Blocks of the lower extremity

Two large nerve trunks are responsible for supplying the legs:

the femoral nerve,

the obturator nerve and the

lateral femoral cutaneous nerve arising from the lumbar plexus and the sciatic nerve and the posterior femoral

cutaneous nerve from the sacral plexus.

Thus, it is always necessary to block both nerve trunks to achieve

complete anaesthesia of the leg.

There are various ways to access the branches of the lumbar plexus and to

the sciatic nerve that we will discuss in the following.

Blocks of the lower extremity

- **Indications**
- Operations on a lower extremity distal to the hip, in
- combination with a proximal sciatic nerve block.

- Particularly suited for complex operations on the knee joint or operations using a tourniquet in the inguinal
- region.

- The catheter technique is particularly suited for operations known to have high postoperative analgesia requirements,
- e.g., cruciate ligament grafting, synovectomies, and knee joint replacements.

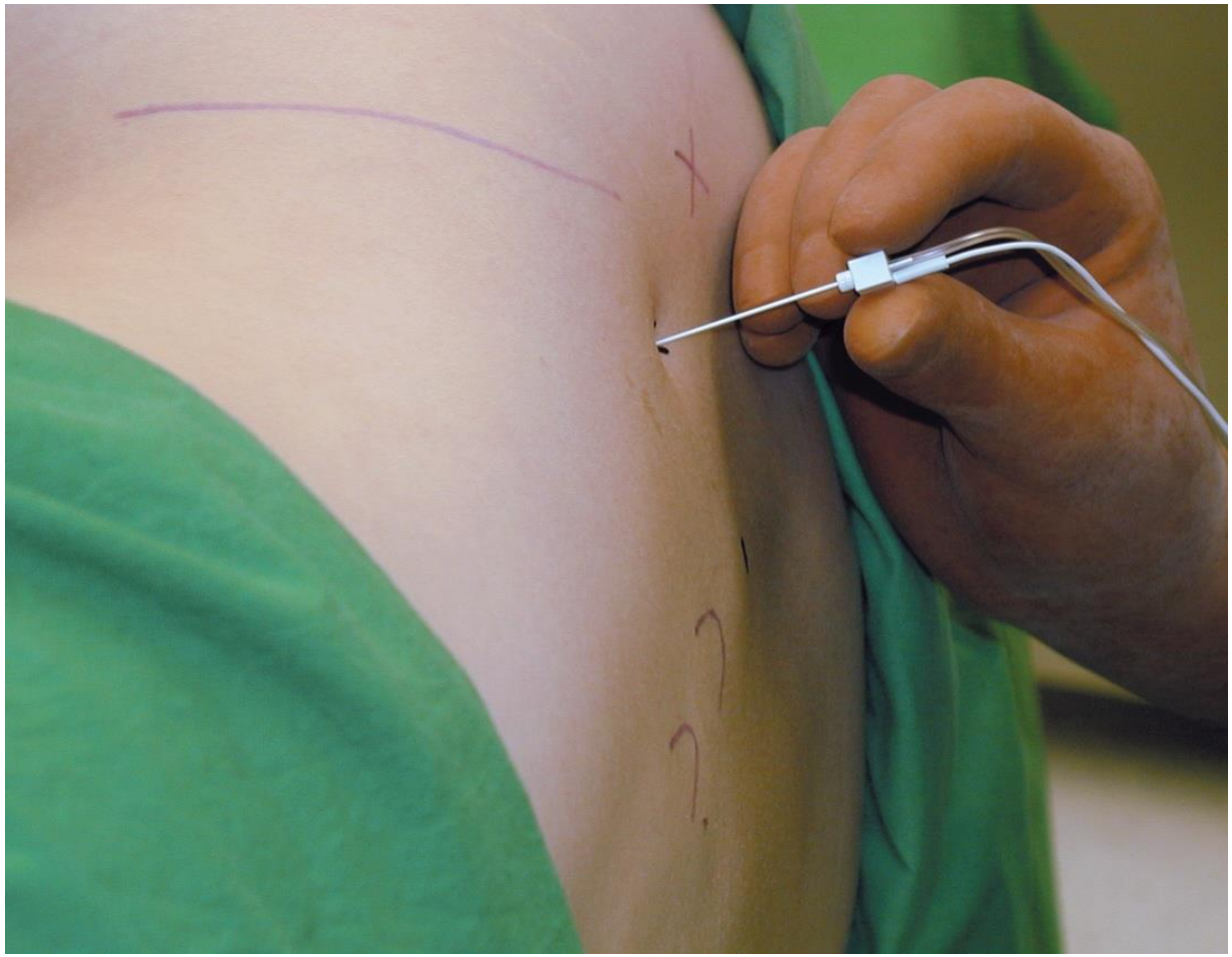
Contraindications

- Coagulation disorders;
- the same rules apply as with as procedures performed close to the spinal cord.
- General contraindications are listed at the end of this chapter.

Psoas block

1. Iliac crest 4. Puncture site
2. Spinous process of L4
5. Puncture site: alternative access
3. Posterior superior iliac spine

Block technique



Blocks of the lower extremity

The patient is placed in the flexed lateral recumbent position.

The landmarks include the spinous process of the 4th lumbar vertebra (L4) and the posterior superior iliac spine, which are marked.

In the event of bone contact with the transverse process of the 5th lumbar vertebra (L5), the puncture direction should be corrected in a cranial direction so as to pass over the transverse process.

The femoral nerve is reached by continuing to advance the needle by 1 – 2 cm.

Once a threshold current of 0.2 -0.3 mA is reached, a test dosage of the local anaesthetic is injected.

This is done in order to rule out an intravascular or intraspinal position of the needle.

If no adverse effect is noted after 1 to 2 minutes, then the remainder of the dosage may be administered.

Psoas block - Dissection on the cadaver

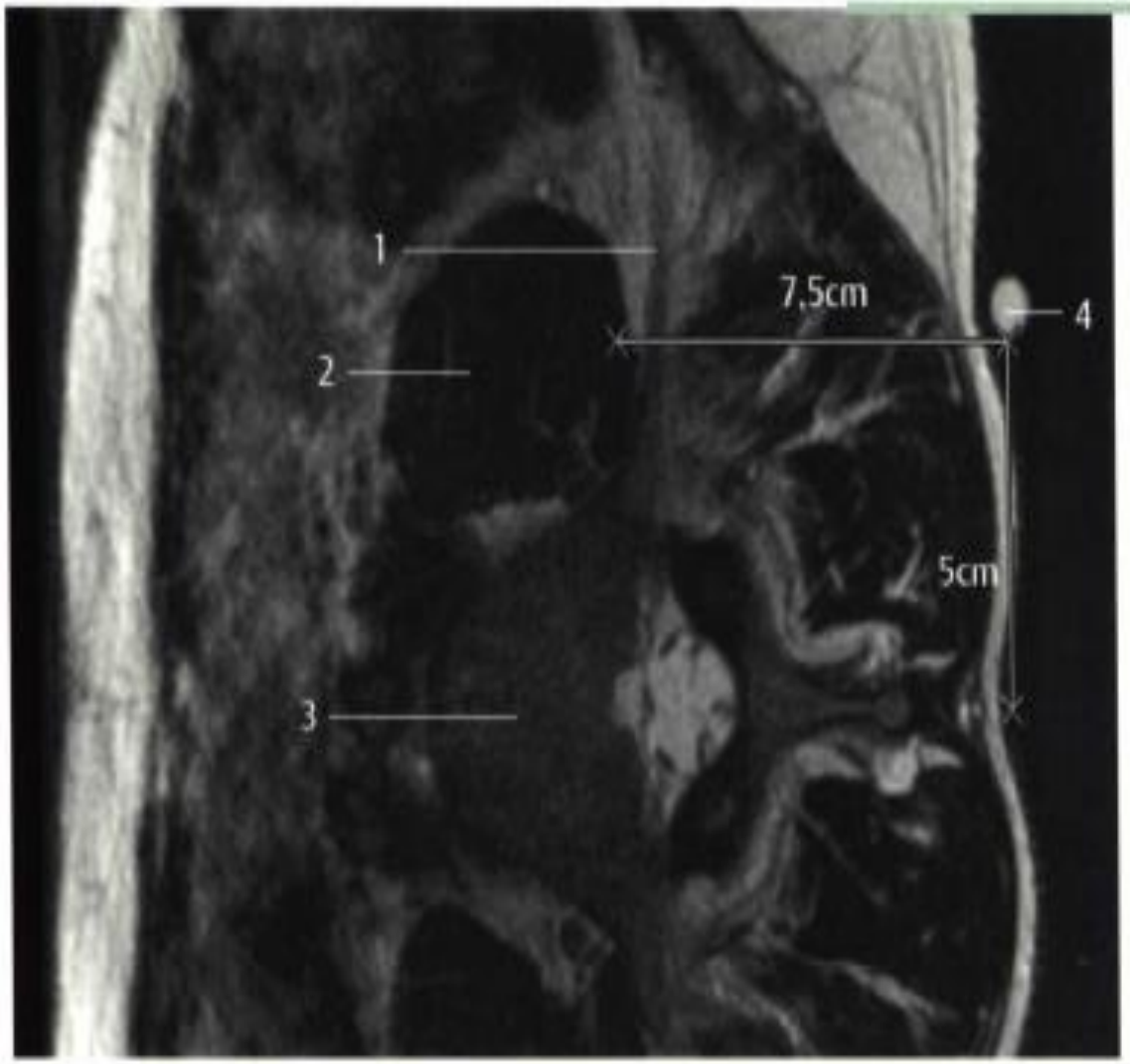


Fig. 8.9 MRI scan at the level of the injection site for psoas compartment block. Note the depth of 7.5 cm at which the psoas major muscle is reached (average male, 75 kg, 185 cm).

1 Transverse process of LV
2 Psoas major
3 LV
4 Puncture site, marked

Fig. 8.**10** Schematic description of anatomy corresponding to the plane of the MR image in Fig. 8.**9**.

1 Lumbar plexus
2 Psoas major
3 LV
4 Psoas fascia
5 Transversalis fascia
6 Erector spinae

Fig. 8.**11** Cross section through a torso at the level of LV, view from above. The lumbar plexus lies embedded with its nerve roots in psoas major muscle. On passing through the quadratus lumborum muscle with the transversalis fascia, a "loss of resistance" is felt. However, the block should generally be performed with the nerve stimulator.

1 Lumbar plexus
2 Psoas major (muscle layers divided to show the lumbar plexus)
3 Quadratus lumborum
4 Transversalis fascia
5 Erector spinae
6 Thoracolumbar fascia
7 Needle tip
8 Vertebral body (L5)

Fig. 8.**13** Section of Fig. 8.**11** enlarged.

1 Psoas major (muscle layers divided to show the lumbar plexus)
2 Nerve roots of the lumbar plexus
3 Needle tip
4 Vertebral body (L5)

Fig. 8.**14** The response is expected in the quadriceps muscle (see assistant's left hand). Aspiration before injection of the LA. Both before injecting through the needle and before injecting through the catheter, as in epidural anesthesia a test dose (3 ml of a medium-acting LA) must be given to exclude an intrathecal position.

TABLE 18.3
Complications of Lumbar Plexus Block and Preventive Techniques

Infection	• A strict aseptic technique is used.
Hematoma	• Avoid multiple needle insertions. • Continuous lumbar plexus blocks are best avoided in patients receiving anticoagulant therapy. • The use of antiplatelet therapy is not a contraindication for this block in the absence of spontaneous bleeding.
Vascular puncture	• Vascular puncture is not common with this technique. • Deep needle insertion should be avoided (vena cava, aorta).
Local anesthetic toxicity	• Higher volume of local anesthetic result in more solid, complete, and faster blockade; however, it carries a higher risk of toxicity. • Large volumes of long-acting anesthetic should be avoided in older and frail patients. • Careful, frequent aspiration should be performed during the injection. • Avoid fast, forceful injection of local anesthetic.
Nerve injury	• The risk of nerve injury after lumbar plexus is low. • Local anesthetic should never be injected when the patient complains of pain on injection or abnormally high pressure is noted. • When stimulation is obtained with current intensity of <0.5 mA, the needle should be pulled back to obtain the same response with a current of 0.5 to 10 mA before injecting local anesthetic to avoid injection into the dural sleeves and the consequent epidural or spinal spread.
Hemodynamic consequences	• Lumbar plexus blockade results in unilateral sympathectomy; as such, significant hypotension is rare in the absence of epidural spread of local anesthetic. • Spread of the local anesthetic to the epidural space may result in significant hypotension and occurs in as many as 15% of patients. • Every patient receiving a lumbar plexus block should be monitored to the same extent as patients receiving epidural anesthesia.

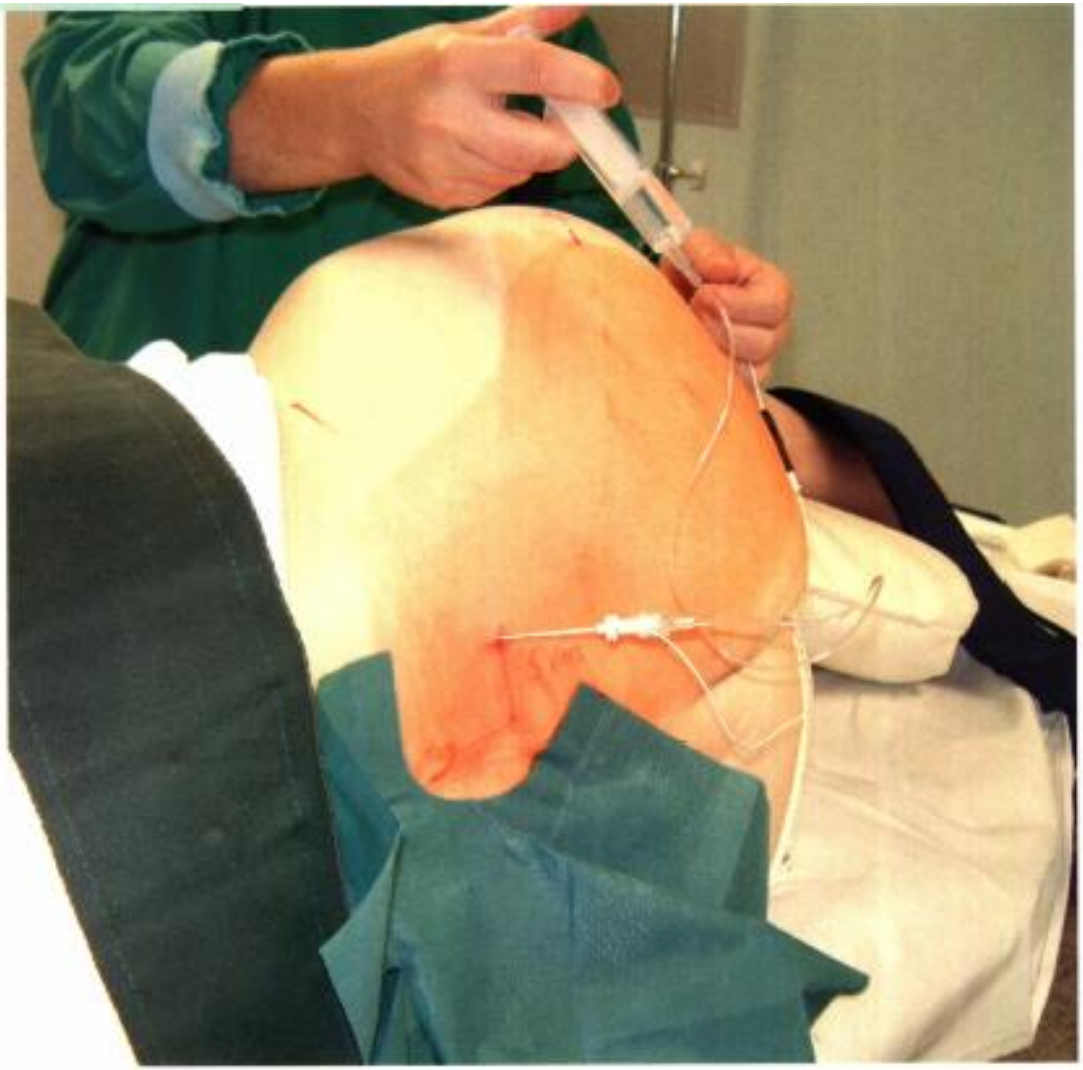
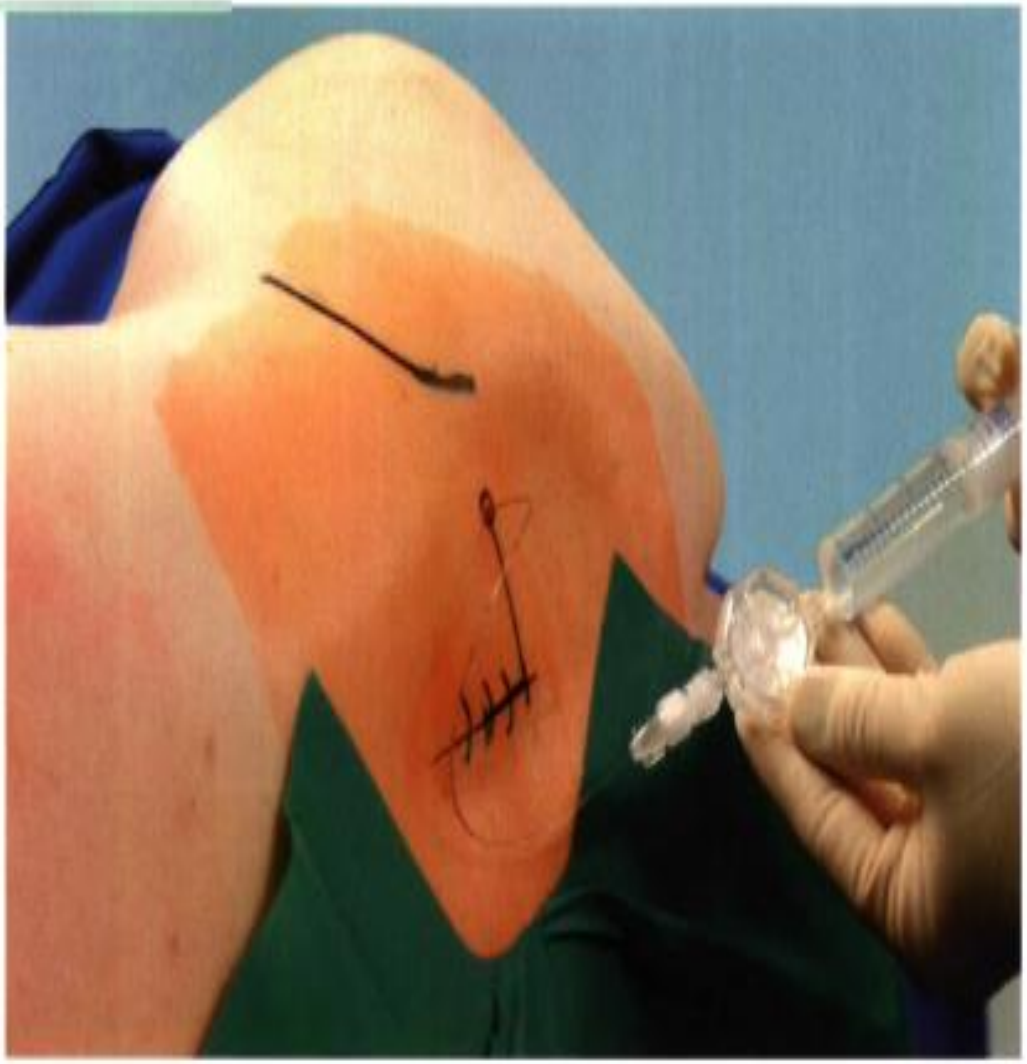


Fig. 8.**15** Initially (following the test dose) 40–50 ml of LA is given. This can be divided when a catheter is being placed (e.g., 20 ml through the needle, 20–30 ml through the catheter).

Fig. 8.**18** After advancing the catheter, further injection of a test dose to exclude an intrathecal position.



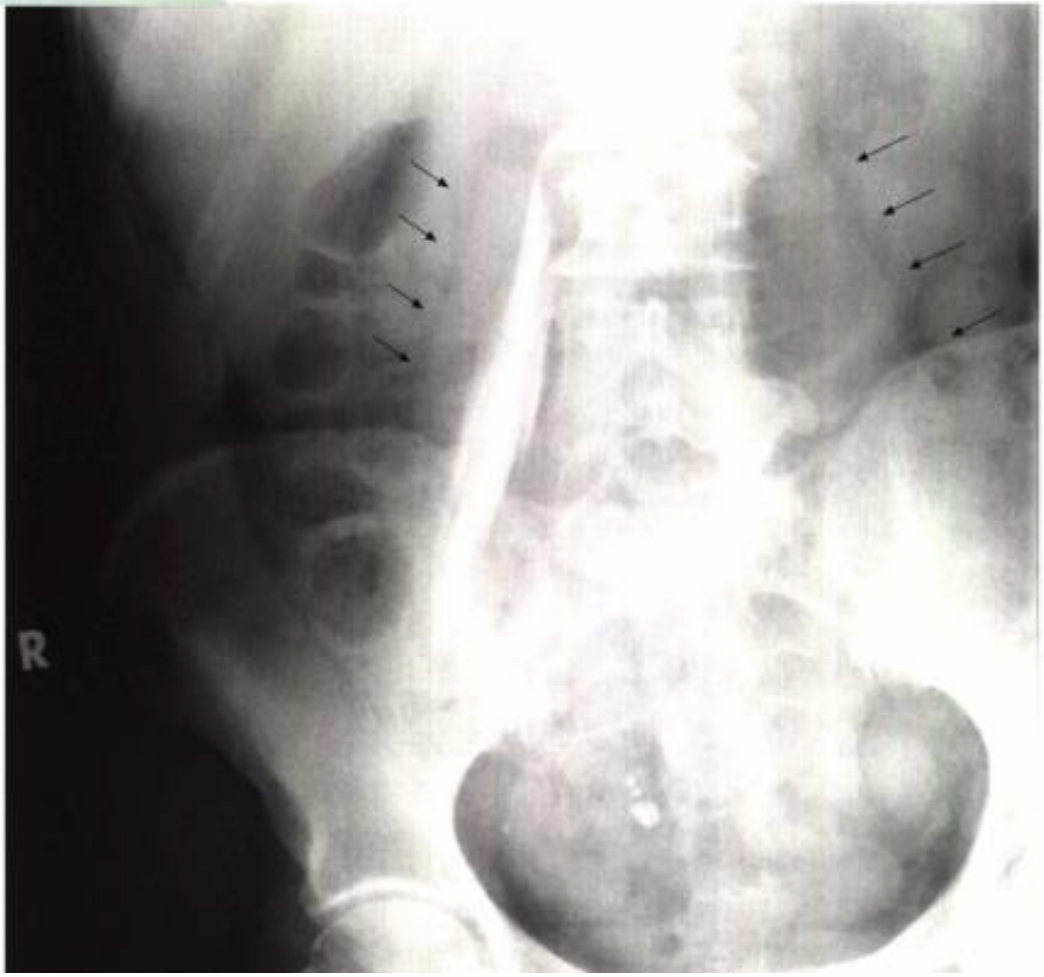


Fig. 8.**19** Spread of contrast with correct psoas compartment block. Note the shadow of the psoas edge.
Arrows: Psoas edge shadow

Fig. 8.**20** Advancing the catheter too far can lead to an epidural position with corresponding spread and effect of the LA (see contrast). For this reason the patient requires adequate monitoring after injection of the LA, as a test dose does not exclude an epidural position. By withdrawing the catheter 7.5 cm, a correct catheter position was obtained in this case. (The radiograph was kindly provided by H. Kaiser.)

Indications

Operations on a lower extremity distal to the hip, in combination with a proximal sciatic nerve block.

Particularly suited for complex operations on the knee joint or operations using a tourniquet in the inguinal region.

The catheter technique is particularly suited for operations known to have high postoperative analgesia requirements, e.g., cruciate ligament grafting, synovectomies, and knee joint replacements.

PSOAS Contraindications

Coagulation disorders; the same rules apply as with as procedures performed close to the spinal cord. General contraindications are listed at the end of this chapter.

Side effects/complications of the psoas block

Atypical (epidural anaesthesia-like) bilateral blockade

Intrathecal injection with high bilateral dissemination of anaesthesia

Fig. 8.**23** Psoas compartment block, lateral view. Because of the risk of penetrating the peritoneal cavity, the depth of needle penetration should not exceed 11 cm.

1 Psoas major

2 Lumbar plexus

3 Peritoneum

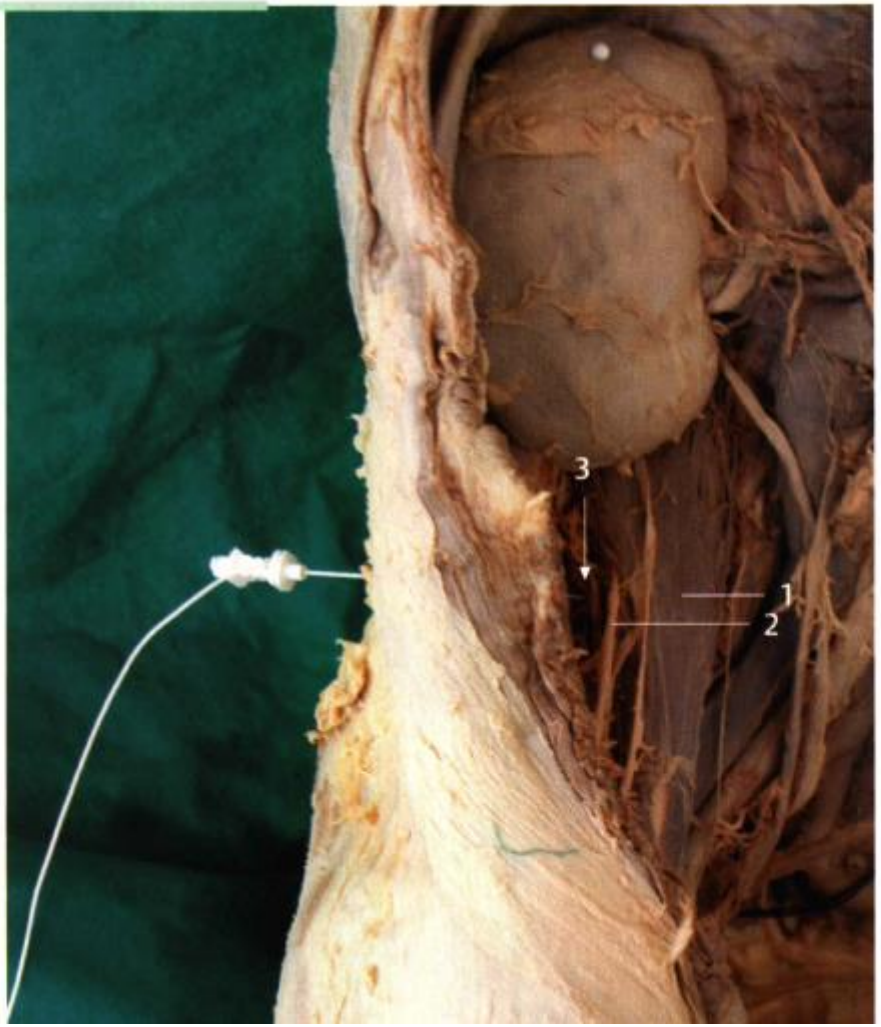


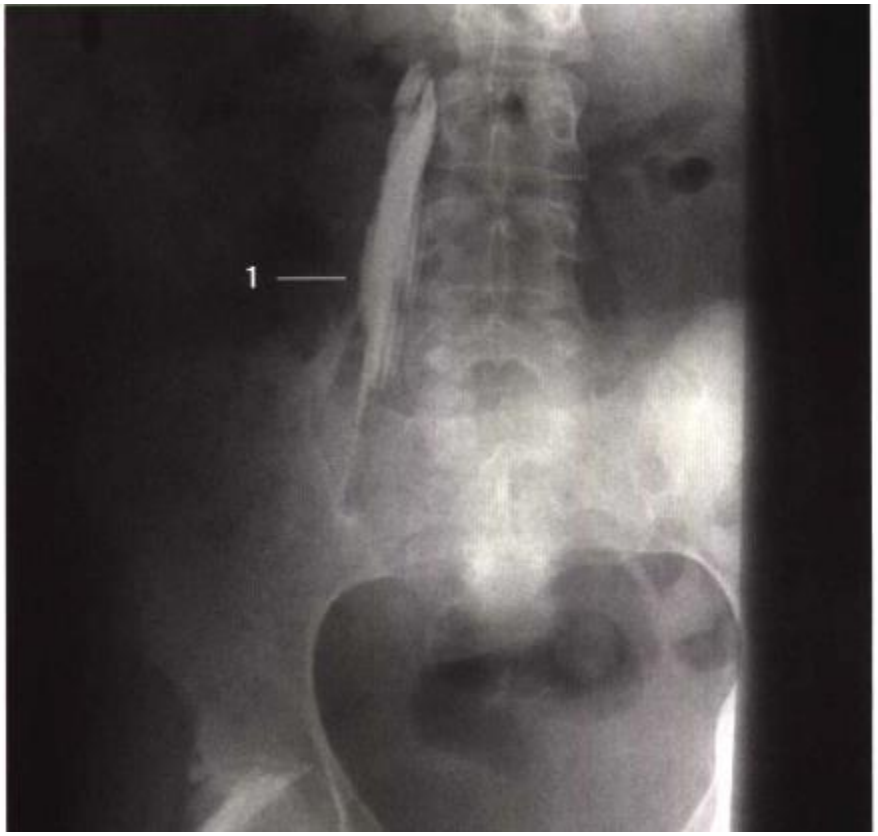
Fig. 8.**24** Psoas compartment block, anterior view. Note the safe distance from the lower pole of the kidney when LIV is the reference level for determining the puncture site.

1 Psoas major
2 Lumbar plexus
3 Needle tip

- Use nerve stimulation. Combination with a loss of resistance technique can simplify the procedure.
- Excessively deep injection (over 11 cm) should be avoided (see below).
- A test dose is indispensable (exclusion of an intrathecal position).
- A volume of 30-50 ml of the LA is required for sufficient anesthesia.
- If the lateral cutaneous nerve of the thigh has a very high origin from the plexus, incomplete anesthesia of the outside of the thigh is possible (rare compared to inguinal lumbar plexus block) (Bruelle et al. 1998).
- An intrathecal or epidural position can be excluded by a radiological check of the catheter's position.

Fig. 8.**26** Spread of contrast in combined psoas compartment and sciatic nerve block. Initially, e.g., about 30 ml of a 1% (10 mg/ml) medium-acting local anesthetic (prilocaine/mepivacaine) in combination with 15(–20) ml of 0.375% (3.75 mg/ml) ropivacaine or 10 ml of ropivacaine 0.75% (7.5 mg/ml) can be given in each catheter.

1 Spread of contrast in psoas compartment block
2 Spread of contrast in sciatic nerve block



8.7 Summary

Psoas compartment block can be performed in sitting position or with the patient lying on his or her side. It consists of a cranial approach to the lumbar plexus with a high success rate. The procedure requires sterile conditions. Full supervision and monitoring of the patient must be ensured. During this monitoring, the possibility of the development of epidural-like spread or spinal anesthesia must be borne in mind. Peritoneal infections, coagulation disorders, and major abnormalities of the spine must be regarded as contraindications. In combination with sacral plexus block, the technique leads to sufficient anesthesia in operations on the leg and is well suited for pain therapy and mobilization with operations on the hip and knee.

6.2 Single-shot technique - lower extremity

Block	Target muscle	Stimulation needle	Drugs	Dosage
Psoas block (Approach according to Chayen)	Quadriceps muscle (usually vastus lateralis muscle) (Stimulus response: femoral nerve)	Stimuplex® D 80 - 120mm 15° bevel, 22 G	1% Scandicaine® (for puncture channel infiltration) 1% Xylonest® 0.5% Naropin® (or 0.5%Carbostesine®)	3ml 30-40ml 10ml
Femoral nerve block	Rectus muscle of the thigh ("dancing knee-cap") (Stimulus response: femoral nerve)	Stimuplex® D 50 mm 15° bevel, 22 G	1% Scandicaine® (Skin weal) 1% Xylonest® 0.5% Naropin® (or 0.5% Carbostesine®)	0.5ml 30-40ml 10ml
Saphenous nerve block	Paraesthesia on the medial lower leg **Important**: 1.0 ms pulse duration (Stimulus response: saphenous nerve)	Stimuplex® D 50 - 80-mm 15° bevel, 22 G	1% Scandicaine® (Skin weal) 1% Xylonest® and/or 0.5% Naropin® (or 0.5% Carbostesine®)	0.5ml 10-15ml
Obturator nerve block	Adductor group -> Adduction of thigh (Stimulus response: obturator nerve)	Stimuplex® D 80 - 100mm 15° bevel, 22 G	1% Scandicaine® (for puncture channel infiltration) 1% Xylonest® and/or 0.5% Naropin® (or 0.5% Carbostesine®)	3ml 10-15ml
Parasacral sciatic nerve block (Approach according to Mansour)	Extensors and/or flexors of feet/toes (Stimulus response: peroneal or tibial nerves)	Stimuplex® D 80 - 120mm 15° bevel, 22 G	1% Scandicaine® (for puncture channel infiltration) 1% Xylonest® 0.5% Naropin® (or 0.5% Carbostesine®)	5ml 20-30ml 10ml
Transgluteal sciatic nerve block (Approach according to Labat)	Extensors and/or flexors of feet/toes (Stimulus response: peroneal or tibial nerves)	Stimuplex® D 80 - 100mm 15° bevel, 22 G	1% Scandicaine® (for puncture channel infiltration) 1% Xylonest® 0.5% Naropin® (or 0.5% Carbostesine®)	5ml 20-30ml 10ml
Anterior sciatic nerve block (Approach according to Meier)	Extensors and/or flexors of feet/toes (Stimulus response: peroneal or tibial nerves)	Stimuplex® D 100 - 120mm 15° bevel, 22 G	1% Scandicaine® (for puncture channel infiltration) 1% Xylonest® 0.5% Naropin® (or 0.5% Carbostesine®)	5ml 20-30ml 10ml
Subtrochanteric sciatic nerve block (Approach according to Guardini)	Extensors and/or flexors of feet/toes (Stimulus response: peroneal or tibial nerves)	Stimuplex® D 80 - 100mm 15° bevel, 22 G	1% Scandicaine® (for puncture channel infiltration) 1% Xylonest® 0.5% Naropin® (or 0.5% Carbostesine®)	5ml 20-30ml 10ml
Lateral distal sciatic nerve block	Extensors and/or flexors of feet/toes (Stimulus response: peroneal or tibial nerves)	Stimuplex® D 50 - 80-mm 15° bevel, 22 G	1% Scandicaine® (Skin weal) 1% Xylonest® 0.5% Naropin® (or 0.5% Carbostesine®)	2ml 30-40ml 10ml

The technique described here is often called the 3-in-1 block. This name derives from the fact that one injection blocks three nerves (femoral, obturator and lateral femoral cutaneous).

However,our own clinical studies suggest that the sensory supply to the thigh is primarily provided by the femoral nerve or its cutaneous branches.

It has additionally become widely accepted that, even though an inguinal femoral nerve block can block the lateral femoral cutaneous nerve when an adequate volume of local anaesthetic is
injected, but, due to the subfascial dissemination to the lateral, the obturator nerve cannot be blocked.

Insurmountable anatomical barriers (including the iliopsoas muscle among others) counteract the simultaneous
spread of the local anaesthetic to the mediodorsal.

Fig. 9.**1** Anatomical overview of the lumbar plexus and the femoral nerve.

1 Obturator nerve
2 Femoral nerve
3 Lateral cutaneous nerve of the thigh
4 Inguinal ligament

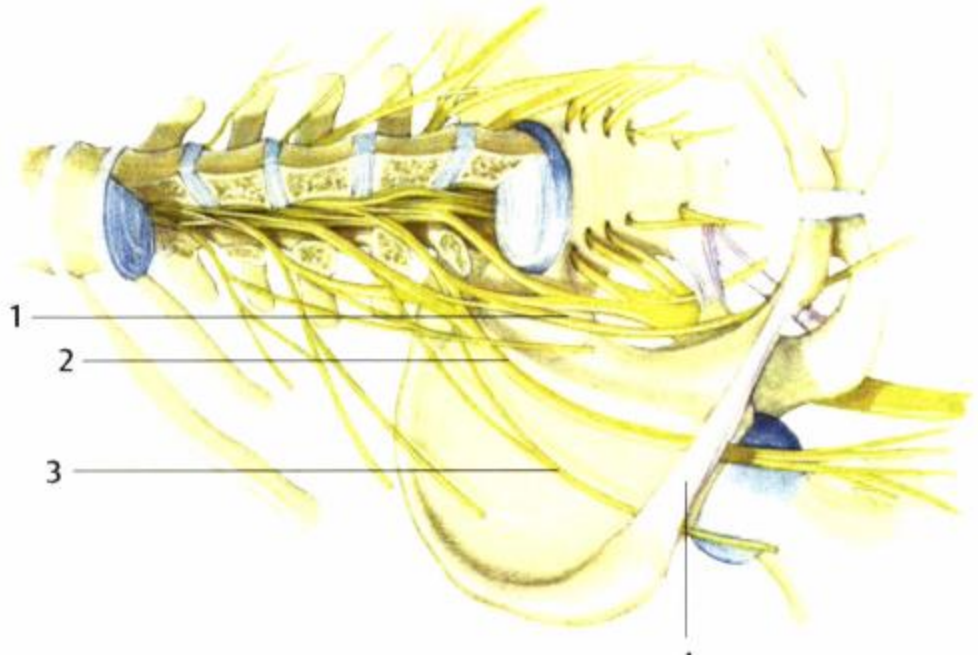
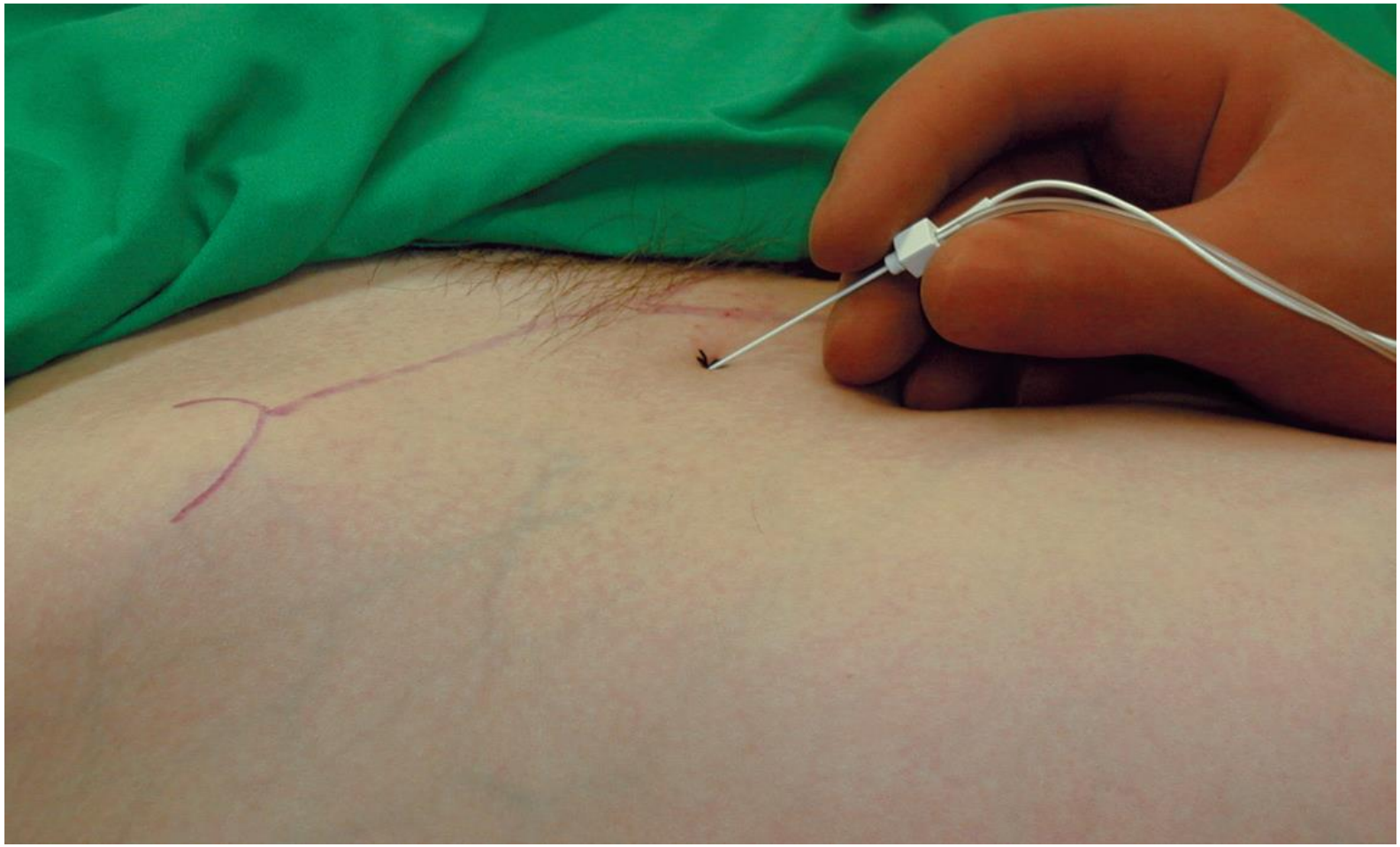


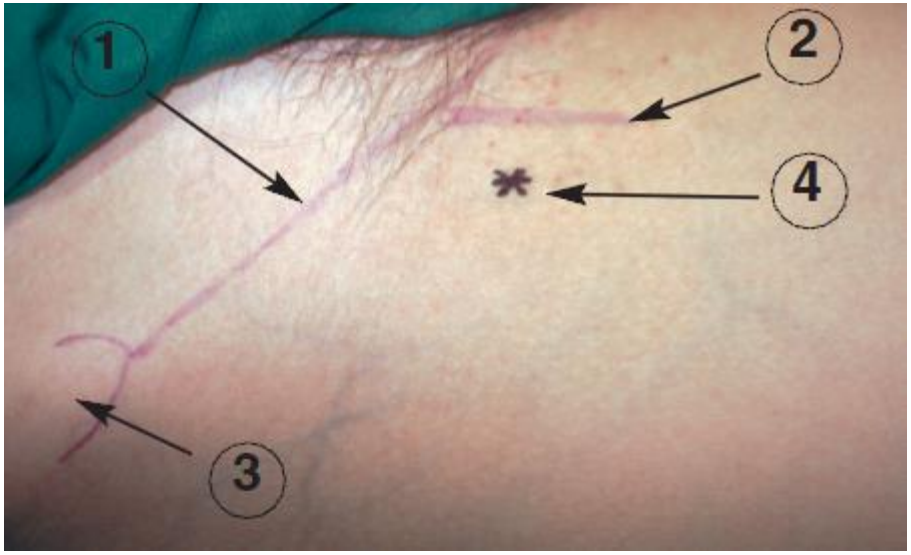
Fig. 9.**2** Lumbar plexus with femoral nerve and obturator nerve. Note the arcus ileopectineus, a sheet of connective tissue that separates the vascular lacuna from the muscular lacuna. In femoral nerve block, the psoas muscle may prevent spread of the local anesthetic to the obturator nerve proximal to the inguinal ligament. Distal to the inguinal ligament, the spatial distance and separation by the iliac fascia make inclusion of the obturator nerve by a femoral nerve block almost impossible.

1 Psoas
2 Femoral nerve
3 Arcus ileopectineus
4 Obturator nerve
5 Femoral artery
6 Inguinal ligament

Fig. 9.**3** Cranial view of the right inguinal region. Note that the fascia lata and the iliac fascia have to be penetrated to block the femoral nerve ("double-click").

1 Femoral artery
2 Fascia lata
3 Iliac fascia with arcus iliopectineus
4 Genitofemoral nerve
5 Femoral nerve
6 Psoas major
A Anterior superior iliac spine
B Symphysis

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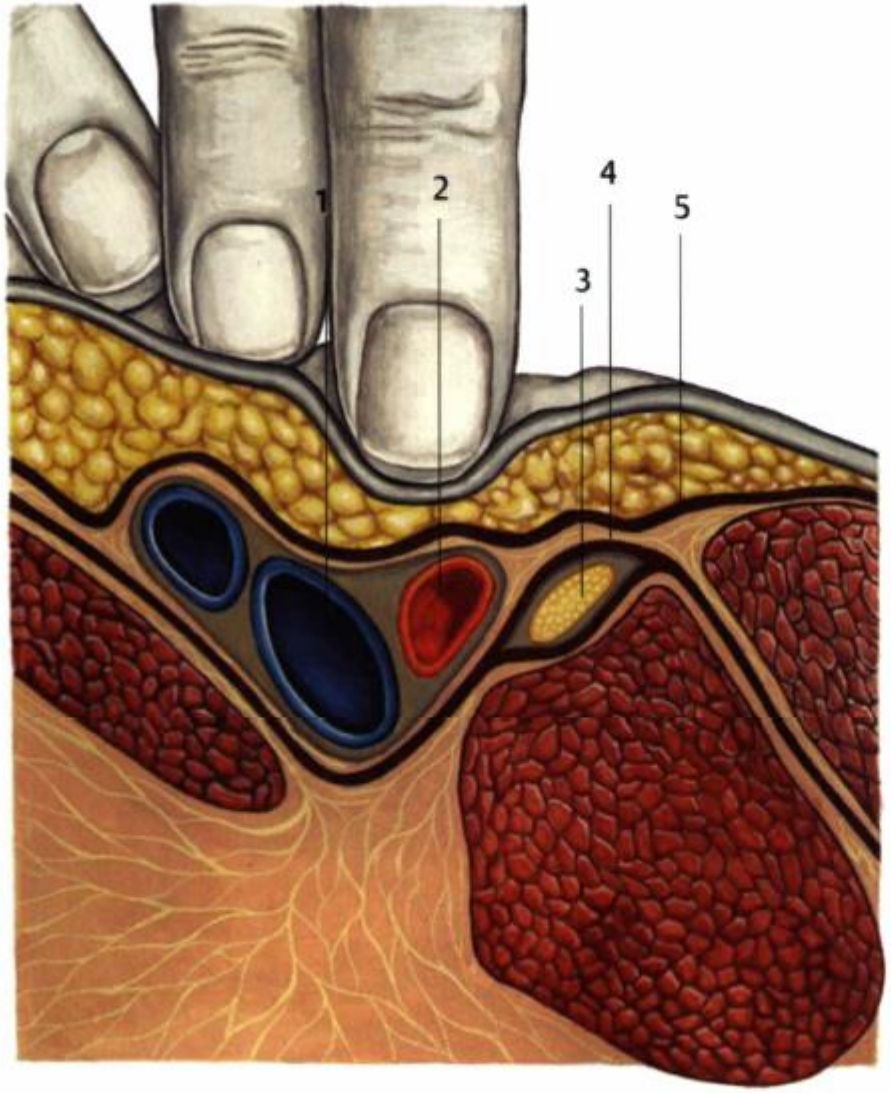


Fig. 9.**4** Cranial view of the right inguinal region. Note that the fascia lata and the iliac fascia have to be penetrated to block the femoral nerve ("double-click," see also Fig. 9.**3**).

1 Femoral vein
2 Femoral artery
3 Femoral nerve
4 Iliac fascia
5 Fascia lata

Fig. 9.**5** Anatomical overview of the inguinal region: note IVAN (Inside Vein, Artery, Nerve).

1 Lateral cutaneous nerve of the thigh
2 Femoral nerve
3 Femoral artery
4 Femoral vein
5 Obturator nerve

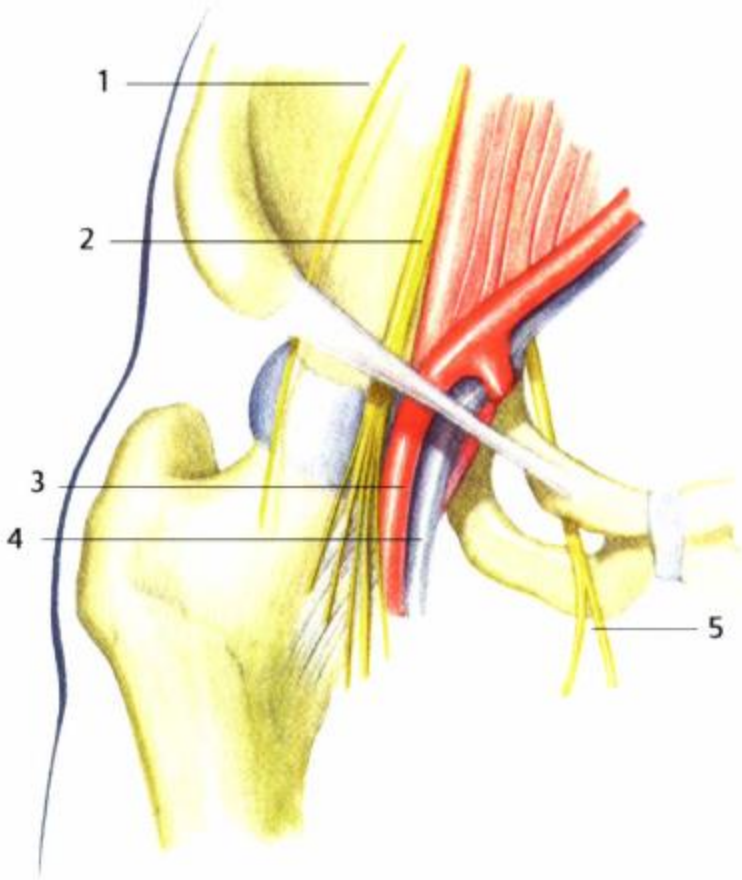


Fig. 9.**6** Anatomical overview of the inguinal region: note IVAN (Inside Vein, Artery, Nerve). The femoral nerve has a cauda equina-like division after passing through the inguinal ligament.

1 Sartorius
2 Femoral nerve (looped)
3 Femoral artery
4 Femoral vein
5 Branch of the obturator nerve

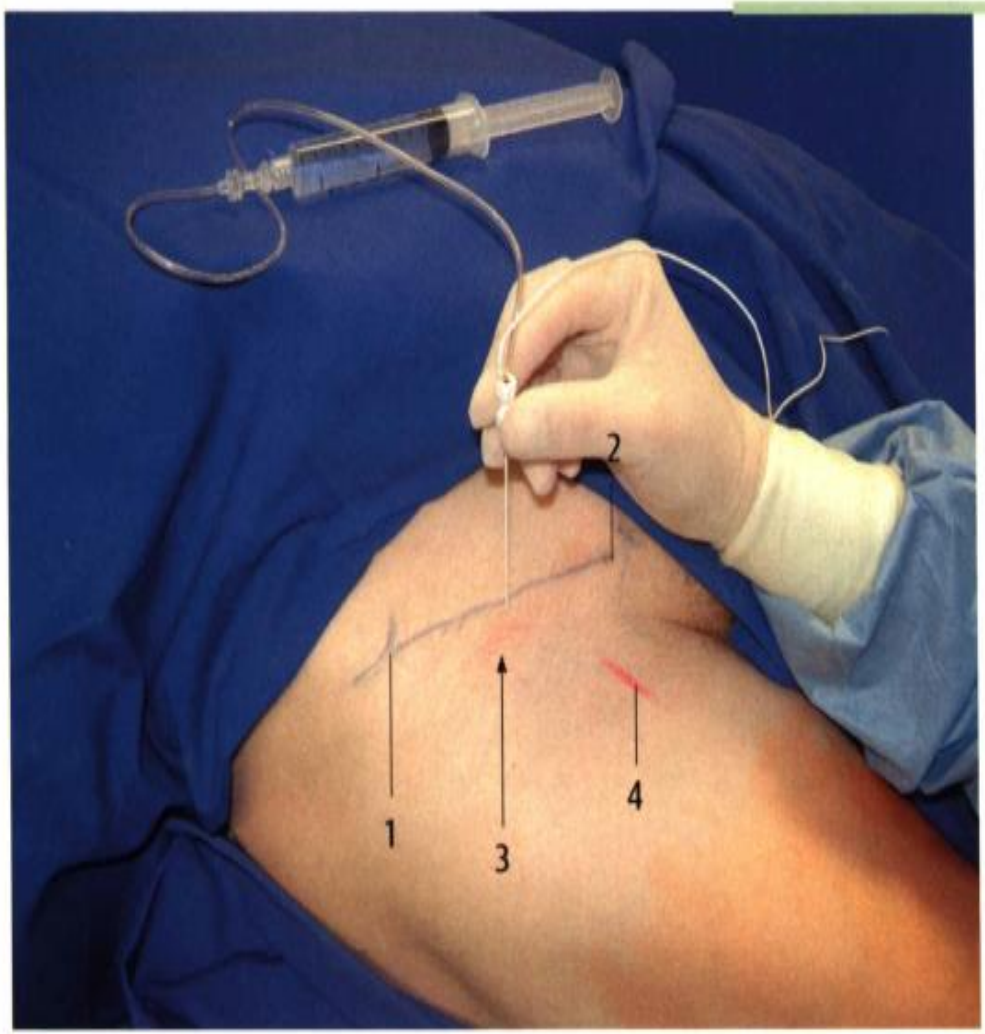


Fig. 9.7 Classical injection site according to Winnie and Labat just below the inguinal ligament. The nerve is here at a greater distance from the skin and is encountered at an angle of almost 90° (see Fig. 9.**8**). It is advisable to seek orientation further distally just below the inguinal crease (see Fig. 9.**9**).

1 Anterior superior iliac spine
2 Pubic tubercle
3 Injection site according to Winnie and Labat
4 Femoral artery

GOAL

The femoral nerve innervates several muscle groups (Fig 21-12). A visible or palpable twitch of the quadriceps muscle (a patella twitch) at 0.2 to 0.5 mA current is the most reliable response.

TABLE 21.2

Some Common Responses to Nerve Stimulation and the Course of Action Required to Obtain the Proper Response

RESPONSE OBTAINED	INTERPRETATION	PROBLEM	ACTION
No response	Needle is inserted either too medially or too laterally	Femoral artery not properly localized or the palpating hand was moved during the procedure	Follow the systematic lateral angulation and reinsertion of the needle as described in the technique
Bone contact	Needle contacts hip or superior ramus of the pubic bone	Needle is inserted too deep	Withdraw needle to skin level and repeat the procedure
Local twitch	Direct stimulation of the iliopsoas or pectineus muscle	Needle is inserted too deep or too superiorly	Withdraw needle to skin level and repeat the procedure
Twitch of the sartorius muscle muscle	Stimulation of the nerve branches to the sartorius	Needle tip is slightly anterior and medial to main trunk of the femoral nerve	Redirect needle laterally and advance it deeper 1—3 mm
Vascular puncture	Blood in the invariably indicates placement into the femoral artery or vein	Needle is inserted too medially	Withdraw needle and reinsert it laterally 1 cm
Patella twitch	Stimulation of the main trunk of the femoral nerve	None	Accept and inject local anesthetic

Equipment

A standard regional anesthesia tray is prepared with the following equipment:

- Sterile towels and gauze packs
- Two 20-mL syringes containing local anesthetic
- Sterile gloves, marking pen, and surface electrode
- 1 1/2-in, 25-gauge needle for skin infiltration
- 5-cm, insulated stimulating needle (Tuohy-style or regular tip)
- Catheter
- Peripheral nerve stimulator

Landmarks

TABLE 21.4

Complications of Femoral Nerve Block and Preventive Techniques

Infection	• Use a strict aseptic technique. • At this location, catheters are difficult to keep sterile and should probably be removed after 48 h.
Hematoma	• Avoid advancement of the needle when the patient reports pain; this may indicate insertion of the needle through the iliopsoas or pectineus muscle. • When the femoral artery or vein is punctured, the procedure should be stopped and a firm, constant pressure applied over the femoral artery for 2—3 min before proceeding with the blockade.
Vascular puncture	• In a patient with difficult anatomy or severe peripheral vascular disease, use a single-injection, smaller-gauge needle to localize the femoral nerve before proceeding with a larger-gauge needle for the continuous technique. • The needle should never be redirected medially!
Nerve injury	• The needle is first inserted just laterally to the femoral artery, and consequent insertions and redirections should all be progressively more lateral. • Use nerve stimulation and slow needle advancement. • Distinct paresthesia is almost never elicited with a femoral nerve block and should not be sought. • Do not inject when the patient complains of pain or when high pressures are met on injection.
Other	• Instruct the patient on the inability to bear weight on the blocked extremity.

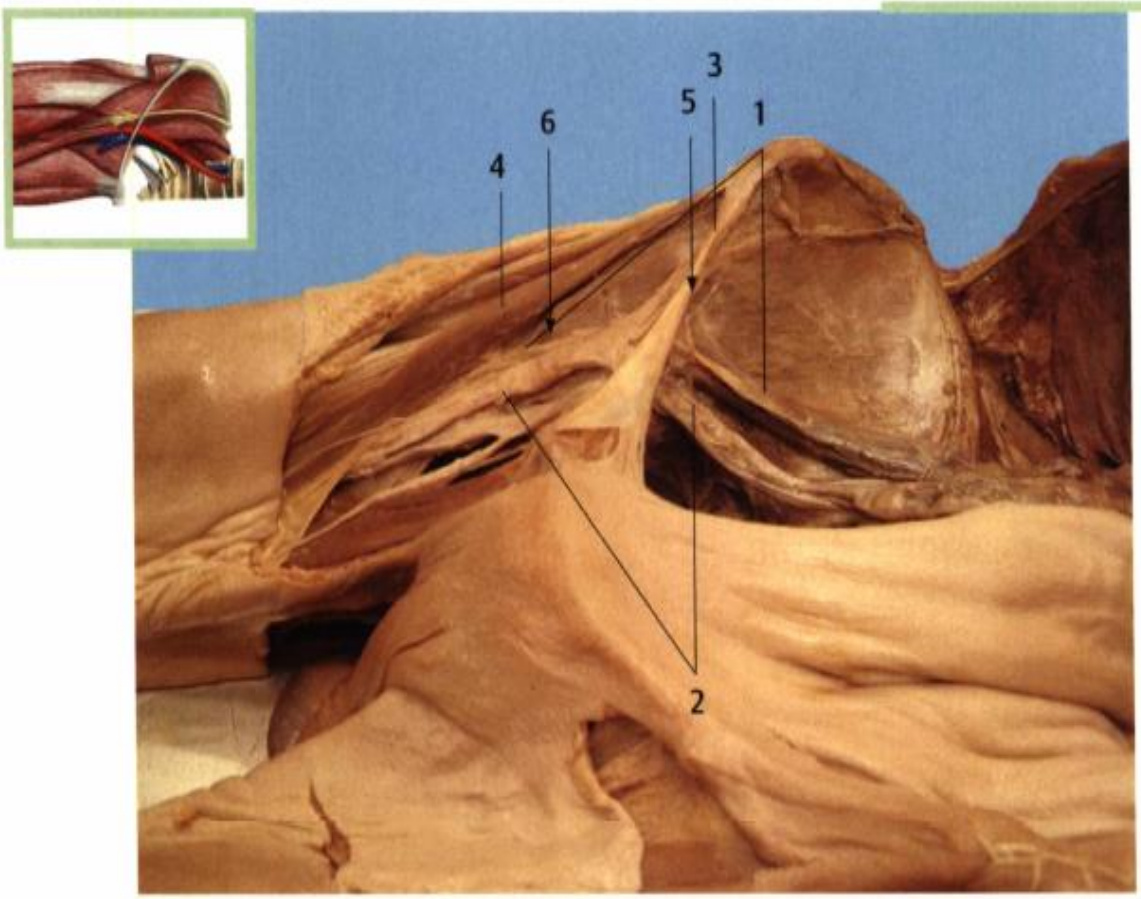
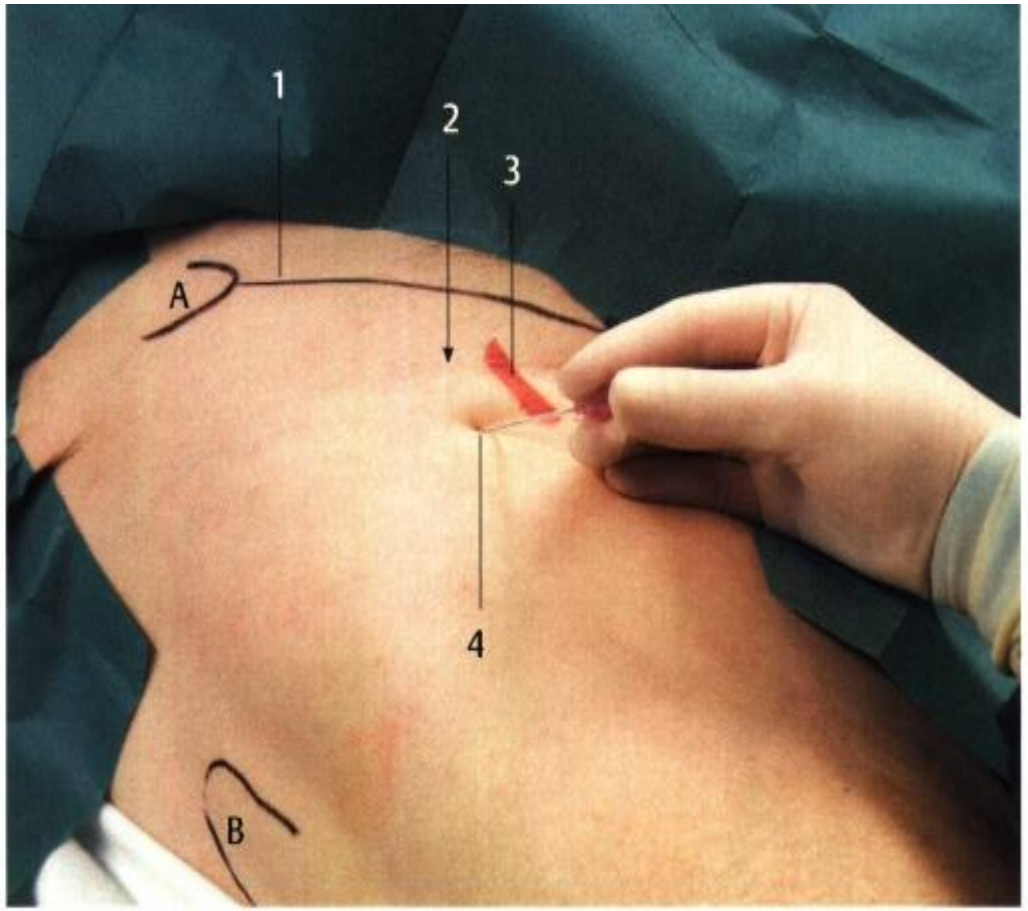


Fig. 9.8 **The** femoral nerve emerges from beneath anteriorly, crosses the iliopubic eminence, and then divides into the individual branches. The shortest skin–nerve distance is at about the level of the inguinal crease. If puncture is performed in the region of the inguinal ligament, a greater skin–nerve distance must be anticipated.

1 Femoral nerve
2 Femoral artery
3 Inguinal ligament
4 Sartorius
5 Note the skin–femoral nerve distance at the level of the inguinal ligament
6 The femoral nerve crosses the iliopubic eminence

Fig. 9.**9** Recommended technique for femoral nerve block: puncture site about 1.5 cm lateral to the femoral artery, which can be palpated, and ca. 1 cm below the inguinal crease. Note that the needle is directed tangentially and proximally.

1 Inguinal ligament
2 Inguinal crease
3 Femoral artery
4 Puncture site
A Anterior superior iliac spine
B Greater trochanter



Position

The patient lies supine and the leg is slightly abducted and externally rotated. In difficult anatomical situations, a flat pad can be placed under the patient's buttocks in order to show the topography of the inguinal region better.

Method

The landmarks are marked and the femoral artery is palpated. If the artery is impalpable, a Doppler probe can be used for orientation (Fig. 9.**13**).

After skin disinfection and intracutaneous or superficial subcutaneous local anesthesia ca. 3 cm (Härtel 1916; Moore 1969) below the inguinal ligament (or 1 cm below the inguinal crease) and ca. 1.5 cm lateral to the artery, the skin is incised with a small lancet. An 18G, 45° short-bevel needle with a surrounding plastic cannula is advanced cranially and dorsally at an angle of 30° to the skin and parallel to the artery until the tough resistance of the fascia lata is felt. The

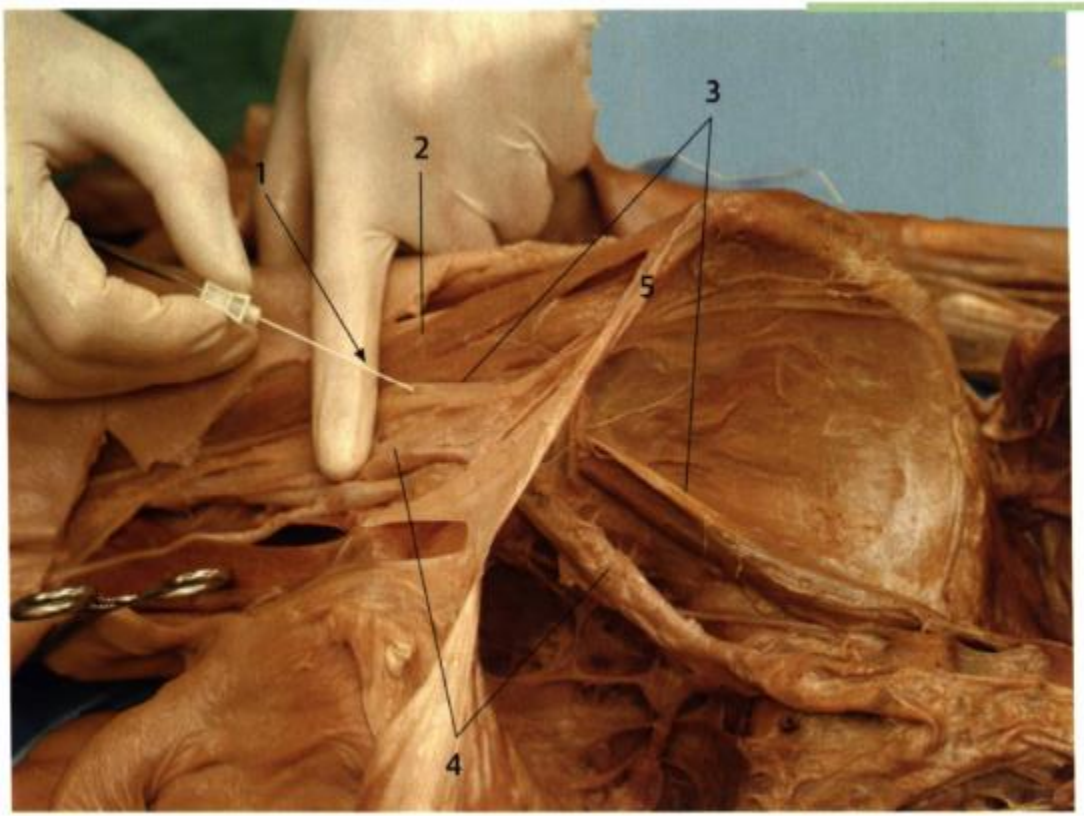


Fig. 9.**12** Recommended puncture site for femoral nerve block. The nerve is relatively superficial just below the inguinal crease. Note the tangential needle direction. When the finger palpates the femoral artery from the lateral aspect, the injection site is at the level of the distal interphalangeal joint.

Right inguinal region

1 Puncture site
2 Sartorius
3 Femoral nerve
4 Femoral artery
5 Inguinal ligament

Fig. 9.**13** In difficult anatomical situations, use of a Doppler probe can facilitate finding the femoral artery.

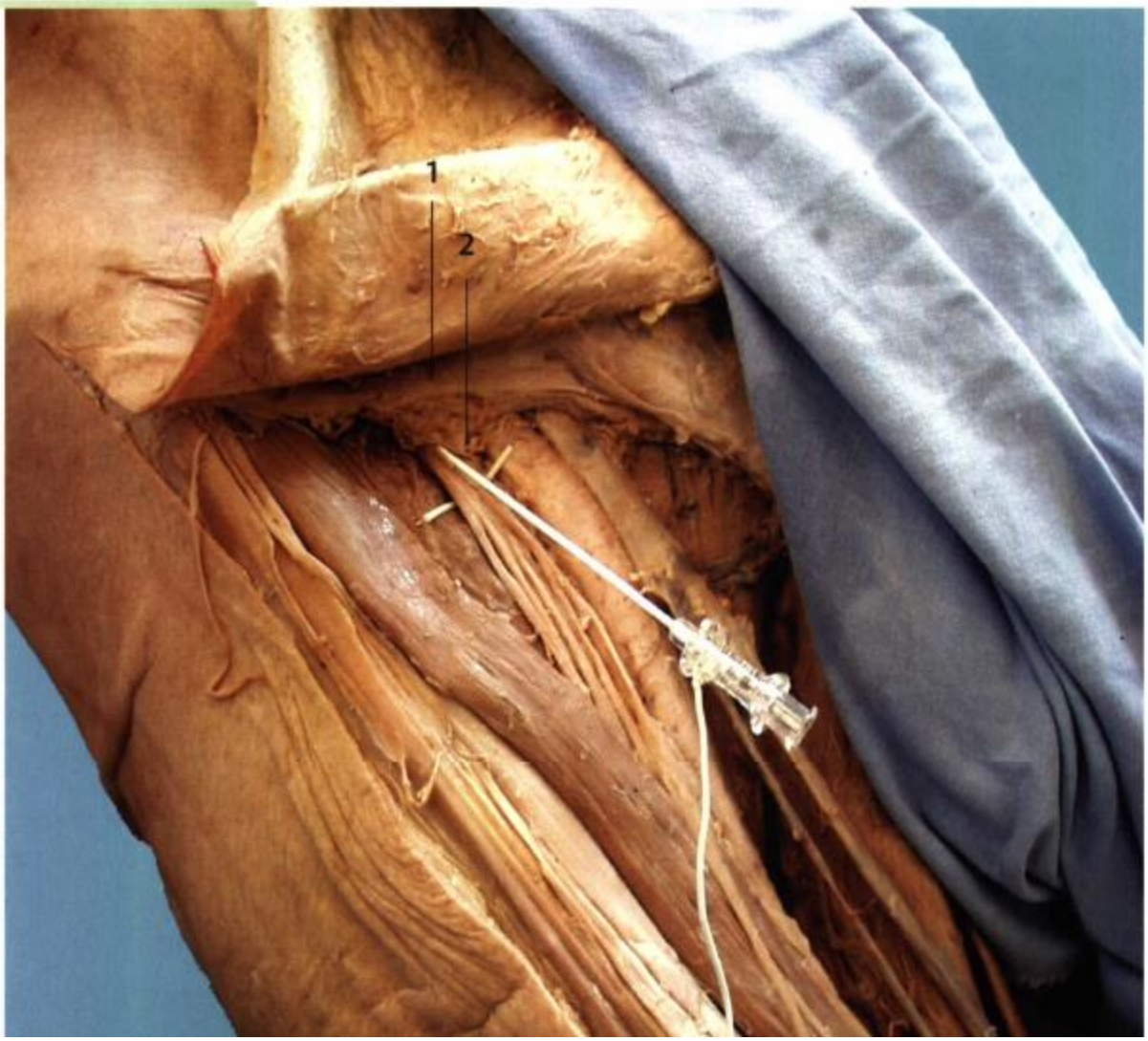


Fig. 9.**14** Puncture of the femoral nerve. The fascia lata and iliac fascia have to be penetrated.

Right inguinal region

1 Fascia lata

2 Iliac fascia with iliopectineal fascia

Fig. 9.**18** After aspiration, 30–40 ml of LA is injected slowly and with repeated aspiration. Digital compression distal to the needle can be helpful.

Right inguinal region

Fig. 9.**20** Spread of the LA, shown radiologically using contrast. Note the spread laterally; contrary to what is imagined of a "3-in-1 block" there is not always central spread toward the lumbar plexus.

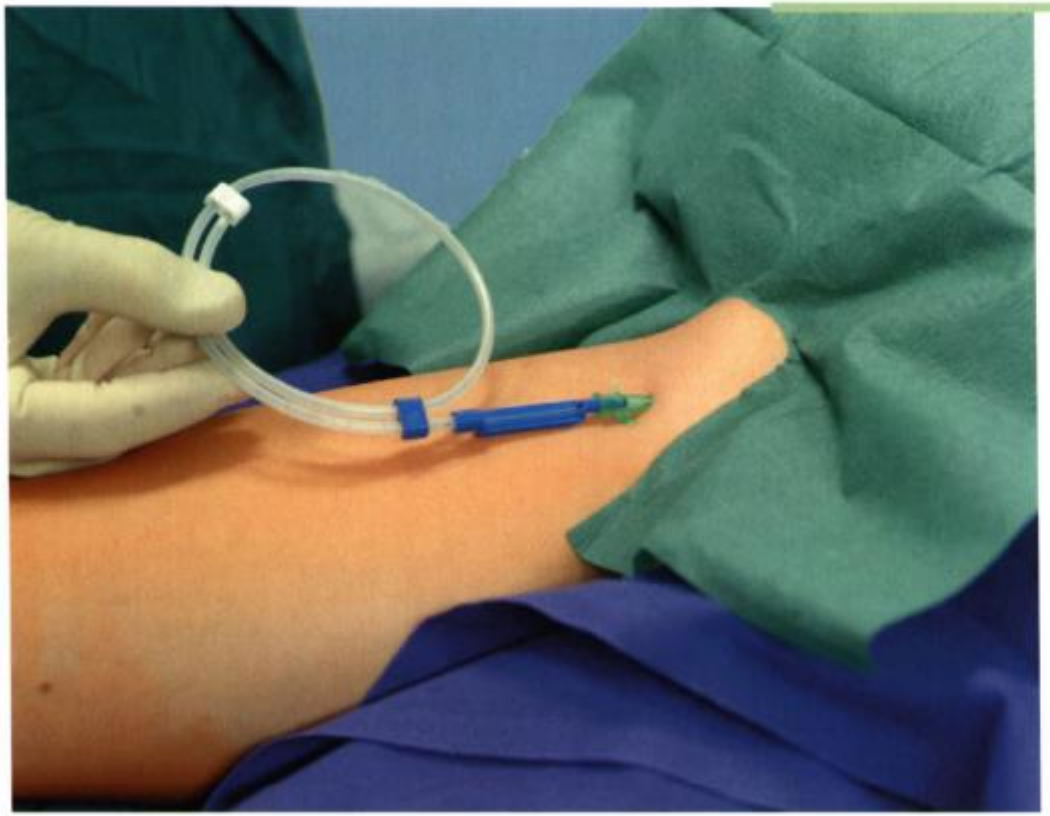


Fig. 9.**21** Introduction of a flexible catheter through the needle. The catheter should not be advanced more than 3–4 cm beyond the needle tip.

9.3 Sensory and Motor Effects

The femoral nerve provides the *sensory* innervation of the front of the thigh and is involved in the innervation of the hip, knee, and femur. It is the *motor* supply to the knee extensors and hip flexors. The saphenous nerve is the sensory terminal branch of the femoral nerve and supplies the inside of the lower leg. The anesthesia can include the great toe in a few cases (Clara 1959).

Indications

In combination with a proximal sciatic nerve block, the femoral nerve block is indicated in all diagnostic and operative procedures on the lower extremities, also with expected application of a tourniquet at the thigh for up to one hour.

In isolation, the femoral nerve block can be used for analgesia in fractures of the neck of the femur (and thus preparation for spinal conduction anaesthesia), for operations on the ventral, medial and lateral thigh (e.g.muscle biopsies) without the use of a tourniquet.

This type of block is less well suited for complex surgical interventions on the knee, such as ligament reconstructions or TKA.

Contraindications

There are no specific contraindications for the femoral nerve block.

Side effects/complications

There are no specific side effects of the femoral nerve block.

Fig. 9.**24** A motor response in the region of the sartorius muscle can be caused by direct stimulation of the muscle or by stimulation of the motor branch of the femoral nerve, which supplies the sartorius. In both cases, the needle position must be corrected, medially in the first case and slightly laterally and a little deeper in the second case. Only a "dancing patella" or response from the different quadriceps muscles produced by slight "wobbling" movements of the needle is secure evidence that the needle is in the correct position (at appropriate stimulation intensity).

1 Sartorius
2 Motor branch to sartorius

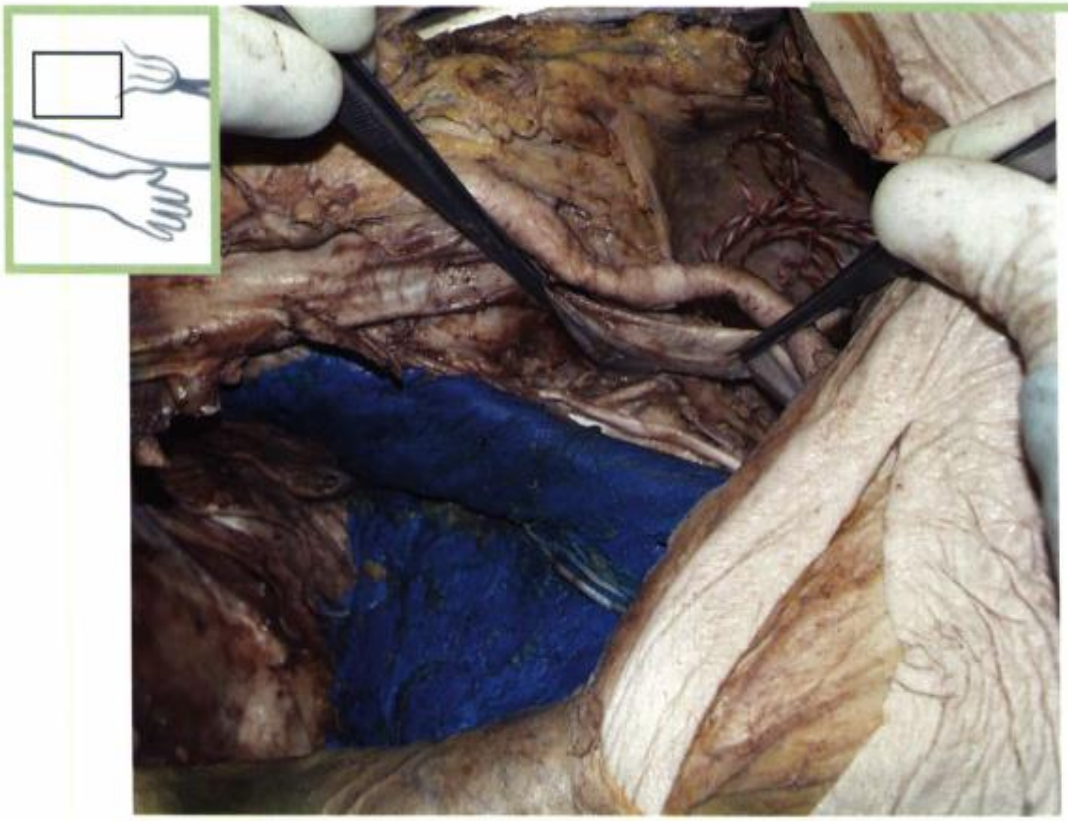


Fig. 9.**28** Dye introduced through a correct access to the femoral nerve block (before dissection) does not reach the obturator nerve.

Right lower abdomen

1 Femoral artery
2 Femoral vein
3 Obturator nerve
4 Psoas
5 Femoral nerve

. In combination with a block of the sciatic nerve (sacral plexus).
all operations on the leg (including total joint replacement of the knee and ankle) can be performed.

Wound management and skin grafts on the anterior and lateral thigh inside of the lower leg.

. Pain therapy after operations on the knee (e.g.. arthroscopic operations.
anterior cruciate ligament repair.
knee replacement.
pain reduction after hipoperations or thigh amputation.
. Pain therapy (e.g.. in femoral shaft fracture

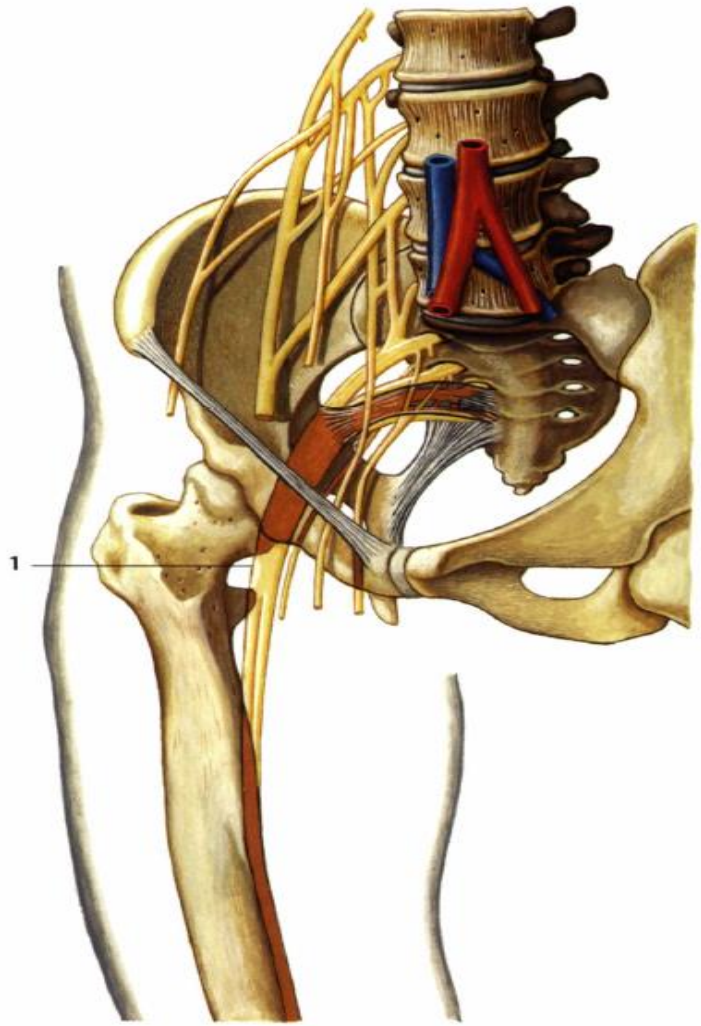


Fig. 10.1 Course of the sciatic nerve, main nerve of the sacral plexus.

1 Sciatic nerve

Proximal sciatic nerve blocks

- **Proximal sciatic nerve blocks target the nerve where it emerges from the lower pelvis. Here, various means of**
- **access are possible. In most patients, the two branches of the sciatic nerve – the tibial nerve and the common**
- **peroneal nerve – are still united in the gluteal region or, at least, are located very close together. It is also of**
- **clinical relevance that proximal sciatic nerve blocks reach the posterior femoral cutaneous nerve. For that reason,**
- **to achieve full analgesia of the leg, it is sensible to combine the proximal sciatic nerve block with a lumbar**
- **plexus block (psoas or femoral).**

Parasacral access Puncture technique

1. Posterior superior iliac spine
2. Ischial tuberosity
3. Greater trochanter
4. Puncture site

Fig. 10.**2** After emerging from the lesser pelvis through the infrapiriform foramen, the sciatic nerve, covered by the gluteal muscles, runs peripherally in the middle between the greater trochanter and the ischial tuberosity behind and medial to the lesser trochanter. The three palpable bony points (posterior superior iliac spine, greater trochanter, and ischial tuberosity) are used for orientation in all dorsal techniques of proximal sciatic nerve block.

1 Posterior superior iliac spine
2 Piriformis
3 Trochanter minor
4 Sciatic nerve
5 Ischial tuberosity
6 Trochanter major

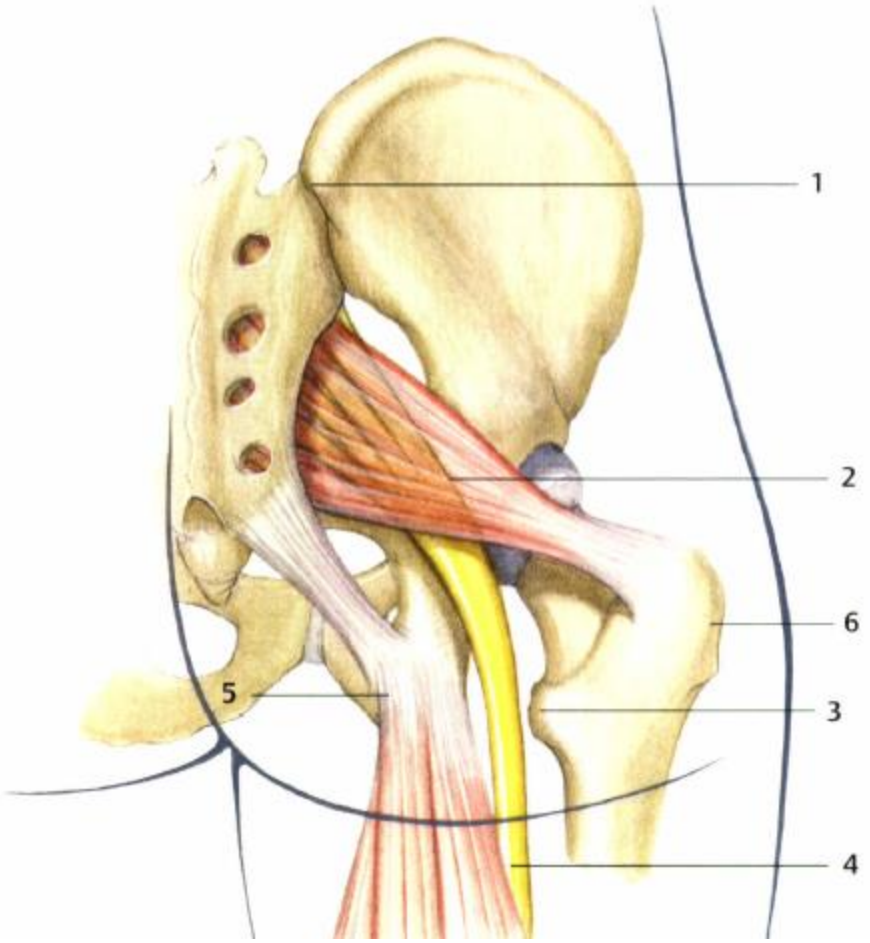


Fig. 10.**3** The sciatic nerve often divides immediately after passing through the infrapiriform foramen into a fibular and a tibial division. The fibular division is always lateral, the tibial one always medial. However, these two divisions run together until about 10–15 cm above the popliteal crease.

1 Sciatic nerve, fibular part
2 Sciatic nerve, tibial part

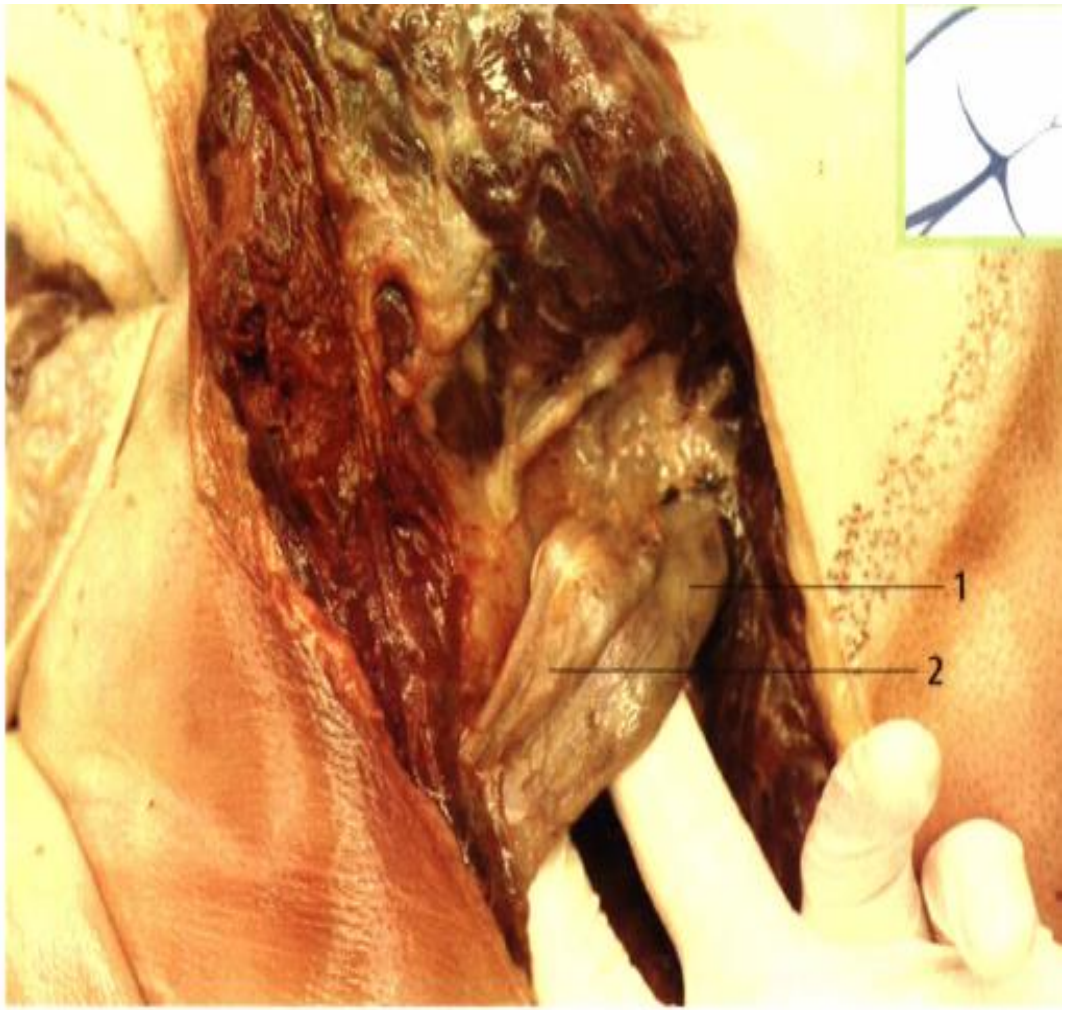


Fig. 10.**4** As Fig. 10.**3**, here with the posterior cutaneous nerve of the thigh and ischial tuberosity.

1 Sciatic nerve, fibular part
2 Sciatic nerve, tibial part
3 Posterior cutaneous nerve of the thigh
4 Ischial tuberosity

Block technique

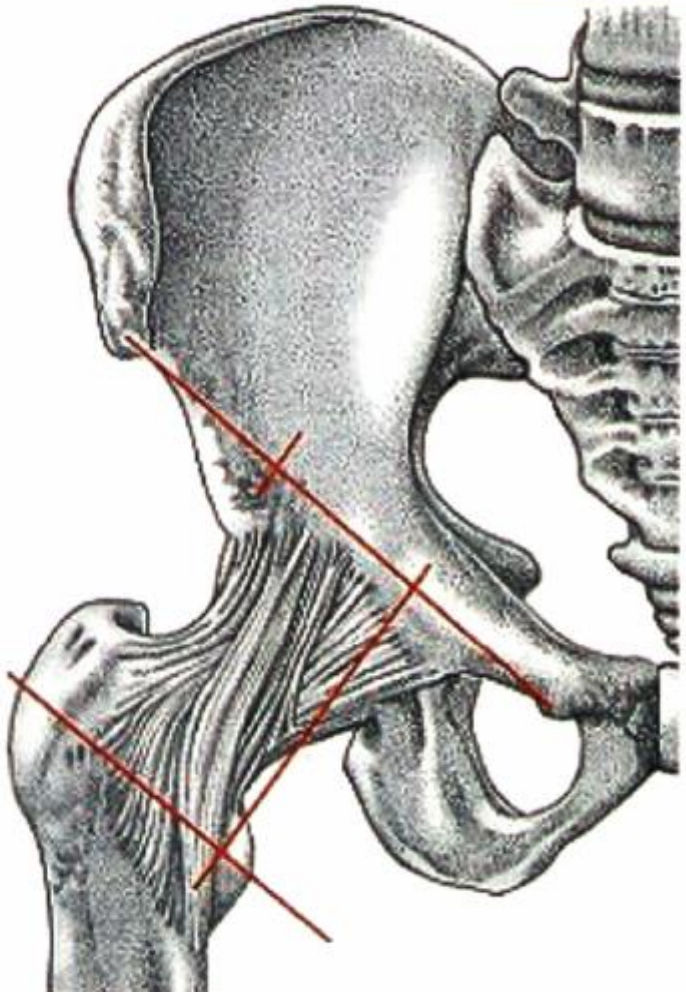


Fig. 10.5 Anterior sciatic block, landmarks for Beck technique. With the Beck technique the puncture site is found as follows: a line from the anterior superior iliac spine to the pubic tubercle is divided into three; a perpendicular is dropped from the junction of the inner and middle thirds to reach a parallel line through the greater trochanter. The intersection marks the puncture site; the needle direction is perpendicular to the surface on which the patient is lying.

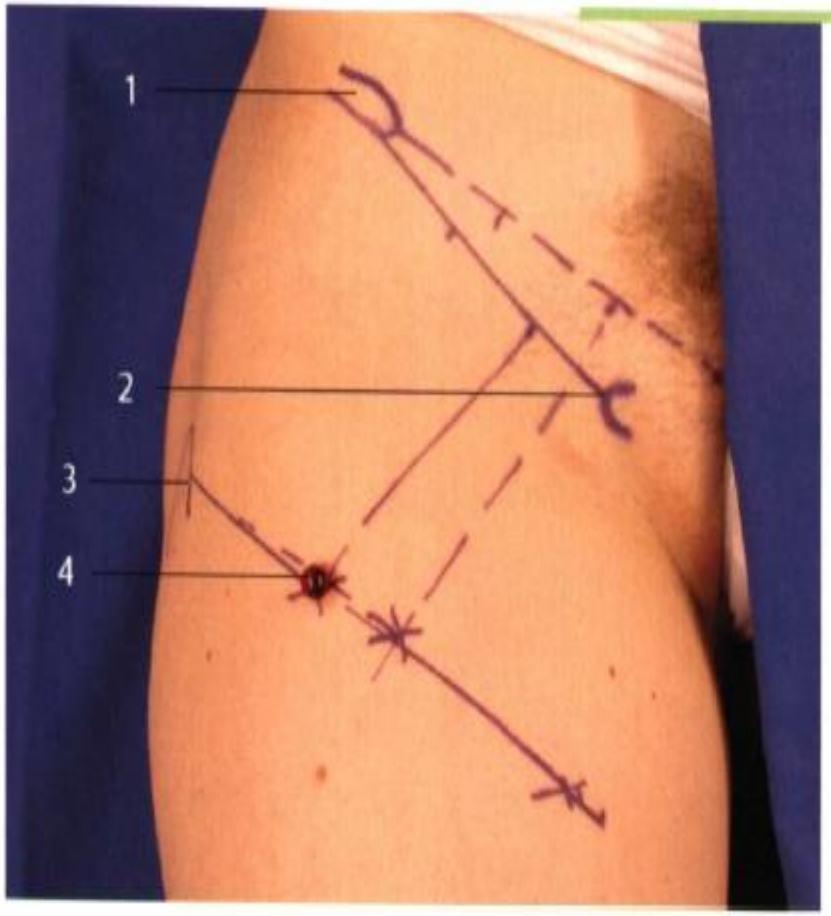


Fig. 10.6 Needle direction for anterior sciatic nerve block using the Beck technique: note that because of the lesser trochanter the needle very often has to be directed too far medially, which may prevent the sciatic nerve from being found. (With MRI, always imagine seeing the plane from below.) The leg was in neutral position in all investigations.

1 Anterior superior iliac spine
2 Pubic tubercle
3 Greater trochanter
4 Puncture site, Beck technique, marked with nitrocapsule

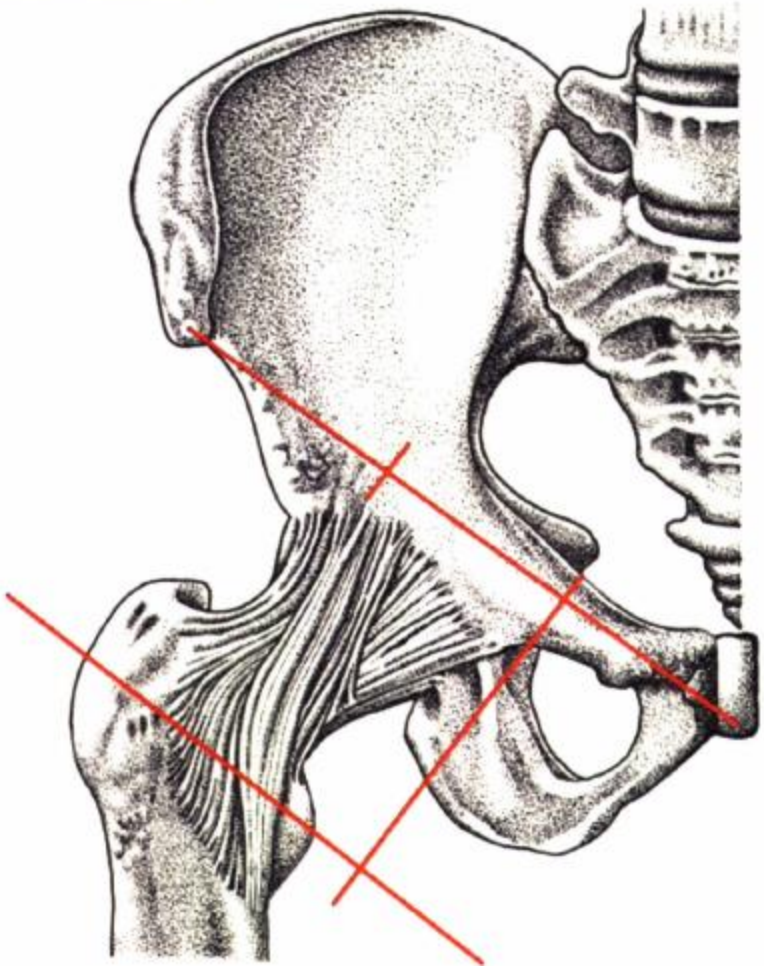


Fig. 10.7 Anterior proximal sciatic nerve block, landmarks for Meier technique: a line is drawn between the anterior superior iliac spine and the middle of the symphysis and a perpendicular through the junction of the inner and middle thirds intersects a parallel line through the greater trochanter at the injection site. In this way, the injection site originally described by Beck is moved medially and caudally, so that it is possible to reach the sciatic nerve.

Fig. 10.**10** Anterior sciatic nerve block using the muscle gap between rectus femoris and sartorius for orientation. The puncture site is a good hand's breadth below the femoral nerve block puncture site. Note the "two-finger grasp" in the muscle gap, which pushes the blood vessels medially. When puncture is performed under nerve stimulation, there is occasionally a response in the anterior part of the thigh in the quadriceps muscle after ca. 2–4 cm through stimulation of branches of the femoral nerve.

1 Rectus femoris
2 Sartorius
3 Femoral artery
4 Femoral nerve
5 Nerve fibers from the femoral nerve

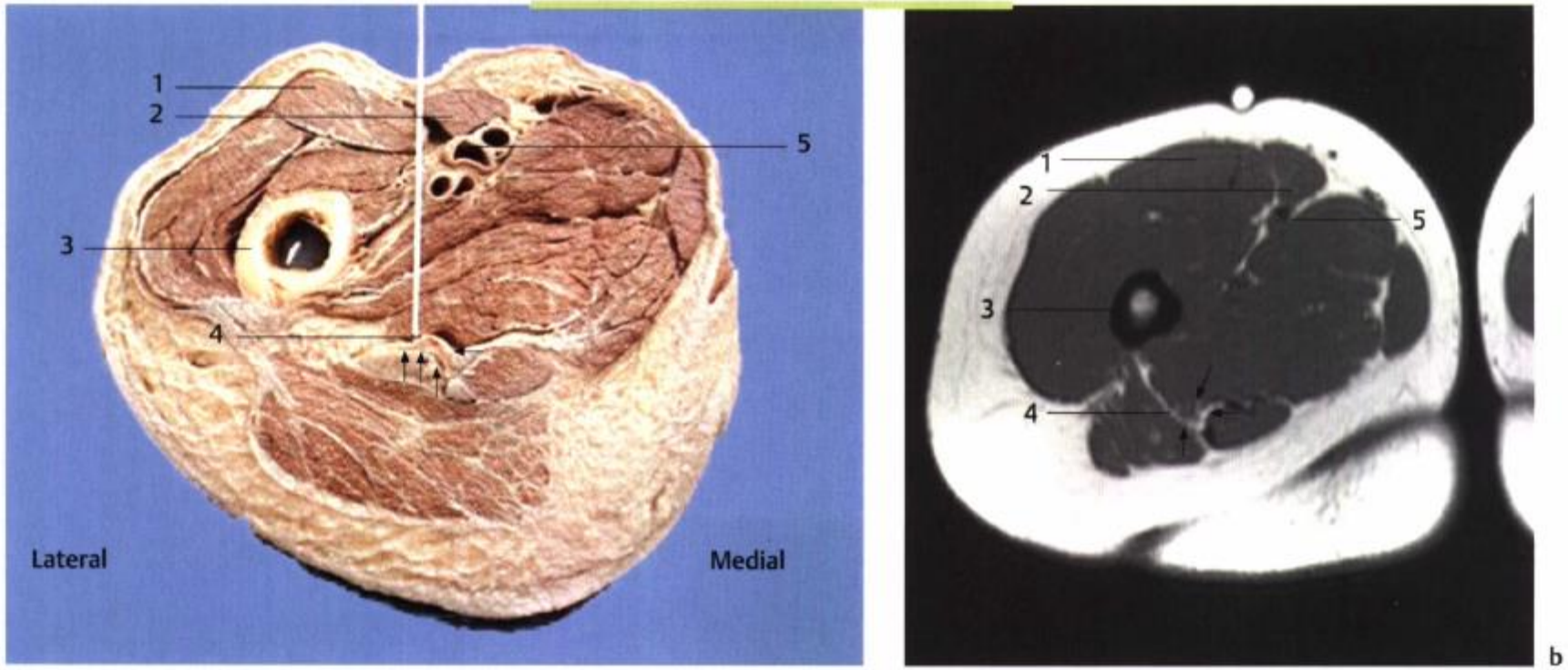


Fig. 10.**11** Anterior sciatic nerve block using the muscle gap between rectus femoris and sartorius for orientation: anatomical cross section and MRI at the level of the puncture. **a** Right leg, seen from below, **b** MR image, right thigh.

1 Rectus femoris
2 Sartorius
3 Femur
4 Sciatic nerve
5 Blood vessels

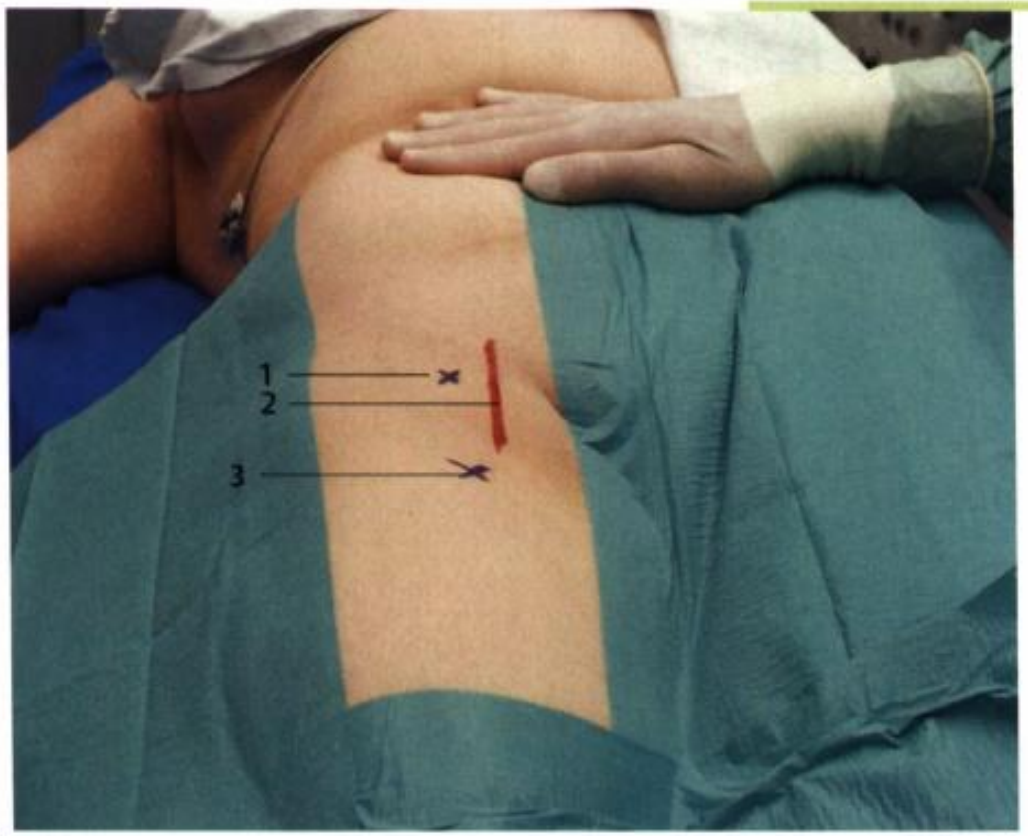


Fig. 10.**13** In practice, it has not proved necessary to exactly define the puncture site for an anterior sciatic nerve block. A sufficient orientation point is a hand's breadth below the puncture site for femoral nerve block. The hand slides medially from the lateral side over the rectus femoris. The first medial muscle gap that can be felt is the gap between rectus femoris and sartorius muscles, and this is where the injection site is located. In many patients, the medial border of the femur can be felt beneath. The puncture site is further medial than the Meier insertion point on the parallel through the greater trochanter, thus usually somewhat medial to the puncture site for the femoral nerve.

1 Puncture site for femoral nerve block
2 Femoral artery
3 Puncture site for anterior sciatic nerve block (variant without measurement)

Fig. 10.**16** The correct muscle response for all proximal sciatic nerve blocks should be seen in the foot. Either the (medially located) tibial part (plantar flexors) or the (laterally located) fibular part (dorsiflexors) is stimulated. In the Labat and Mansour techniques, a response by the ischiocrural muscles (thigh flexors or "hamstring muscles") can also be regarded as a correct response.

1 Response of tibial part of the sciatic nerve: plantar flexion, foot inversion.
2 Response of fibular part of the sciatic nerve: dorsiflexion, foot eversion.

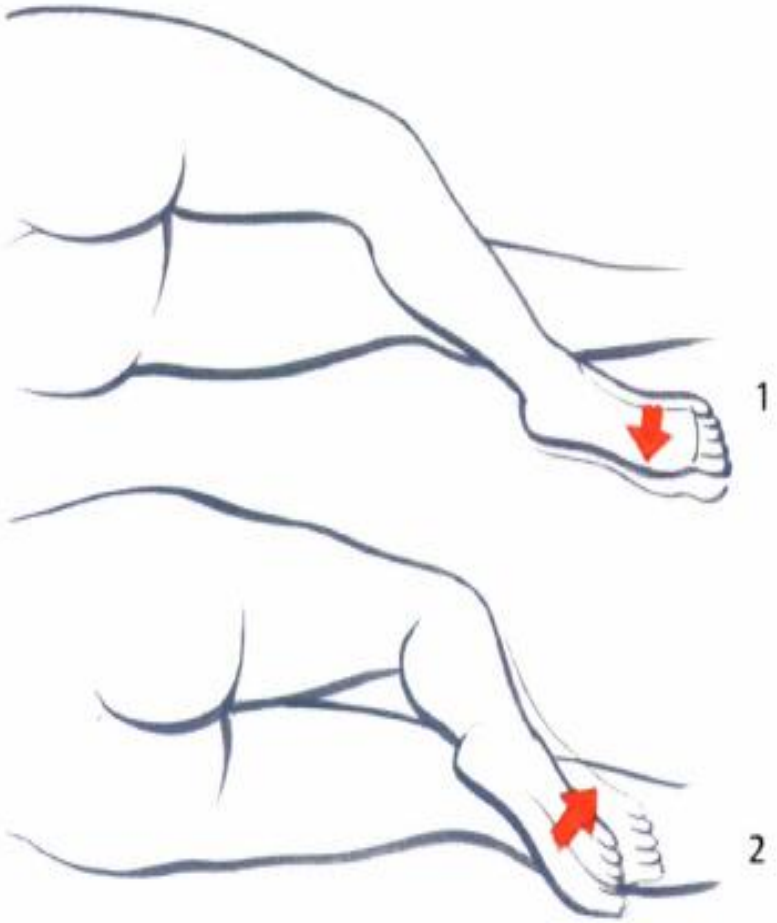


Fig. 10.**19** Advancing an indwelling sciatic catheter via the anterior approach. Using a cranial needle direction, the catheter can usually be advanced easily after the slight resistance when the catheter tip has reached the end of the needle.

1 Femoral nerve catheter in situ

Fig. 10.**20** An anteriorly introduced needle meeting the sciatic nerve; a catheter was advanced cranially through the needle.

Right thigh, posterolateral view

1 Tip of an anteriorly introduced needle close to the sciatic nerve

2 Part of the catheter advanced through the needle

Fig. 10.**21** Anterior sciatic nerve block is possible even in obese patients, where the sciatic nerve can be expected at a depth of 13–15 cm. Note the hand grasp!

Fig. 10.**23** Planned thigh amputation, operation on the thigh stump, phantom and/or stump pain are proper indications for continuous proximal sciatic nerve block. If the operative situation does not allow anterior sciatic block, continuous posterior access is possible. When amputation has already taken place, the patient can control the needle passage by giving phantom information about the response to the nerve stimulator ("the foot is now moving downward").

NFK: Femoral nerve catheter
KAI: Continuous anterior sciatic nerve block

- Fig. 10.24 Example of a patient with traumatic lower leg amputation,
- fracture of the patella and surgically treated LI fracture.
- Because of uncontrollable phantom pains three days after the trauma, a regional block was urgently indicated.
- Neuraxial block was ruled out because of the spinal fracture, and it was possible to place an anterior sciatic catheter with the patient's assistance using the nerve stimulator.
- In conjunction with a femoral nerve block.
- this rendered the patient pain-free.

- Fig. 10.25
- Particularly when extension of the knee is prevented, continuous block of
- the sciatic nerve in conjunction with a
- femoral nerve block is of great importance
- to achieve good postoperative mobility after
- insertion of a total knee replacement.
- "3-in-1 "; femoral nerve block

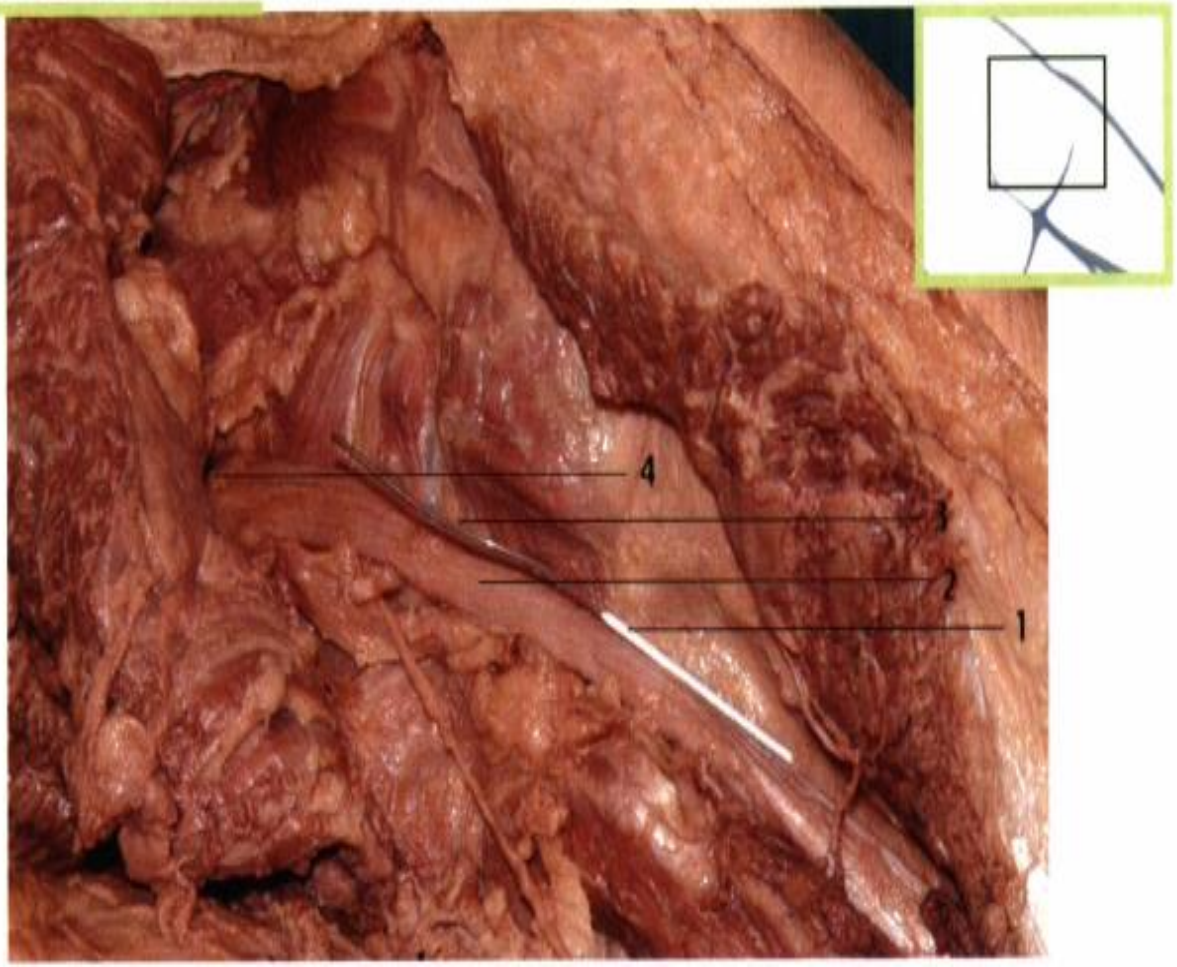


Fig. 10.**26** Advancing an anterior sciatic nerve catheter too far can cause it to enter the lesser pelvis through the infrapiriform foramen.

Right gluteal region, posterior view

1 Needle introduced from anterior
2 Sciatic nerve
3 Catheter
4 Infrapiriform foramen with sciatic nerve

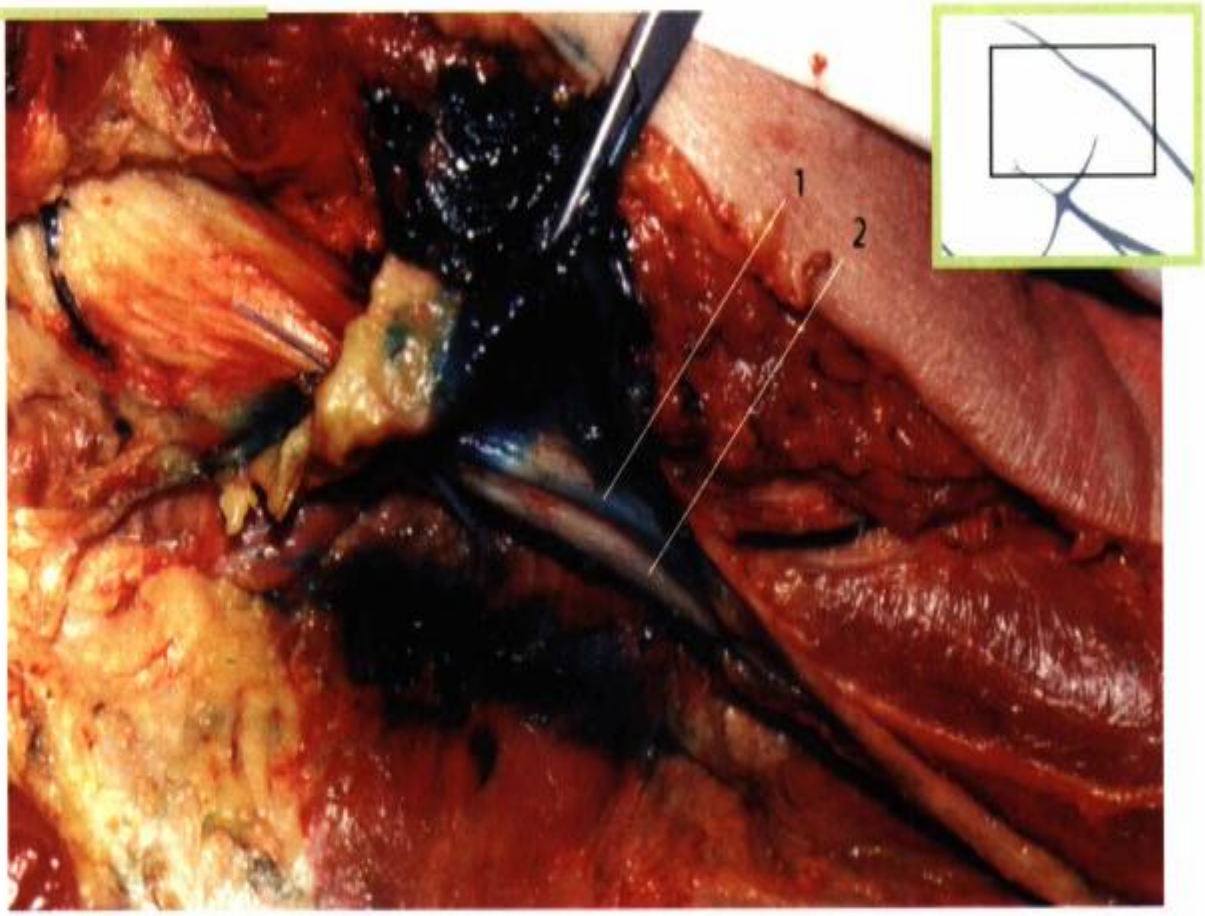


Fig. 10.**27** Posterior view. Our studies with dye (methylene blue) in nonpreserved cadavers have shown that a minimum volume of 20 ml is required to block the entire sciatic nerve.

Right gluteal region, posterior view

1 Sciatic nerve: fibular division, surrounded by dye

2 Sciatic nerve: tibial division, not surrounded by dye

Fig. 10.**28** Distribution of the local anesthetic after anterior sciatic nerve block (contrast was added to the local anesthetic).

→ Catheter

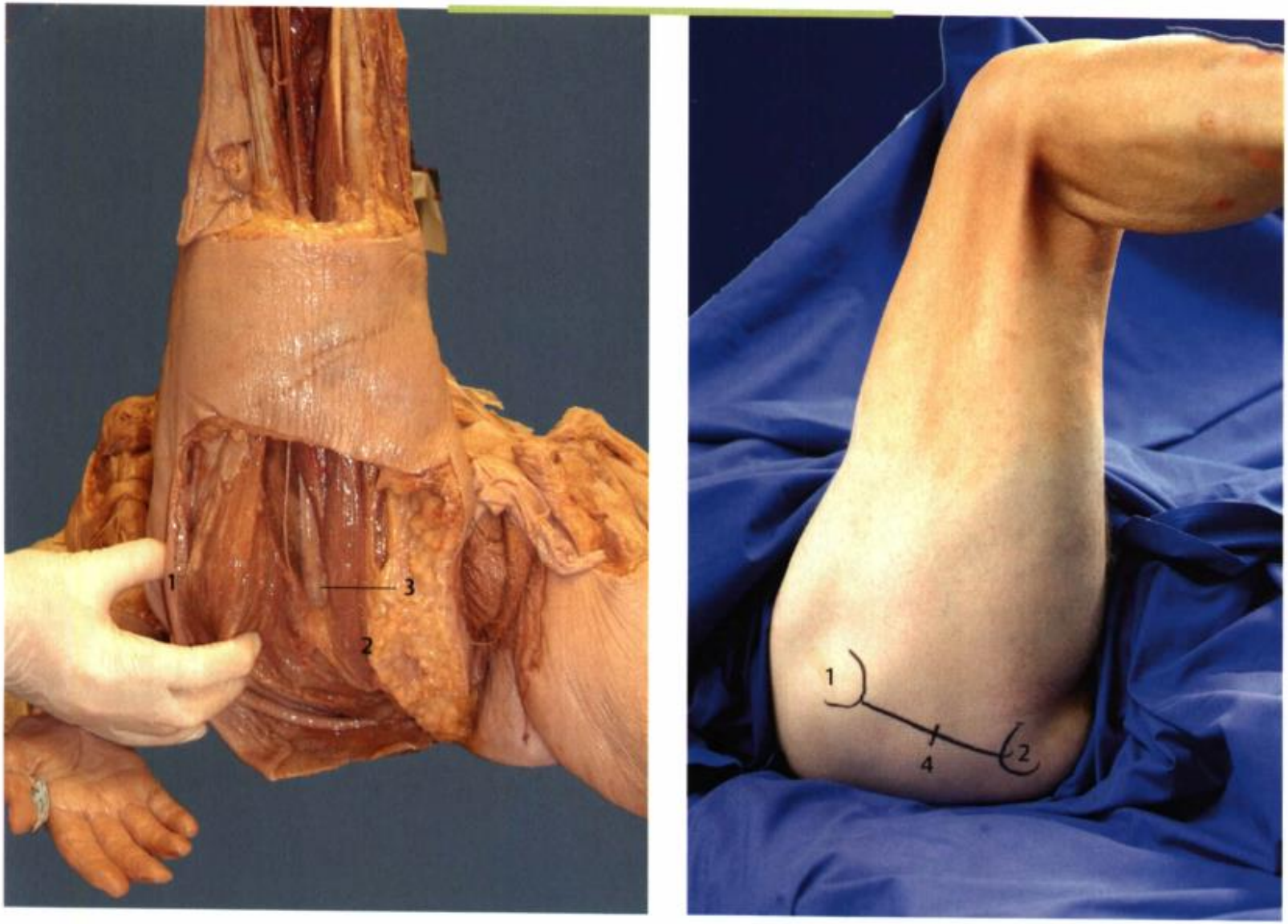


Fig. 10.**29** (Dorsal) Subgluteal sciatic nerve blockade, Raj technique. The nerve runs in the middle between the greater trochanter and ischial tuberosity. The patient lies supine, the leg is flexed at a right angle at the hip and knee.

1 Greater trochanter
2 Ischial tuberosity
3 Sciatic nerve
4 Puncture site

Fig. 19-7

Fig. 19-8

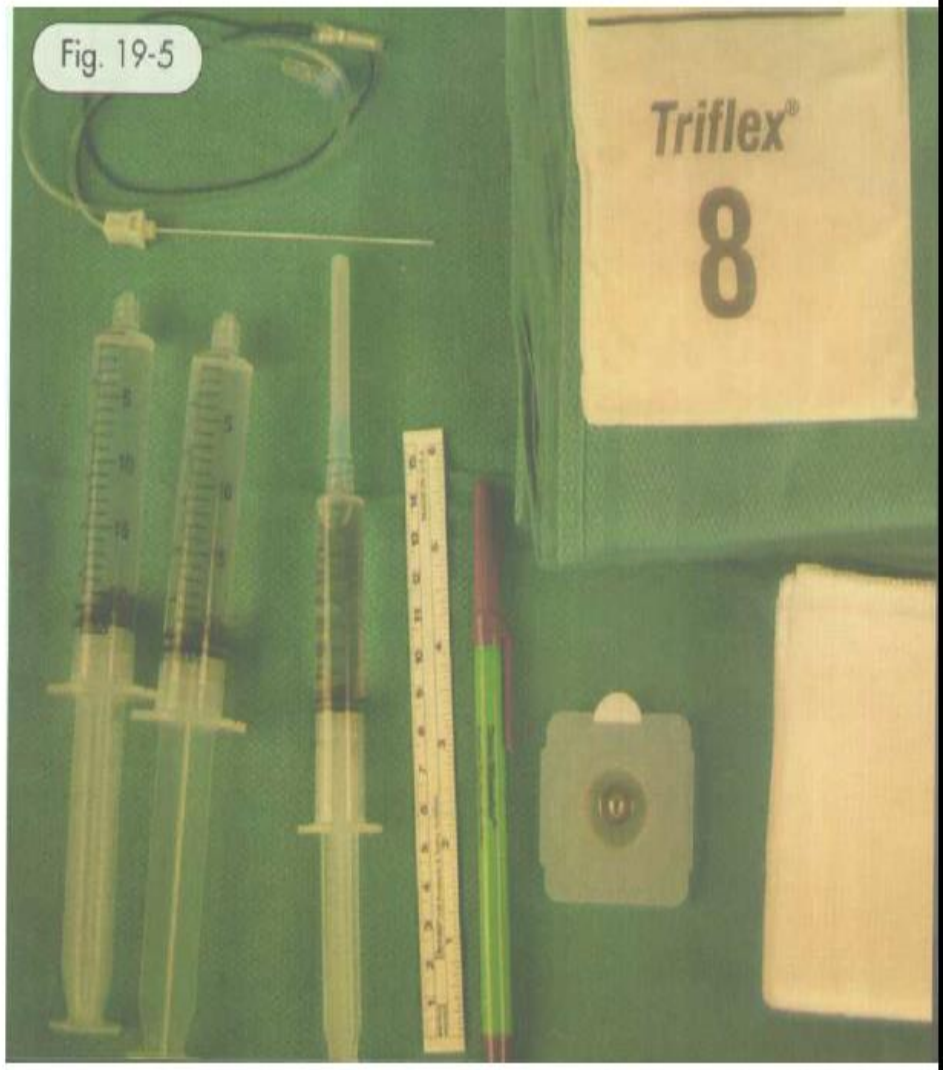
Fig. 19-9

Fig. 19-10

Equipment

A standard regional anesthesia tray is prepared with the following equipment:

- Sterile towels and gauze packs
- 20-mL syringes containing a local anesthetic
- Sterile gloves, marking pen, and surface electrode
  I $^{1}/_{2}$-in, 25-gauge needle for skin infiltration
- 10-cm, short-bevel, insulated stimulating needle
- Peripheral nerve stimulator



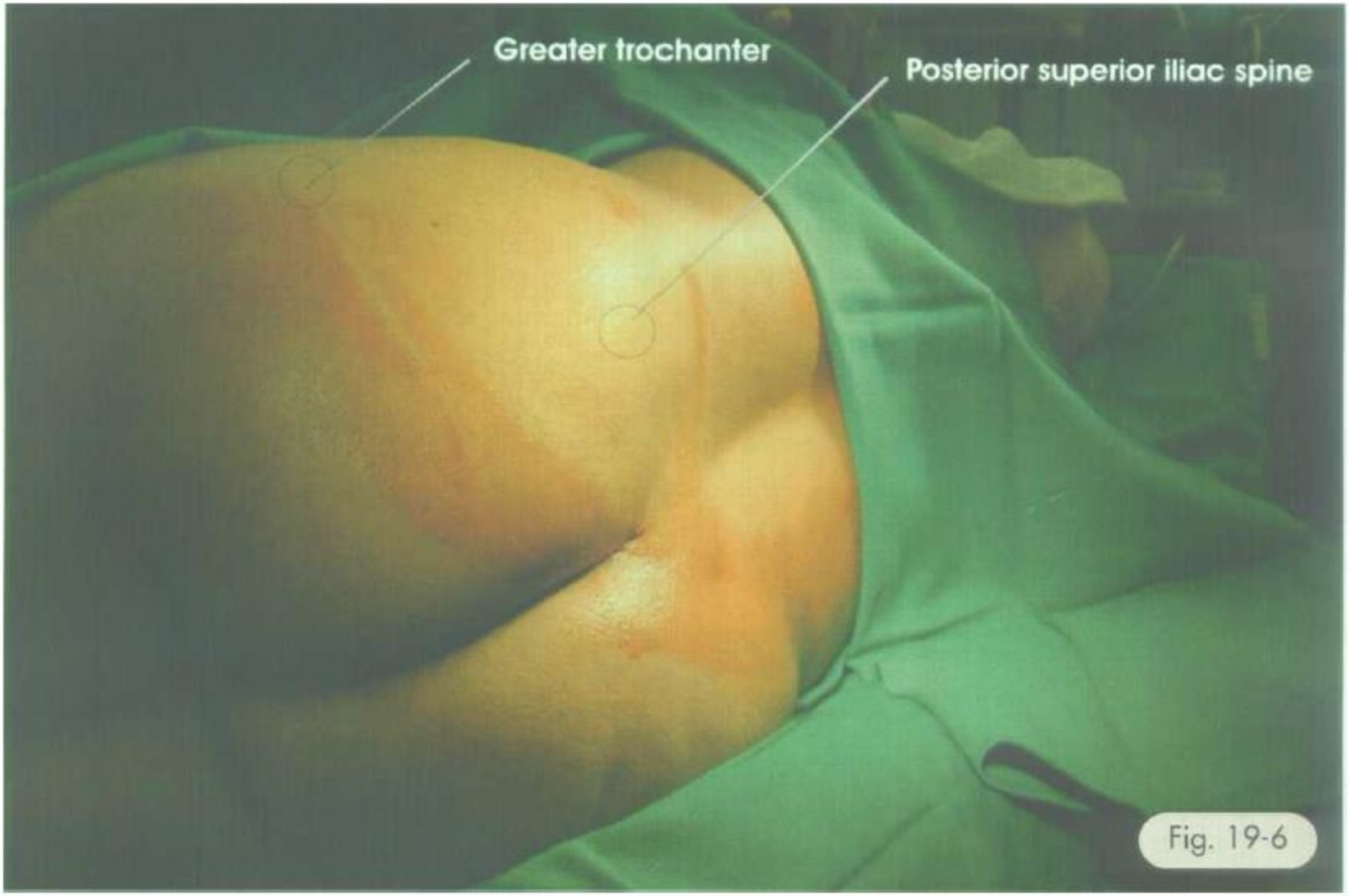


Fig. 19-6

TIP

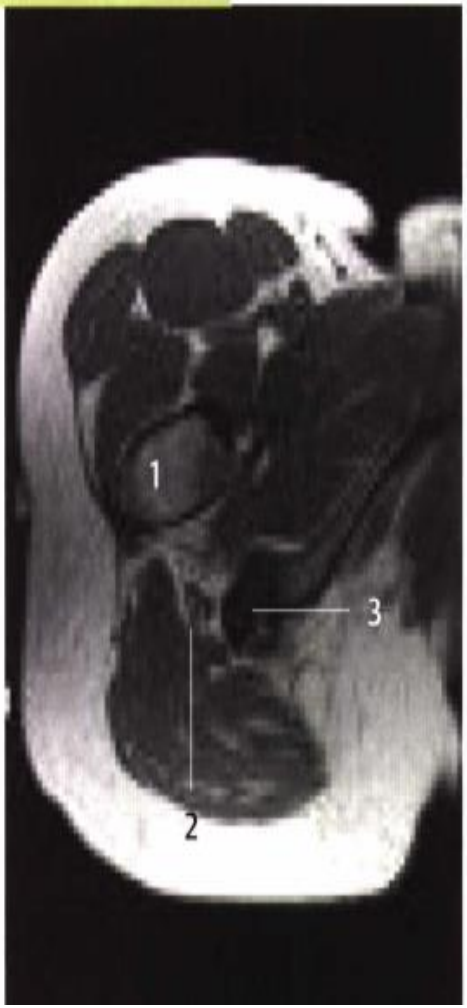
▶ Palpating the greater trochanter (**Fig. 19-7**): it is important that the structure of the greater trochanter be approached from its posterior aspect.

▶ Palpating the posterior superior iliac spine: the palpating hand is rolled back until the fingers meet the posterior superior iliac spine (**Fig. 19-8**). This landmark should be labeled on the side facing the great trochanter.

▶ Palpating and labeling of the "inner" aspects of the greater trochanter and the posterior superior iliac spine results in a shorter line connecting the two (**Fig. 19-9**) and a more precise approximation of the position of the sciatic nerve.

Fig. 10.**30** Subgluteal sciatic nerve blockade, Raj technique. The line connecting the greater trochanter and ischial tuberosity is halved. The midpoint marks the puncture site. The needle is advanced in a cranial direction vertical to the skin surface. After ca. 5 cm (max. 10 cm), the correct needle position is shown by a response in the foot.

1 Greater trochanter
2 Sciatic nerve
3 Ischial tuberosity



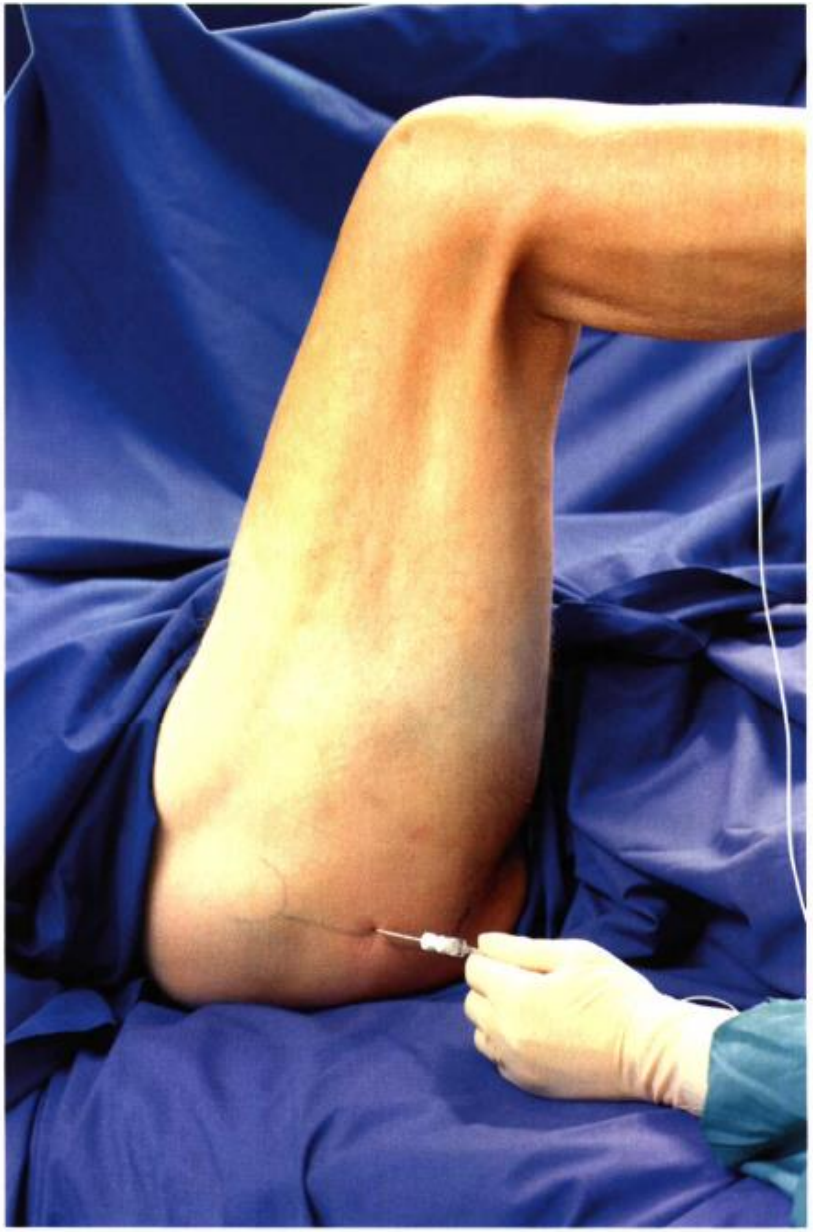


Fig. 10.**32** Subgluteal sciatic nerve blockade, Raj technique. A catheter can be advanced without difficulty.

TABLE 19.2
Choice of Local Anesthetic for Sciatic Nerve Block

ANESTHFTIC	ONSET (min)	DURATION OF ANESTHESIA (h)	DURATION OF ANAI GESIA (h)
3% 2-Chloroprocaine (+ HCO_3)	10—15	2	2.5
1.5% Mepivacaine (+ HCO_3)	10—15	4—5	5—8
2% Lidocaine (+ HCO_3)	10—20	5—6	5—8
0.5% Ropivacaine	15—20	6—12	6—24
0.75% Ropivacaine	10—15	8—12	8—24
0.5 Bupivacaine (or levobupivacaine)	15—30	8—16	10—48

TIPS

- Avoid the use of epinephrine during sciatic nerve blockade because of the peculiar blood supply to the sciatic nerve, the possibility of additional ischemia due to stretching or sitting on the anesthetized nerve, and the long duration of blockade.

TABLE 19.1
Some Common Responses to Nerve Stimulation

RESPONSE OBTAINED	INTERPRETATION	PROBLEM	ACTION
Local twitch of the gluteus muscle	Direct stimulation of the gluteus muscle	Too shallow (superficial) placement of the needle	Continue advancing the needle
Needle contacts bone but local twitch of the gluteus muscle is not elicited	Needle is inserted close to the attachment of the gluteus muscle to the iliac bone	Too superior placement of the needle	Stop the procedure, recheck the patient's position, and reassess the landmarks
Needle encounters bone; sciatic twitches not elicited	Needle missed the plane of the sciatic nerve and is stopped by the hip joint or ischial bone	The needle is inserted to laterally (hip joint) or medially (ischial bone)	Withdraw the needle and redirect it slightly medially or laterally (5^2—10^2) **(Fig. 19-14)**
Hamstring twitch	Stimulation of the main trunk of the sciatic nerve	None. These branches are within the sciatic nerve sheath at this level	Accept and inject local anesthetic
Needle is placed deep (10 cm); twitches not elicited; bone is not contacted	Needle has passed through the sciatic notch	Too inferior placement of the needle	Withdraw the needle and redirect it slightly superiorly

GOAL

Visible or palpable twitches of the hamstrings, *calf muscles, foot, or* toes *at 0.2 to 0.5* mA *current. Twitches of the* hamstring *are equally acceptable because this approach blocks the nerve proximal to the separation of the neuronal branches to the hamstring muscle.*

Proximal Lateral Sciatic Nerve Block (with Patient in Supine Position)

- **Technique**
- landmarks
- Greater trochanter, ischial tuberosity.
- Position
- The patient lies supine with the leg to be
- anesthetized in neutral position.
- A small pad
- is placed under the popliteal fossa so that
- the greater trochanter is moved slightly forward.
- Procedure
- The puncture site for the lateral approach to
- proximal sciatic nerve block is 3-5 cm distal
- to the most prominent lateral part of the
- greater trochanter. The skin is entered at the
- level of the posterior border of the femur
- and the 20G, 12-15 cm insulated needle is
- directed dorsally (15-30°) and cranially; the
- response must be in the foot. as in anterior
- sciatic nerve block (Figs. 10.34-10.36).

- Muscular contractions on the back of the thigh are frequent (Gligorijevic 2000). The sciatic nerve is reached after 8-12 cm (Fig.10.37) and the correct position of the needle tip in the vicinity of the nerve is confirmed
- by a motor response in the foot region.
- (dorsiflexion or plantar flexion) at 0.3 *mA/0.1 ms.*
- After careful aspiration, 20-30 ml of a
- medium-acting or long-acting LAis injected.

Practical Notes

. A hand can be placed beneath the buttocks to palpate the ischial tuberosity in order to improve the anatomical orientation.

. If no motor response is produced, the needle should be withdrawn and corrected in the anterior direction when it is advanced again.

. The fibular nerve is stimulated first with the described needle direction. The motor response with this technique is therefore usually dorsiflexion of the foot initially.

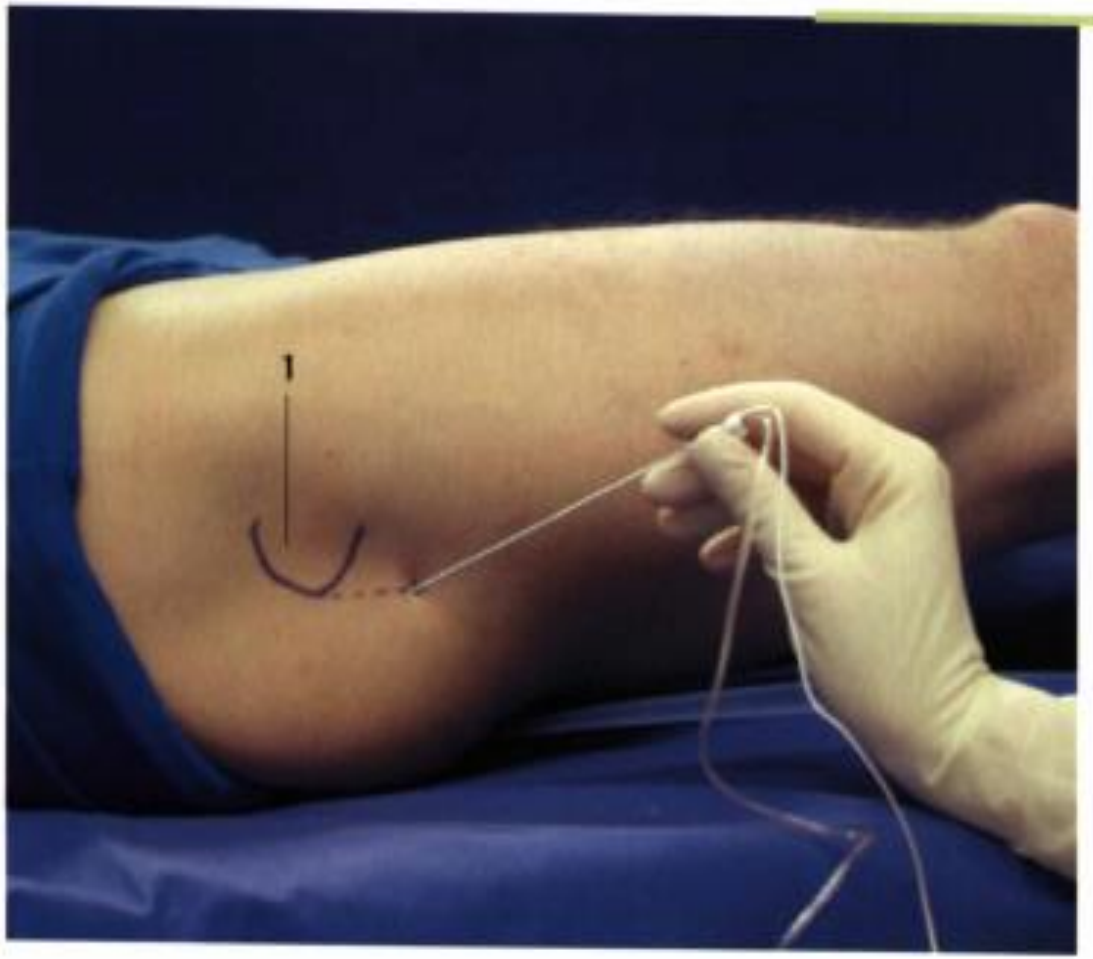
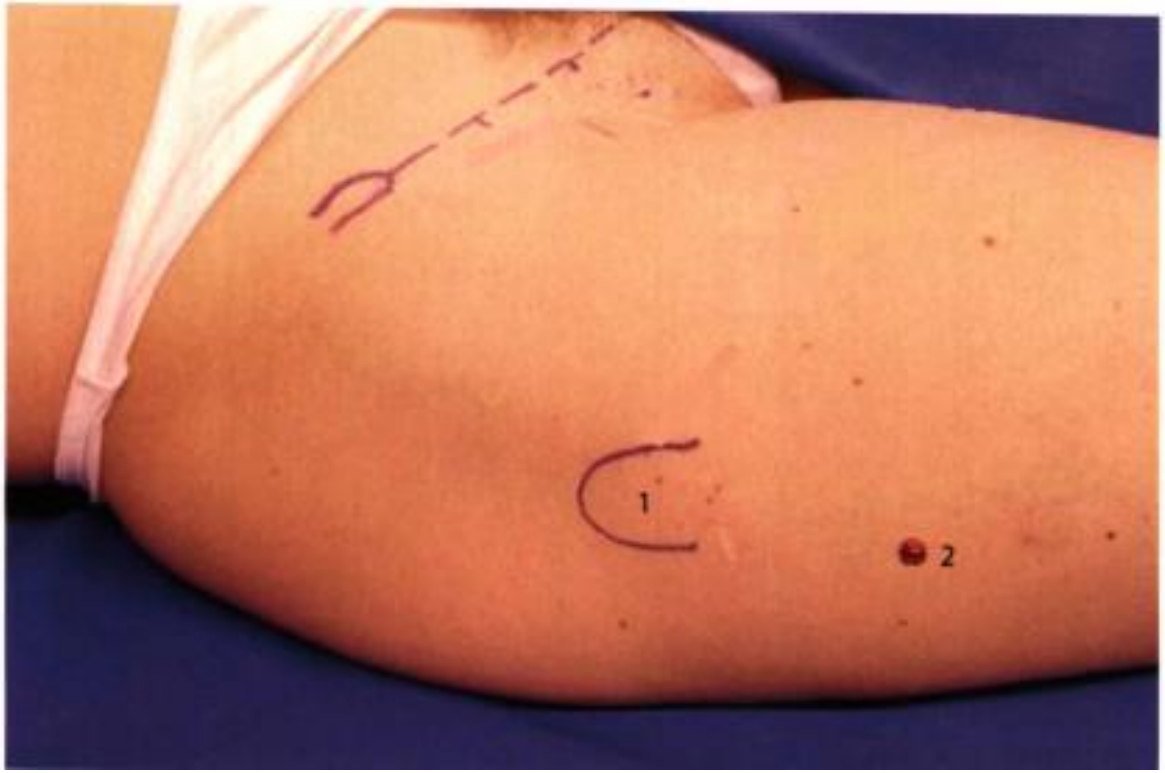


Fig. 10.**34** The puncture site for the proximal lateral approach to proximal sciatic nerve block is 3–5 cm distal to the most prominent lateral part of the greater trochanter. The needle enters at the level of the posterior border of the femur and is directed dorsally (15–30°) and cranially; as in anterior sciatic nerve block, the stimulation response must be in the foot.

1 Greater trochanter



1 Greater trochanter
2 Puncture site

Fig. 10.**36** Sciatic nerve, lateral view.

1 Sciatic nerve
2 Ischial tuberosity
3 Greater trochanter

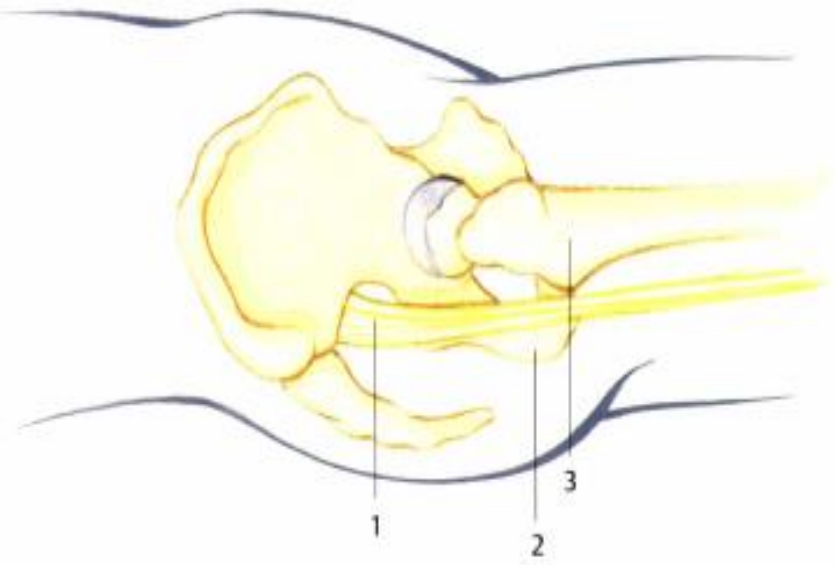


Fig. 10.**37** Lateral approach to the proximal sciatic nerve (dissection in left lateral position, posterior view). The slightly dorsal needle direction makes it possible to approach the sciatic nerve tangentially, so that the tibial division may be stimulated instead of the lateral fibular division.

1 Greater trochanter
2 Sciatic nerve
3 Ischial tuberosity

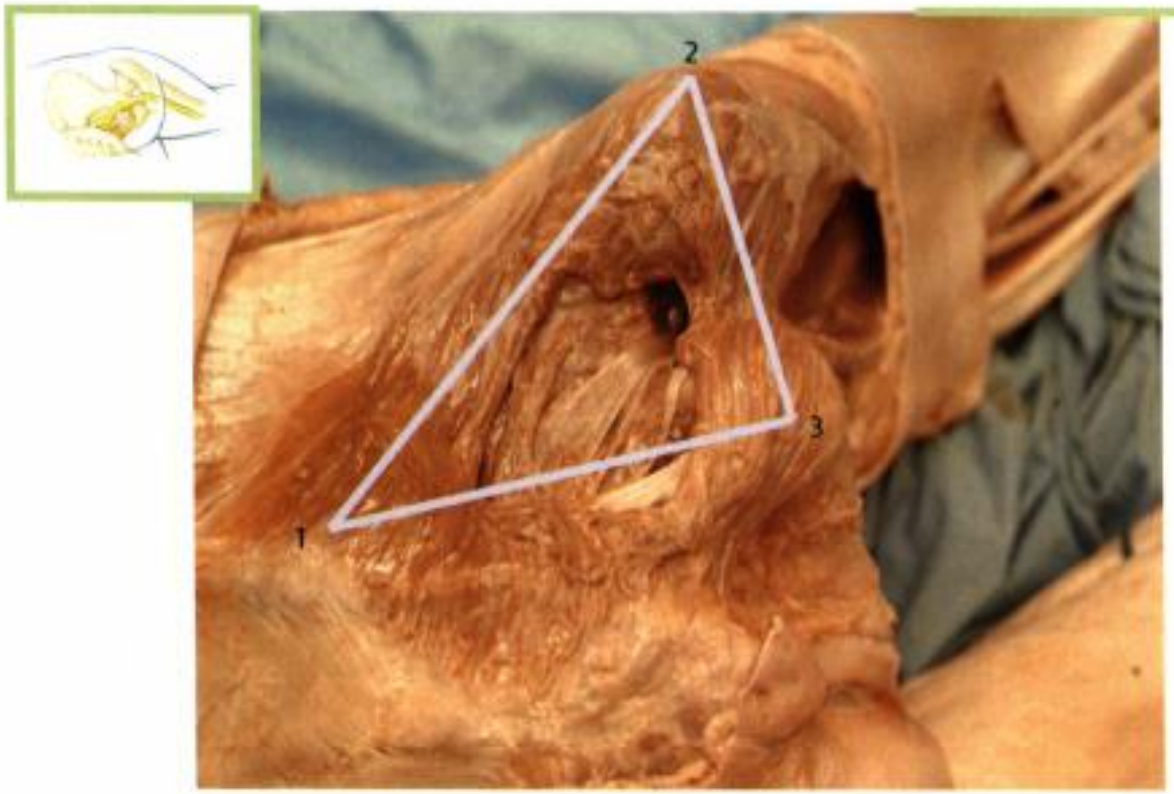


Fig. 10.**38** Right leg, posterior view: the triangle between the superior posterior iliac spine, greater trochanter and ischial tuberosity is used for orientation in all proximal blocks of the sciatic nerve that are performed from behind. The sciatic nerve leaves the pelvis minor through the infrapiriform foramen; it crosses the spine–tuberosity line ca. 6 cm caudal to the spine (puncture site according to Mansour technique), and it leaves the triangle in the middle of the tuberosity–trochanter line (puncture site according to Raj's dorsal subgluteal technique). Labat's classical technique uses the spine–trochanter line for orientation. For a continuous dorsal technique with the patient in lateral position, the puncture site is selected according to either Mansour or Labat, and the needle is directed toward the middle of the tuberosity–trochanter line.

Right pelvis, posterior view

1 Posterior superior iliac spine
2 Greater trochanter
3 Ischial tuberosity

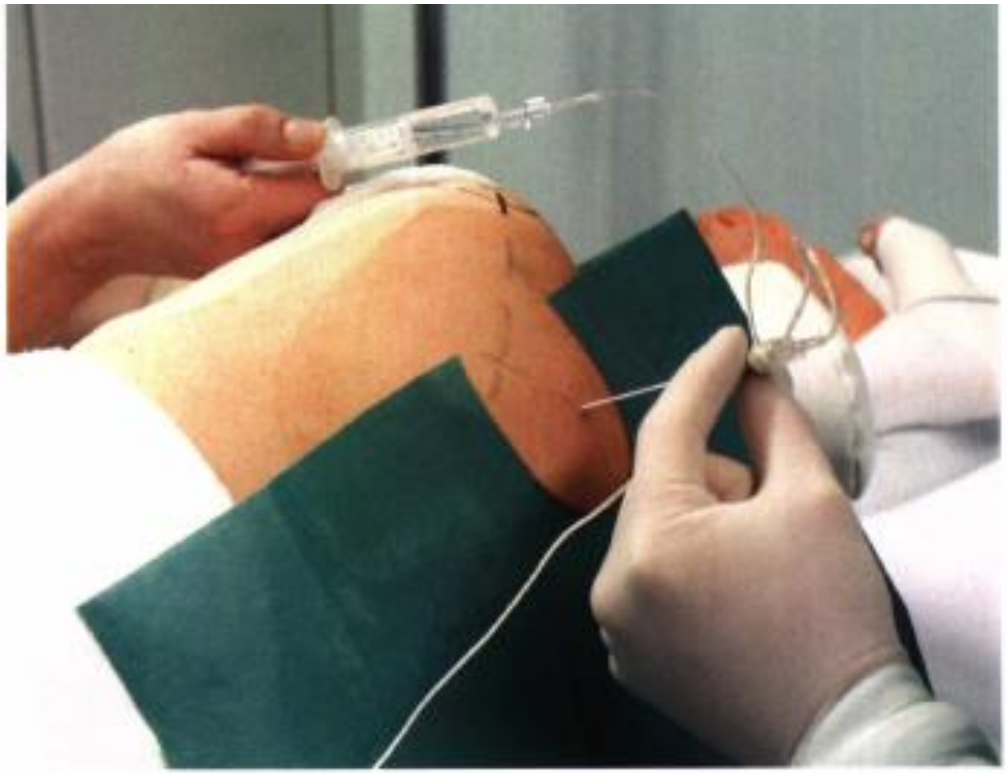
Fig. 10.**39** Posterior sciatic nerve block, Labat technique. The leg to be blocked is positioned so that the shaft of the femur lies in the continuation of the tuberosity–trochanter line. The injection site is 4–5 cm caudal on the perpendicular through the midpoint of the line between the posterior superior iliac spine and the greater trochanter. A line connecting the sacral hiatus and the greater trochanter intersects this perpendicular at the injection site.

1 Posterior superior iliac spine
2 Greater trochanter
3 Sacral hiatus
4 Injection site

Fig. 10.**40** Posterior sciatic nerve block, Labat technique. The puncture is made perpendicular to the skin surface. The nerve is reached after 7.5–12 cm. The stimulation response should be in the foot, but with this approach a response in the ischiocrural muscles (thigh flexors or "hamstring muscles") can also be regarded as adequate. A response in the gluteal muscles, which is often produced when the needle is advanced, is not adequate; the needle must be advanced further.

Fig. 10.**41** Posterior sciatic nerve block, Labat technique. The puncture is made perpendicular to the skin surface. The nerve is reached after 7.5–12 cm.

Fig. 10.**42** Posterior sciatic nerve block, Labat technique. The puncture is made perpendicular to the skin surface. The nerve is reached after 7.5–12 cm. Aspiration must be performed at intervals during injection of the local anesthetic to exclude intravascular injection.



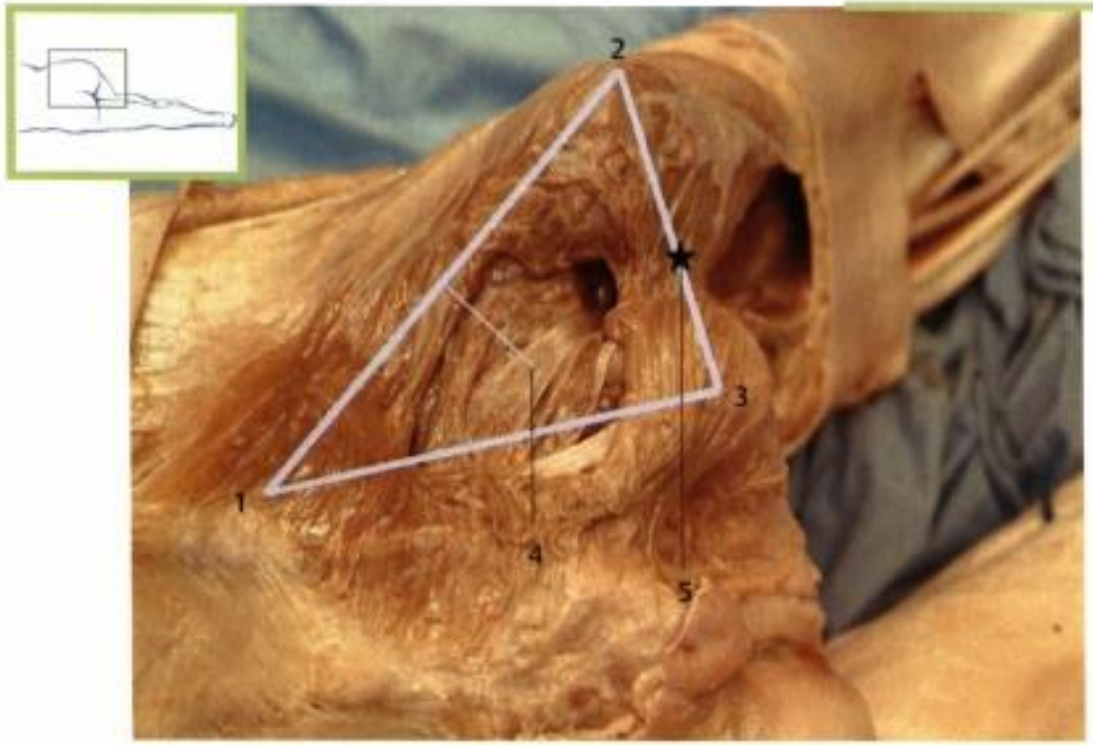


Fig. 10.**43** For continuous posterior sciatic nerve block using the Labat technique, the tip of the needle should be directed to follow the course of the sciatic nerve, i.e., toward the middle of the line between the ischial tuberosity and greater trochanter. In this way, a tangential approach to the nerve is achieved, which enables the catheter to be advanced without problems.

Right pelvis, posterior view

1 Posterior superior iliac spine
2 Greater trochanter
3 Ischial tuberosity
4 Classical puncture site, Labat method
5 Target for continuous posterior sciatic nerve block

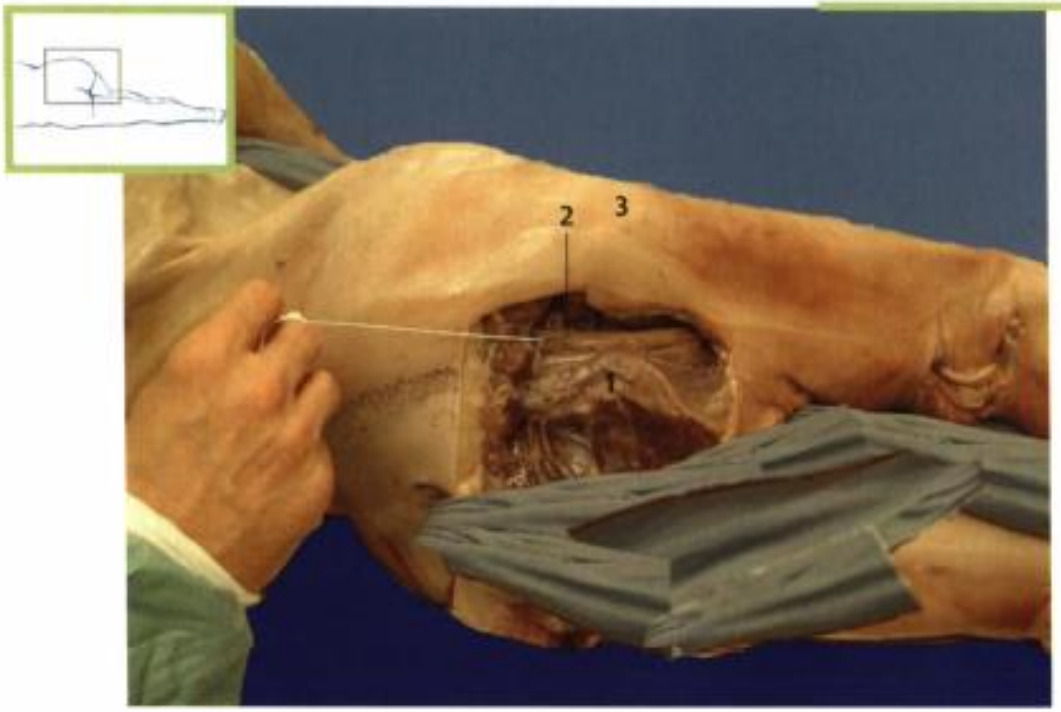


Fig. 10.**45** As Fig. 10.**44**, here in an anatomical dissection.

1 Ischial tuberosity
2 Sciatic nerve
3 Greater trochanter

Fig. 10.**46** Continuous posterior sciatic nerve block. The tip of the needle should be directed according to the course of the sciatic nerve toward the middle third between the ischial tuberosity and the greater trochanter.

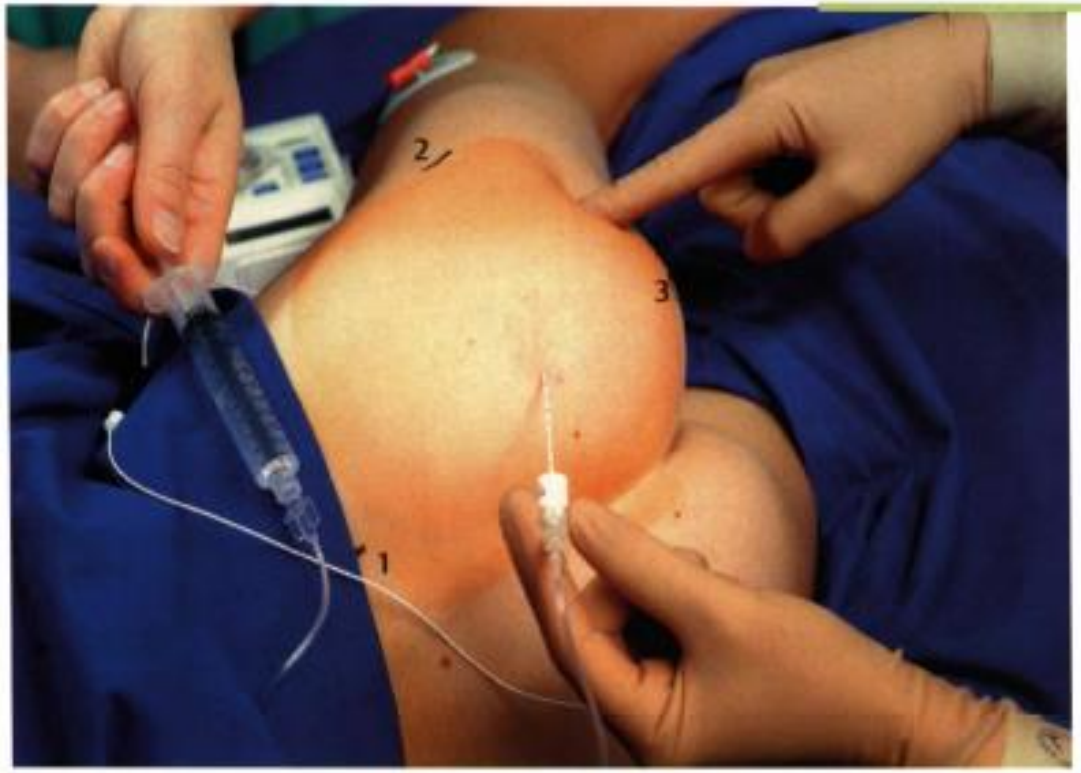


Fig. 10.**48** Posterior continuous technique to block the sciatic nerve (as modified by Meier). The puncture site is the middle of the spine–tuberosity line; the needle should be directed to follow the course of the sciatic nerve, i.e., toward the middle of the line between the ischial tuberosity and the greater trochanter. In this way, a tangential approach to the nerve is achieved, which enables the catheter to be advanced easily.

1 Posterior superior iliac spine
2 Greater trochanter
3 Ischial tuberosity

Indications and Contraindications for Proximal Dorsal SciaticNerve Blocks

] Indications

(in combination with psoas compartment block)

. Operations on the knee.

lower leg or foot

(including tourniquet at the thigh during.

e.g.. total knee replacement, tibial head osteotomy. arthrodesis. lateral ligament suture. forefoot operations)

. Repositioning of fractures of the lower leg and foot

. Amputation in the thigh, lower leg, and foot Regional sympathetic block (perfusion disorders, wound healing disorders. CRPS

. 1) Pain therapy (e.g.. postoperative.achillodynia. oligoarthritis)

. Traumatology (e.g.. pain-free positioning for diagnostic investigations)

Fig. 10.**50** As Fig. 10.**49**, here in an anatomical dissection.

Right thigh, posteroinferior view

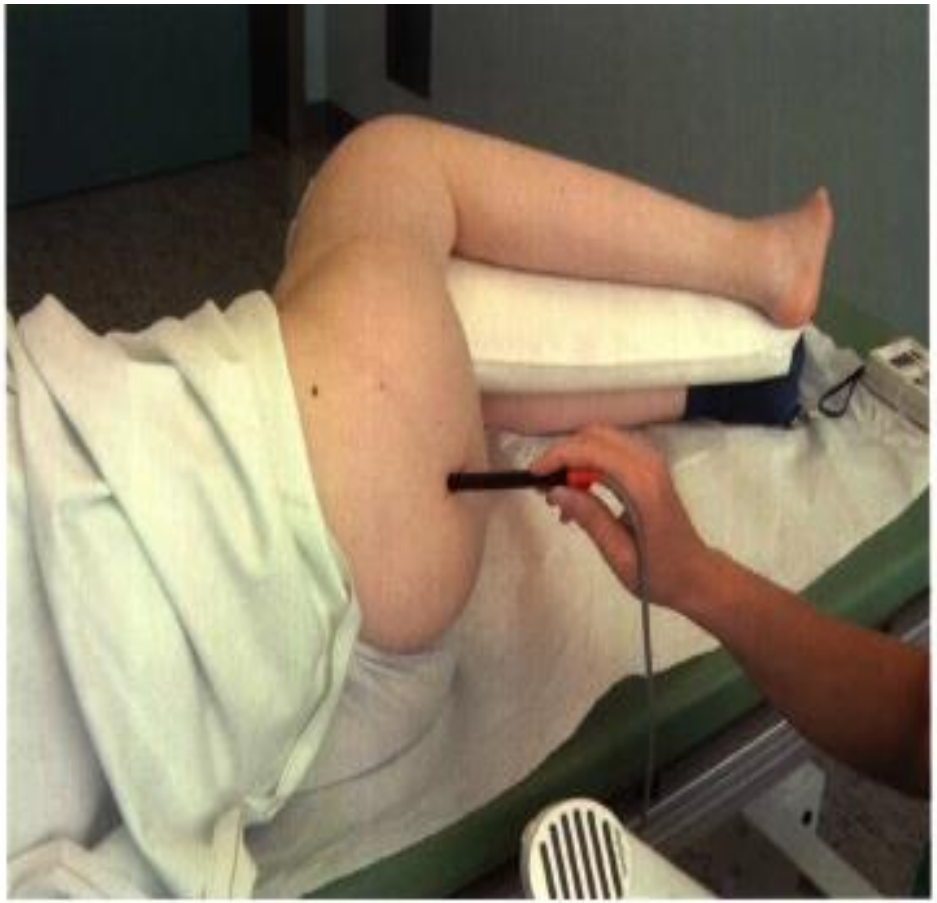
1 Greater trochanter
2 Ischial tuberosity
3 Sciatic nerve

Fig. 10.**53** Using the Labat technique, needle puncture too far medially should be avoided as blood vessels pass here.

Right gluteal region, posterior view

1 Sciatic nerve
2 Inferior gluteal artery

Fig. 10.**54** The blood vessels (inferior gluteal artery and vein) can be located using Doppler; they run about 1–2 cm medial to the puncture site in the Labat technique.



11 Blocks at the Knee

11.1 Anatomical Overview

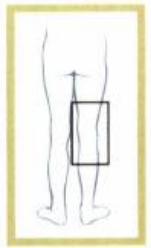
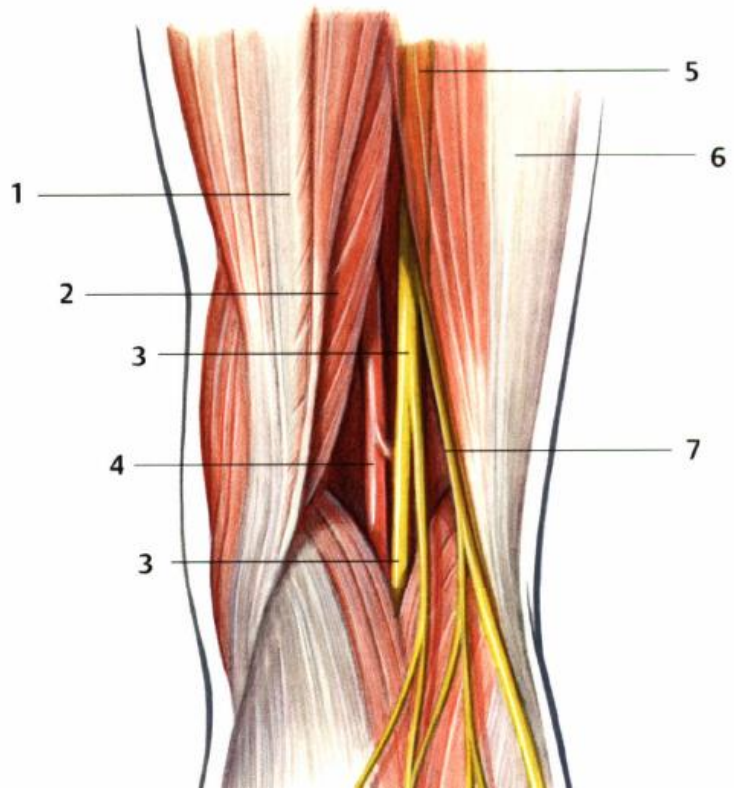


Fig. 11.**1** The sciatic nerve, which often divides very proximal into the tibial nerve and fibular nerve, leaves the common that which surrounds the two divisions at the latest on entering the popliteal fossa (ca. 8–10 cm above the popliteal crease), and the tibial nerve and fibular nerves separate here. In order to block both divisions of the sciatic nerve in the region of the popliteal fossa with one injection, this must be performed at least 8–10 cm above the popliteal crease. A continuous technique can also be performed here without difficulty. A complete block distal to the knee requires an additional block of the saphenous nerve, a main branch of the femoral nerve which provides sensory innervation of the medial lower leg.



1 Semitendinosus
2 Semimembranosus
3 Tibial nerve
4 Popliteal artery
5 Sciatic nerve (covered by muscle)
6 Biceps femoris
7 Common fibular nerve

These anatomical structures are best accentuated by asking the patient to elevate the foot while palpating (Fig. 22-6).

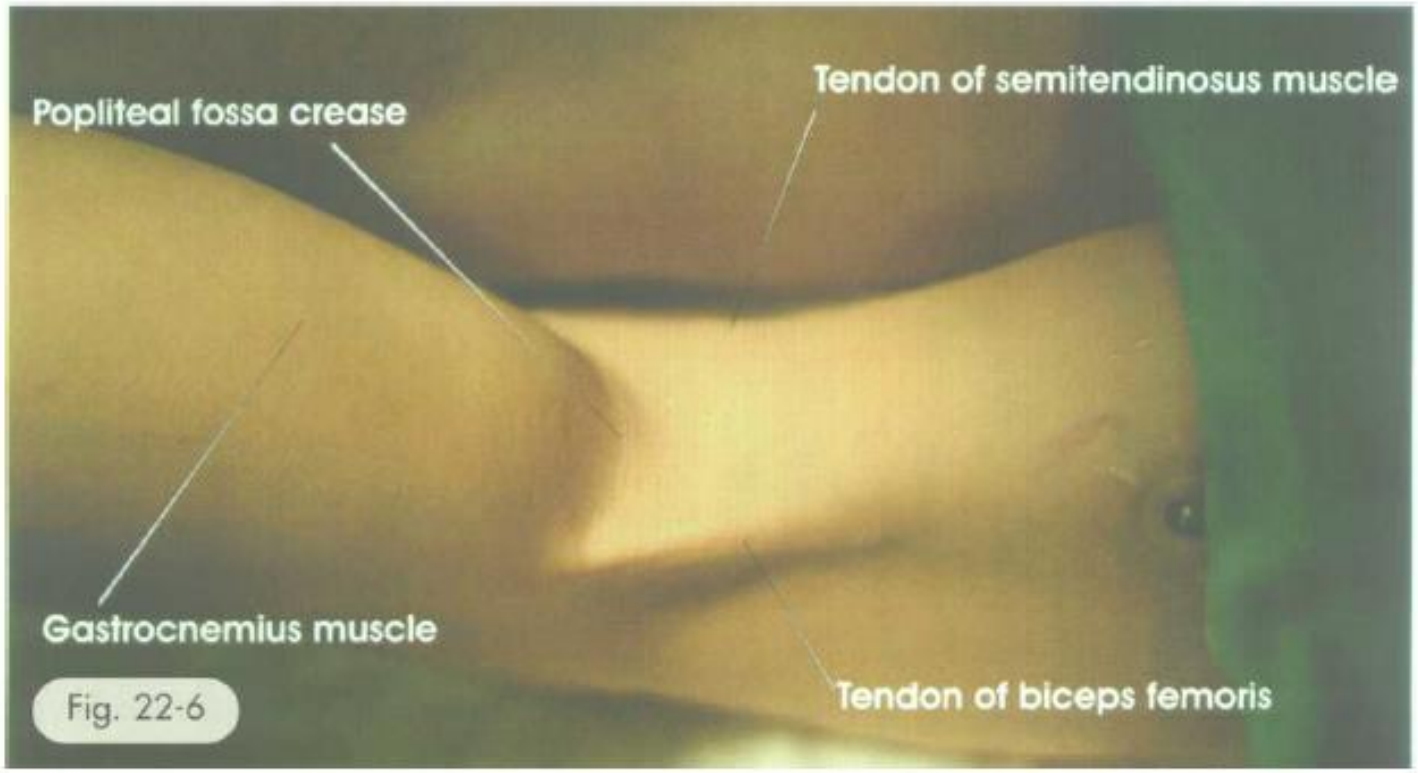
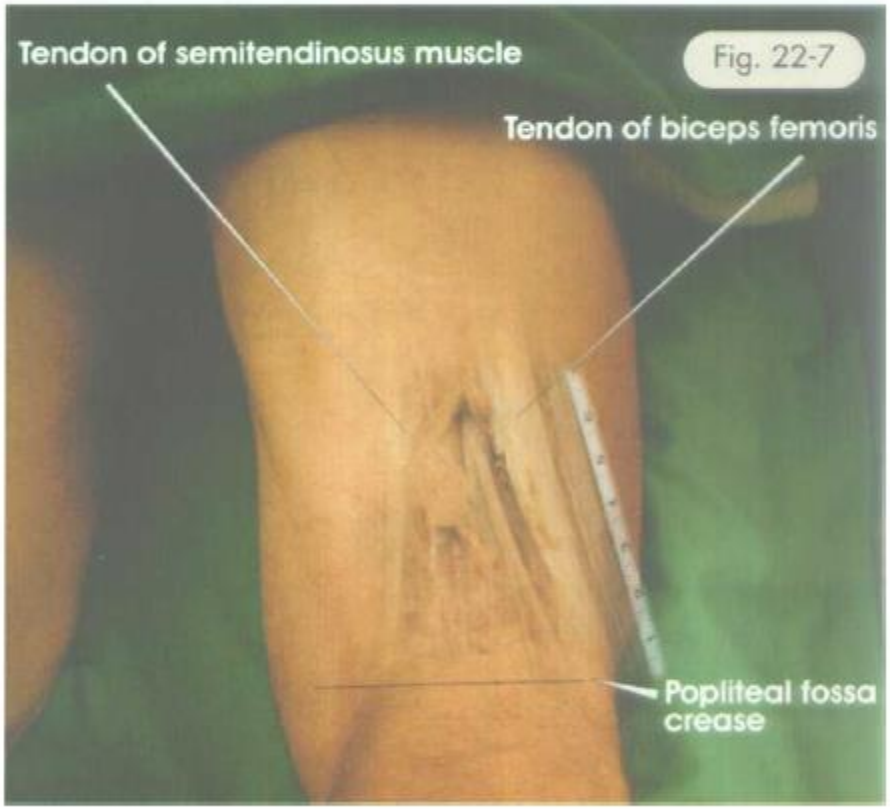


Fig. 22-6

Anatomic Landmarks

Landmarks for the intertendinous approach to a popliteal block are easily recognizable even in obese patients. All three landmarks should be outlined with a marking pen **(Fig. 22-7):**

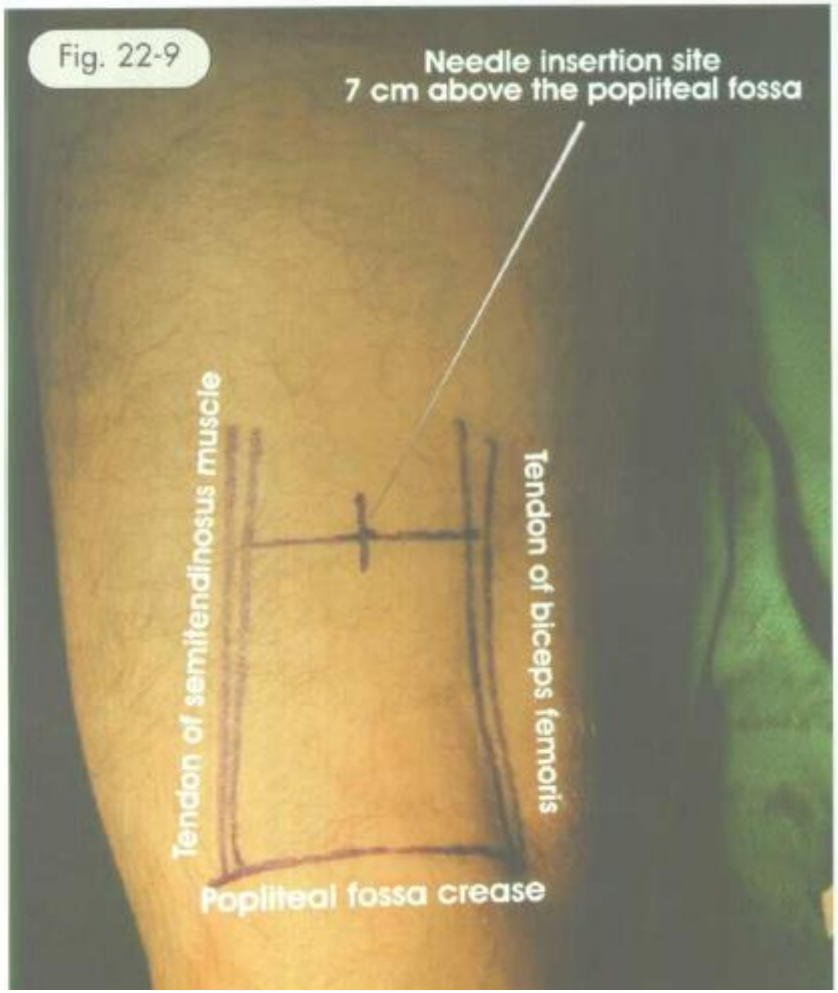
1. Popliteal fossa crease
2. Tendon of the biceps femoris muscle (laterally)
3. Tendons of the semitendinosus and semimembranosus muscles (medially)



TIP

► Relying on tendons rather than on a subjective interpretation of the popliteal fossa triangle gives a more precise, consistent localization of the sciatic nerve.

► The tendons of the semitendinosus and semimembranosus (**Fig. 22-8A**) and biceps femoris (**Fig. 22-8B**) are palpated using a two-finger technique.



The needle insertion point is marked at 7 cm above the popliteal fossa crease at the midpoint between the two tendons (Fig. 22-9).

TIPS

- ► It should be noted that these landmarks differ from those in the popliteal fossa triangle approach in that they are based on easily palpable anatomic structures rather than on the imaginary lines of the triangle.
- ► Relying on the tendons of the biceps femoris and semitendinosus as landmarks makes this approach easy to use even in obese patients.
- ► In obese patients, it is easier to start tracing the tendons cephalad from their attachment at the knee.

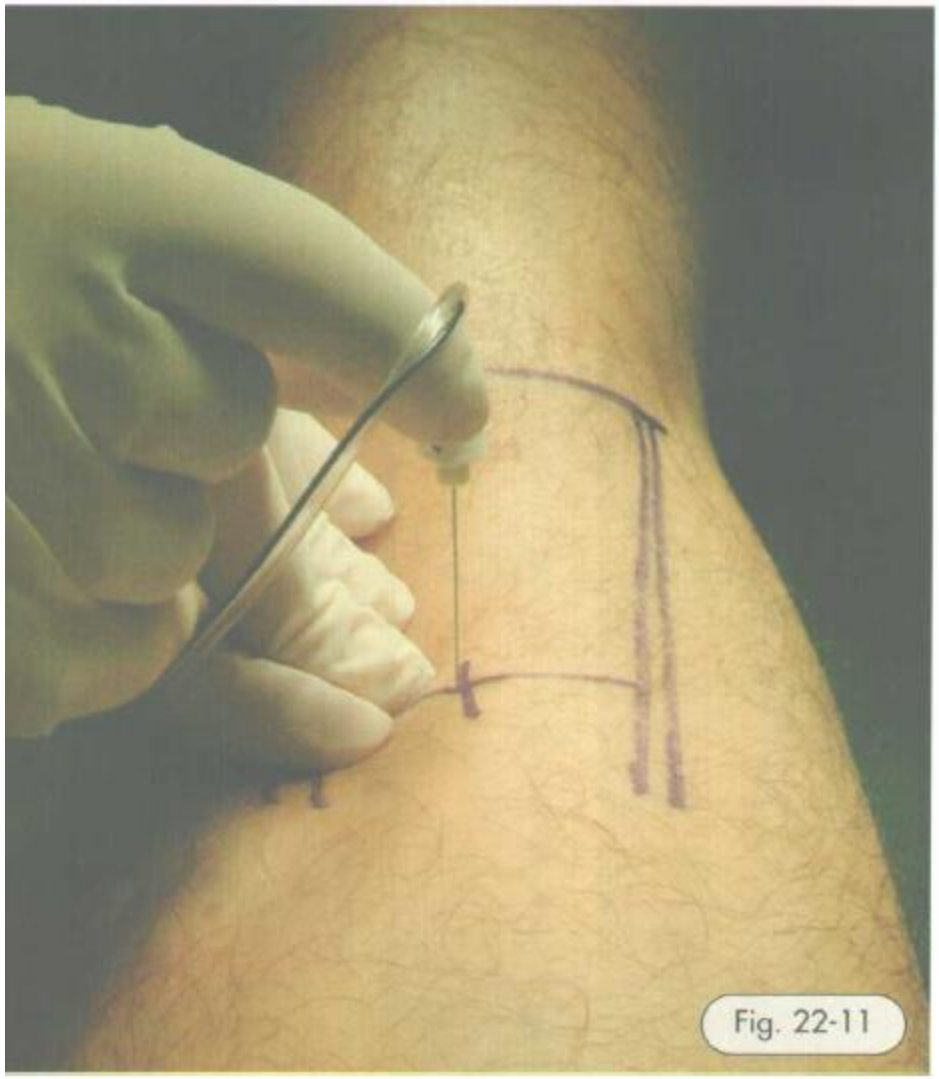


Fig. 22-11

TIPS

- Keeping the fingers of the palpating hand on the biceps muscle is important for the early detection of twitches of the biceps or semitendinosus muscle beneath the fingers (**Fig. 22-11**).
- These local twitches are the result of direct muscle stimulation when the needle is placed too laterally or medially, respectively (**Fig. 22-12**).
- When local stimulation of the biceps muscle is felt under the fingers, the needle should be redirected medially (**Fig. 22-12**).
- Local twitches of the semitendinosus muscle indicate that the needle has been inserted too medially. The needle should be with-drawn to skin level and reinserted laterally (**Fig. 22-12**).

TIPS

▶ Stimulation at a current intensity of less than 0.5 mA may not be possible in some patients. This is occasionally (but not frequently) the case in patients with long-standing diabetes mellitus, peripheral neuropathy, sepsis, or severe peripheral vascular disease. In these cases, stimulating currents up to 1.0 mA should be accepted as long as the motor response is specific and clear-

seen or felt.

ly seen or test.

▶ Occasionally, a very small (e.g., 1-mm) movement of the needle results in a change in the motor response from that of the popliteal nerve (plantar flexion of the foot) to that of the common peroneal nerve (dorsiflexion of the foot). This indicates an intimate needle—nerve relationship at a level before the divergence of the sciatic nerve and should be accepted as the most reliable sign of localization of the common trunk of the sciatic nerve.

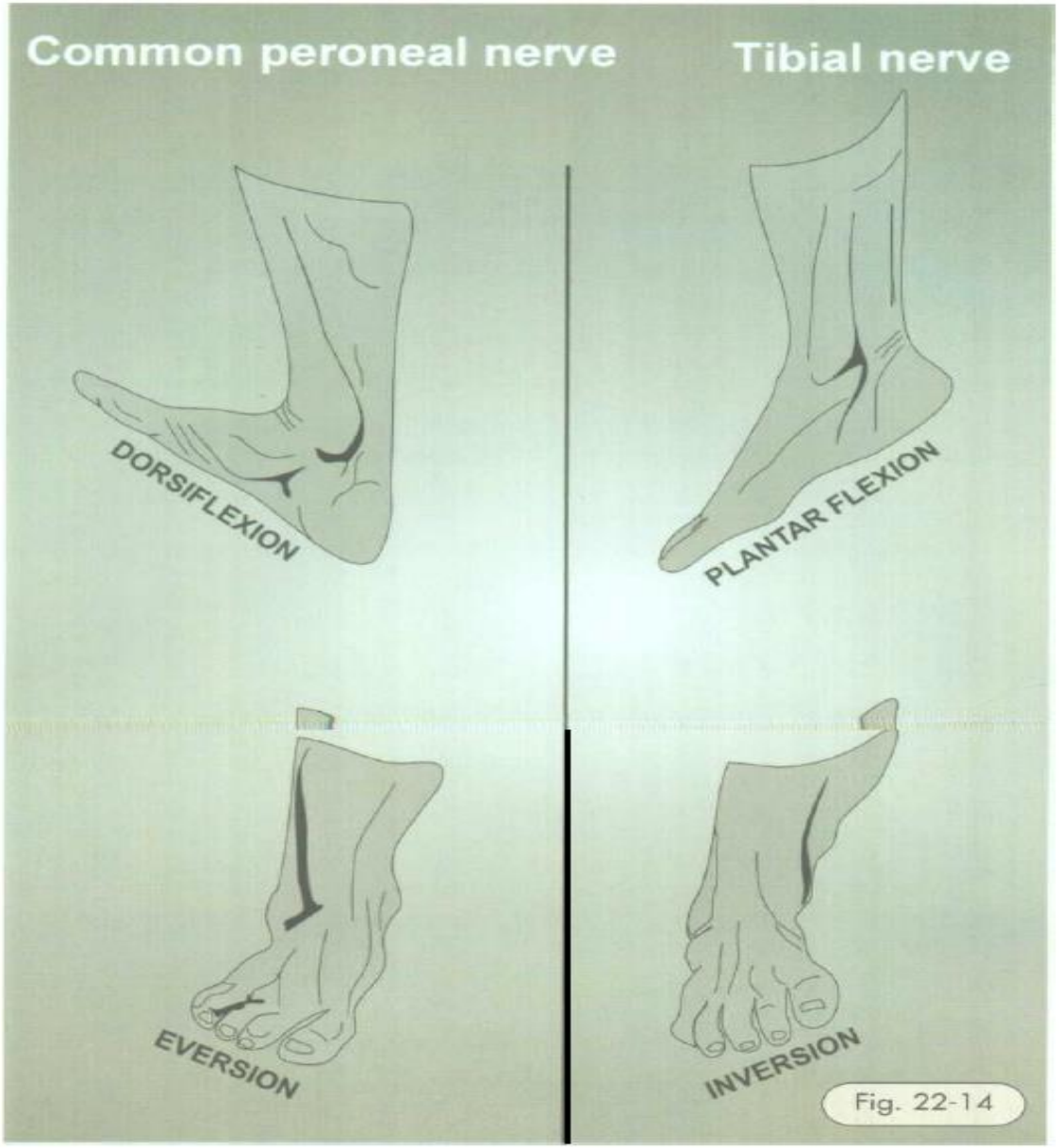
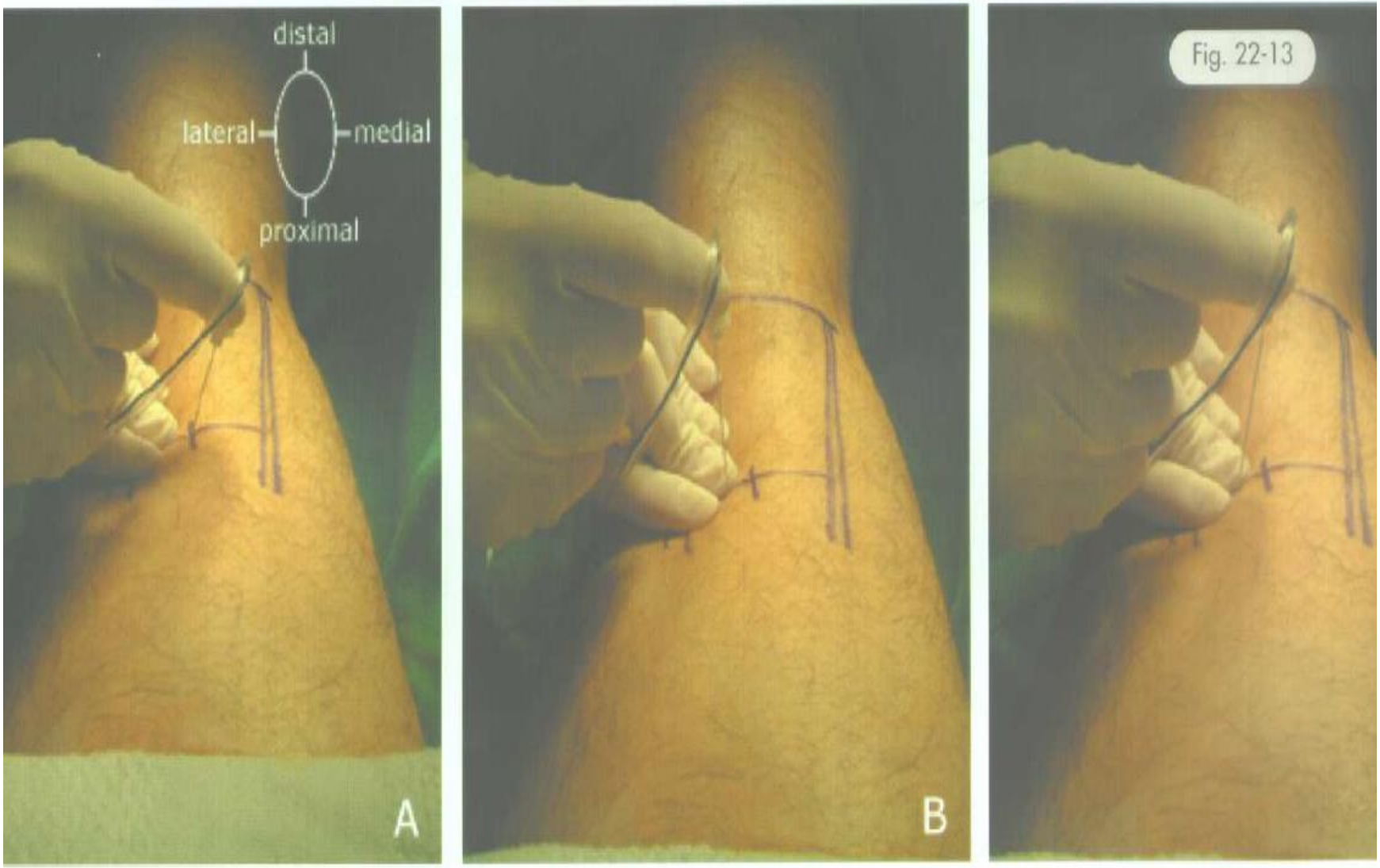

Common peroneal nerve
Tibial nerve
DORSIFLEXION
PLANTAR FLEXION
EVERSION
INVERSION

Fig. 22-14

Troubleshooting:

When insertion of the needle does not result in stimulation of the sciatic nerve (foot twitches), implement the following maneuvers:

1. Keep the palpating hand in the same position.
2. Withdraw the needle to skin level, redirect it 15' laterally, and reinsert it **(Fig.22-13A).**
3. When step 2 fails to result in sciatic nerve stimulation, withdraw the needle to skin level, reinsert it 1 cm laterally, and repeat the procedure first with perpendicular needle insertion.
4. When the step 3 fails, reinsert the needle 15" laterally. These maneuvers should invariably result in localization of the sciatic nerve.


distal
lateral
medial
proximal
A
B
Fig. 22-13

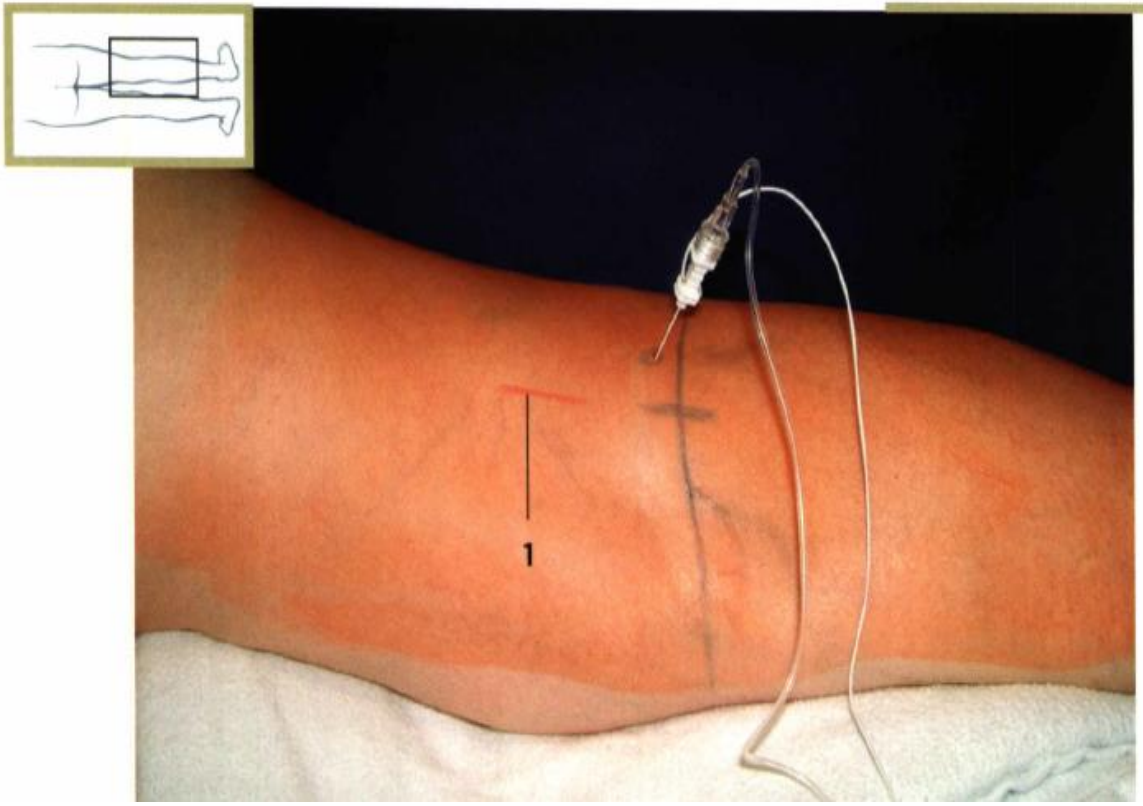


Fig. 11.**2** Right popliteal fossa, posteromedial view. The classical "popliteal block" is performed in the popliteal crease where the tibial nerve and fibular nerve are already separated, so that the two nerves have to be found and blocked individually to obtain a complete block of the lower leg. Here block of the tibial nerve.

1 Popliteal artery

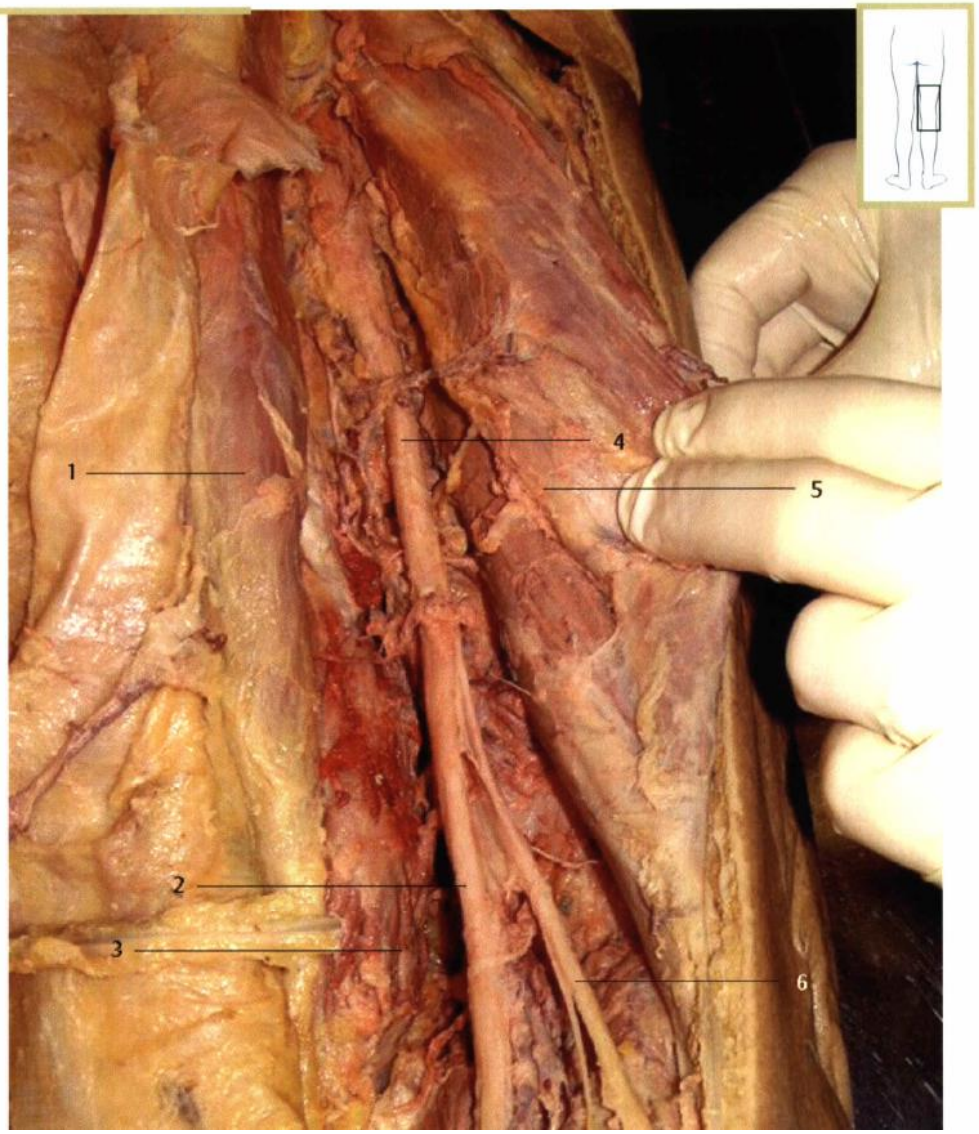


Fig. 11.**3** Right popliteal fossa, posterior view. The sciatic nerve, which often splits very proximal into the tibial and fibular nerves, leaves the common sheath that surrounds the two divisions at the latest on entering the popliteal fossa (ca. 8–10 cm above the popliteal crease) where the two main branches separate. In order to block both divisions of the sciatic nerve in the region of the popliteal fossa with one injection, this must be performed at least 8–10 cm above the popliteal crease. A continuous catheter technique can also be used here without difficulty.

1 Semimembranosus
2 Tibial nerve
3 Popliteal crease
4 Sciatic nerve
5 Biceps femoris, reflected laterally
6 Fibular nerve

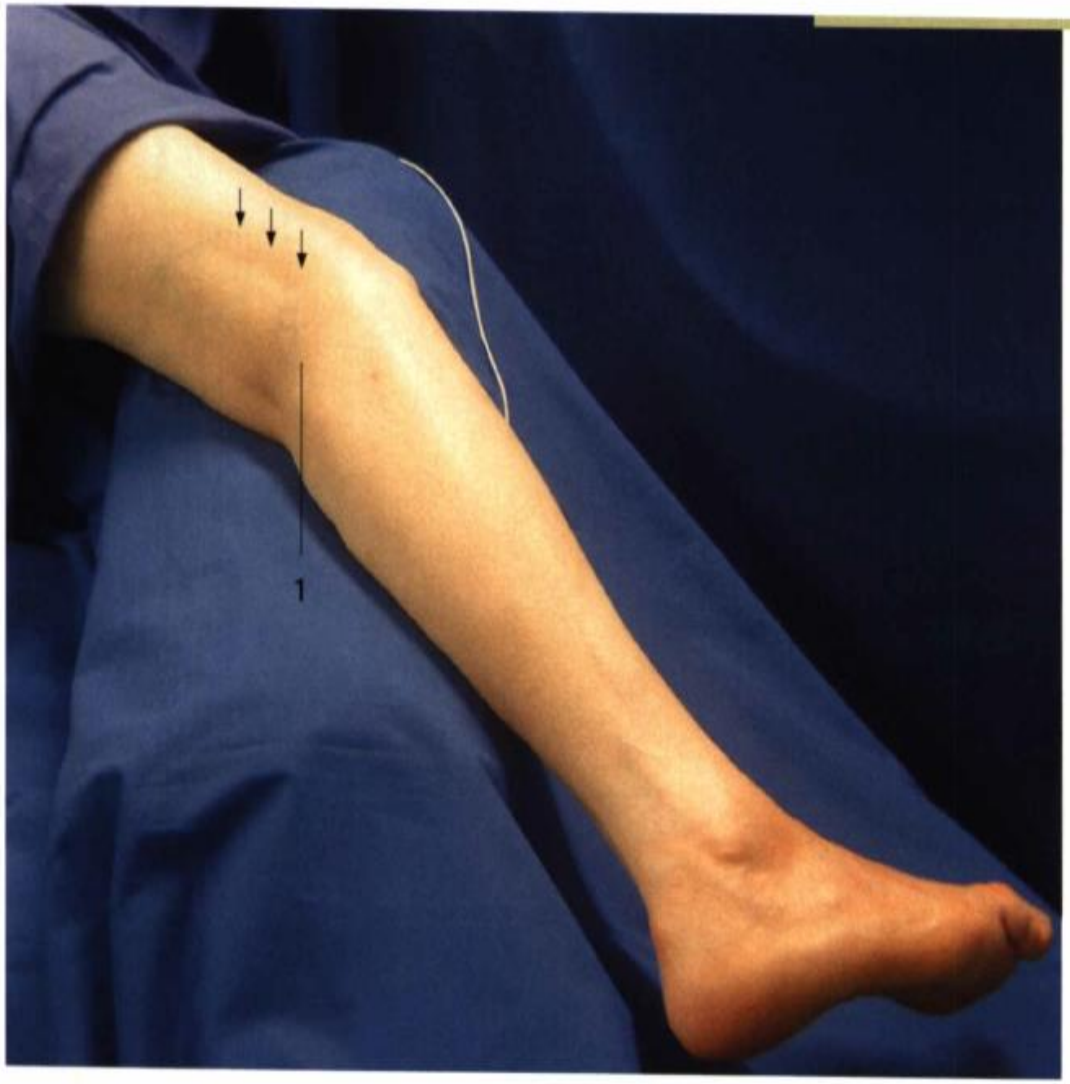


Fig. 11.**5** Distal sciatic nerve block, distal approach in lateral position: there is a posterior and a lateral approach to distal sciatic nerve block. The dorsal approach can be performed in the lateral or supine position (see below). The tendon of the biceps femoris is used for orientation. A skin groove can often be identified medial to the tendon and for better orientation the patient can be asked to flex the lower leg against resistance, which makes the tendon more prominent.

1 Popliteal crease
→ Skin groove medial to the tendon of
→ biceps femoris

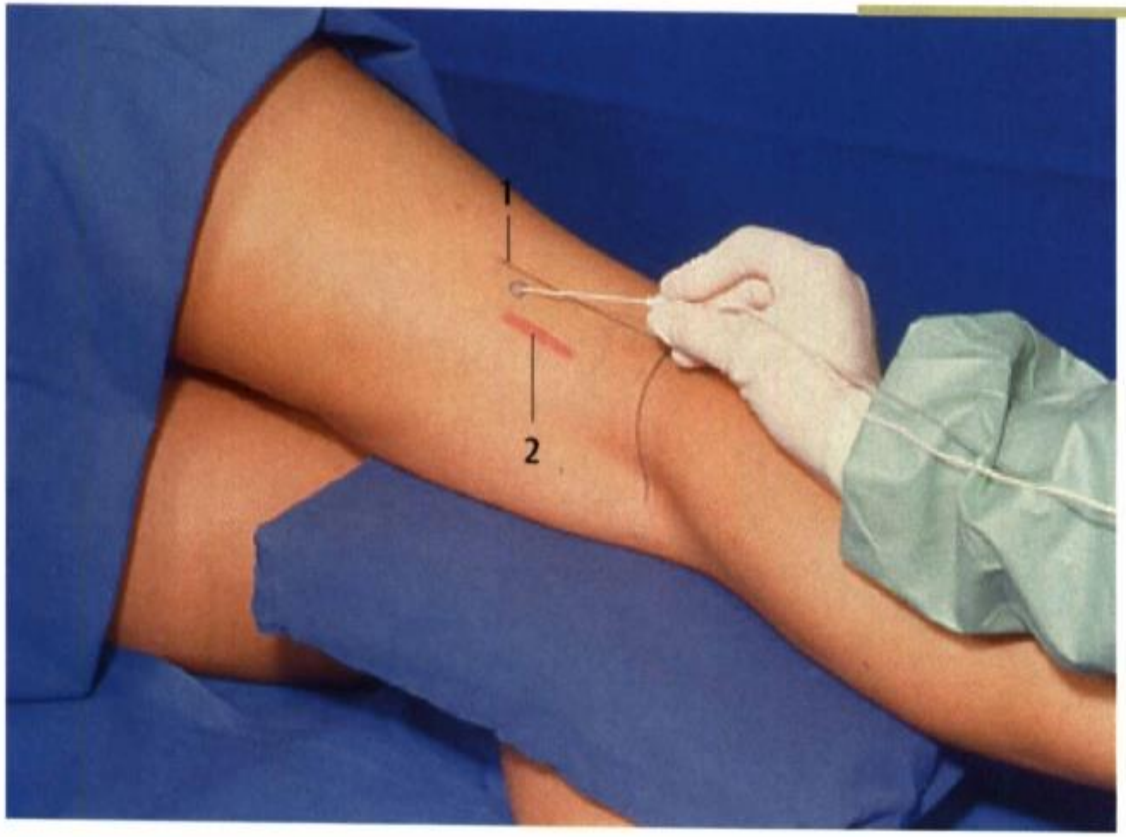


Fig. 11.**6** The injection site for posterior distal sciatic nerve block is located immediately medial to the tendon of biceps femoris ca. 10 cm cranial to the popliteal crease. The needle is directed slightly medially and cranially. Note that the artery runs lateral to the midline and that the sciatic artery is still lateral to the artery.

1 Tendon of biceps femoris
2 Popliteal artery (does not absolutely have to be found for this technique)

Fig. 11.7 If the leg is positioned appropriately, dorsal distal sciatic nerve block can also be performed on a patient in supine position.

Fig. 11.**8** Right popliteal fossa, posterior view. Dorsal distal sciatic nerve block: the puncture site is medial to the tendon of biceps femoris and lateral to the popliteal vessels.

1 Biceps femoris
2 Tibial division of the sciatic nerve
3 Fibular division of the sciatic nerve
4 Semitendinosus
5 Popliteal artery
6 Semimembranosus

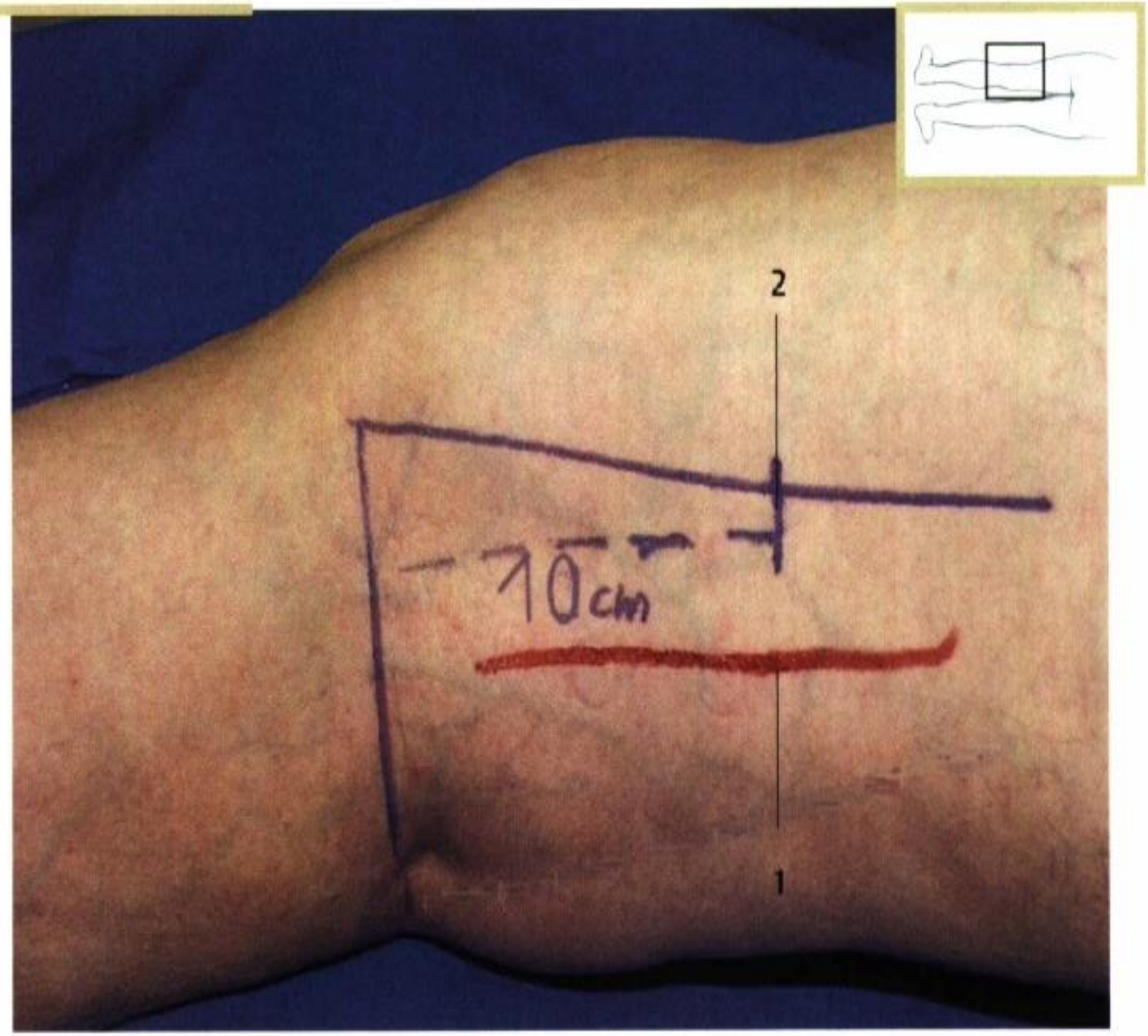


Fig. 11.**9** Orientation and performance of a distal posterior sciatic nerve block is also possible in obese patients, here in the left leg. A 6 cm needle may be too short in obese patients.

1 Popliteal artery
2 Puncture site

Fig. 11.**10** Using the distal posterior approach, the sciatic nerve is reached after 4–6 cm depending on the angle. The response is due to stimulation of either the lateral fibular division (dorsiflexors) or the medial tibial division (plantar flexors). It is often possible to stimulate both divisions by slight wobbling movements. The optimal response is from the foot. After the nerve is successfully found, the nerve 30–40 ml of local anesthetic is injected intermittently.

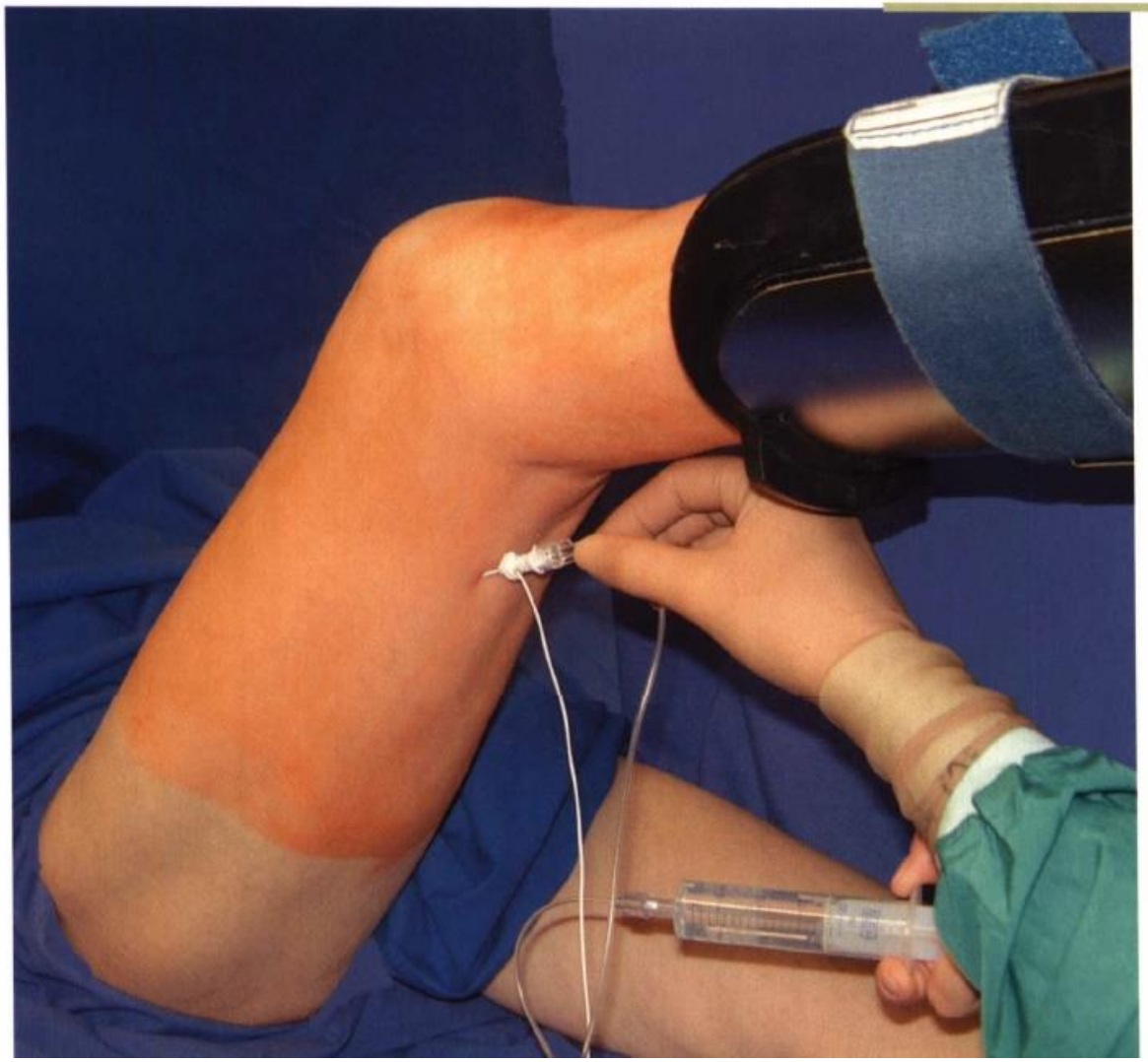


Fig. 11.**11** Performing dorsal distal sciatic nerve block in supine position.

Fig. 11.**16** Distal sciatic nerve block, lateral approach with the patient in supine position: for orientation, the muscle gap between the vastus lateralis and the biceps femoris is localized ca. 12 cm above the popliteal crease.

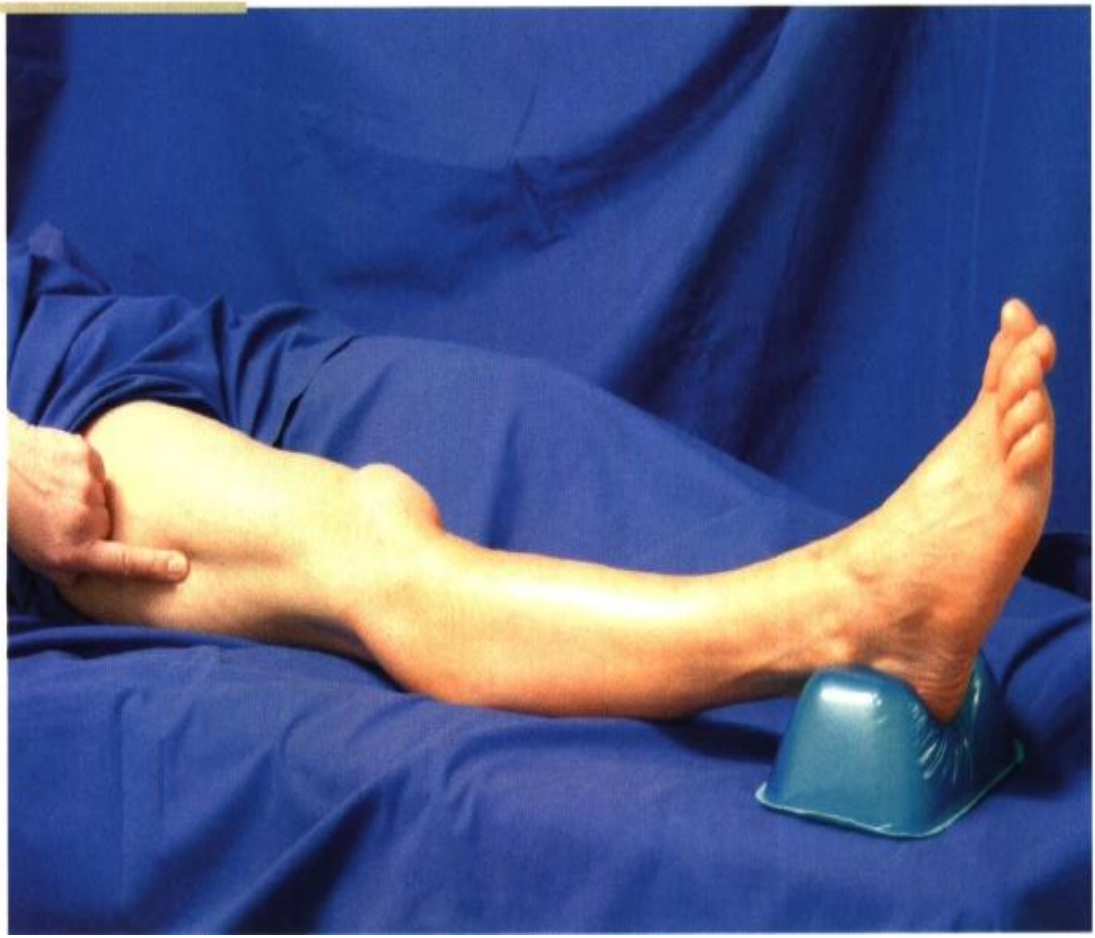
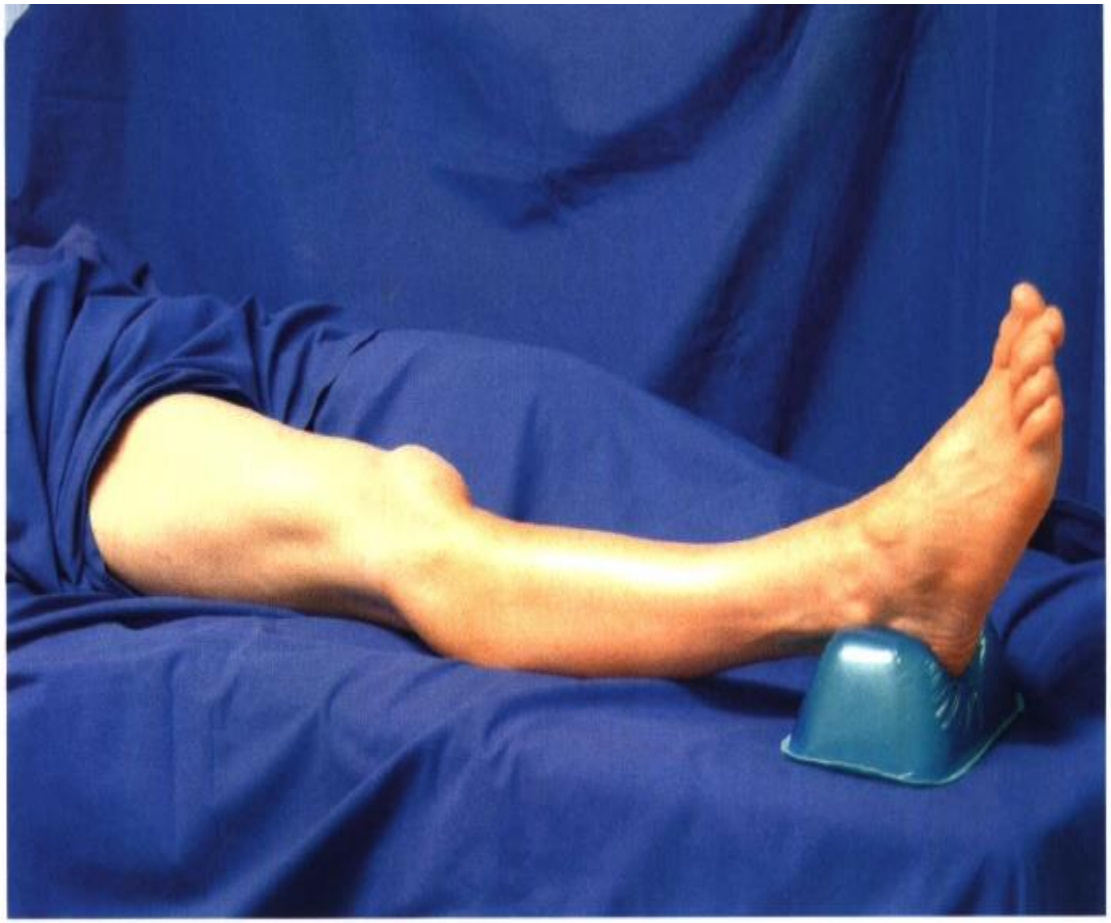


Fig. 11.**15** Besides the posterior approach, there is also a lateral approach to the distal sciatic nerve. For this approach, the lower leg should be supported with a pad so that the dorsal muscles sag as freely as possible.



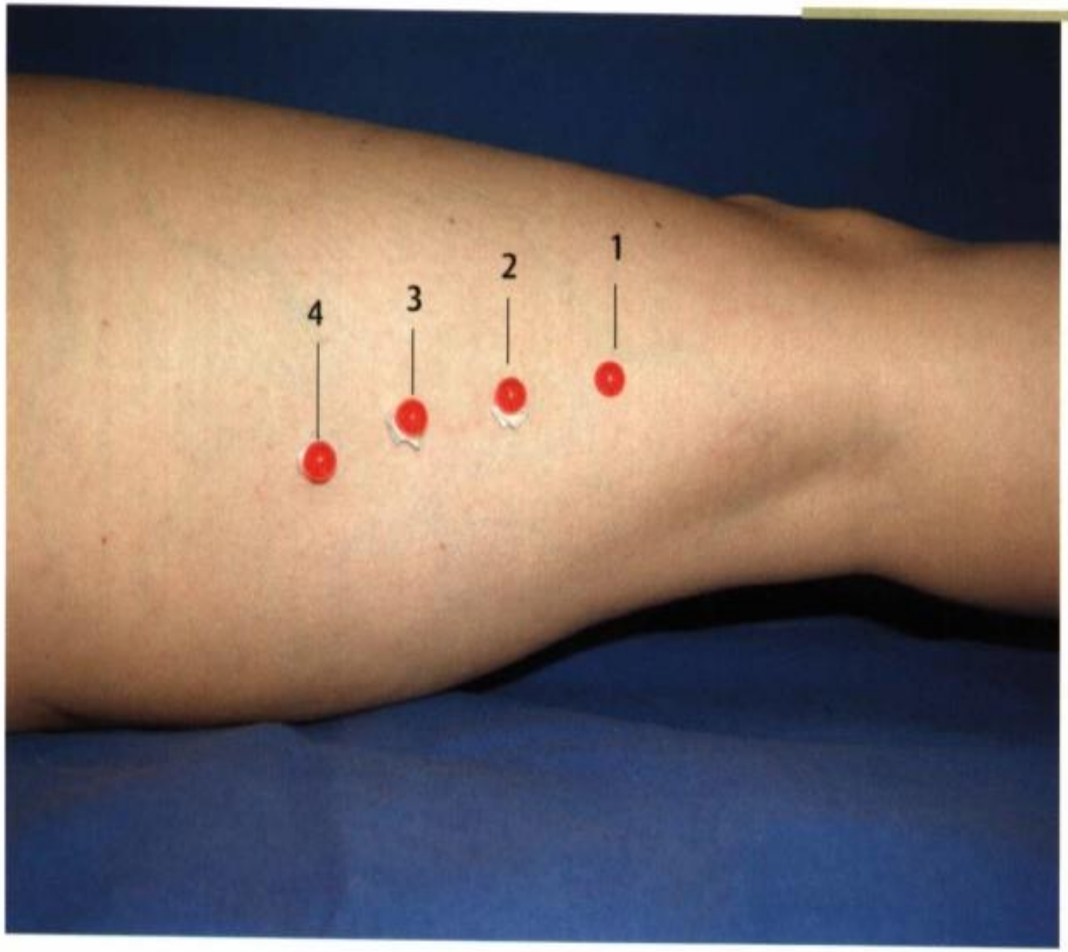


Fig. 11.**17** In general the lateral approach to the sciatic nerve can be used at any level, but the level of puncture has a considerable influence on the puncture angle in the dorsal direction. MRI investigations at three different levels proximal to the popliteal crease (12, 16, 20 cm) were used to determine the angle between the marked puncture site (between the vastus lateralis and the biceps femoris) and the sciatic nerve. As the gap between the vastus lateralis and the biceps femoris moves dorsally from distal to proximal, the angle of needle direction decreases as the distance from the popliteal crease increases.

Distance from popliteal crease to puncture site:

1 9 cm
2 12 cm
3 16 cm
4 20 cm

Equipment

A standard regional anesthesia tray is prepared with the following equipment **(Fig. 22-5)**:

- Sterile towels and gauze packs
- 20-mL syringes containing local anesthetic
- Sterile gloves, marking pen, and surface electrode
- $1^1/2$-in, 25-gauge needle for skin infiltration
- 5-cm, short-bevel, insulated stimulating needle
- Peripheral nerve stimulator

Fig. 22-5

Fig. 11.**28** The sciatic nerve is rich in sympathetic fibers. After successful injection of the local anesthetic there is a marked sympathetic block with a rise in temperature and vasodilatation which can also be used therapeutically. Continuous sciatic nerve block is an ideal alternative to a continuous lumbar epidural block for various indications.