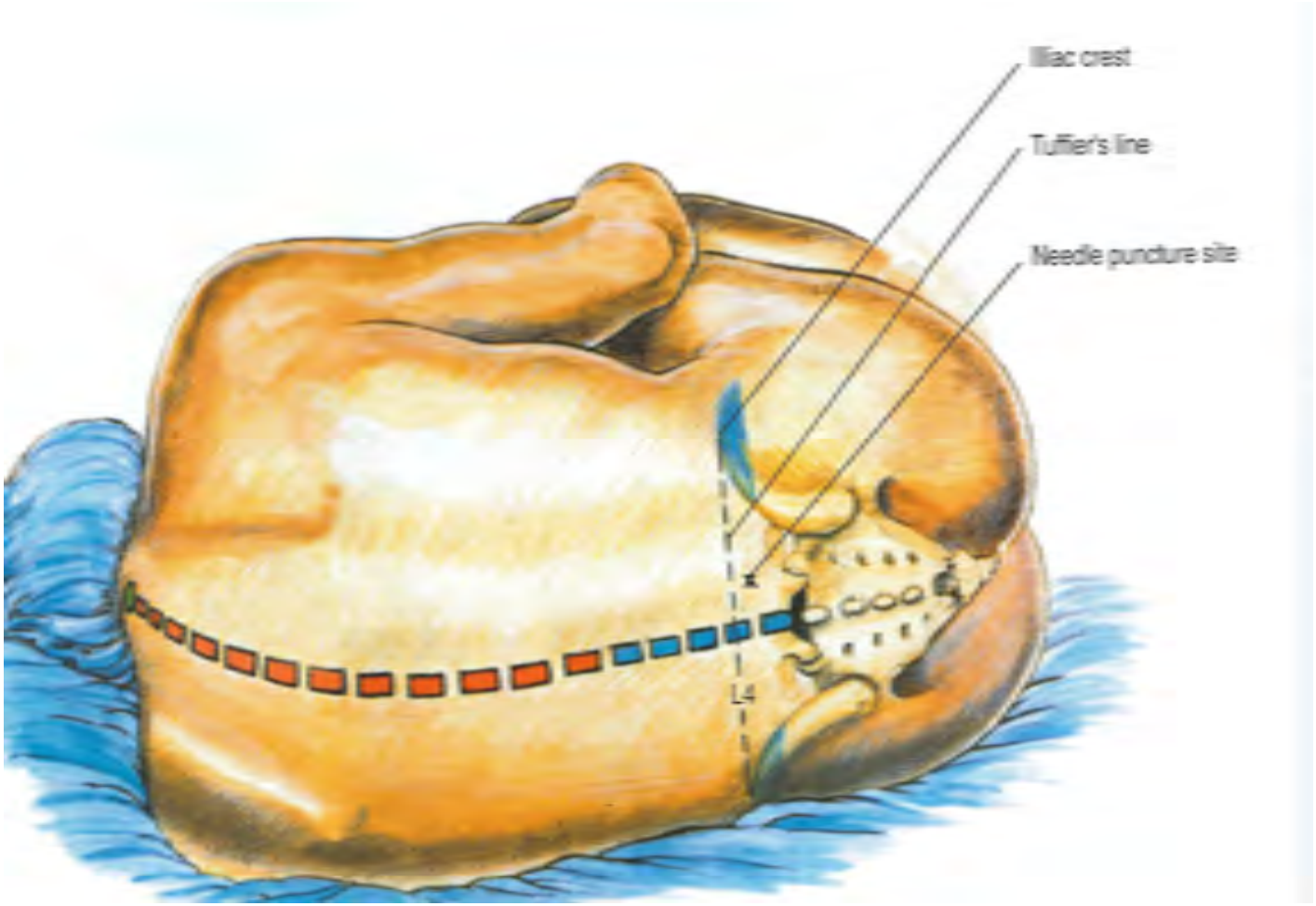




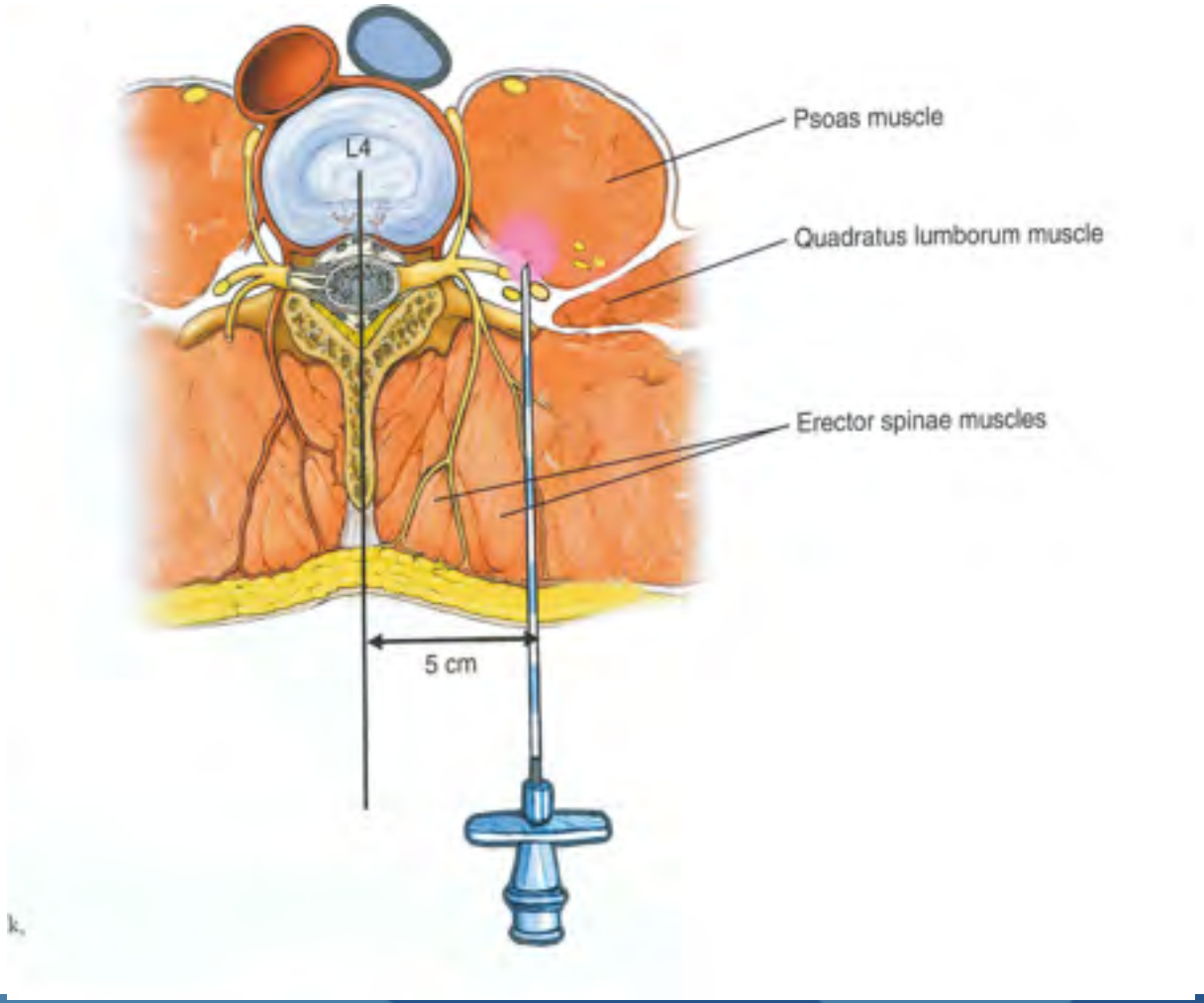


3 Lumbar plexus block. **a** Tuffier's line, **b** posterior superior iliac spine. The distance from the midline is 4–6 cm.

Lumbal plexus

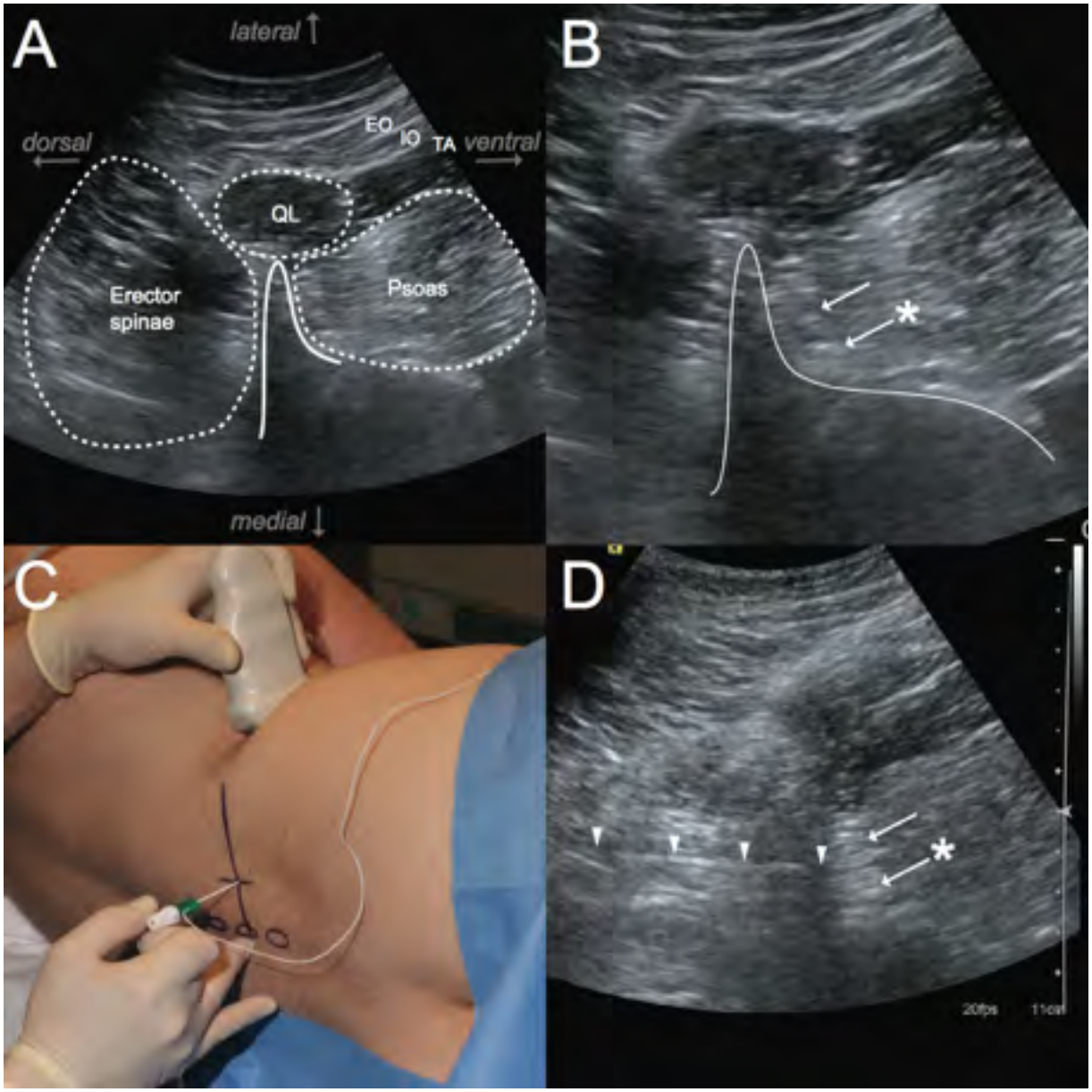


Lumbal plexus



BJA Correspondence

The "Shamrock Method" - a new and promising technique for ultrasound guided lumbar plexus blocks.



Axel R. Sauter, Kyrre Ullensvang, Thomas F. Bendtsen, Jens Boerglum,Oslo University Hospital, Department of Anaesthesiology

Published 19 December 2013

BJA Correspondence

Solution to the challenging part of the Shamrock method during lumbar plexus block

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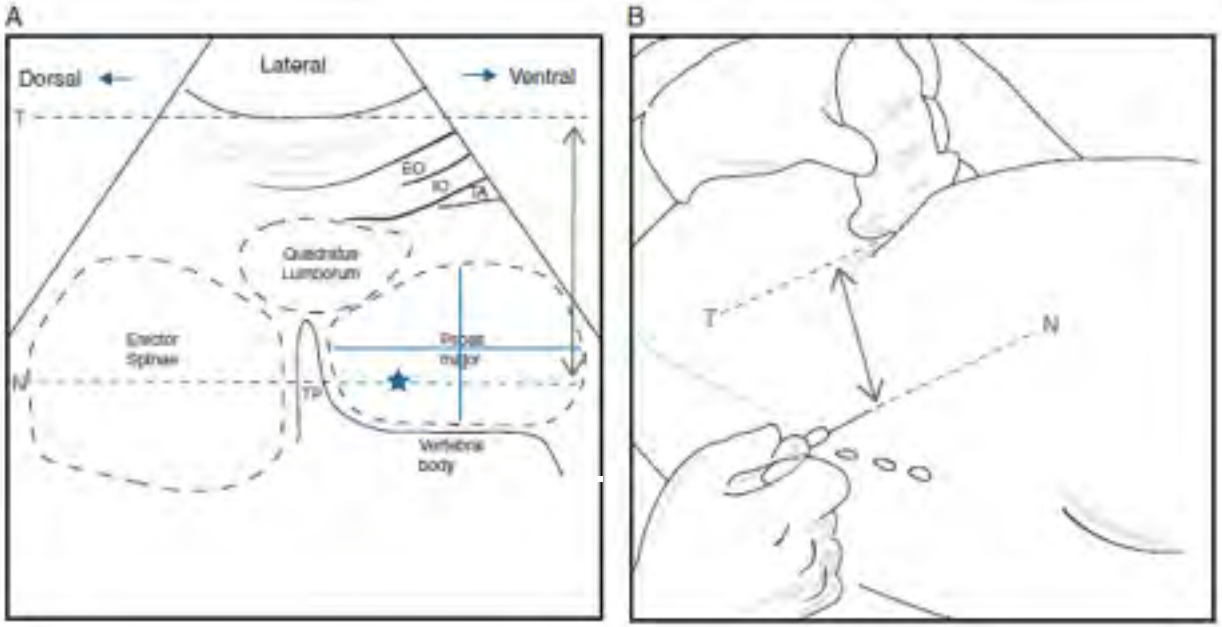

Fig 1 The needle insertion point to keep its trajectory perpendicular to the ultrasound beam during Shamrock lumbar plexus block. By using the Shamrock method for lumbar plexus block, the distance from the bottom of the transducer to the plexus could be obtained in the ultrasound image (A), exactly the distance away from the transducer for the needle insertion within the emitting plane (B). EO, external oblique muscle; IO, internal oblique muscle; TA, transversus abdominis muscle; TP, transverse process. Blue star, the centre of the postero-medial quadrant of psoas major muscle. T, the horizontal line at the bottom of the transducer contacting the patient skin. N, the horizontal line at the level of the blue star.

BJA

Correspondence

Finding the bulging edge: a modified shamrock lumbar plexus block in average-weight patients

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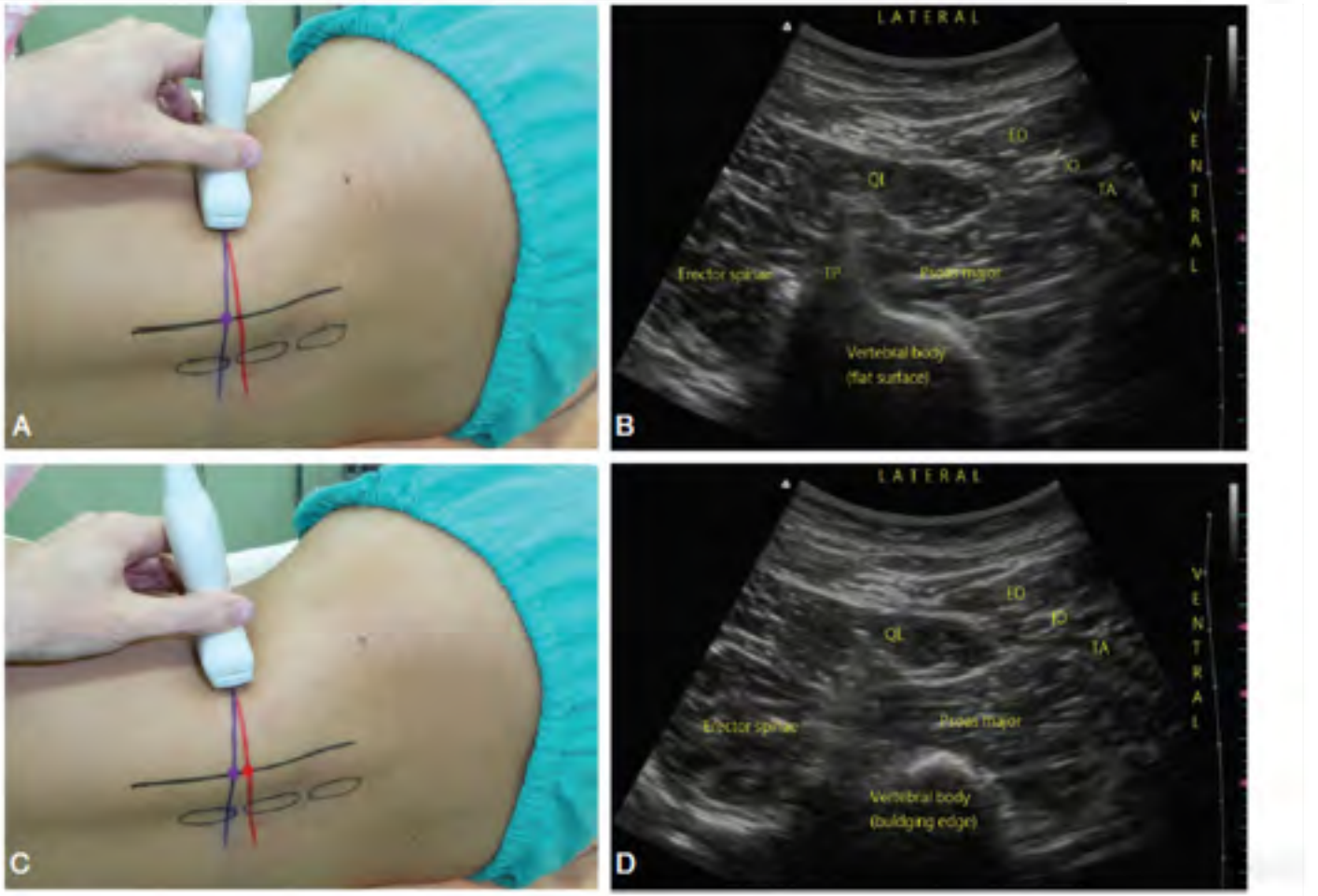

Nerve Stimulation

Ultrasound Guided Single Injection Lumbosacral Plexus Blockade For Hip Surgery Anaesthesia?

Anaesthesia 2014, 69, 1227–1240 doi:10.1111/anae.12753

Original Article

The suprasacral parallel shift vs lumbar plexus blockade with ultrasound guidance in healthy volunteers – a randomised controlled trial

T. F. Bendtsen,[1] E. M. Pedersen,[2] S. Haroutounian,[3] K. Soballe,[4] B. Moriggl,[5] L. Nikolajsen,[6] J. B. Hasselstrom,[7] A. K. Fisker,[8] J. M. C. Strid,[9] B. Iversen[10] and J. Borglum[11]

1 Research Consultant, Professor (Hon.), 9 Ph.D. Fellow, 10 Consultant, Department of Anaesthesia, 2 Research Consultant, Professor (Ass.), Department of Radiology, 3 Postdoc, 6 Professor (Ass.), Danish Pain Research Center, 4 Professor, Department of Orthopedic Surgery, Aarhus University Hospital, Aarhus, Denmark
5 Professor, Department of Anatomy, Histology and Embryology, Innsbruck Medical University, Innsbruck, Austria
7 Professor (Ass.), Department of Forensic Medicine, 8 Research Fellow, Health Aarhus University, Aarhus, Denmark
11 Consultant, Professor (Ass.), Department of Anaesthesia, Bispebjerg University Hospital, Bispebjerg, Denmark

Summary

Surgical anaesthesia with haemodynamic stability and opioid-free analgesia in fragile patients can theoretically be provided with lumbosacral plexus blockade. We compared a novel ultrasound-guided suprasacral technique for blockade of the lumbar plexus and the lumbosacral trunk with ultrasound-guided blockade of the lumbar plexus. The objective was to investigate whether the suprasacral technique is equally effective for anaesthesia of the terminal lumbar plexus nerves compared with a lumbar plexus block, and more effective for anaesthesia of the lumbosacral trunk. Twenty volunteers were included in a randomised crossover trial comparing the new suprasacral with a lumbar plexus block. The primary outcome was sensory dermatome anaesthesia of L2–S1. Secondary outcomes were peri-neural analgesic spread estimated with magnetic resonance imaging, sensory blockade of dermatomes L2–S3, motor blockade, volunteer discomfort, arterial blood pressure change, block performance time, lidocaine pharmacokinetics and complications. Only one volunteer in the suprasacral group had sensory blockade of all dermatomes L2–S1. Epidural spread was verified by magnetic resonance imaging in seven of the 34 trials (two suprasacral and five lumbar plexus blocks). Success rates of the sensory and motor blockade were 88–100% for the major lumbar plexus nerves with the suprasacral technique, and 59–88% with the lumbar plexus block ($p > 0.05$). Success rate of motor blockade was 50% for the lumbosacral trunk with the suprasacral technique and zero with the lumbar plexus block ($p < 0.05$). Both techniques are effective for blockade of the terminal nerves of the lumbar plexus. The suprasacral parallel shift technique is 50% effective for blockade of the lumbosacral trunk.

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Accepted: 28 April 2014

Introduction

Patients admitted for hip fracture surgery will often be old, fragile and sometimes afflicted with severe cardiac co-morbidity. They may have increased intra- and peri-operative risks with traditional general or spinal anaesthesia. Haemodynamic stability of surgical anaes-

The suprasacral parallel shift vs lumbar plexus blockade with ultrasound guidance in healthy volunteers – a randomised controlled trial

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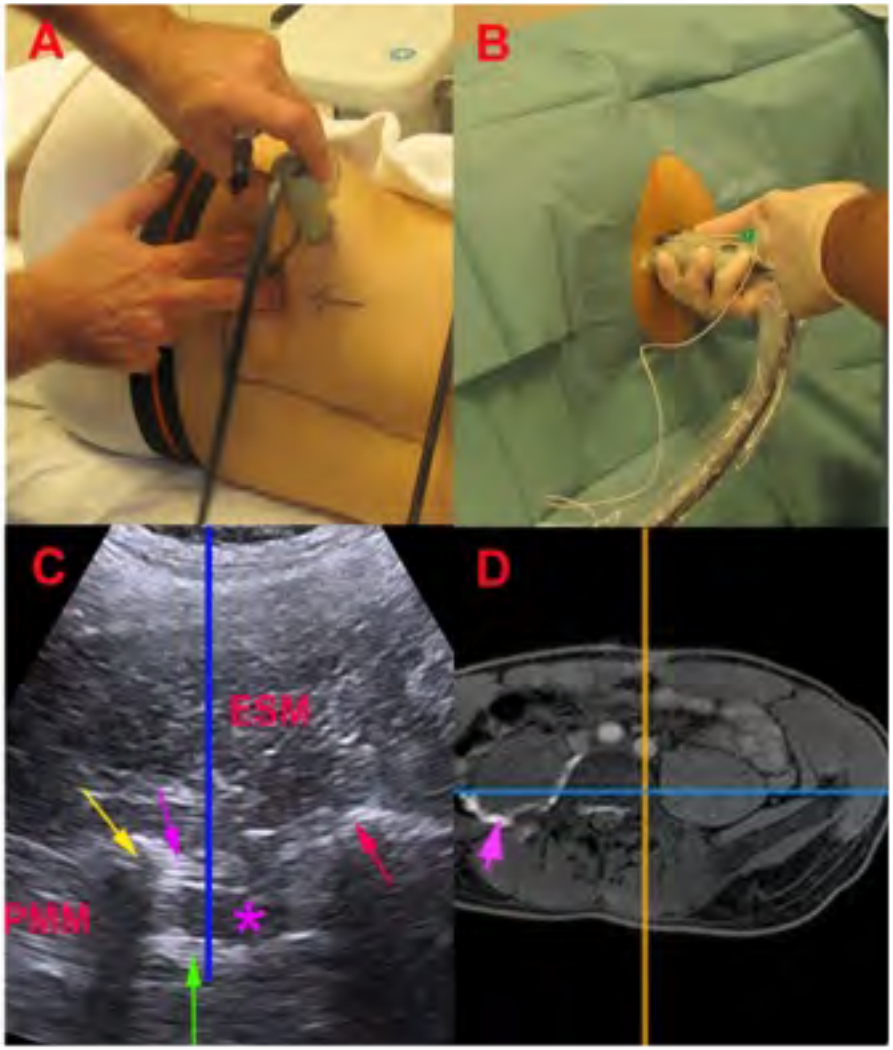

Anaesthesia 2014, 69, 1227–1240

The suprasacral parallel shift vs lumbar plexus blockade with ultrasound guidance in healthy volunteers – a randomised controlled trial

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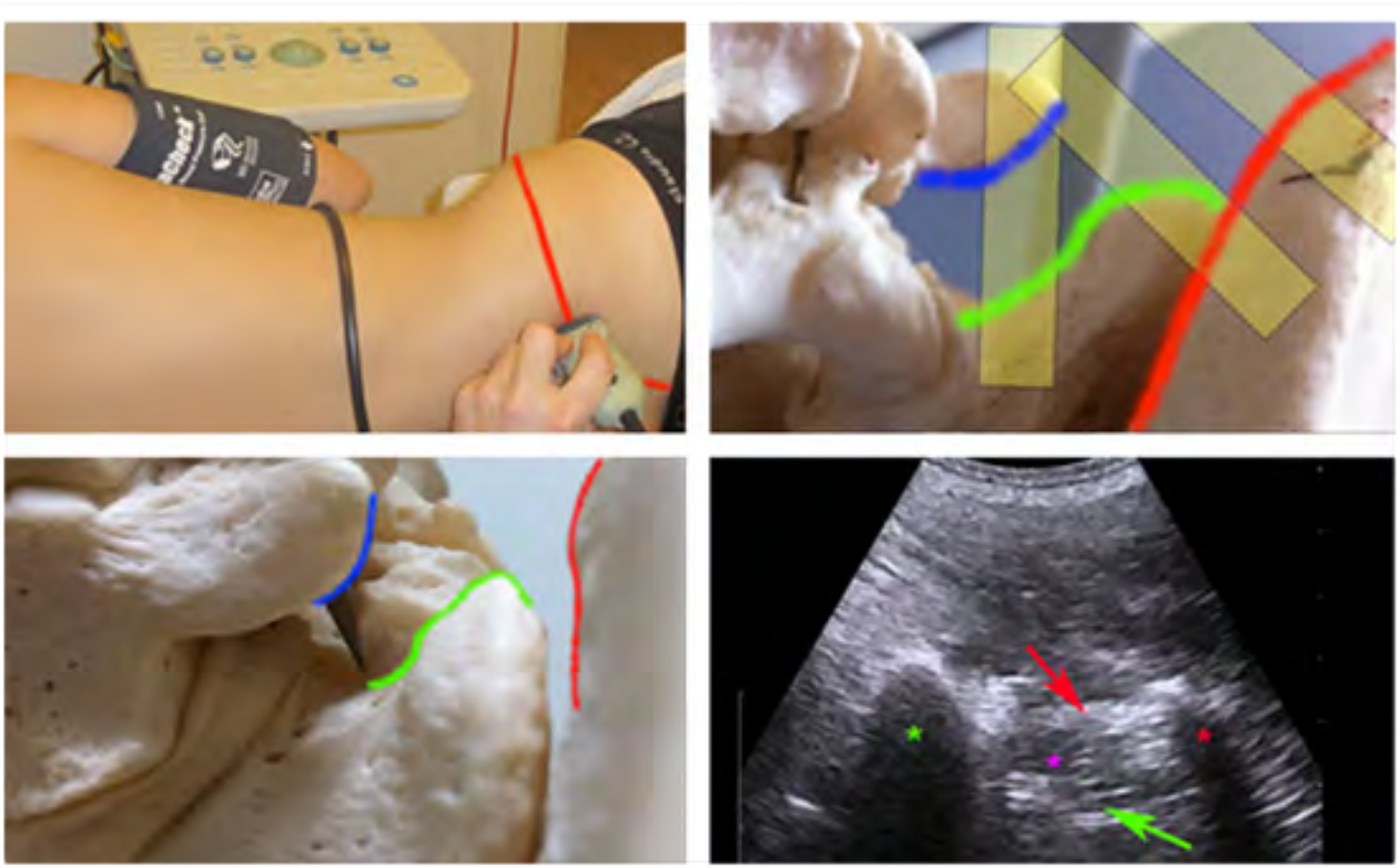

Anaesthesia 2014, 69, 1227–1240

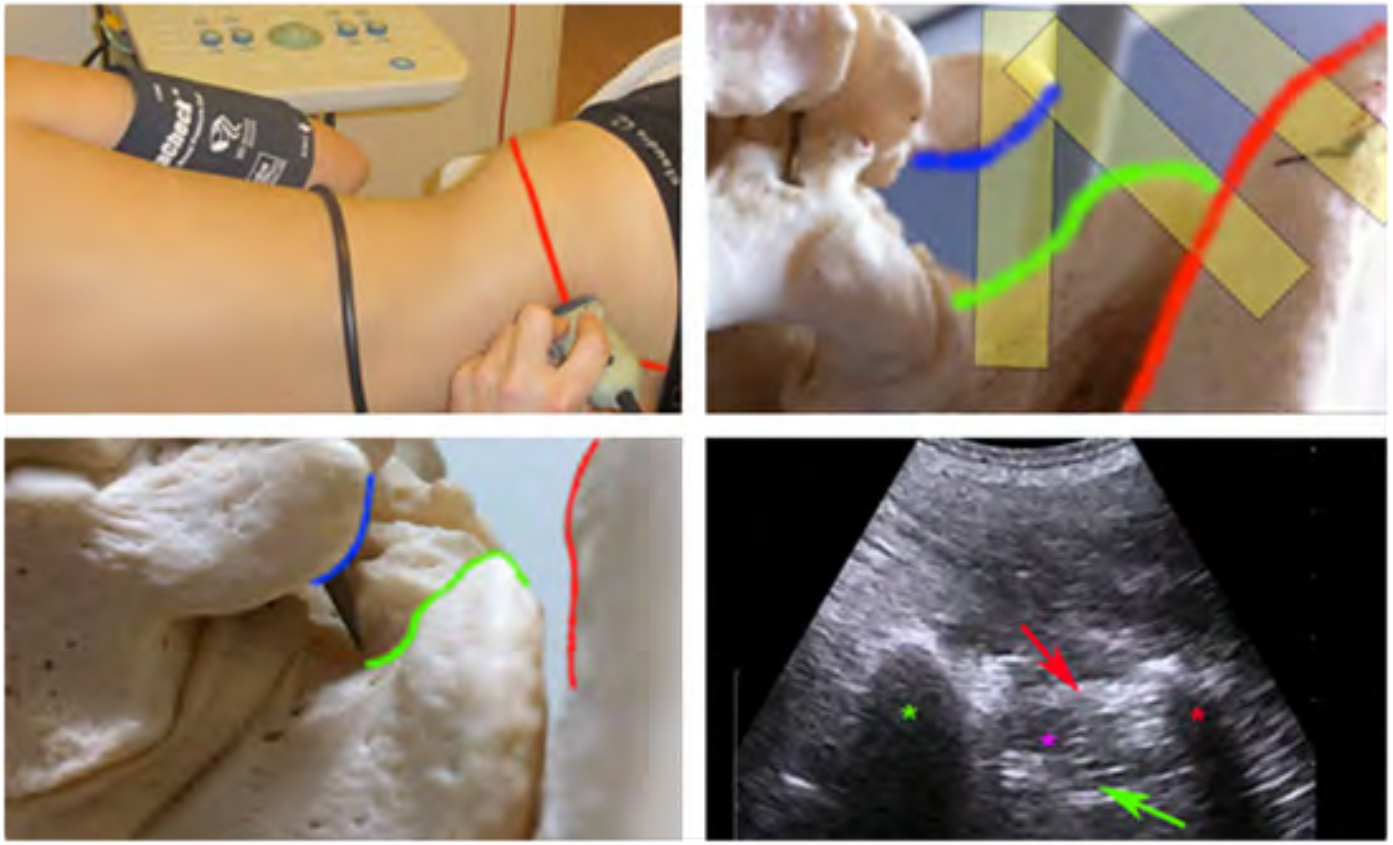

Figure 2 The suprasacral parallel shift technique. (a) The iliac crest is marked with a red line and the probe is parallel-shifted along the iliac crest, (b) When the upper lateral edge of the sacrum (green line) and the lower border of the transverse process of L5 (blue line) comes into view, the probe (represented by the yellow rectangles) is rotated to the parasagittal plane showing the transverse process of L5 and the upper rim of the sacrum in the same visual field, (c) Displays the transverse process of L5 and the sacrum from the anterior side, (d) The needle is inserted with a steep out-of-plane approach until the needle tip penetrates the intertransverse ligament (red arrow), and the osteofibrotic tunnel (magenta asterisk) as well as the lumbosacral ligament (green arrow) between the sacrum (green asterisk) and the transverse process of L5 (red asterisk).

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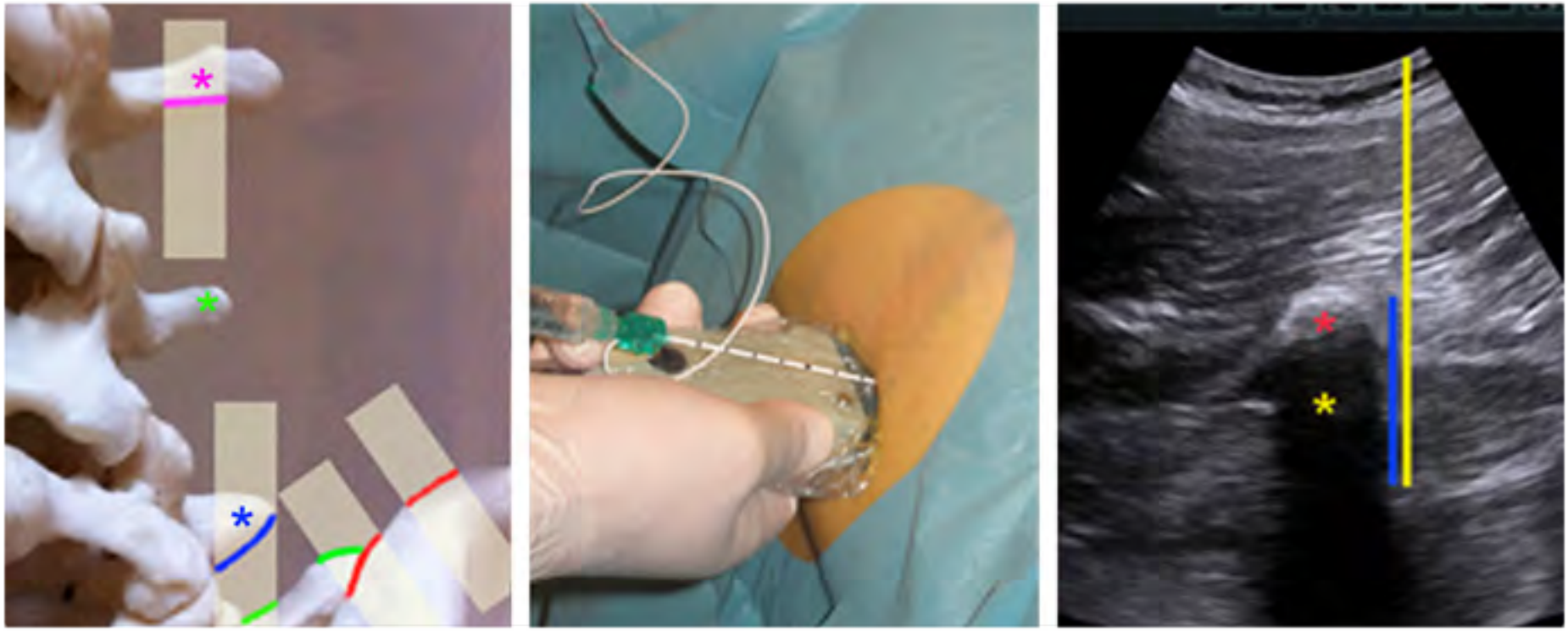

Figure 3 The lumbar plexus block technique. (a) The probe (rectangles) is parallel-shifted along the iliac crest (marked with red) until the upper edge of the sacrum (marked with green) comes into view. The probe is rotated to the parasagittal orientation, keeping the transverse process of L5 (blue asterisk) and the sacrum in the visual field. The lower posterior edge of the transverse process of L5 is marked with blue. Counting from the transverse process of L5, the probe is shifted cranially until the transverse process of L3 comes into view (magenta asterisk). The lower posterior edge of the transverse process of L3 is marked with magenta. The transverse process of L4 is marked with a green asterisk, (b) The needle is inserted with a steep out-of-plane approach, (c) The needle (yellow line) is aiming at a depth of approximately 20 mm (indicated by a blue line) deep to the posterior edge of transverse process of L3 (red asterisk). The acoustic shadow of the transverse process of L3 is indicated by a yellow asterisk.

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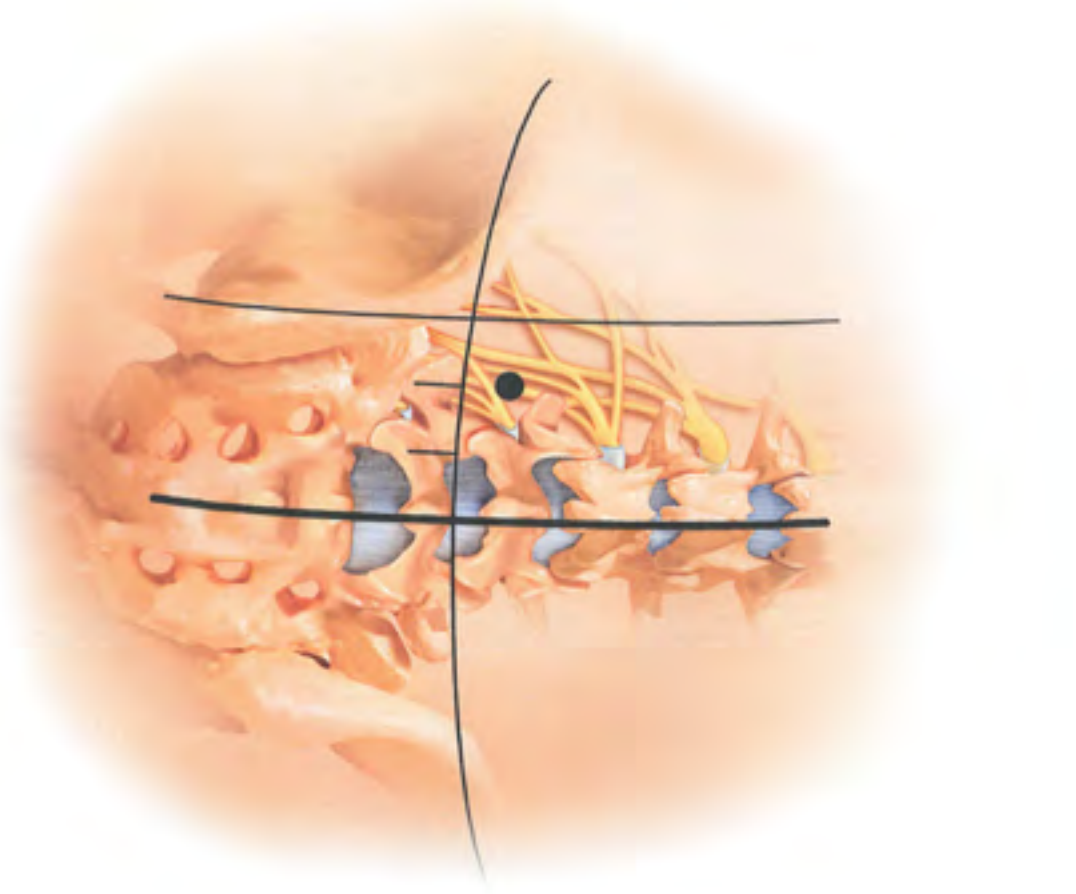
Lumbal plexus



Transversalis fascia plane block, a novel ultrasound-guided abdominal wall nerve block

Can J Anesth/J Can Anesth (2009) 56:618–620

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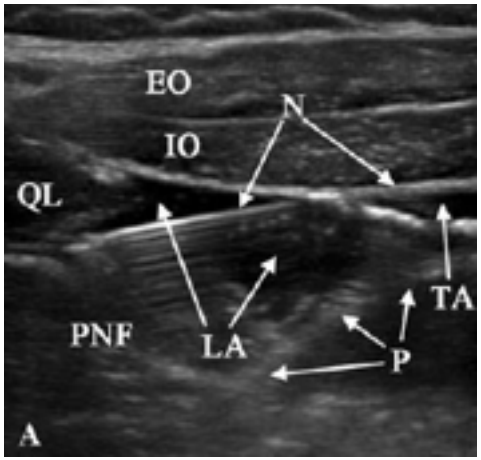
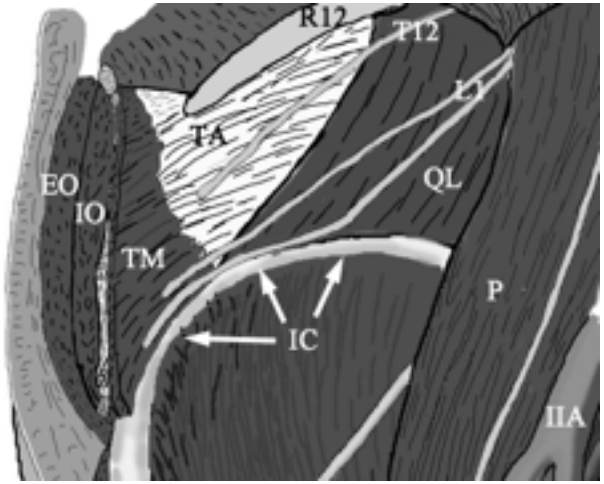
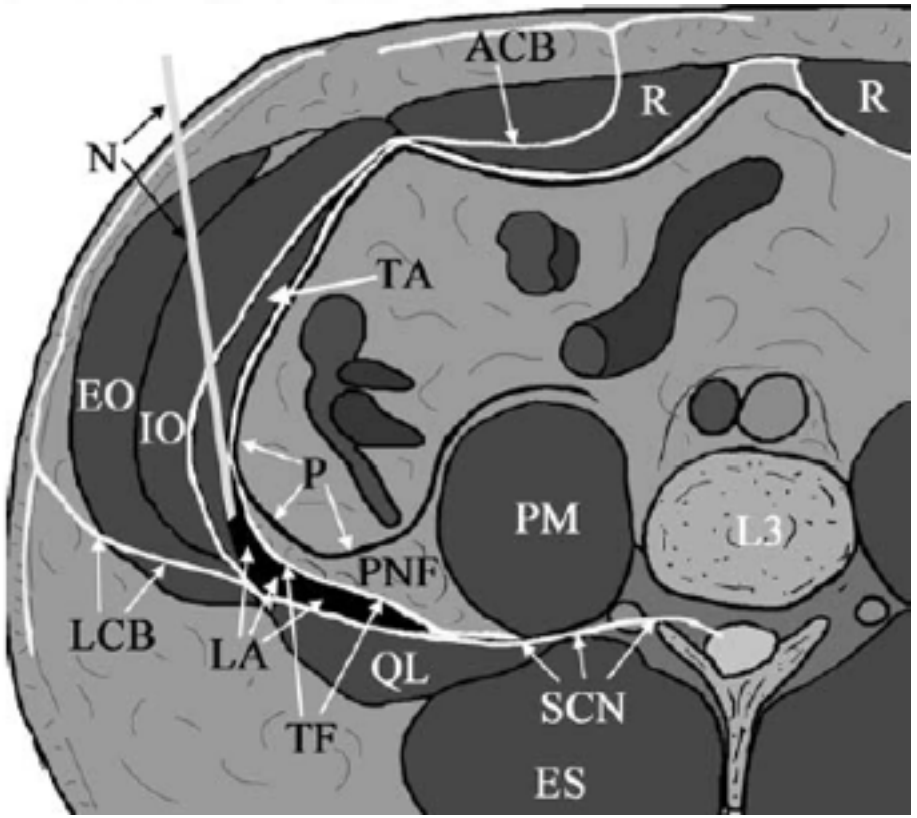
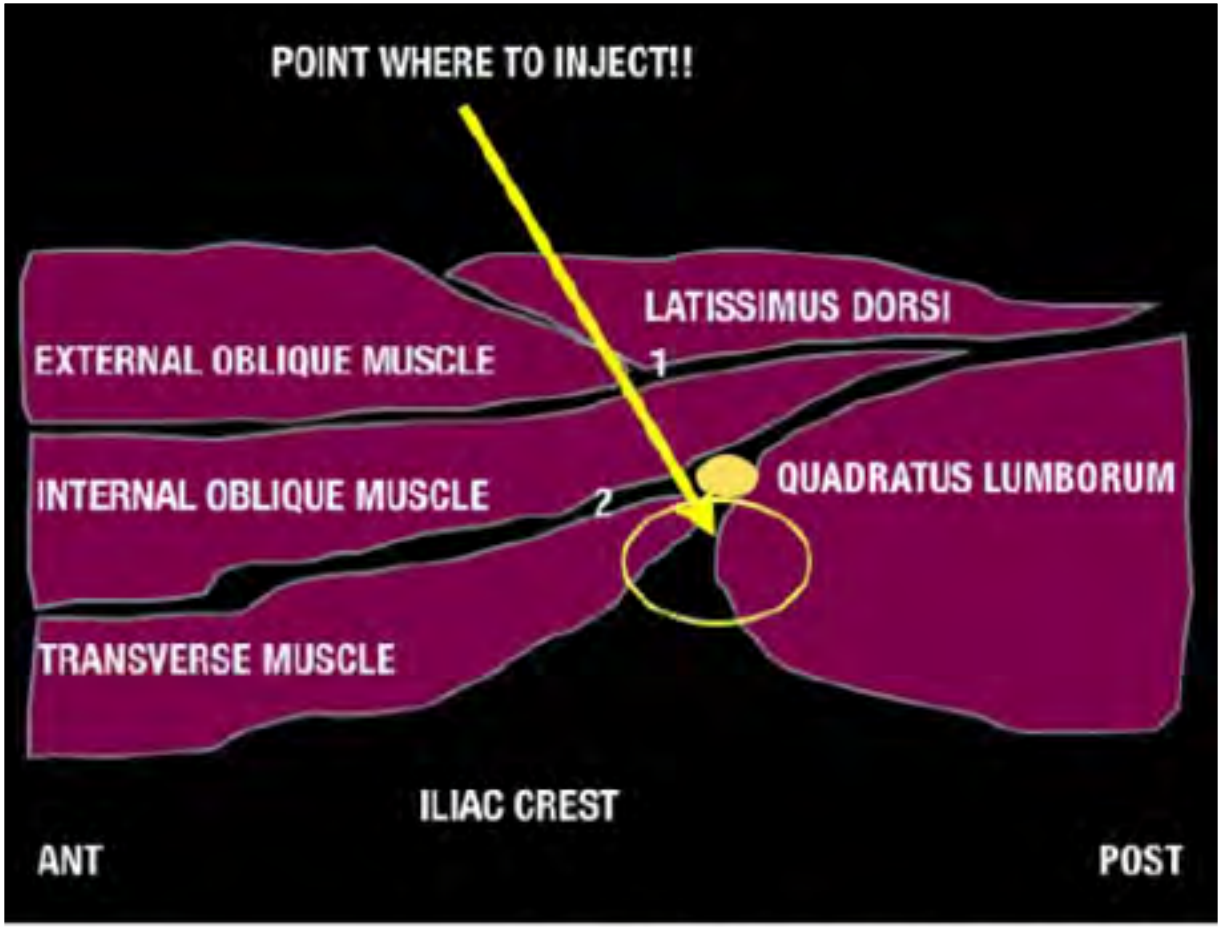






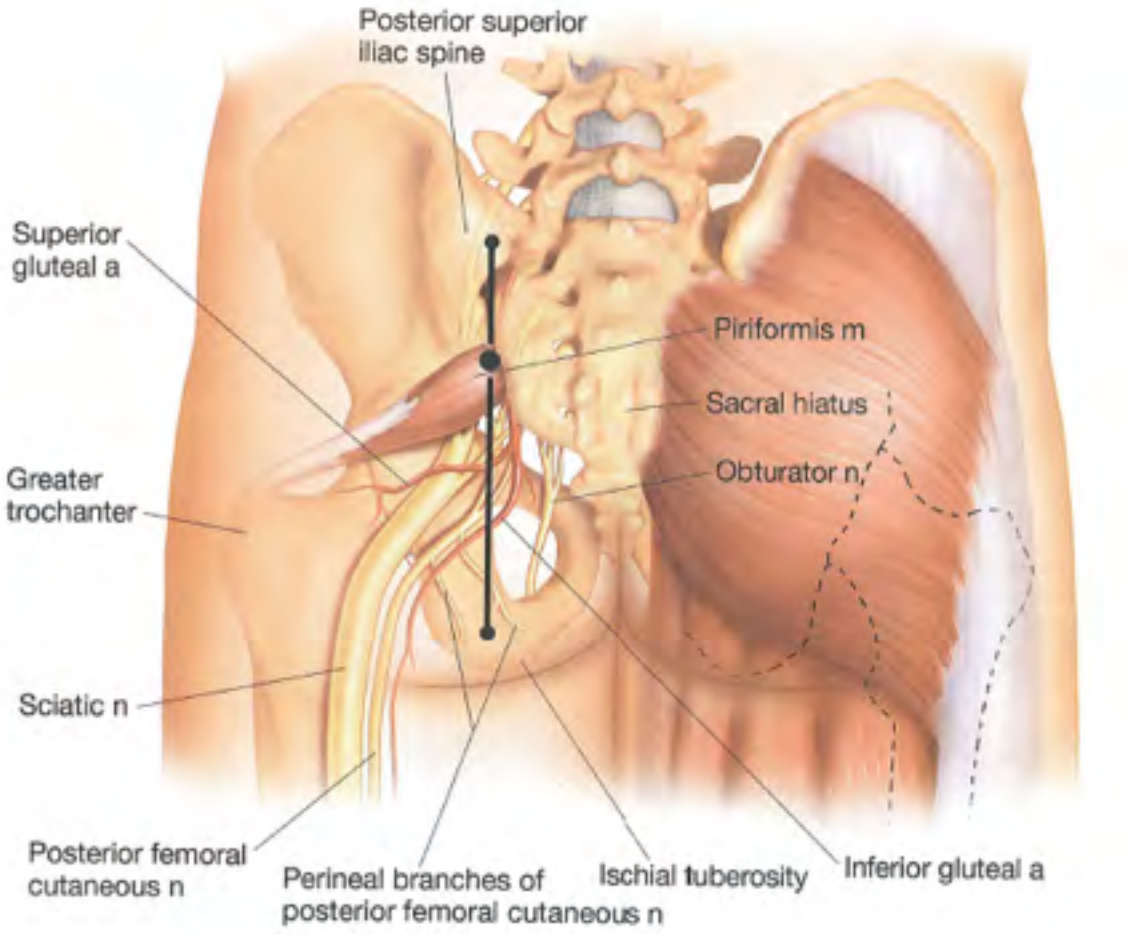
abdomen. Also, the TFP is continuous medially with the plane of the lumbar plexus, and opening the plane with fluid may provide an alternative lateral approach to lumbar plexus block under ultrasound-guidance.

Quadratus Lumborum Block



Source: LSORA > The Blanco block: a Quadratus lumborum block

Sciatic Nerv (parasacral approach)



BJA

PSPS

The ParaSacral Parallel Shift

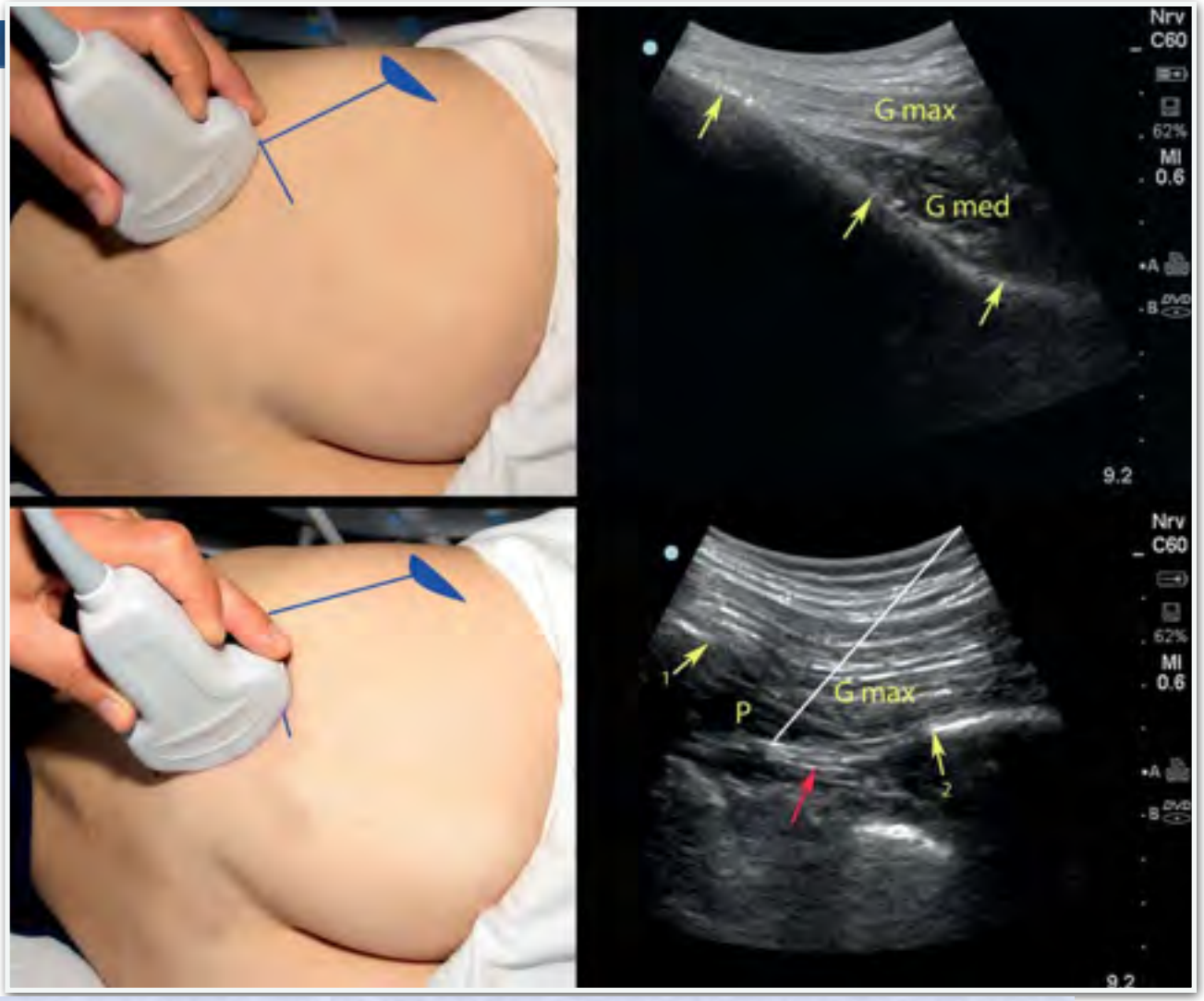
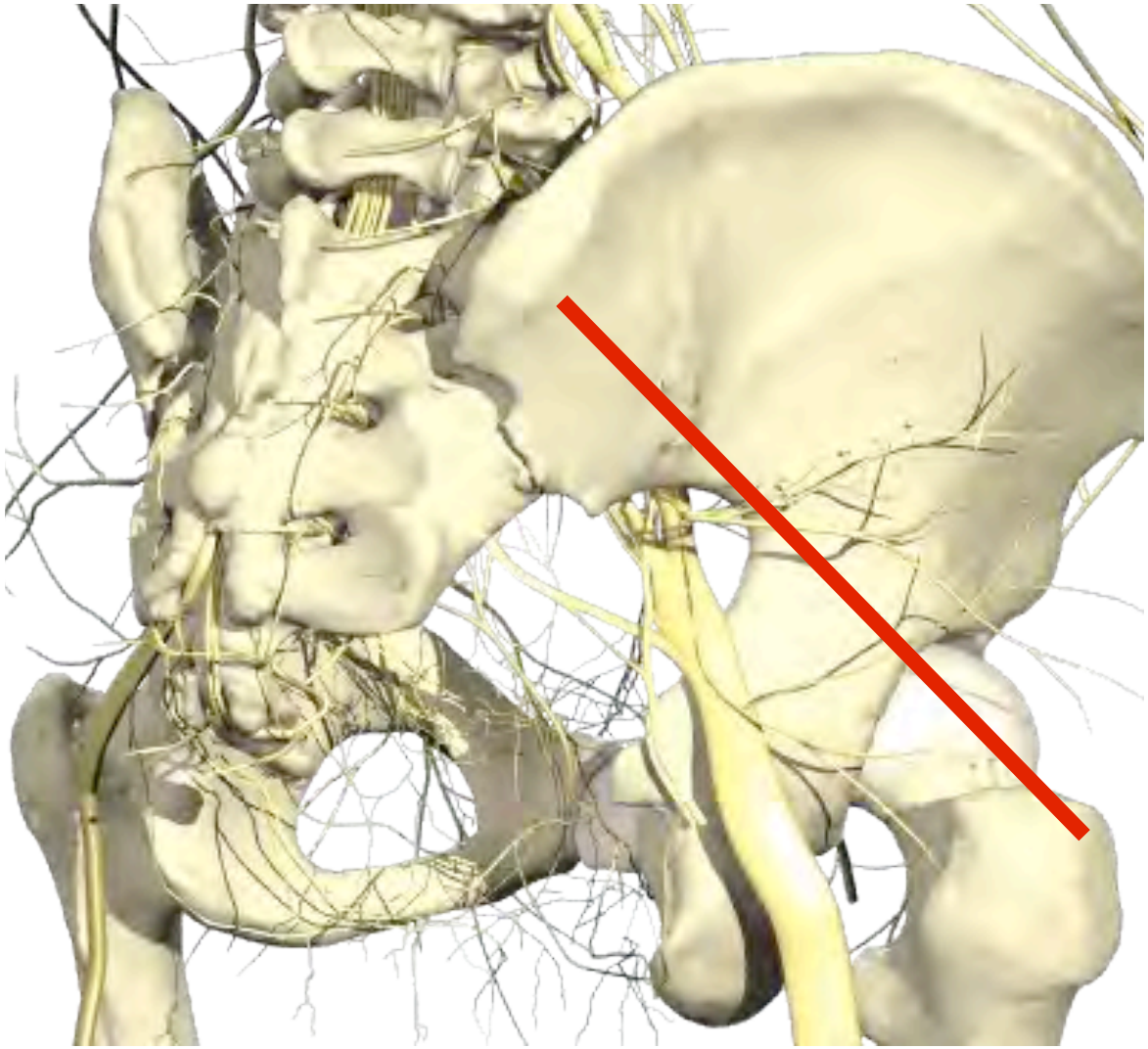
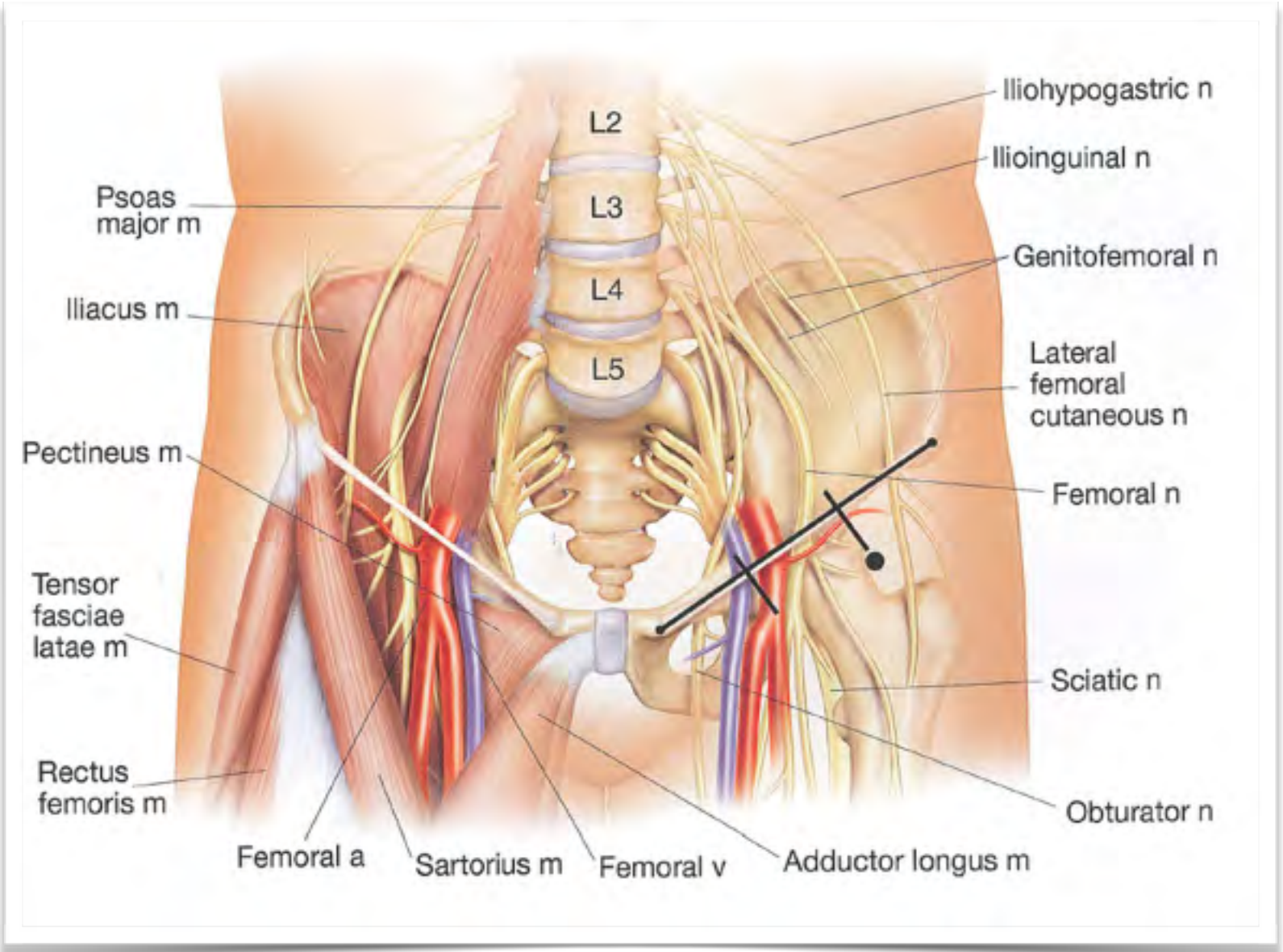


Fig 1 The PSPS. (A) The transducer is placed on the line connecting the PSIS and the greater trochanter between the midpoint of this line and the PSIS. (B) The corresponding ultrasound scan demonstrates the characteristic continuous, hyperechoic iliac bone line (yellow arrows). (C) The transducer is moved inferomedially with the PSPS. (D) When the transducer reaches the upper margin of the greater sciatic foramen, the continuity of the iliac bone line is broken, and the sacral plexus appears deep to the piriformis muscle. The needle is inserted from the lateral end of the transducer and advanced until the tip of the needle reaches the sacral plexus. Gluteus maximus muscle (G max); gluteus medius muscle (G med); piriformis muscle (P); sacral bone (yellow arrow 1); ischial bone (yellow arrow 2); the hyperechoic sacral plexus (red arrow); the path of the needle (white line).

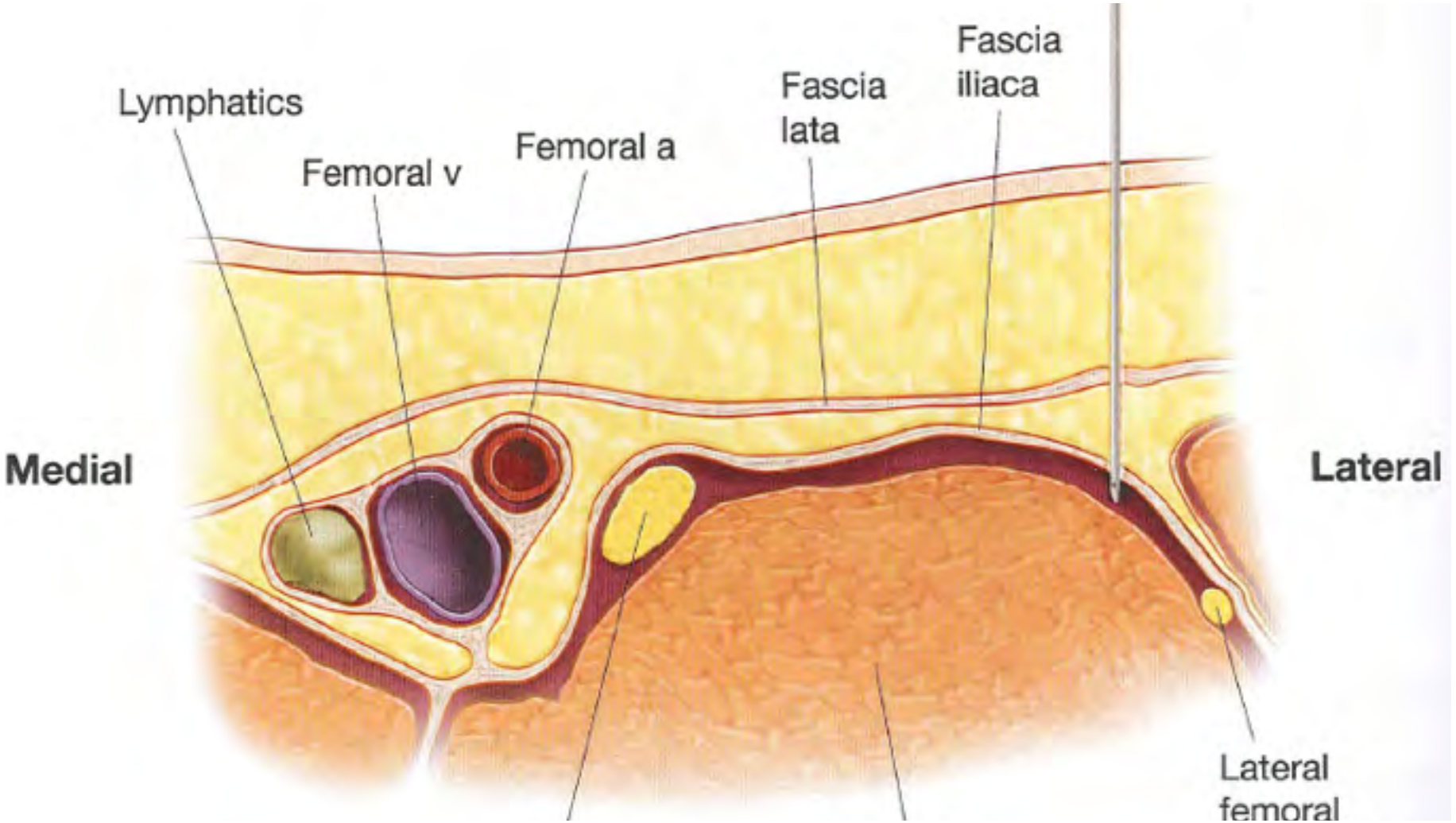


Fascia Iliaca Compartment blockad

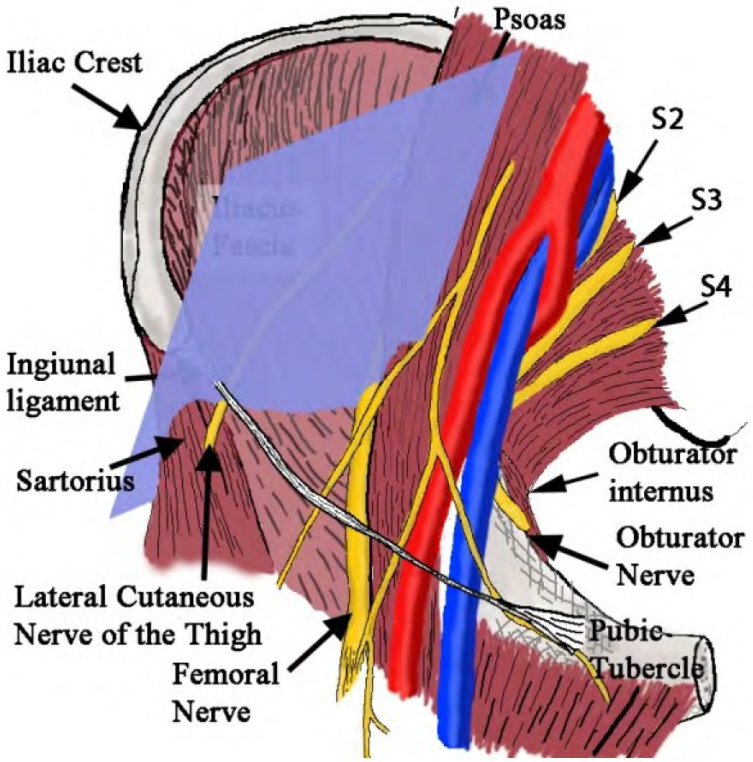
FIC

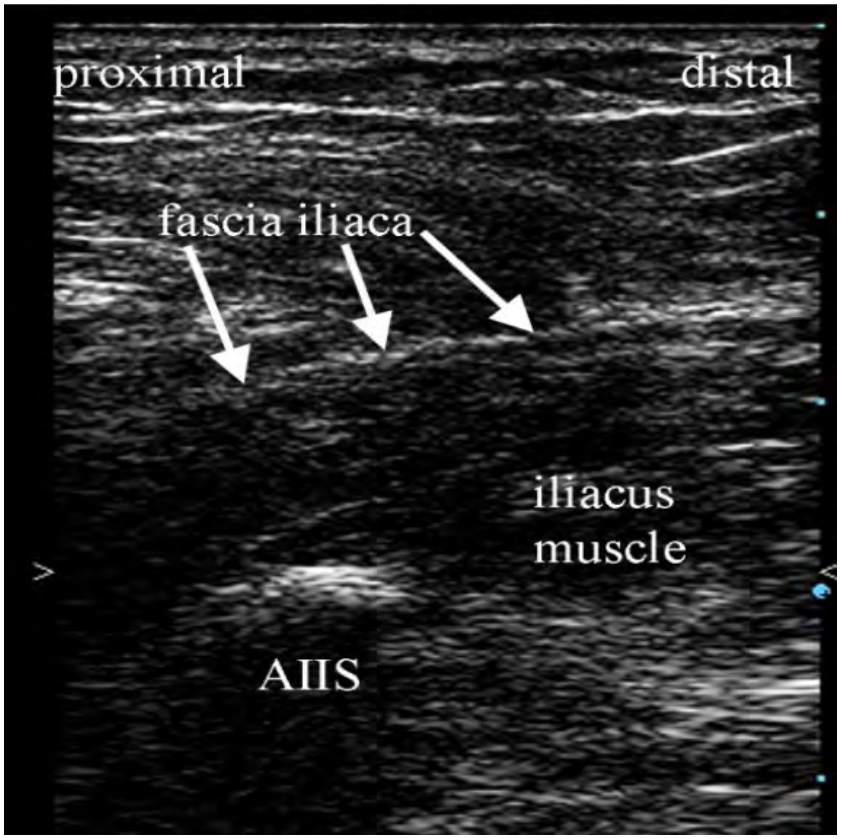

L2
L3
L4
L5
Iliohypogastric n
Ilioinguinal n
Psoas major m
Genitofemoral n
Iliacus m
Lateral femoral cutaneous n
Pectineus m
Femoral n
Tensor fasciae latae m
Sciatic n
Rectus femoris m
Obturator n
Femoral a
Sartorius m
Femoral v
Adductor longus m

FIC


Lymphatics
Femoral v
Femoral a
Fascia lata
Fascia iliaca
Medial
Lateral
Lateral femoral

Fascia Iliaca Block





Fascia Iliaca Block

Probe and needle position for the block

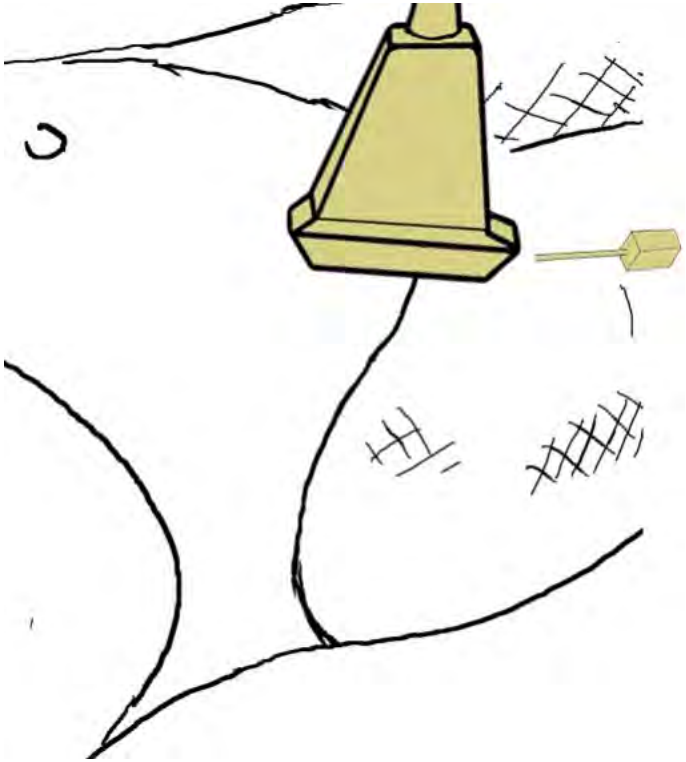
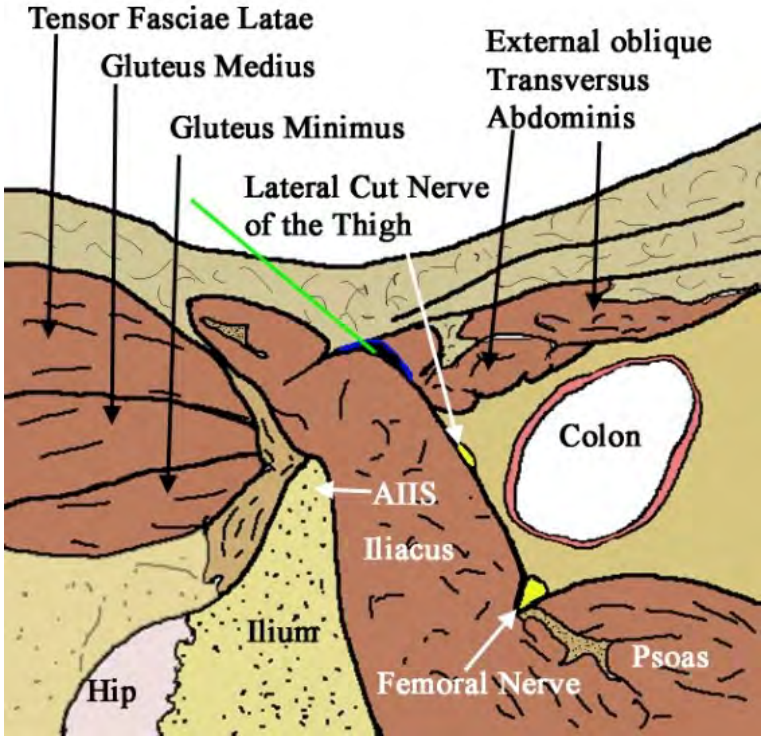
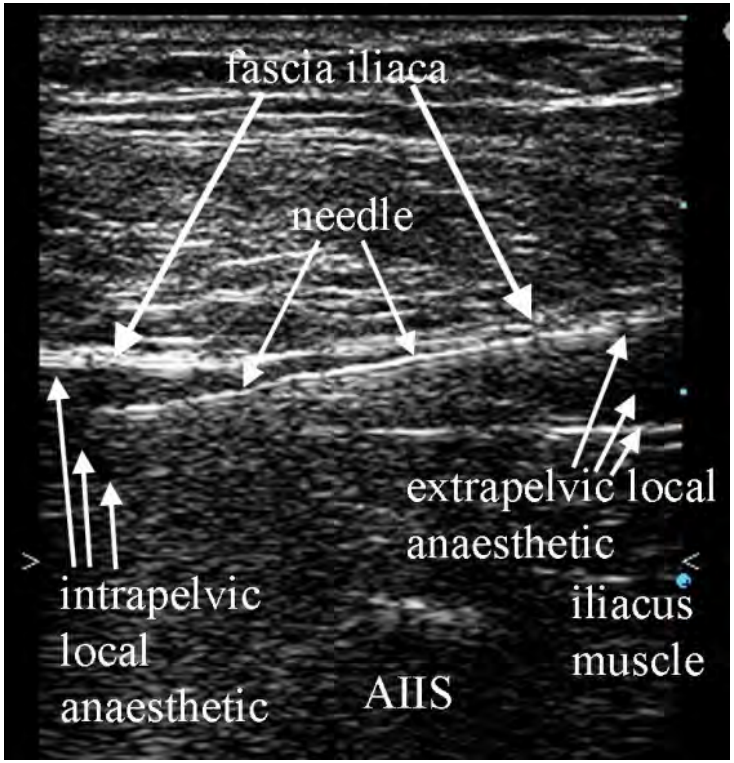


Diagram of the plane of the ultrasound image, needle positioned deep to fascia iliaca with a small lens of fluid in the correct plane

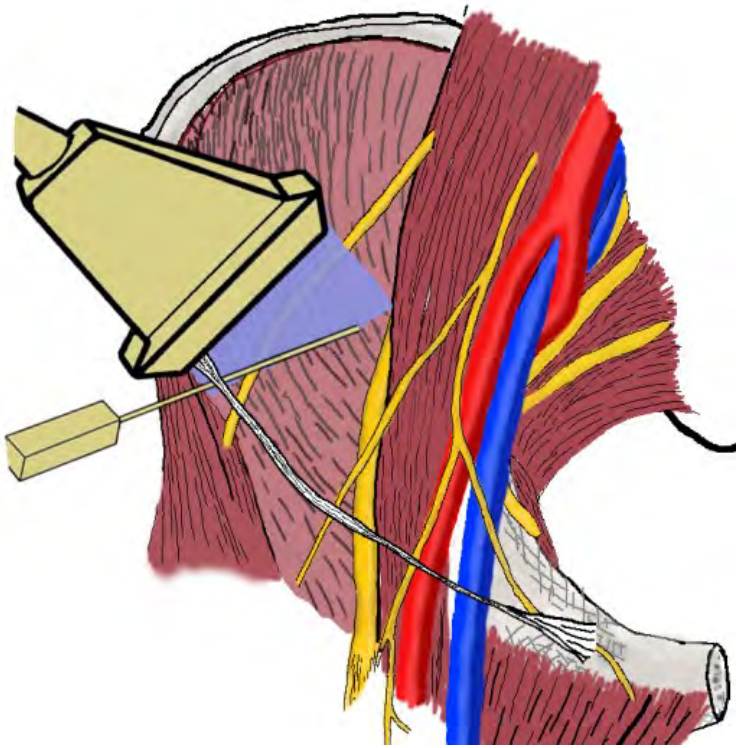


Fascia Iliaca Block

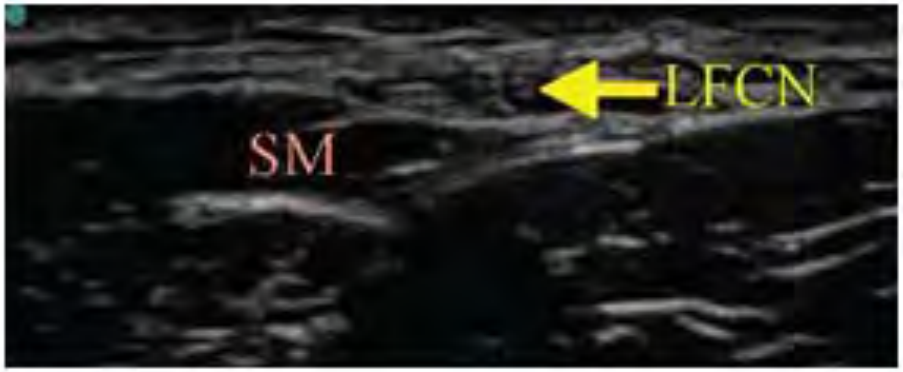
Sonogram of the needle proximal to the AIIS, there is fluid under both intra and extrapelvic parts of the iliacus fascia. Local anaesthetic is extending deep into the pelvis past the tip of the needle and beyond the image

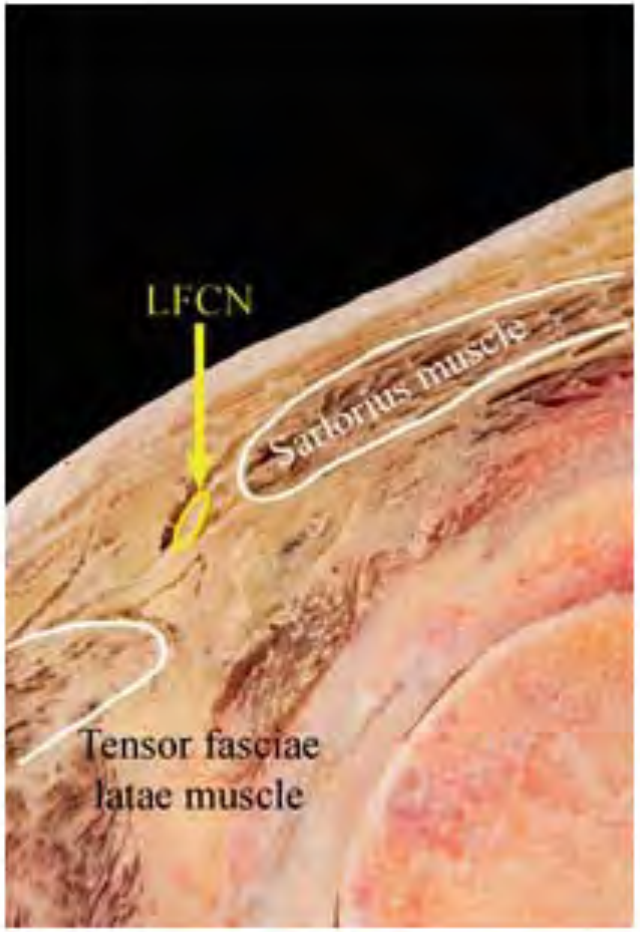


Position of probe and needle at conclusion



Lateral femoral cutaneous nerve block





Blockader / Analgesia

- Lumbosacral plexus block
- Femoral nerve block
- Lateral femoral cutaneous nerve block
  - Fascia Iliaca Compartment blockad

Teaching and learning!

Ultraljudsguidade alternativ för perifera blockader vid knäkirurgi

Auris Pelanis Mölndal

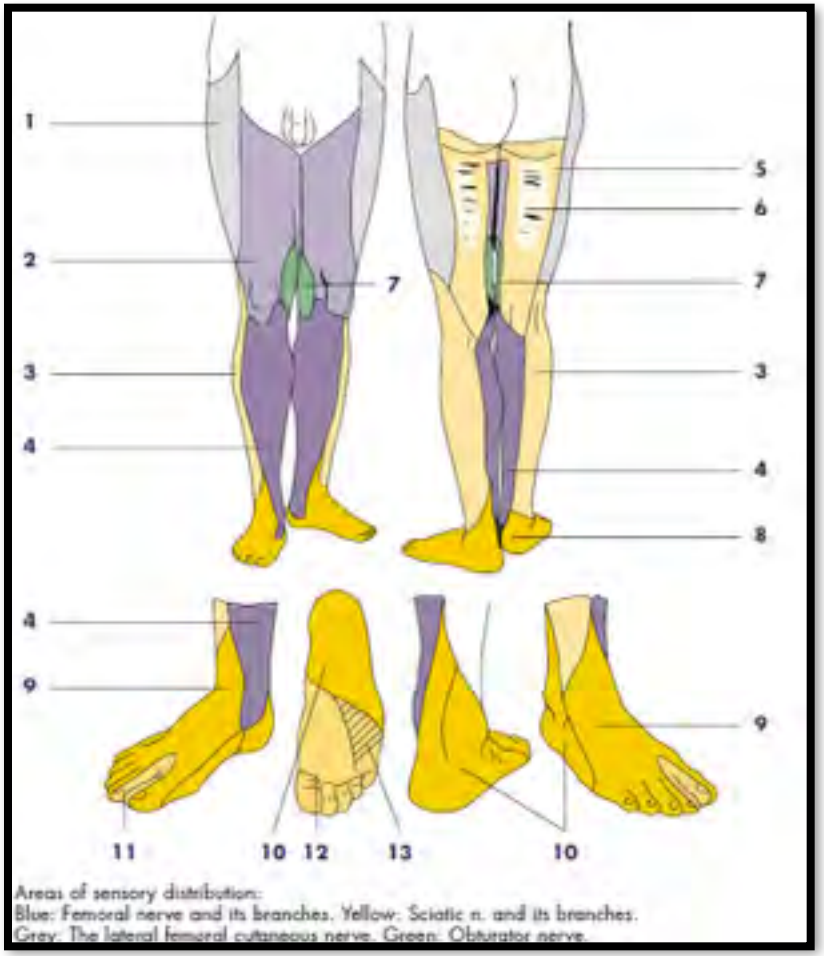
VÄSTRA GÖTALANDSREGIONEN
SAHLGRENSKA UNIVERSITETSSJUKHUSET

Blockader

- Femoral nerve block
- Proximal sciatic nerve block
- Obturator nerve block
- Lateral femoral cutaneous nerve block
- Fascia Iliaca Compartment blockad

Femoralis

- *N.femoralis* är en blandad nerv:
  - Ombesörjer flexion i höft och sträckning i knä
  - Försörjer femurskaftet sensoriskt
  - Försörjer huden på lårets framsida
  - Fortsätter sedan ner till fotens medialsida som *n.saphenus*
  - Blockeras med hjälp av nervstimulator eller ultraljud

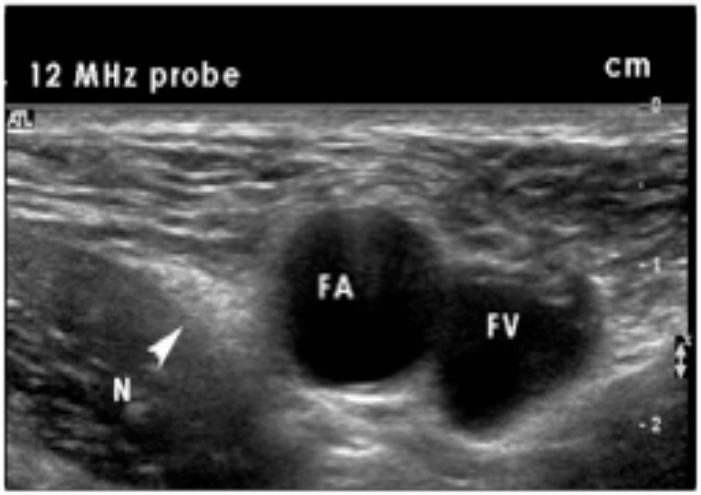


Saphenous nerve block

- Nerve block technique:
  - Long axis (single-shot) is preferable
- Sonoanatomic landmarks:
  - - Sartorius muscle

Saphenous nerve block

Femoral nerve block



BJA

PSPS

The ParaSacral Parallel Shift

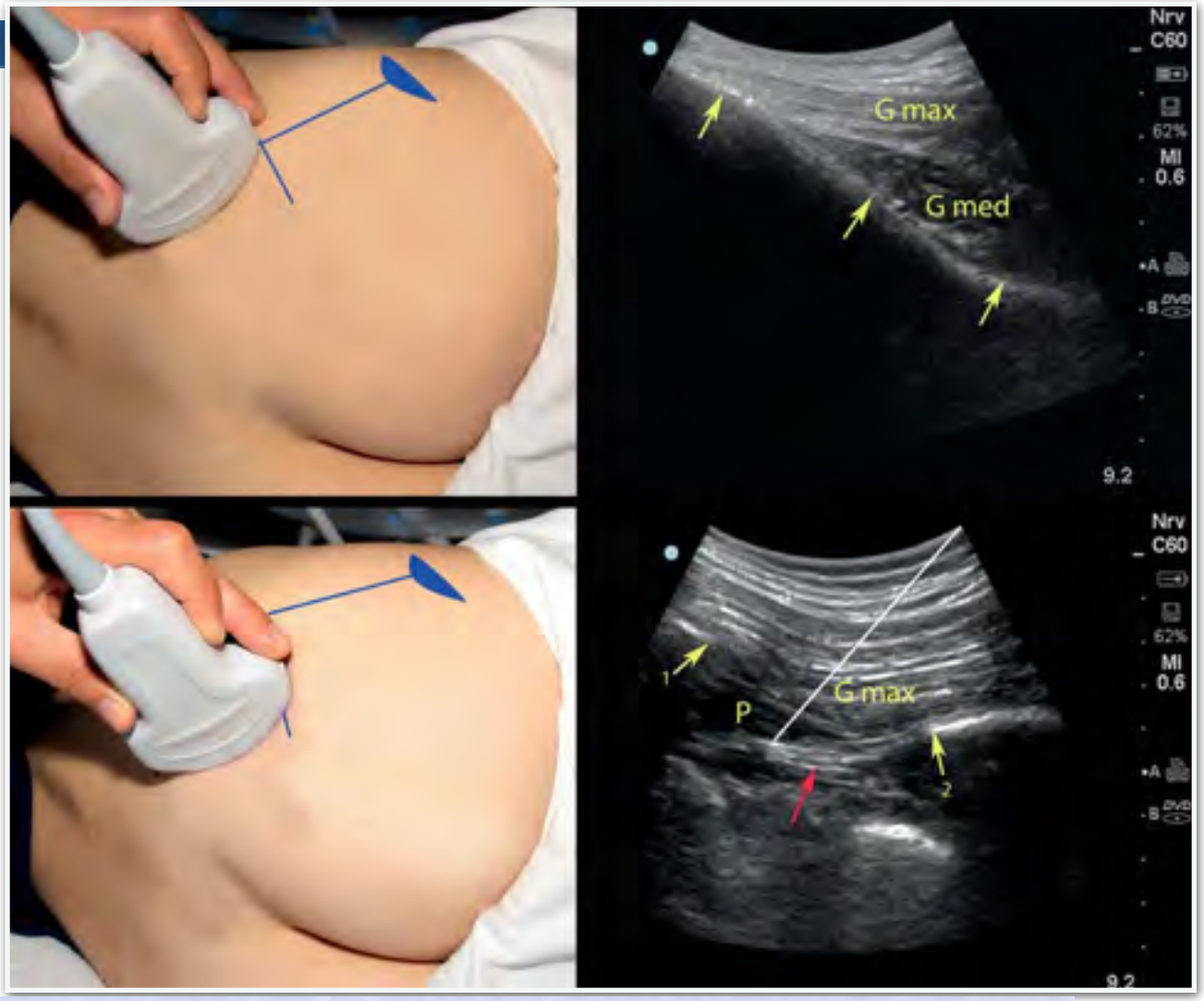
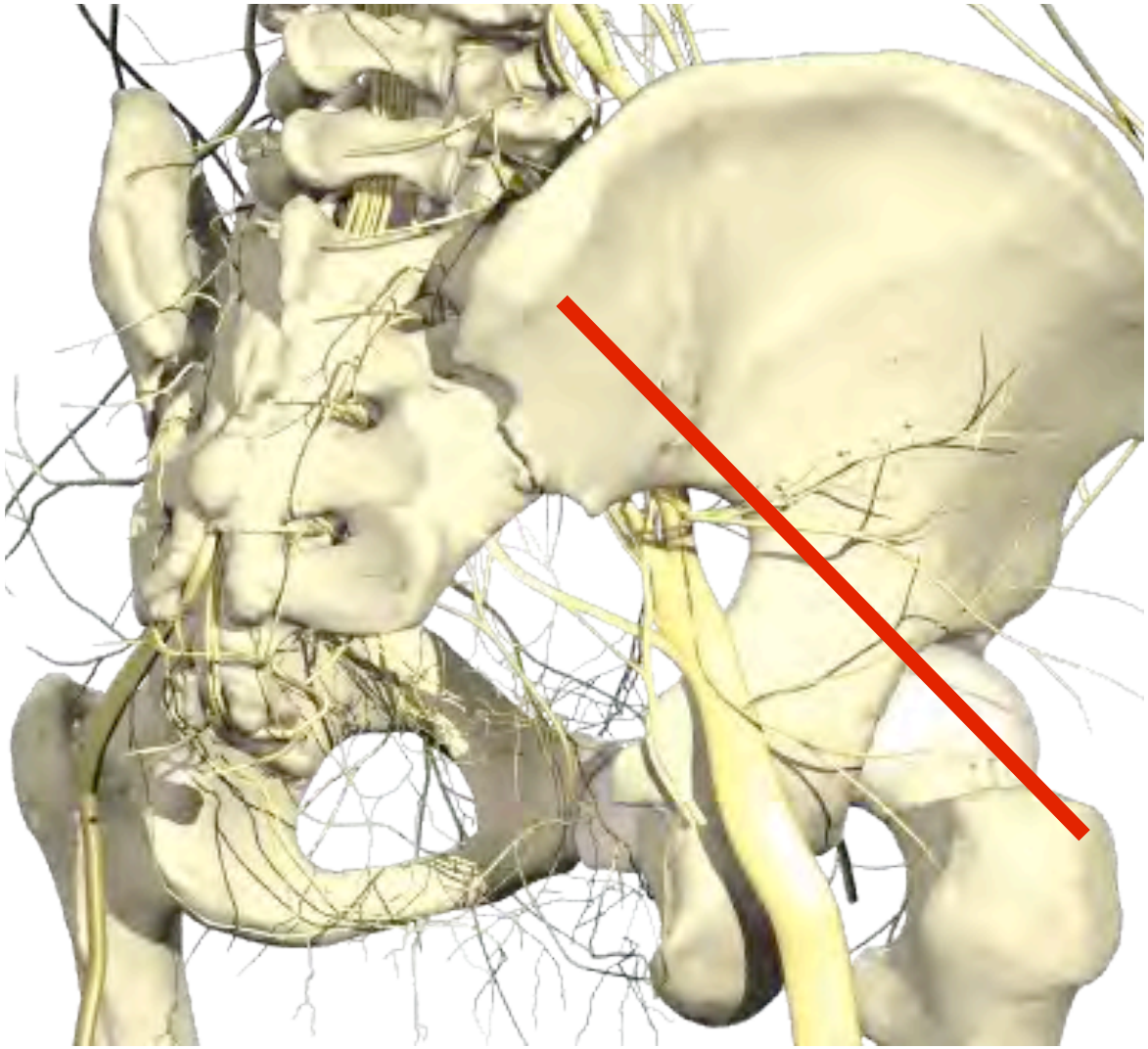


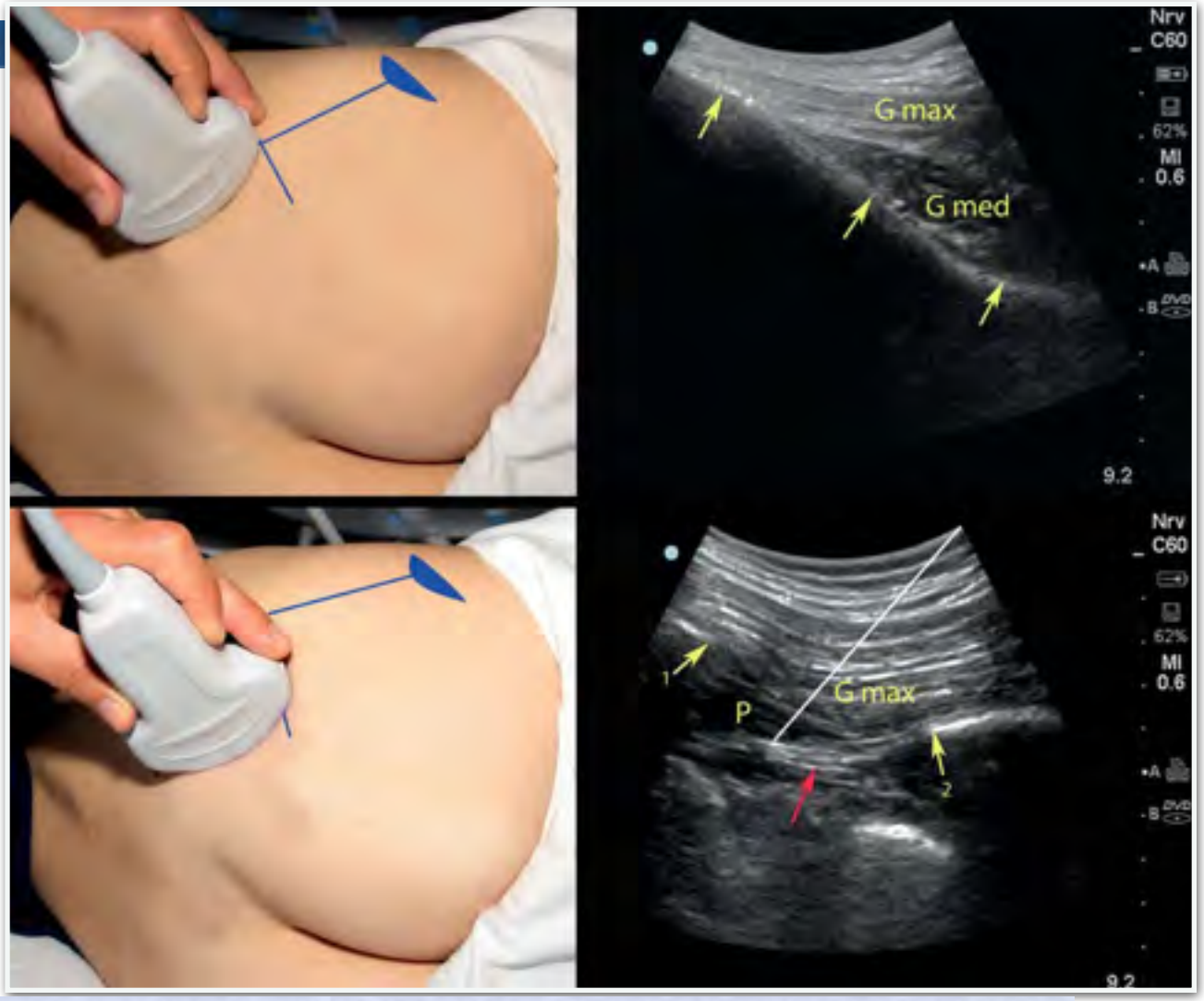
Fig 1 The PSPS. (A) The transducer is placed on the line connecting the PSIS and the greater trochanter between the midpoint of this line and the PSIS. (B) The corresponding ultrasound scan demonstrates the characteristic continuous, hyperechoic iliac bone line (yellow arrows). (C) The transducer is moved inferomedially with the PSPS. (D) When the transducer reaches the upper margin of the greater sciatic foramen, the continuity of the iliac bone line is broken, and the sacral plexus appears deep to the piriformis muscle. The needle is inserted from the lateral end of the transducer and advanced until the tip of the needle reaches the sacral plexus. Gluteus maximus muscle (G max); gluteus medius muscle (G med); piriformis muscle (P); sacral bone (yellow arrow 1); ischial bone (yellow arrow 2); the hyperechoic sacral plexus (red arrow); the path of the needle (white line).



BJA

PSPS

The ParaSacral Parallel Shift



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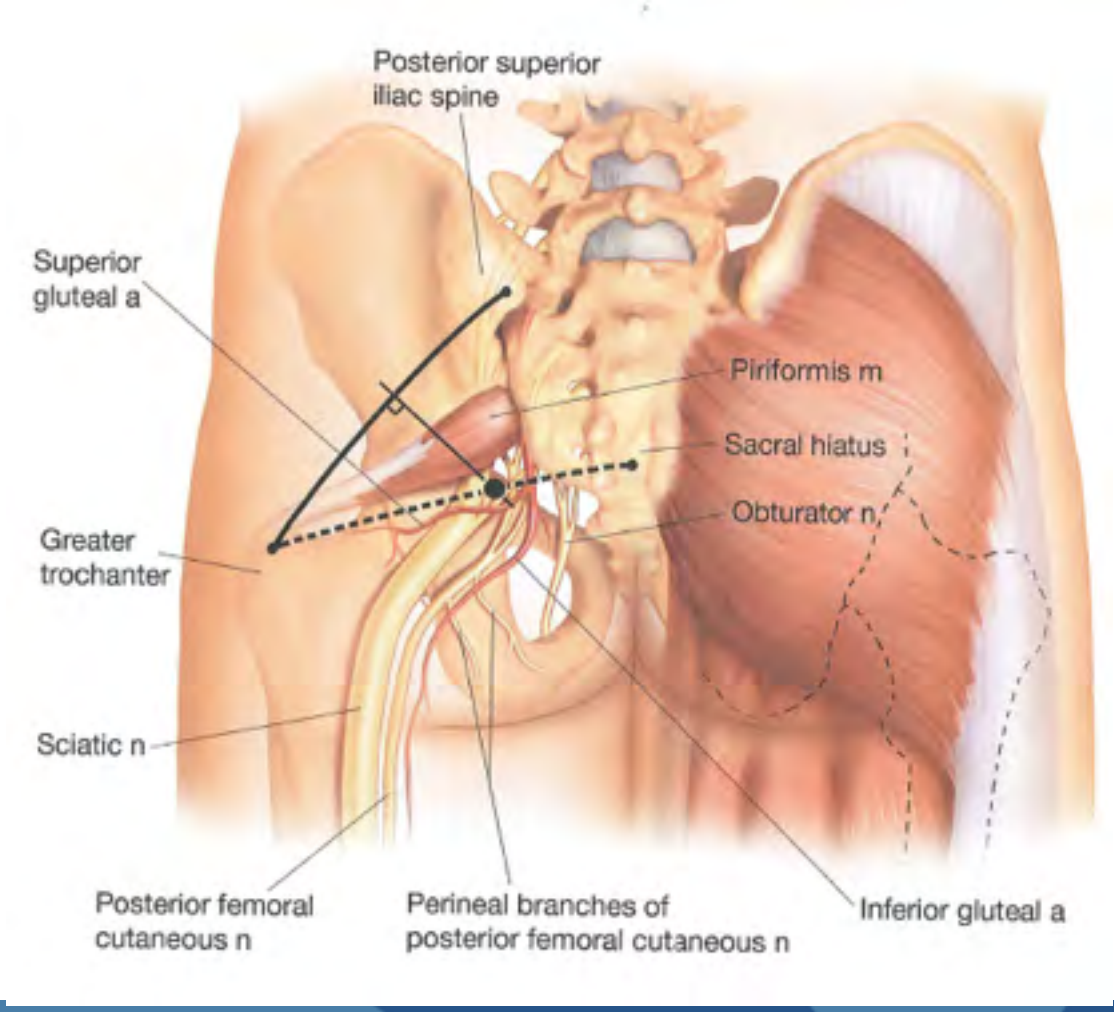
Sciatic Nerv (posterior approach)

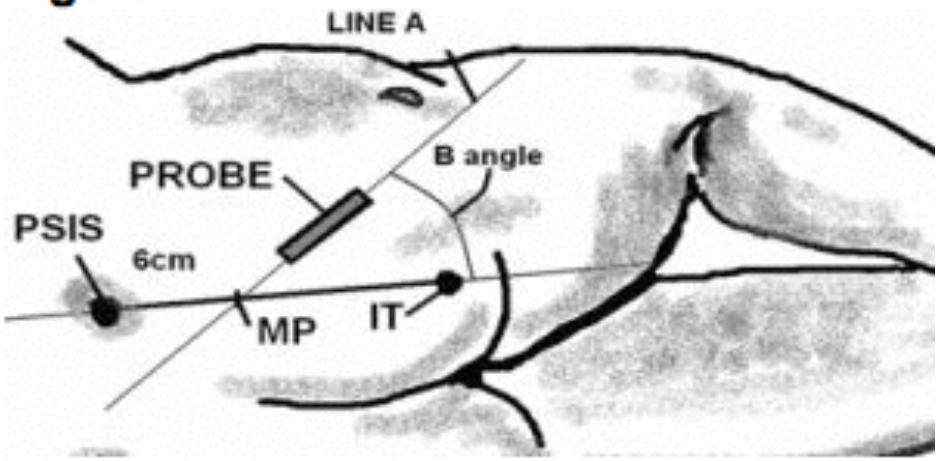


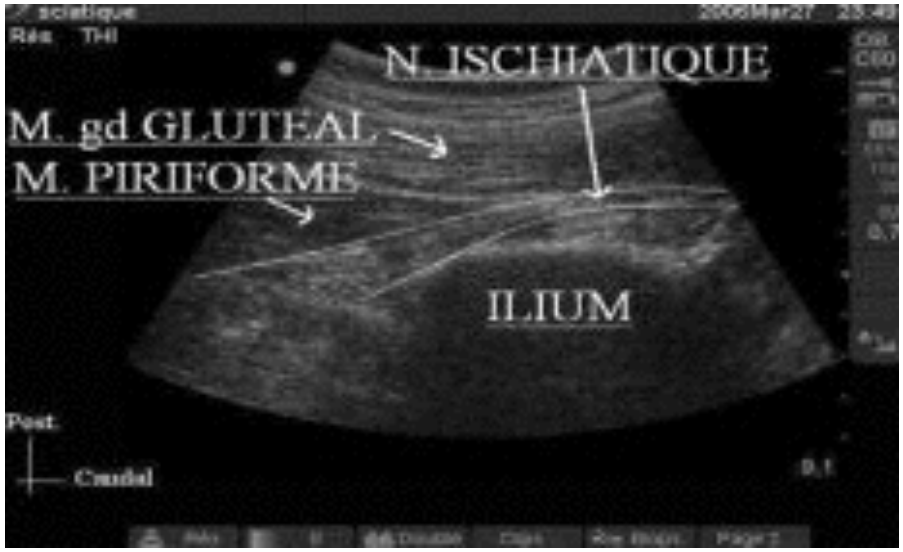
A648
October 14, 2007
9:00 AM - 11:00 AM
Room Hall D, Area F,

Ultrasound Guided Sciatic Nerve Block: A New Parasacral Infra-Piriformis Technique

Eryk Eisenberg, M.D., Guillaume Gindre, M.D., Nicolas Dufeux, M.D., Elisabeth Gaertner, M.D., Vincent Tubert, M.D.
Department of Anesthesiology, Pôle Santé République, Clermont Ferrand, France

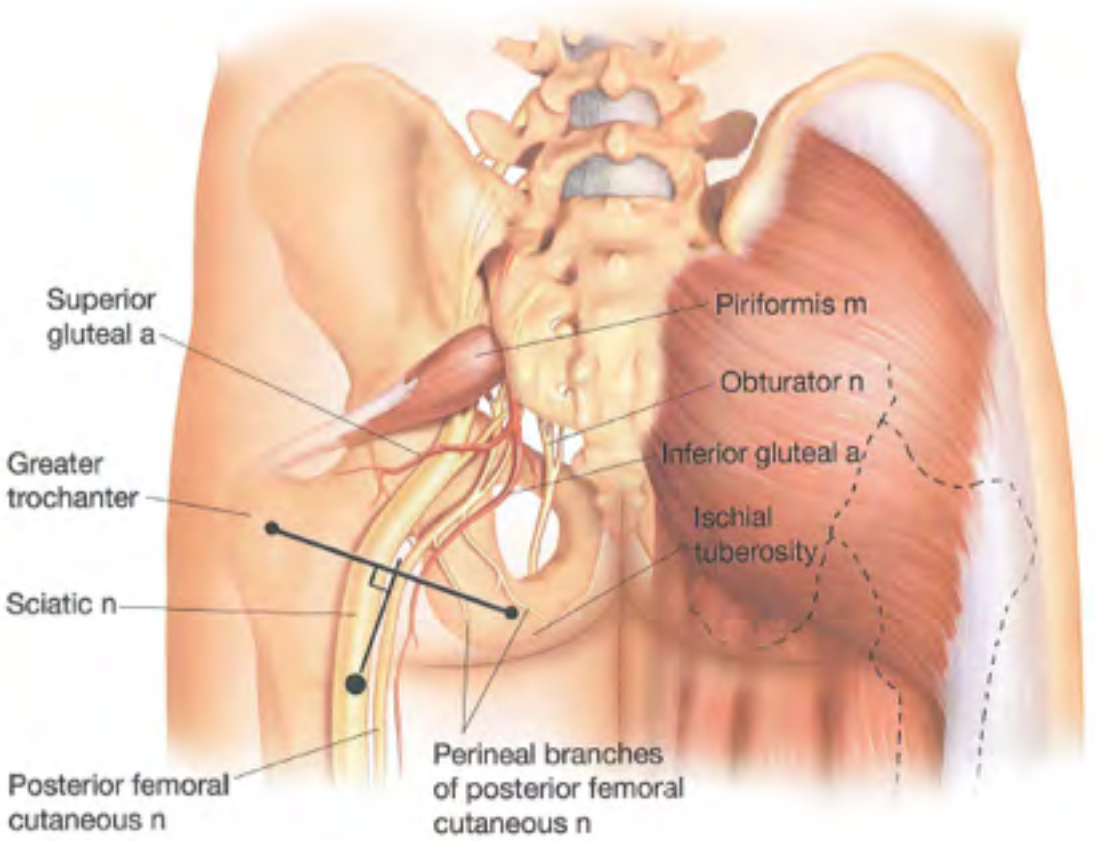
Figure 1

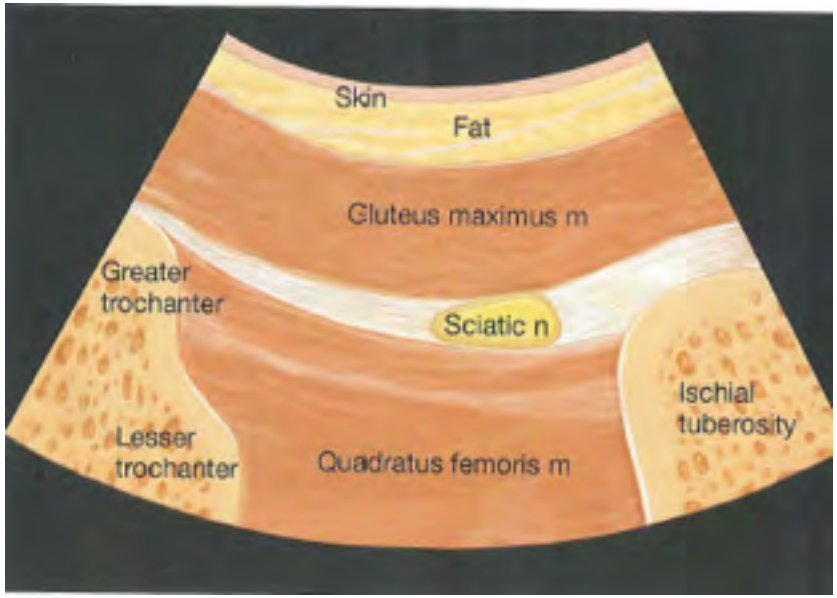




Conclusion: US guided IN block using an infra-piriformis para sacral approach seems to be a convenient and efficient technique. This approach is associated with the same success rate than with the neurostimulated parasacral sciatic nerve block [2]. This visual aided procedure benefits from a lateral and caudal way of approach of the needle associated with a lower risk of accidental vascular or pelvic organ puncture.

Sciatic Nerv (sugluteal approach)



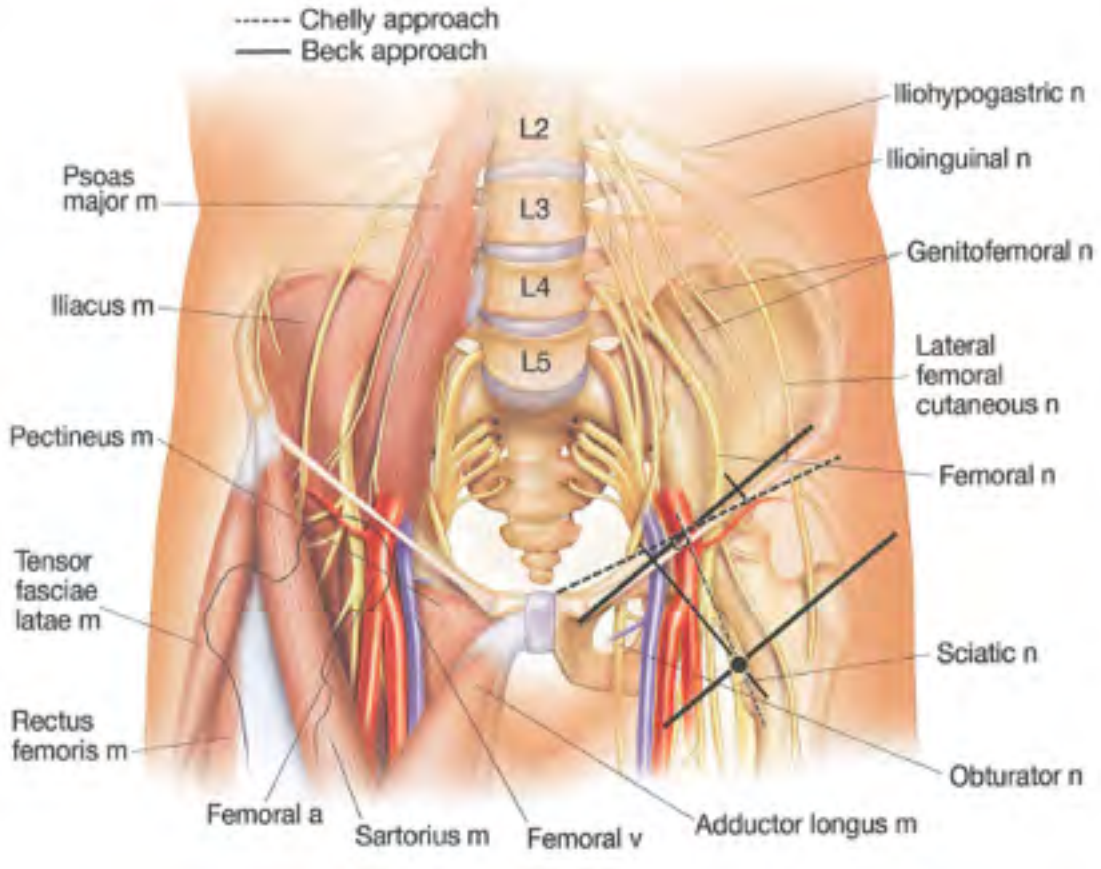

Skin
Fat
Gluteus maximus m
Greater trochanter
Sciatic n
Ischial tuberosity
Lesser trochanter
Quadratus femoris m


OB
C60
MI
0.8
6.6

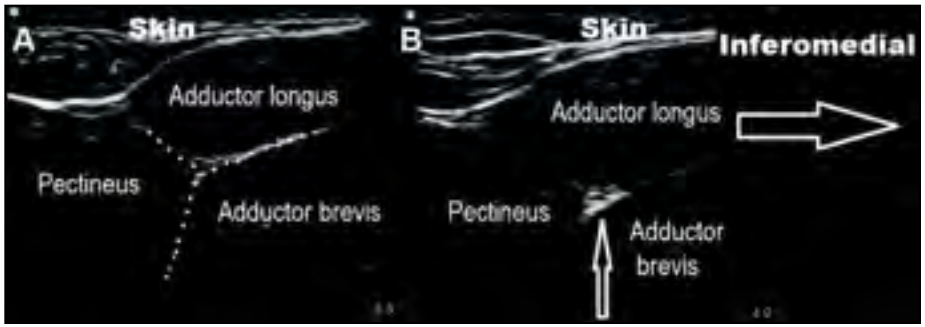

Skin
Fat
Gluteus maximus m
Needle
Local anesthetic
Sciatic n
Ischial tuberosity
Quadratus femoris m
Greater trochanter


C60
6.6

Sciatic Nerv (anterior approach)



Obturator Nerve Block



Ultrasound-Guided Obturator Nerve Block: A Proximal Interfascial Technique.
Taha, Ahmad

Anesthesia & Analgesia. 114(1):236-239, January 2012.
DOI: 10.1213/ANE.0b013e318237fb40

BRIEF REPORT

Ultrasound-Guided Obturator Nerve Block: A Proximal Interfascial Technique

Ahmad Muhammad Taha, MD

BACKGROUND: In this report, I describe and evaluate a proximal ultrasound (US)-guided obturator nerve block technique using an interfascial local anesthetic (LA) injection deep to the pectineus muscle.
METHODS: The pectineus muscle was identified and followed, while the US probe was tilted cranially until the superior pubic ramus was visualized. In this plane, LA was injected interfascially between the pectineus and obturator externus.
RESULTS: The median time required to identify the injection site was 4 seconds (95% confidence interval, 3–5 seconds). The median motor block onset was 4 minutes (95% confidence interval, 3–5 minutes). Both obturator nerve branches were blocked successfully in all patients (100%).
CONCLUSION: The US-guided obturator nerve block using interfascial LA injection inferior to the superior pubic ramus, between the pectineus and obturator externus muscles, was shown to be a simple and successful technique. (Anesth Analg 2012;114:236–9)

Peripheral nerve blocks can provide reliable anesthesia for major knee procedures.[1] In such procedures, it is important to achieve a complete block of the femoral, sciatic, and obturator nerves. Recently, ultrasound (US) guidance has been used to identify the obturator nerve;[2,3] but localization of the nerve may be difficult and may require multiple needle passes for confirmation by electrical stimulation.[2,3] Interfascial US-guided obturator block has also been described,[4] but the success depends on proper identification of the desired fascial plane. The goal of this study was to describe and evaluate a proximal obturator nerve block technique using an US-guided interfascial local anesthetic (LA) injection inferior to the superior pubic ramus, between the pectineus and obturator externus muscles.

METHODS

After obtaining Institutional Ethical Committee approval and the patients' written informed consent, 60 patients who were scheduled to undergo hamstring anterior cruciate ligament (ACL) reconstruction formed the study group.

After application of routine monitoring and supplemental oxygen, all patients received midazolam 4 mg IV. Forty-five milliliters of LA mixture was prepared by mixing 30 mL of 0.5% ropivacaine and 15 mL of 2% lidocaine with epinephrine (1:80,000) (the resultant concentration was 0.33% ropivacaine, 0.67% lidocaine and epinephrine 1:240,000). Skin asepsis and sterile draping were performed, and the US probe was sheathed. All blocks were performed by 1 experienced anesthesiologist using an S-Nerve machine (SonoSite, Inc., Bothell, WA). All patients received US-guided sciatic (at the inferior sciatic level) and femoral nerve blocks as described elsewhere[5,6] using 20 and 10 mL of the same LA mixture, respectively. The US-guided obturator nerve block was then performed.

Block Technique

The obturator nerve block technique used in the current study relied on the identification of the pectineus muscle. On the US image, the hyperechoic fascial borders of the pectineus, adductor longus, and brevis muscles usually form a tricompartmental configuration that visually resembles the letter Y with its stem directed posteriorly. The pectineus muscle lies between the lateral limb and the stem of the letter Y (Fig. 1). The patient's hip was abducted and externally rotated. A linear US probe (SonoSite, HFL38; 13–6 MHz) was placed on the medial aspect of the inguinal crease and aimed posteriorly (Fig. 2). The characteristic letter Y and the pectineus muscle were identified. The US probe was tilted 40 to 50 degrees cranially, until a hyperechoic structure deep and lateral to the pectineus (the inferior margin superior pubic ramus) was visualized. In this plane, a well-defined interfascular fascia was visualized deep to the pectineus muscle separating it from the obturator externus muscle. The most medial part of this fascia was defined as the injection site. A 5-cm, 21-gauge needle (Locoplan, Vygon, France) was inserted inferior to the probe and advanced via out-of-plane approach toward the injection site. Fifteen milliliters of the LA mixture was slowly injected interfascially. During injection, the needle position was adjusted as necessary to achieve spread within the intermuscular fascial layer deep to the pectineus muscle.

Block Assessment and Measurements

The hip was abducted 40 to 60 degrees, and the patient was asked to actively adduct the hip. The motor block was classified as the following: grade 0 = normal hip adduction; grade I = either weak or incomplete hip adduction; and grade II = no hip adduction to any degree. The hip adduction was assessed every minute until the patient had grade II motor block or to a maximum of 30 minutes. Identification time, block onset, success rate, intraoperative opioid supplementation, and any complications were recorded. The identification time was defined as the time from

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The author declares no conflicts of interest.
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DOI: 10.1213/ANE.0b013e318237fb40

Ultrasound-Guided Obturator Nerve Block: A Proximal Interfascial Technique

Ahmad Muhammad Taha, MD

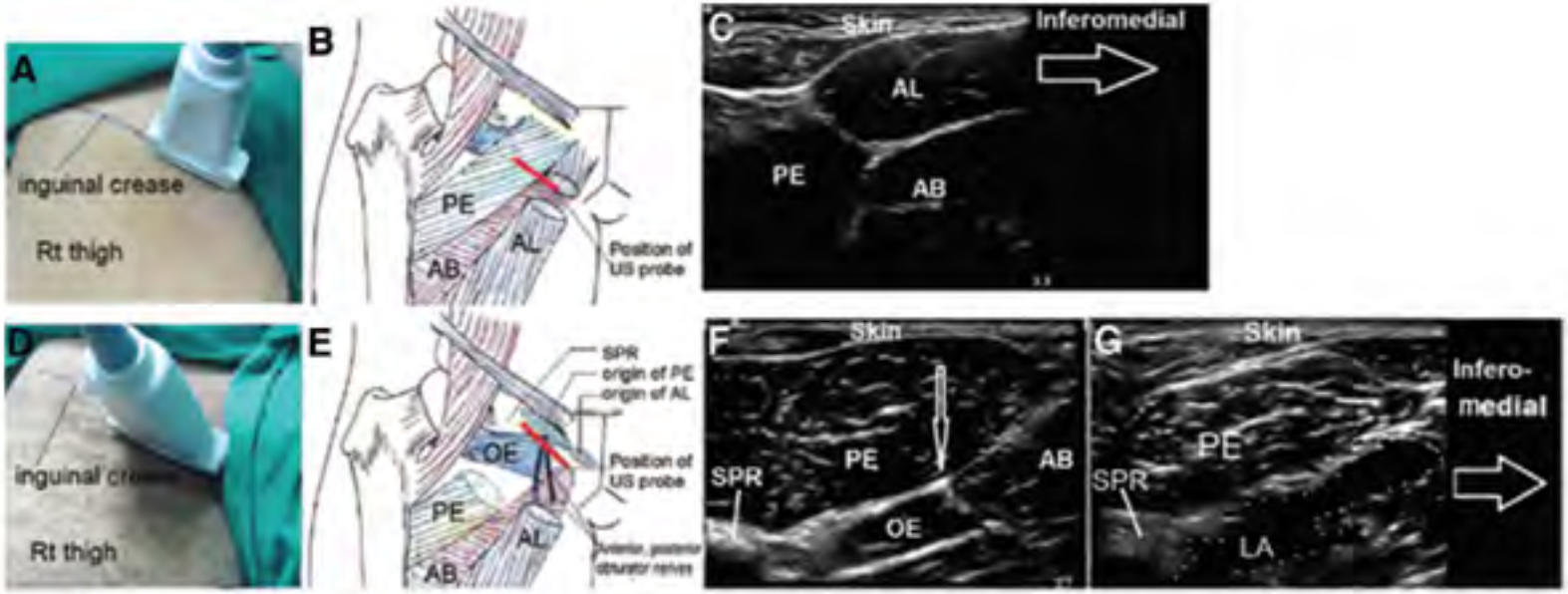
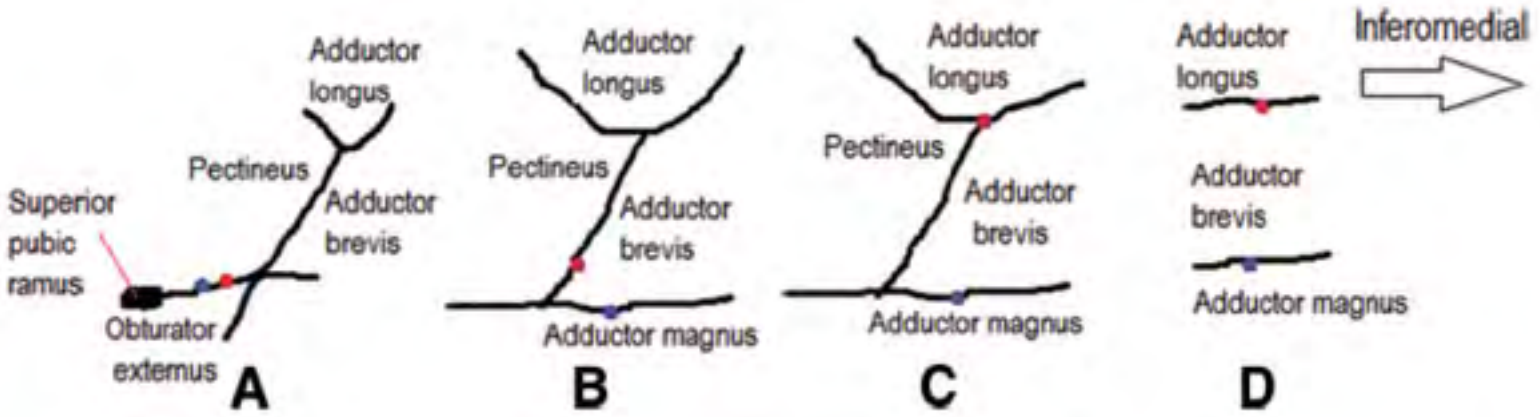


Figure 2. The ultrasound (US)-guided obturator nerve block technique. A and B, The US probe was placed on the medial aspect of the inguinal crease and aimed posteriorly. C, The letter Y and the pectineus (PE) muscle were identified. D and E, The US probe was tilted cranially, while following the pectineus muscle, until the superior pubic ramus (SPR) was visualized (F). In this plane (F), a needle was advanced toward the most medial part (the arrow) of the fascia separating the pectineus and obturator externus (OE) muscles. G, Local anesthetic (LA) was injected to achieve spread within the intermuscular fascial layer deep to the pectineus muscle. AB = adductor brevis; AL = adductor longus.

Ultrasound-Guided Obturator Nerve Block: A Proximal Interfascial Technique

Ahmad Muhammad Taha, MD



BJA

Ultrasound standard for obturator nerve block: the modified Taha's approach

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T. Nakamoto[2]
S-D. Yeh[1]
[1]Taipei, Taiwan
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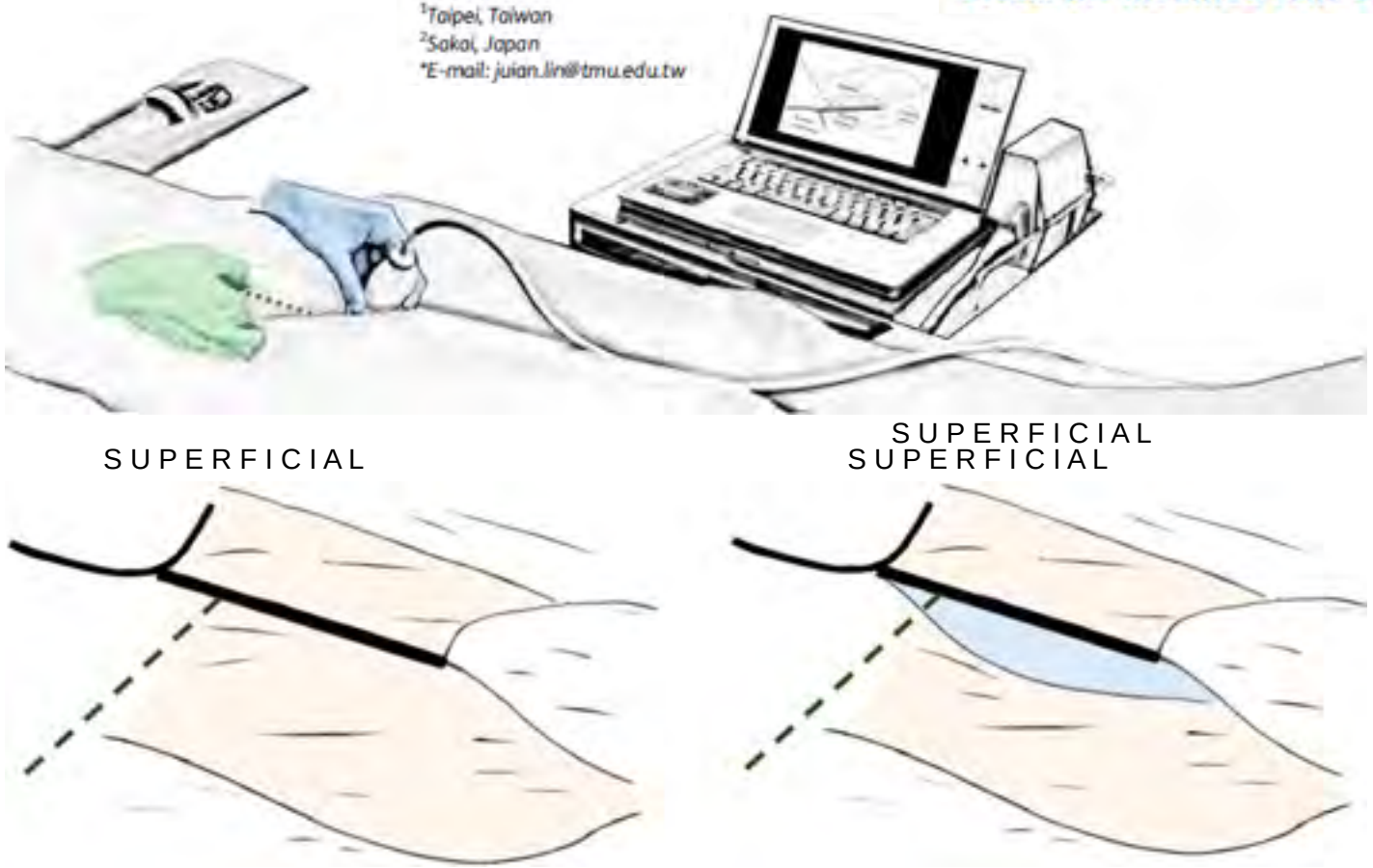

Fig 1 Modified Taha's approach for proximal obturator nerve block. The echogenic needle is inserted by the dominant hand (green hand) from lateral to medial in the inguinal crease with the long axis of the transducer oriented along the visual axis (A). The ultrasound transducer (held by the non-dominant hand in blue) is tilted cephalad as Taha suggested by using the inferior margin of the superior pubic ramus as the bony landmark to find the thick hyperechoic fascia in between the pectineus and obturator externus,[4] but instead is reached with the in-plane needle trajectory (green dotted line) (B). Local anaesthetic spread (blue area) into this thick hyperechoic fascial plane usually results in separation and elevation of the pectineus fascia (C).

Ultrasound-Guided Single-Penetration Dual-Injection Block for Leg and Foot Surgery

A Prospective, Randomized, Double-blind Study

Jens Børglum, MD, PhD, Karina Johansen, MD,* Margrethe D. Christensen, MD,* Katja Lenz, MD,* Thomas F. Bendtsen, MD, PhD,† Katrine Tanggaard,* Anders F. Christensen, MD, PhD,‡ Bernhard Moriggl, MD, PhD,§ and Kenneth Jensen, MD, BBA**

Original Article

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Regional Anesthesia and Pain Medicine • Volume 39, Number 1, January-February 2014

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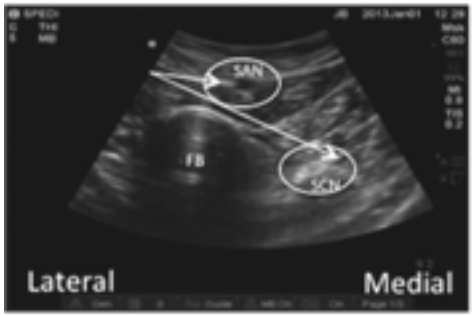
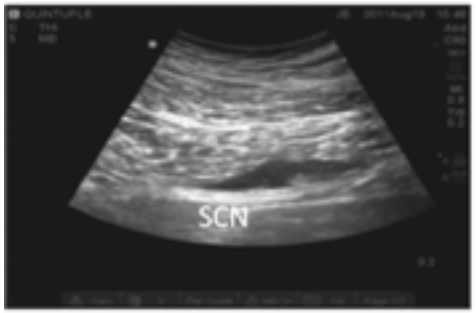
A



B



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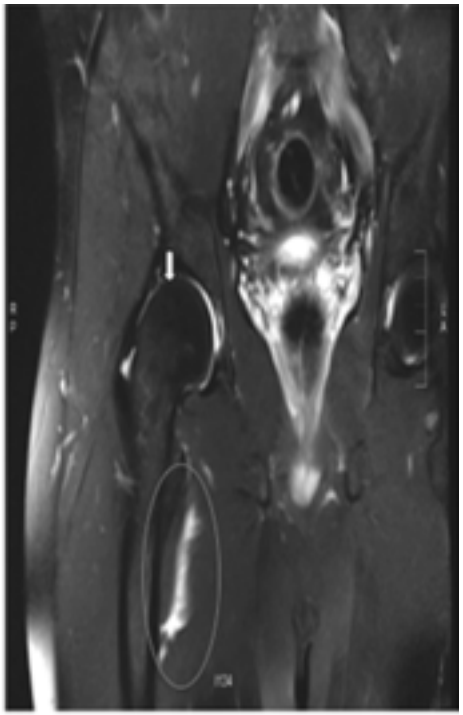

D

E

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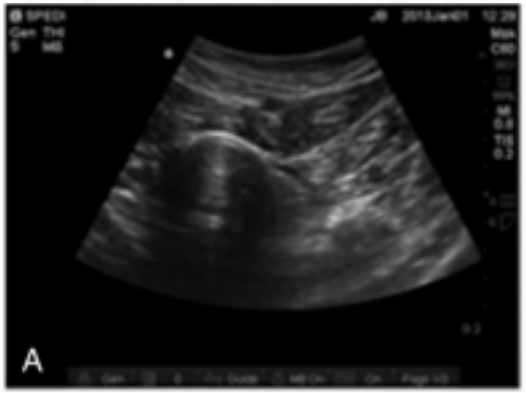
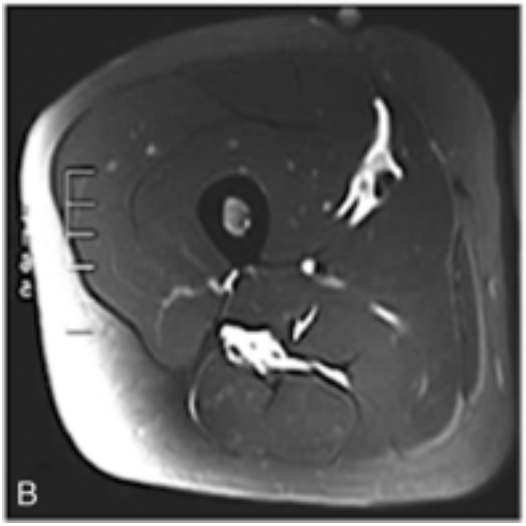
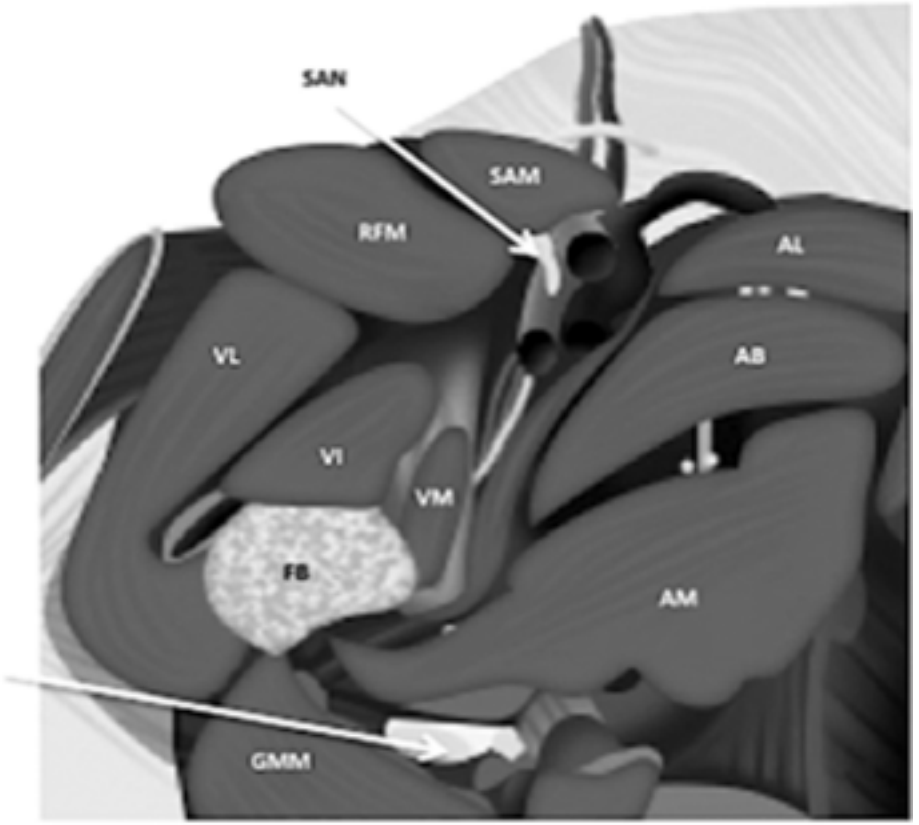




C

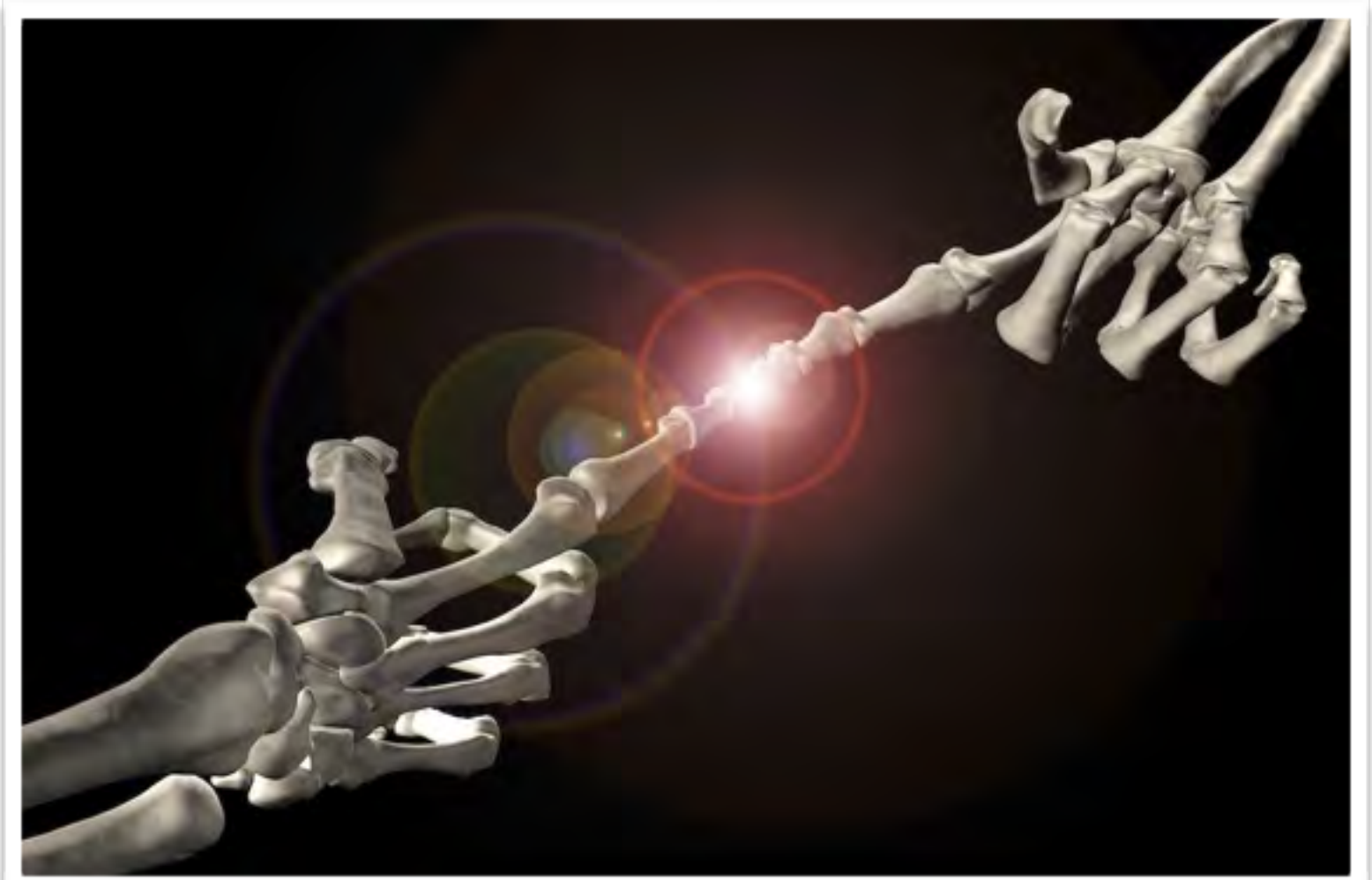


Regional Anesthesia and Pain Medicine • Volume 39, Number 1, January-February 2014

Blockader / Analgesia

- Obturator Nerve block
- Saphenus nerve block

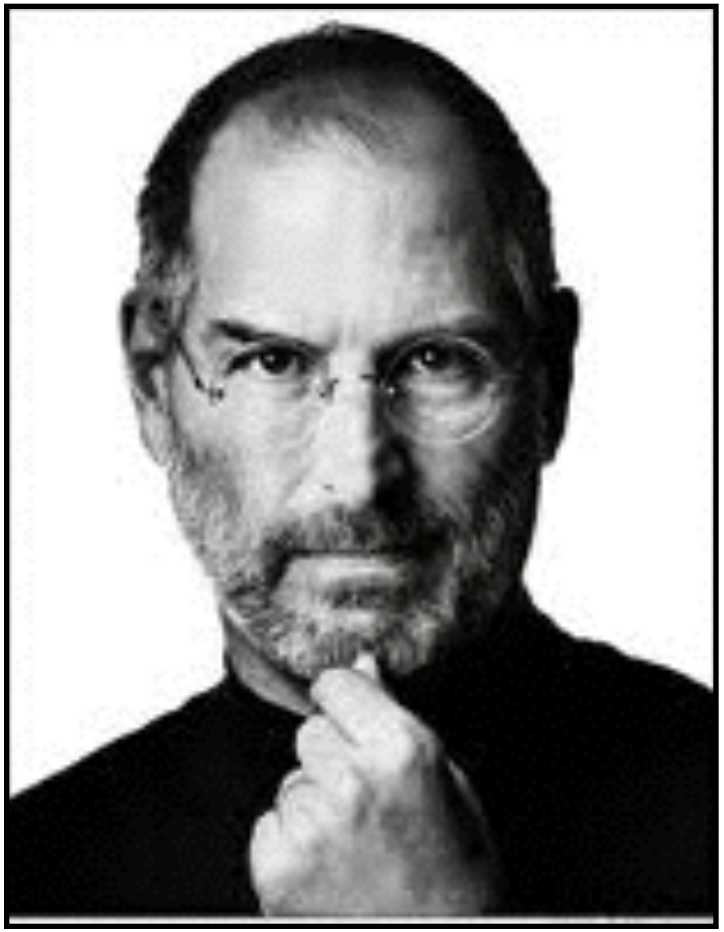
Produktivt samarbete



Framtiden?

- Långverkande lokalbedövning
- Perineural kateter
- Infutionsmumpar med:
  - Remote Control & monitoring
  - Autobolus

Framtiden?



Steve Jobs

”Ditt jobb kommer att fylla en stor del av ditt liv och det enda sättet att bli helt nöjd, är att göra vad du tror är ett fantastiskt jobb.

Och det enda sättet att göra ett fantastiskt jobb är att älska det du gör!"

(Steve Jobs, 2005)

Tack för uppmärksamhet