Preface

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After so many of our colleagues have expressed the wish for a pocket edition of our Peripheral Regional Anesthesia Tutorial published by the Ulm Rehabilitation Hospital (RKU), we have now complied by offering this compact version. The fundamentals contained in this condensed guide still grow from the now almost 20 years of clinical and practical experience gained in our hospital. This book differs from the previous, more comprehensive Tutorial Script in that it includes many new developments and supplemental information. These shall be incorporated into the next edition of the tutorial script and its coming Internet version.

It is here that I would like to extend my very special thanks to the managing Senior Physician of our Department, Dr. Peter Geiger. Without his tireless assistance, the production of the compact version of this pocket tutorial would not have been possible. Additional thanks go to B. Braun Melsungen, whose continuing technical and financial support have been invaluable for the completion of this work.

We would appreciate your suggestions and criticisms and look forward to your many visits at our Internet Forum **www.nerveblocks.net.**

Ulm, June 2004 Prof. H.-H. Mehrkens, M.D.

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Equipment

Nerve stimulator

- Current range from 1.0 – 0.1 mA
- Pulse duration 0.1 ms (mixed nerve)
  1.0 ms (sensory nerve)
- Constant square wave pulse over a wide impedance range
  e.g. Stimuplex® HNS 12 (B. Braun Melsungen AG)

Single shot technique

- Unipolar needles of varying lengths
  e.g.: Stimuplex® D (B. Braun Melsungen AG)

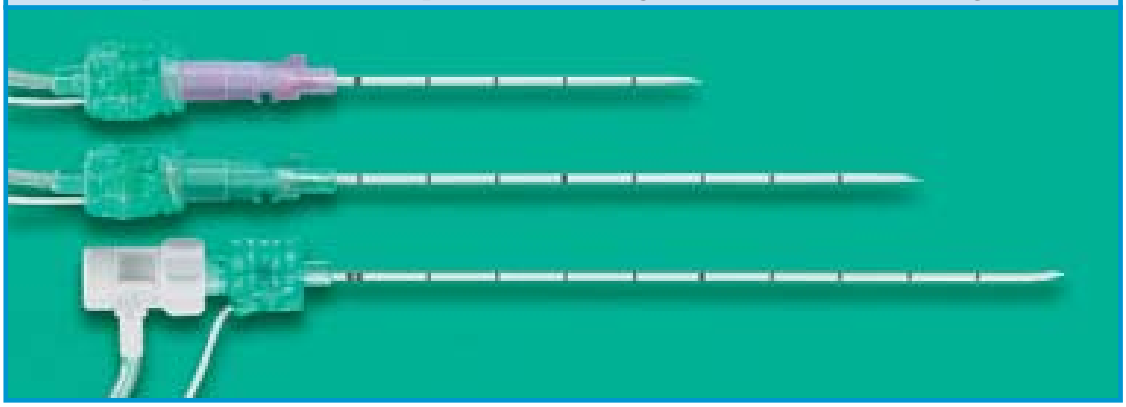
Catheter technique

- Unipolar needles in a plastic introducer of varying lengths
  e.g.: Contiplex® D Sets with a flexible and non-wired catheter
  (B. Braun Melsungen AG)

Stimuplex® HNS 12 (B. Braun Melsungen AG)

Stimuplex® D (B. Braun Melsungen AG)

Contiplex® D, Contiplex® Tuohy (B. Braun Melsungen AG)



Drugs

Conventional, medium-acting local anesthetics (LA) like
- prilocaine
- mepivacaine

and long-acting ones like
- ropivacaine
- bupivacaine.

For anesthesia, we prefer a combination of
- prilocaine 1 % (20 – 40 ml) and ropivacaine 0.5 – 0.75 % (10 – 20 ml) or bupivacaine 0.5 % (10 – 20 ml).

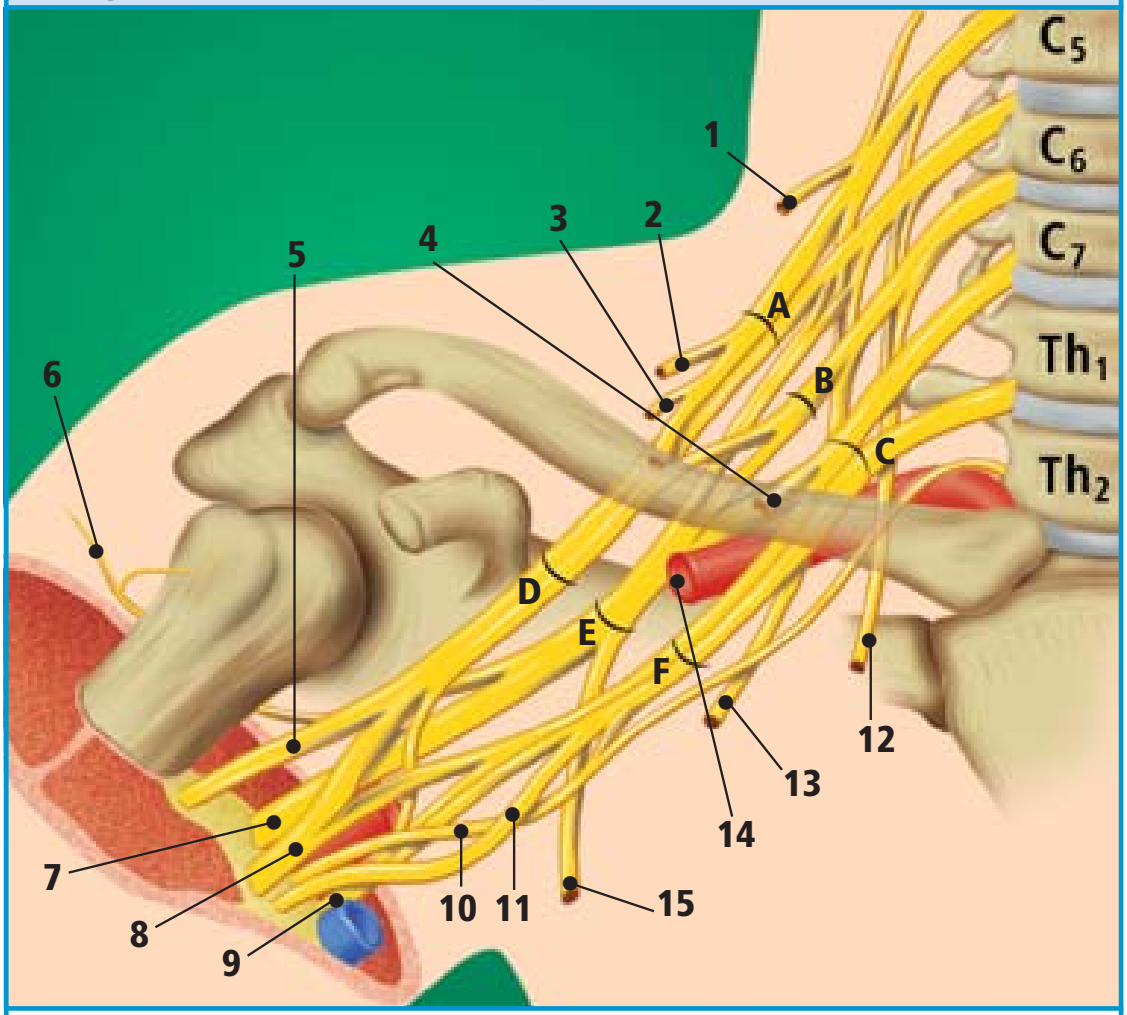
This combination has the advantage that a LA with comparably low toxicity is given primarily and inadvertent intravascular injections mostly occur during the prodromal stage. Subsequently, a long-acting LA is administered to achieve a blockade of sufficient duration.

For analgesia, 0.2% ropivacaine is generally administered. The preferred mode of delivery is through a PCA pump equipped with basal rate and bolus settings or by continuous infusion through the nerve catheter. Intermittant bolus injections are rarely used.

Stimulation and injection technique

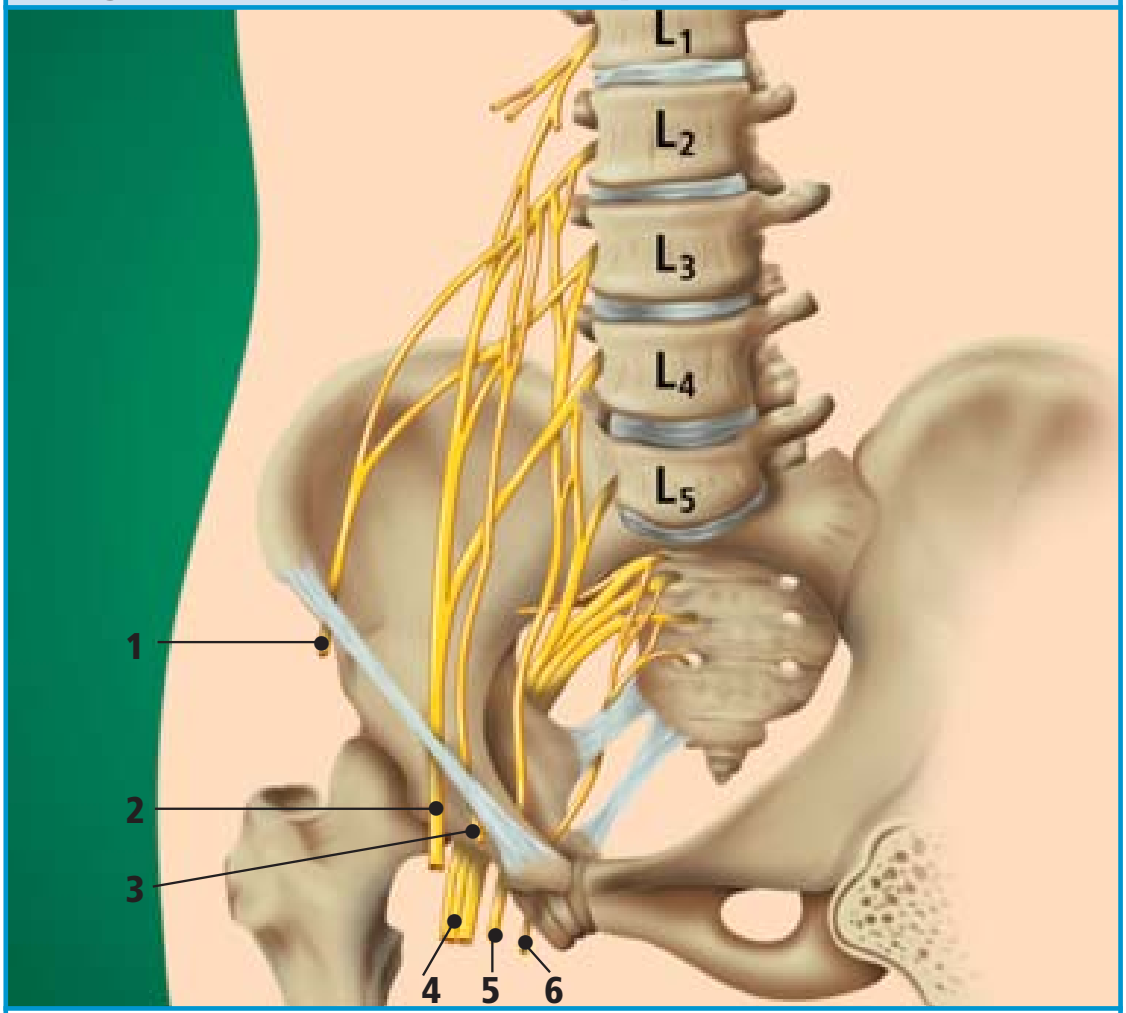
1. Initial current	1.0 mA
2. Pulse duration	0.1 ms (mixed nerve)
3. Threshold current	0.3 – 0.2 mA
4. Aspiration test	5 – 10 ml LA injected slowly
5. Increase to 1.0 mA initial current	No stimulatory response Recurring stimulatory response: may indicate (partial) intravascular needle position. Attempt careful aspiration, perform reinjection slowly with constant verbal monitoring.
6. Administration of remaining LA	1.0 mA
7. Catheter placement after primary LA administration	
Upper extremity:	Approx. 3 cm beyond the end of the introducer sheath
Lower extremity:	Approx. 5 cm beyond the end of the introducer sheath
8. Catheter aspiration test	

Diagram of the brachial plexus

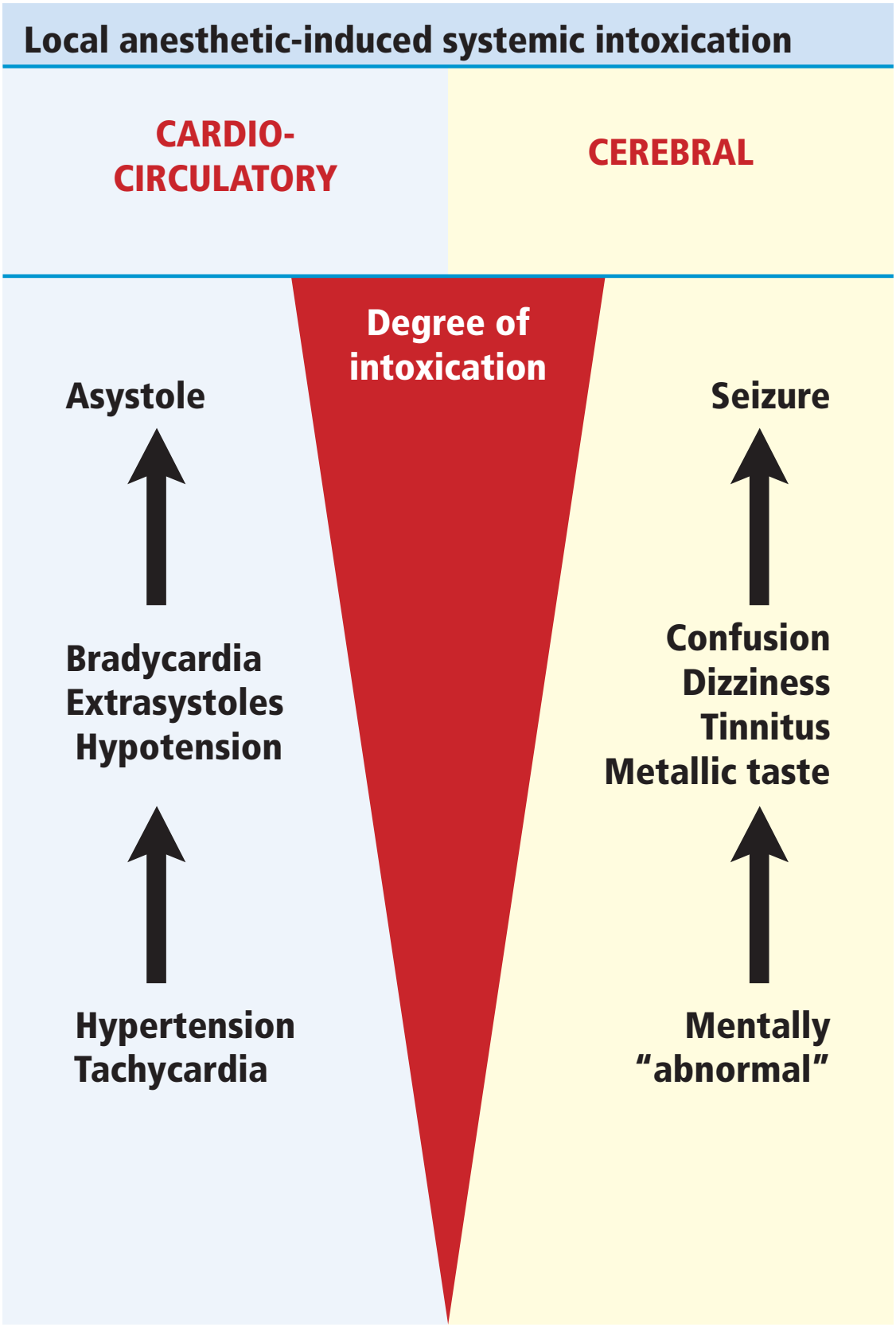


A	Upper trunk	5	Musculocutaneus nerve
B	Middle trunk	6	Axillary nerve
C	Lower trunk	7	Radial nerve
D	Lateral cord	8	Median nerve
E	Posterior cord	9	Ulnar nerve
F	Medial cord	10	Medial brachial cutaneous nerve
		11	Medial antebrachial cutaneous nerve
1	Dorsal scapular nerve	12	Long thoracic nerve
2	Suprascapular nerve	13	Subscapular nerve
3	Subclavian nerve	14	Axillary artery
4	Pectoral nerves	15	Thoracodorsal nerve

Diagram of the lumbosacral plexus



1 Lateral femoral cutaneous nerve
2 Femoral nerve
3 Genitofemoral nerve
4 Sciatic nerve
5 Obturator nerve
6 Pudendal nerve


Local anesthetic-induced systemic intoxication
CARDIO-CIRCULATORY
CEREBRAL
Degree of intoxication
Asystole
Bradycardia
Extrasystoles
Hypotension
Hypertension
Tachycardia
Seizure
Confusion
Dizziness
Tinnitus
Metallic taste
Mentally "abnormal"

Anterior interscalene nerve block

(Anterior approach according to Meier)

Indications

- Operative procedures on the shoulder, proximal upper arm and lateral clavicle
- Analgesia

Contraindications

- Contralateral phrenic and recurrent paresis

Side effects / complications

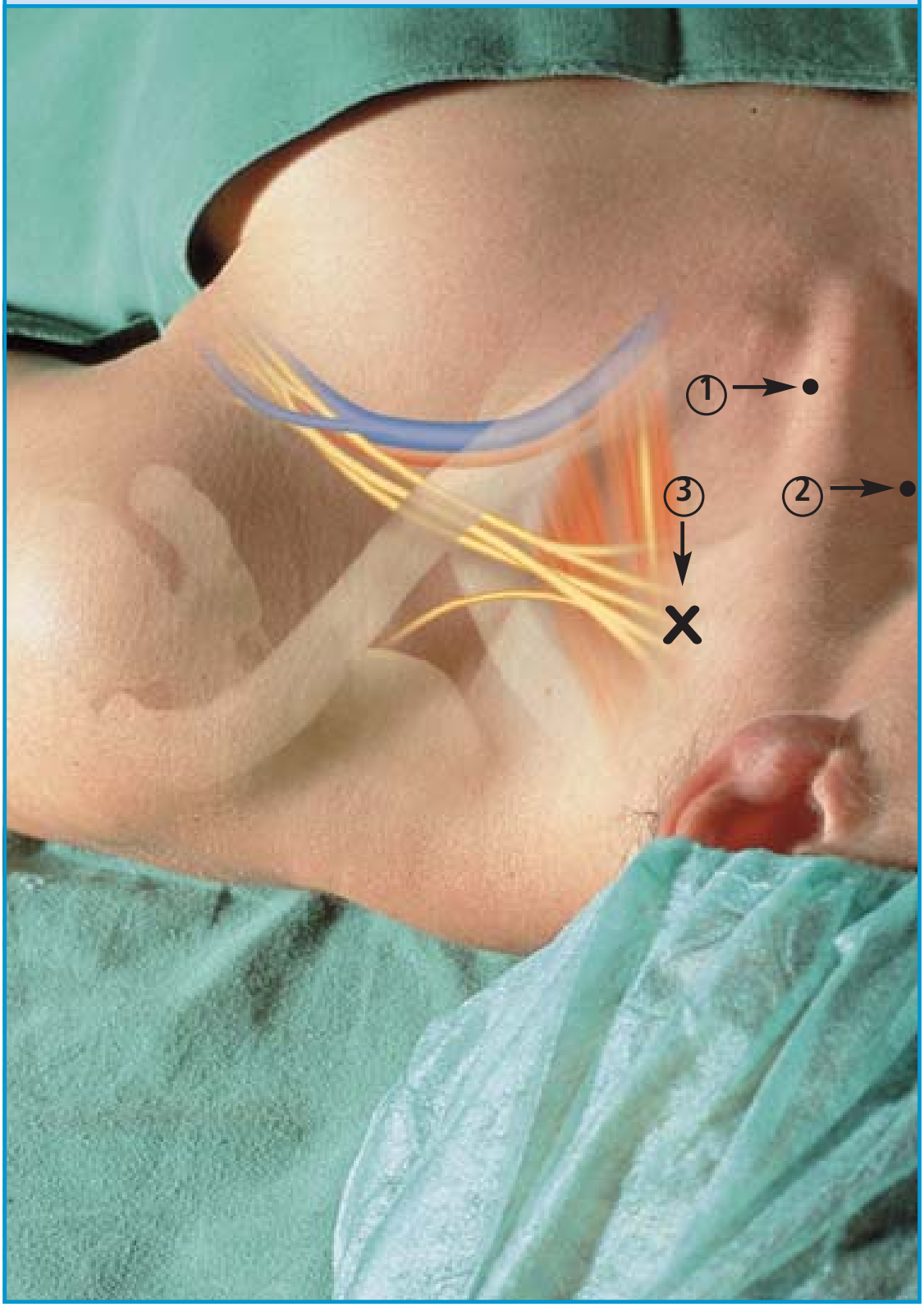
- Horner´s syndrome
- Phrenic paresis
- Recurrent paresis
- Vessel puncture (external jugular vein)

Anatomical landmarks

- Sternocleidomastoid muscle
- Superior thyroid notch
- Scalenus gap
- VIB (vertical infraclavicular blockade) point

① Sternocleidomastoid muscle, ② Thyroid notch, ③ Puncture site

Anatomical landmarks



Anterior interscalene nerve block

Blockade technique

The patient lies supine, head turned slightly to contralateral side, shoulder and arm positioned comfortably.

Puncture site:
Posterior edge of the sternocleidomastoid muscle at the level of the thyroid notch (1.5 – 2 cm above the cricoid). Insertion direction tangential to the course of the plexus in the direction of the VIB point or anterior axillary line.

Puncture depth: 2 – 4 cm.

Positive stimulatory response from the upper trunk (lateral cord): biceps and/or brachial muscle.

Dosage

30 – 50 ml LA

Single shot technique

e.g. Stimuplex® D, 50 mm

Catheter technique

e.g. Contiplex® D-Set, 55 mm
Advance the soft plastic catheter max. 3 cm beyond the end of the introducer sheath.

What to do when ...?

Stimulation of the axillary nerve (deltoid muscle) or radial nerve (triceps muscle) occurs: Leave the needle in place Administer LA.

Stimulation of the suprascapular nerve (levator scapulae muscle) occurs: The insertion direction is too lateral and dorsal Retract the needle, advance it markedly more to the ventral and somewhat more medial.

Stimulation of the phrenic nerve (unilateral singultus) occurs: The insertion direction is too ventral and medial Retract the needle, advance it slightly more to the lateral and dorsal.

Blood is aspirated: Retract the needle, check direction of puncture Re-advance needle.

Potential errors and hazards

Always avoid a medial direction of puncture:

- Risk of puncturing large vessels (carotid and vertebral arteries, internal jugular vein).
- Risk of intrathecal injection = high spinal!
  (Most suitable and reliable stimulatory response: biceps and/or brachial muscle = most lateral part of plexus [C5])

Posterior interscalene nerve block

(Posterior approach according to Pippa)

Indications

- Operative procedures on the shoulder, proximal upper arm and lateral clavicle
- Analgesia

Contraindications

- Contralateral phrenic and recurrent paresis

Side effects / complications

- Horner´s syndrome
- Phrenic paresis
- Recurrent paresis
- Vessel puncture

Anatomical landmarks

- Spinous process C7 (vertebra prominens)
- Spinous process C6
- Cricoid
- Sternocleidomastoid muscle

① C6, ② C7, ③ Puncture site

Anatomical landmarks

Posterior interscalene nerve block

Blockade technique

Patient is in axially aligned recumbent position (or seated); the cervical spine is flexed backwards; shoulder and arm are relaxed.

Puncture site:
3 cm midline between the two spinous processes C6 and C7,
Insertion direction 5 – 10° to the lateral, aimed at the height of the cricoid.

Puncture depth: 6 – 8 cm, depending on the distance between puncture site and posterior edge of the sternocleidomastoid muscle.

Positive stimulatory response from the upper trunk (lateral cord): biceps and/or brachial muscles.

Dosage

30 – 50 ml LA

Single shot technique

e.g. Stimuplex® D, 80 – 100 mm

Catheter technique

e.g. Contiplex® D-Set, 80 – 110 mm
Advance the soft plastic catheter max. 3 cm beyond the end of the introducer sheath.

What to do when ...?

Stimulation of the axillary nerve (deltoid muscle) or radial nerve (triceps muscle) occurs: Leave the needle in place Administer LA.

Stimulation of the suprascapular nerve (levator scapulae muscle) occurs: Insertion direction too lateral Retract the needle, advance it slightly to the medial and slightly deeper.

Stimulation of the phrenic nerve (unilateral singultus) occurs: Insertion direction too deep and too medial Retract the needle, advance it more to the lateral and less deep.

Blood is aspirated: retract the needle, check puncture direction Re-advance the needle.

Potential errors and hazards

Always avoid a medial insertion direction:

- Risk of puncturing the vertebral artery.
- Risk of intrathecal injection = high spinal!
  (Most suitable and reliable stimulatory response: biceps and/or brachial muscle = most lateral part of plexus [C5])

Vertical infraclavicular block (VIB)

(Approach according to Kilka, Geiger, Mehrkens)

Indications

- Operative procedures on the distal upper arm, forearm and hand
- Analgesia

Contraindications

- Chest deformities
- Healed, but dislocated (shortened) fracture of the clavicle

Side effects / complications

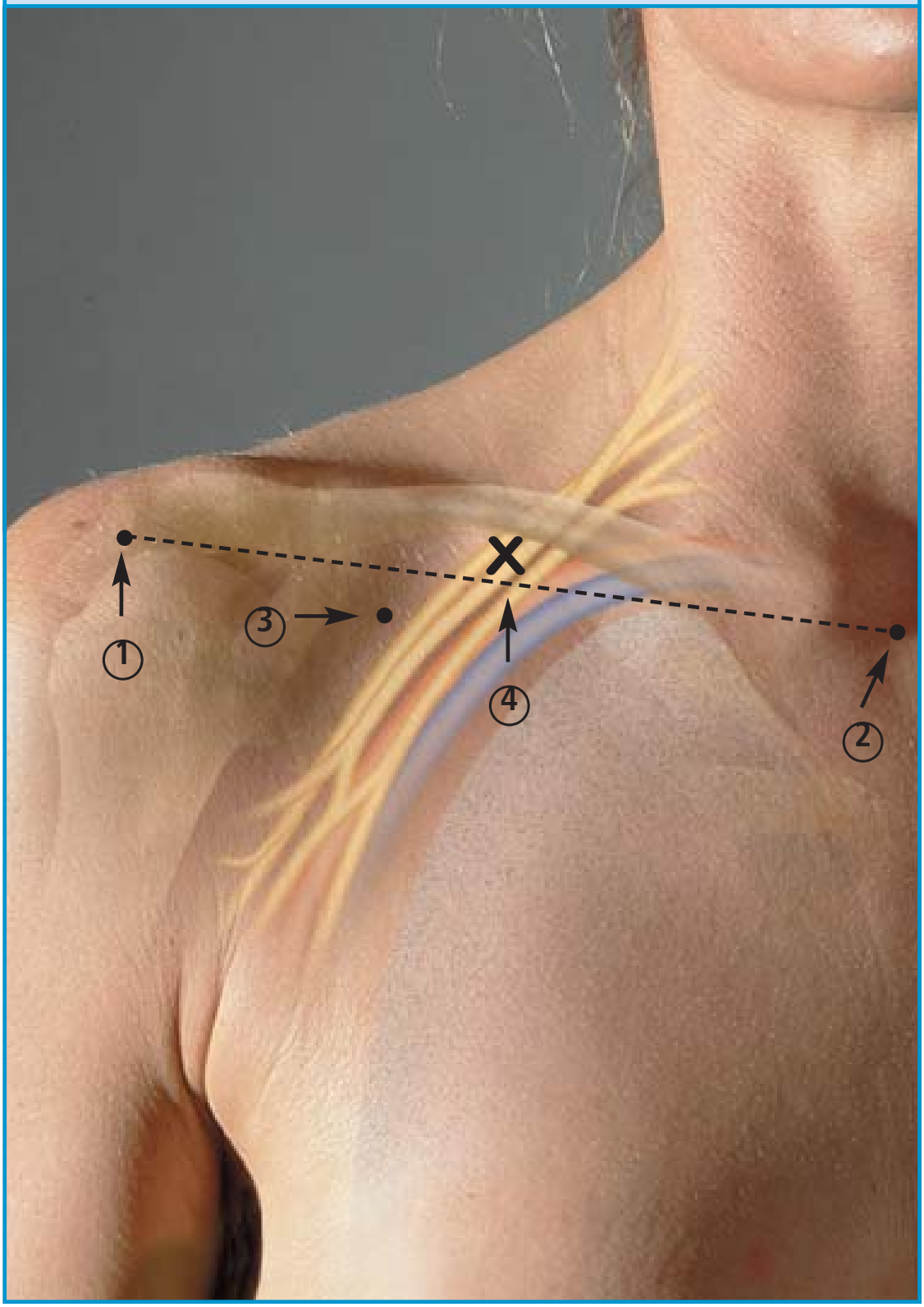
- Horner´s syndrome
- Phrenic paresis
- Vessel puncture (cephalic vein, subclavian artery and vein)
- Pneumothorax

Anatomical landmarks

- Suprasternal notch
- Lateral edge of the acromion
- Infraclavicular fossa

① Lateral edge of acromion, ② Suprasternal notch, ③ Infraclavicula fossa, ④ Puncture site

Anatomical landmarks



Vertical infraclavicular block

Blockade technique

The patient is supine, with his hand relaxed on abdomen.

Puncture site:
Midway between ventral apophysis of the acromion and the supra-sternal notch, directly below the clavicle (medial edge of the infraclavicular fossa). Insertion direction must be absolutely perpendicular to the supporting surface (operating table).

Puncture depth: 2 – 4 cm.

Positive stimulatory response from the posterior cord:
Extensor or flexor muscle D 1 – 3 (= radial or median nerve).

Dosage

30 – 50 ml LA

Single shot technique

e.g. Stimuplex® D, 50 mm

Catheter technique

e.g. Contiplex® D-Set, 55 mm
Advance the soft plastic catheter max. 3 cm beyond the end of the introducer sheath.

What to do when ...?

Lateral landmarks (ventral apophysis of acromion) cannot be found: Palpation of the clavicle from medial to lateral leads to the acromioclavicular joint The lateral edge of the acromion is located ventral and lateral. Palpation of the crest of the scapula from dorsal to lateroventral leads to the acromion and stops at the correct site.

Stimulation of the musculocutaneous nerve (biceps muscle = lateral cord) occurs: Puncture is too medial and superficial Retract the needle, shift it subcutaneously to the lateral (0.3 – 0.5 cm) and then advance it perpendicularly (!) approx. 0.5 – 1 cm deeper than before.

Blood is aspirated: Puncture site is too medial or too far away from the lower clavicular edge Retract the needle, check lateral landmarks (ventral apophysis of the acromion) and re-advance the needle.

Potential errors and hazards

- Puncture too medial (establish a lateral landmark as described above).
- Puncture is not performed in a perpendicular direction.
- Puncture depth orientation: estimated distance between surface and palpable lower clavicular margin + 1 cm (Beware > 4 cm in persons with asthenic physiques).

Axillary blockade
(Approach according to de Jong)

Indications

- Operative procedures on the elbow, forearm and hand
- Analgesia

Contraindications

- No particular

Side effects / complications

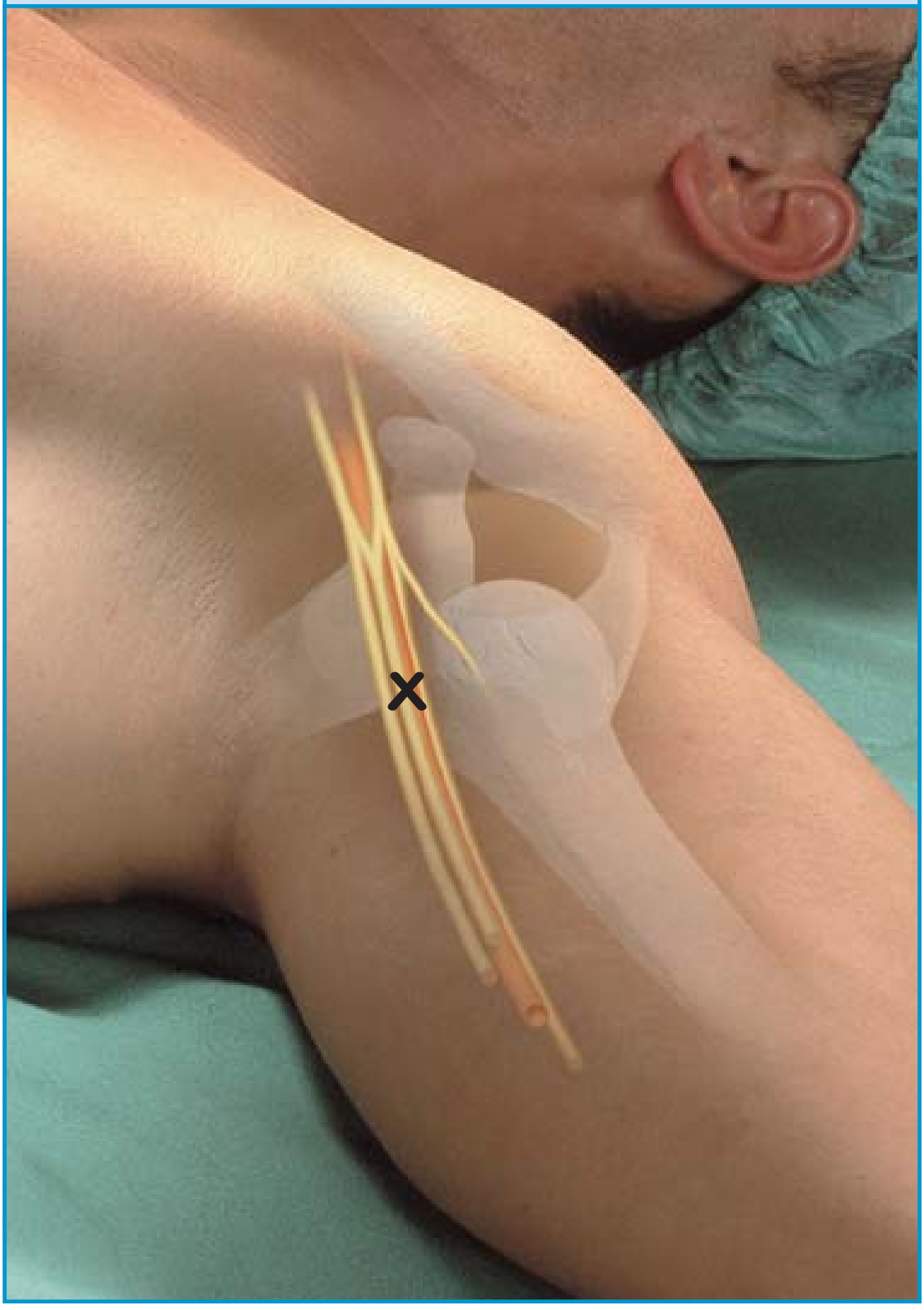
- Haematoma if the radial artery is injured

Anatomical landmarks

- Axillary artery
- Coracobrachialis muscle
- Medial bicipital groove
- Pectoralis major and minor muscles

✕ = *Puncture site*

Anatomical landmarks



Axillary blockade

Blockade technique

With the patient supine, the shoulder joint is abducted 90°, elbow joint extended 90°.

Puncture site:
Slightly above the axillary artery in the gap between artery and coracobrachialis muscle, at the highest point in the axilla and slightly beneath the pectoralis major muscle.

Insert the needle approx. 30° parallel to the axillary artery, taking a very superficial course.

Puncture depth: 1 – 3 cm.

Positive stimulatory response from median nerve: flexor digitorum muscles.

Dosage

30 – 50 ml LA

Single shot technique

e.g. Stimuplex® D, 50 mm

Catheter technique

e.g. Contiplex® D-Set, 55 mm
Advance the soft plastic catheter 5 cm beyond the end of the introducer sheath.

What to do when ...?

There is no stimulatory response:
The puncture has probably gone too deep Retract the needle and advance at a flatter (more tangential) angle, watching out for any "fascial click".

Stimulation of the musculocutaneous nerve:
The needle is not positioned within the neurovascular sheath Retract the needle, advance it less deep and more tangential to the artery.

Potential errors and hazards

- Puncture too deep.
- Difficulties identifying the axillary artery.

Suprascapular nerve block
(Approach according to Meier)

Indications

- Frozen shoulder (for pain management and mobilization therapy)
- Analgesia

Contraindications

- No particular

Side effects / complications

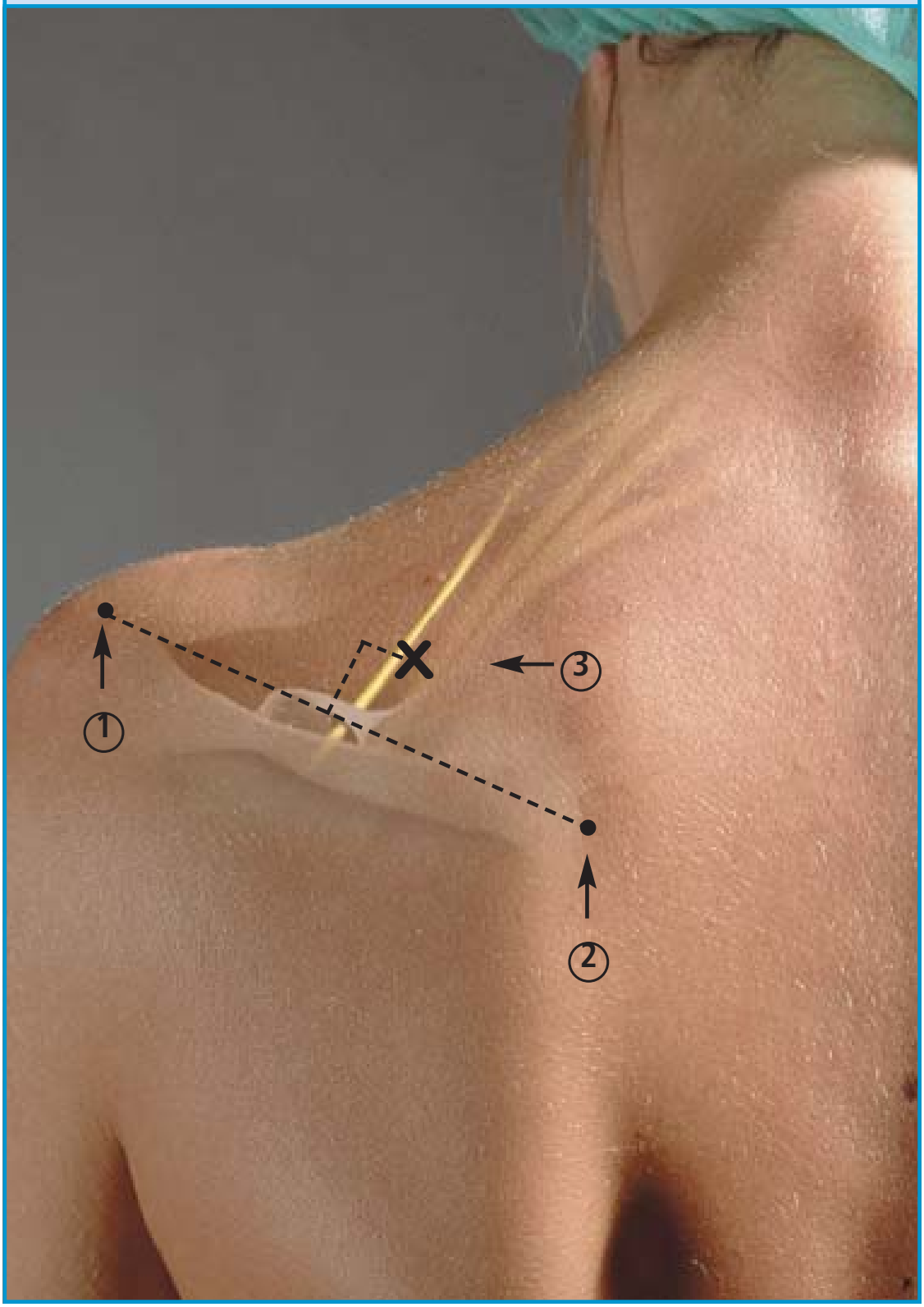
- No particular

Anatomical landmarks

- Spine of scapula

① Lateral end of the spine of scapula, ② Medial end of the spine of scapula, ③ Puncture site

Anatomical landmarks



Suprascapular nerve block

Blockade technique

The patient is seated, hand on their contralateral shoulder.

Puncture site:
1 – 2 cm cranial and medial to the mid-spine. Insertion direction approx. 45° caudad and lateral towards the humerus head.

Puncture depth: 3 – 4 cm.

Positive stimulatory response: supraspinatus or infraspinatus muscles.

Dosage

20 – 30 ml LA

Single shot technique

e.g. Stimuplex® D, 50 mm

Catheter technique

e.g. Contiplex® D-Set, 55 mm
Advance the soft plastic catheter < 3 cm beyond the end of the introducer sheath.

What to do when ...?

There is no stimulatory response:
Try to find the floor of the supraspinous fossa or retract the needle and advance it at a flatter angle towards the humerus head.

Note two important aspects:

1. A muscular stimulatory response is not imperative to achieve blockade.
2. The suprascapular nerve is not involved in the (sensory) skin supply of the shoulder!

Potential errors and hazards

- Puncture is made too deep and steep.

Psoas compartment block
(Approach according to Chayen)

Indications

- Operative procedures in the lumbar plexus supply area
- In combination with proximal sciatic nerve block for complicated operations on the whole leg distal to the hip (total knee arthroplasty, cruciate ligament replacement ...)
- Analgesia

Contraindications

- Extreme hyperlordosis (relative)
- Coagulation disorders

Side effects / complications

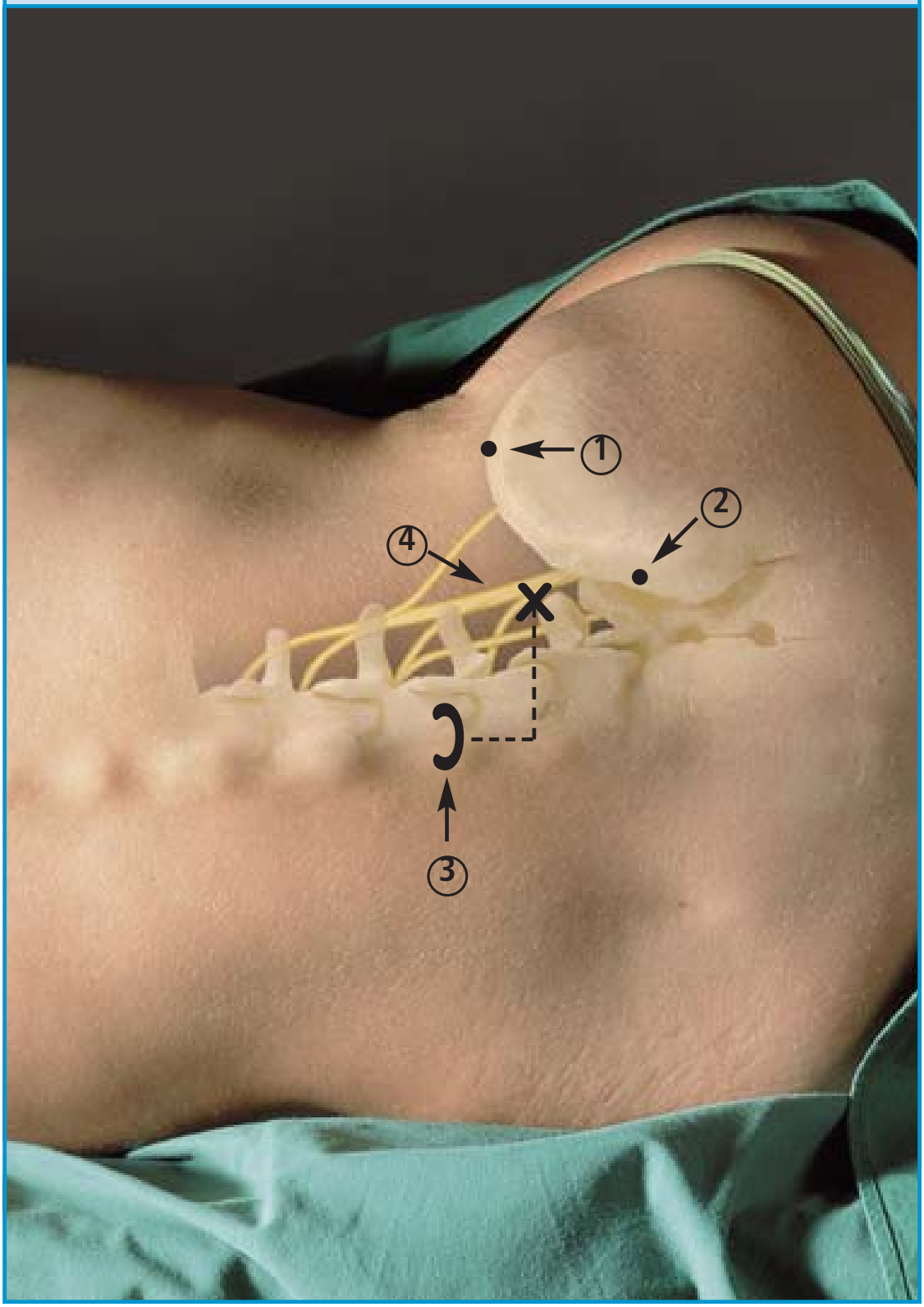
- Vessel puncture (paravertebral veins)
- Dissemination similar to epidural anesthesia (contralateral)
- High (total) spinal anesthesia

Anatomical landmarks

- Posterior superior iliac spine
- Iliac crest
- Spinous process L4
- Costal process L5

① Iliac crest, ② Posterior superior iliac spine, ③ Spinous process L 4, ④ Puncture site

Anatomical landmarks



Psoas compartment block

Blockade technique

The patient is in the lateral recumbent position (or seated), the cervical spine is flexed backwards.

Puncture site:

3 cm caudad and 4 cm midline to the spinous process L4. Sagittal insertion direction; upon contact with transverse process L5 retract and lower the needle, and advance it over the transverse process (2 cm).

Puncture depth: 6 – 10 cm.

Positive stimulatory response from the femoral nerve: quadriceps muscle (usually the vastus lateralis muscle). Puncture is also possible at the level of the transverse process L4; now advance the caudad aligned needle under the transverse process.

Dosage

30 – 50 ml LA, test dose 5 ml

Single shot technique

e.g. Stimuplex® D, 80 – 120 mm

Catheter technique

e.g. Contiplex® D-Set, 80 – 110 mm
Advance the soft plastic catheter < 5 cm beyond the end of the introducer sheath.

What to do when ...?

Stimulation of the obturator nerve (contraction of the adductor group) occurs: Puncture direction is too medial Retract the needle, then lateralize it somewhat.

Stimulation of the fourth lumbar nerve (= lumbosacral trunk, contractions in the peroneal group) occurs:
Puncture direction is much too medial Retract the needle; advance it markedly in the lateral direction.

No transverse process contact and no stimulatory response is achieved:
Puncture site and/or direction may be too lateral Check the distance between puncture site and midline (max. 4 cm), and, if needed, adjust the puncture direction to the patient's position. Adequate stimulatory response may also be possible without prior transverse process contact!

Potential errors and hazards

Always avoid a medial puncture direction (towards the spinal column)!

- Risk of epidural or even intrathecal dissemination of the LA. Perform a test dose.

Femoral nerve block

Indications

- Operative procedures in areas supplying the femoral and lateral femoral cutaneous nerves
- In combination with proximal sciatic nerve block, operative procedures on the whole leg (from distal thigh to foot)
- Analgesia

Contraindications

- No particular

Side effects / complications

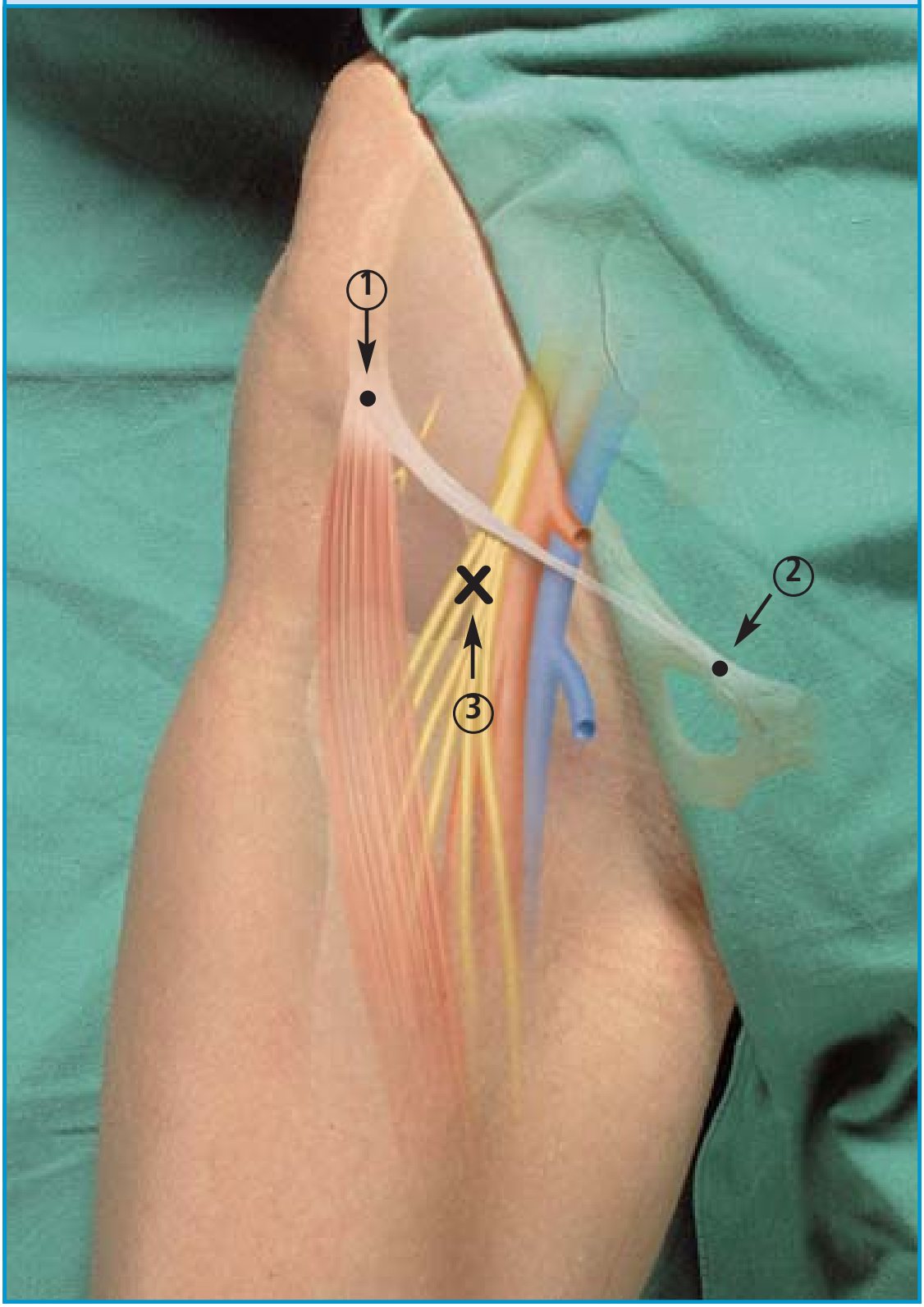
- Vessel puncture (of the femoral vein or artery)

Anatomical landmarks

- Groin
- Femoral artery
- Anterior superior iliac spine
- Pubic tubercle
- Inguinal ligament

① Anterior superior iliac spine, ② Pubic tubercle, ③ Puncture site

Anatomical landmarks



Femoral nerve block

Blockade technique

The patient lies on his back, his leg loosely abducted and turned to the outside.

Puncture site:
2 cm caudad to the groin, 1 – 2 cm lateral to the femoral artery.
Puncture direction: 30 – 45° cranial parallel to the artery.

Puncture depth: 2 – 4 cm.

Positive stimulatory response from the femoral nerve: Rectus muscle of the thigh ("dancing patella").

Dosage

30 – 50 ml LA

Single shot technique

e.g. Stimuplex® D, 50 mm

Catheter technique

e.g. Contiplex® D-Set, 55 mm
Advance the soft plastic catheter max. 5 cm beyond the end of the introducer sheath.

What to do when ...?

Stimulation of the sartorius muscle (medial contraction) occurs:

Puncture direction usually too medial

Retract the needle, and shift it slightly to the lateral.

Direct stimulation of the sartorius muscle (rare):

Puncture direction is usually too lateral

Shift the needle slightly to the medial.

Femoral artery puncture:

Retract the needle

Shift puncture direction to the lateral.

Potential errors and hazards

- LA injection in the case of sartorius muscle stimulation.

Saphenous nerve block

Indications

- Operative procedures in the area supplying the saphenous nerve
- In combination with distal sciatic nerve block for operations on the whole lower leg and foot
- Analgesia

Contraindications

- No particular

Side effects / complications

- No particular

Anatomical landmarks

- Patellar crest
- Sartorius muscle
- Vastus medialis muscle

✕ = *Puncture site*

Anatomical landmarks

Saphenous nerve block

Blockade technique

The patient is supine on his back, with the extended leg in a neutral position, rotated slightly outwardly.

Puncture site:
Approx. 2 – 4 cm cranial and medial of the upper patellar crest over the sartorius muscle. Puncture direction perpendicular through the muscle up to the subsartorial fatty tissue.

Puncture depth: 3 – 5 cm.

Positive responses include paresthesias on the medial lower leg at a pulse duration of 1.0 ms.

Dosage
10 – 15 ml LA

Single shot technique
e.g. Stimuplex® D, 50 – 80 mm

Catheter technique
e.g. Contiplex® D-Set, 55 – 80 mm Advance the soft plastic catheter 3 cm beyond the end of the introducer sheath.

What to do when ...?

Motor stimulatory response comes from the vastus medialis muscle:
Can be considered "positive" Inject LA.

Patient is uncooperative:
Femoral nerve block (as described above) with reduced LA volume (20 ml).
Alternative technique: Subcutaneous infiltration below the medial knee joint from the medial head of the gastrocnemius muscle to the tibial tuberosity (10 – 15 ml LA).

Potential errors and hazards

- No particular.

Obturator nerve block

Indications

- Suppression of the adductor reflex for transurethral lateral bladder wall resection
- Treatment of adductor spasm
- Adjunct to femoral nerve blocks for postoperative medial knee joint pain
- Analgesia

Contraindications

- No particular

Side effects / complications

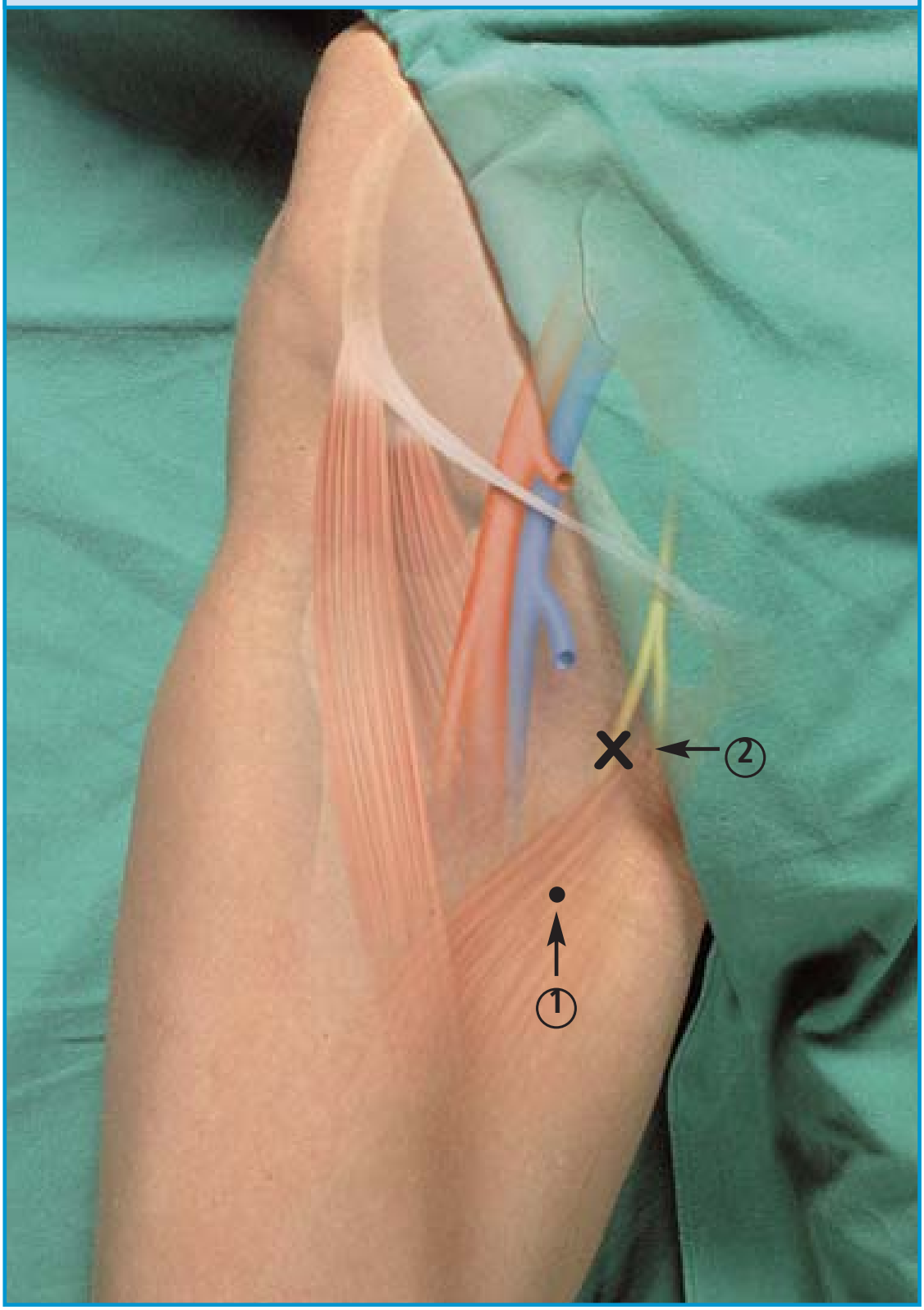
- Vessel puncture (obturator artery or vein)

Anatomical landmarks

- Origin of the adductor longus muscle
- Pubic tubercle
- Femoral artery
- Anterior superior iliac spine

① Adductor longus muscle, ② Puncture site

Anatomical landmarks



Obturator nerve block

Blockade technique

The patient is supine on his back, his leg is rotated outwardly and abducted.

Puncture site:
5 – 10 cm beneath the pubic tubercle directly lateral to the tendon origin of the adductor longus muscle. Puncture direction approx. 45° craniolateral pointing towards the anterior superior iliac spine.

Puncture depth: 4 – 6 cm.

Positive stimulatory response from adductor group.

Dosage
10 – 15 ml LA

Single shot technique
e.g. Stimuplex® D, 80 mm

Catheter technique
e.g. Contiplex® D-Set, 80 mm Advance the soft plastic catheter 5 cm beyond the end of the introducer sheath.

What to do when ...?

Persistent adductor spasm despite (proper) obturator nerve block occurs:
Perform an additional femoral nerve block, which will block any accessory obturator nerve that runs together with femoral nerve.

Note:
The adductor reflex for transurethral lateral bladder wall can only be reliably suppressed by a separate obturator nerve block (not by a femoral nerve block nor spinal anesthesia!).

Potential errors and hazards

- No particular.

Parasacral sciatic nerve block

(Approach according to Mansour)

Indications

- Operative procedures in areas supplying the sciatic nerve
- In combination with psoas compartment block/femoral nerve block for operations on the whole leg
- Analgesia

Contraindications

- No particular

Side effects / complications

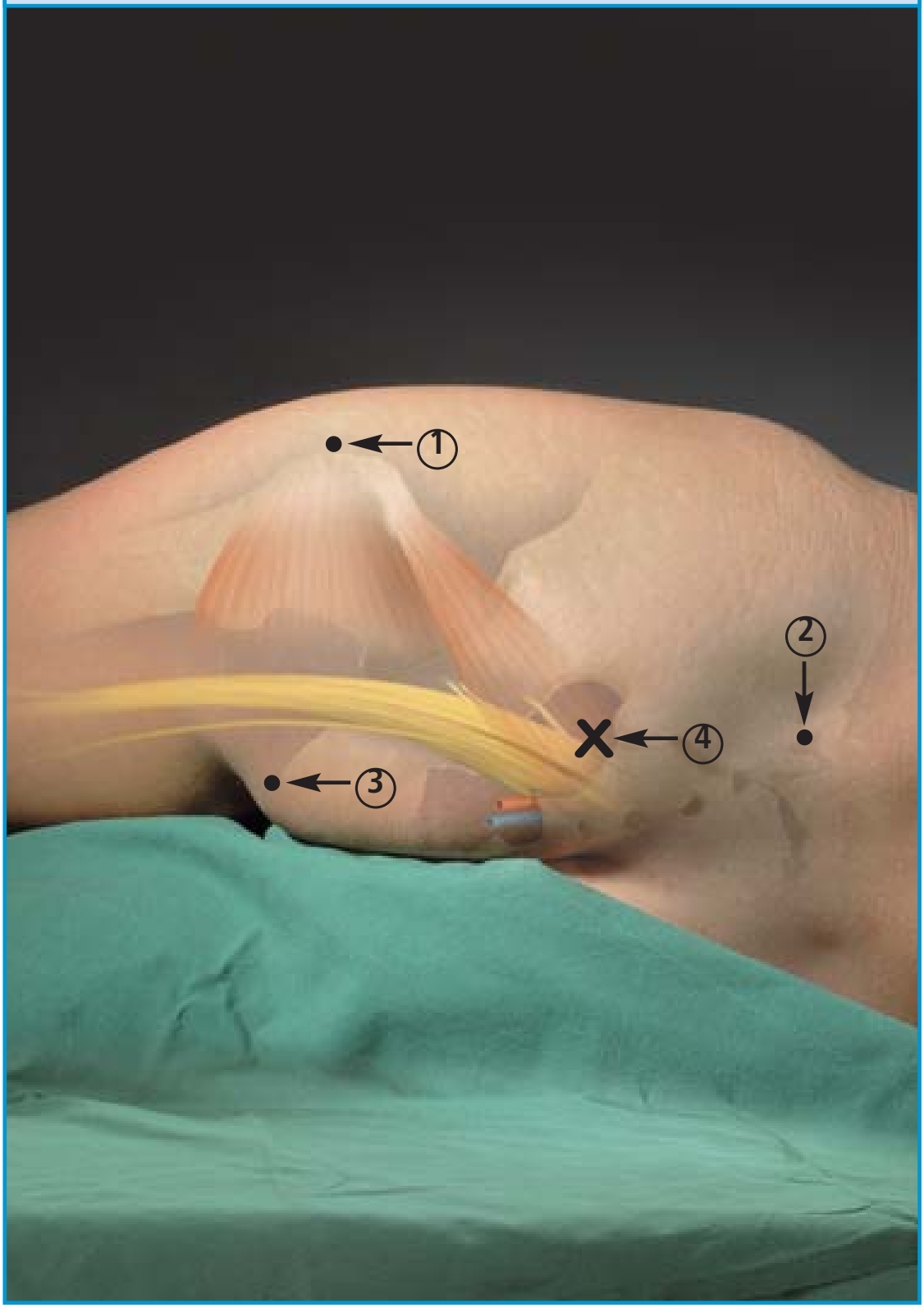
- Vessel puncture (inferior gluteal artery)

Anatomical landmarks

- Posterior superior iliac spine
- Ischial tuberosity

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

Anatomical landmarks



Parasacral sciatic nerve block

Blockade technique

The patient is placed in the lateral recumbent position, hip flexed 45°, knee flexed 70°, or both knees against the abdomen (favorable when combined with a psoas compartment block).

Puncture site:
Approx. 5 – 6 cm caudad to the posterior superior iliac spine along the connecting line to the ischial tuberosity. Insertion direction 20 – 30° caudad to midline between ischial tuberosity and greater trochanter.

Puncture depth: 6 – 8 cm.

Positive stimulatory response from the peroneal and tibial nerves: extensors or flexors of the foot/toes.

Dosage

20 – 40 ml LA

Single shot technique

e.g. Stimuplex® D, 80 – 120 mm

Catheter technique

e.g. Contiplex® D-Set, 80 – 110 mm
Advance the soft plastic catheter 5 cm beyond the end of the introducer sheath.

What to do when ...?

Bone contact occurs:
Shift puncture site further caudad or puncture direction more caudad.

No stimulatory response is elicited:
Shift puncture direction more caudad and lateral.

Potential errors and hazards

- LA injection upon stimulatory response from the gluteal muscles.

Transgluteal sciatic nerve block
(Approach according to Labat)

Indications

- Operative procedures in areas supplying the sciatic nerve
- In combination with psoas compartment block/femoral nerve block for operations on the whole leg
- Analgesia

Contraindications

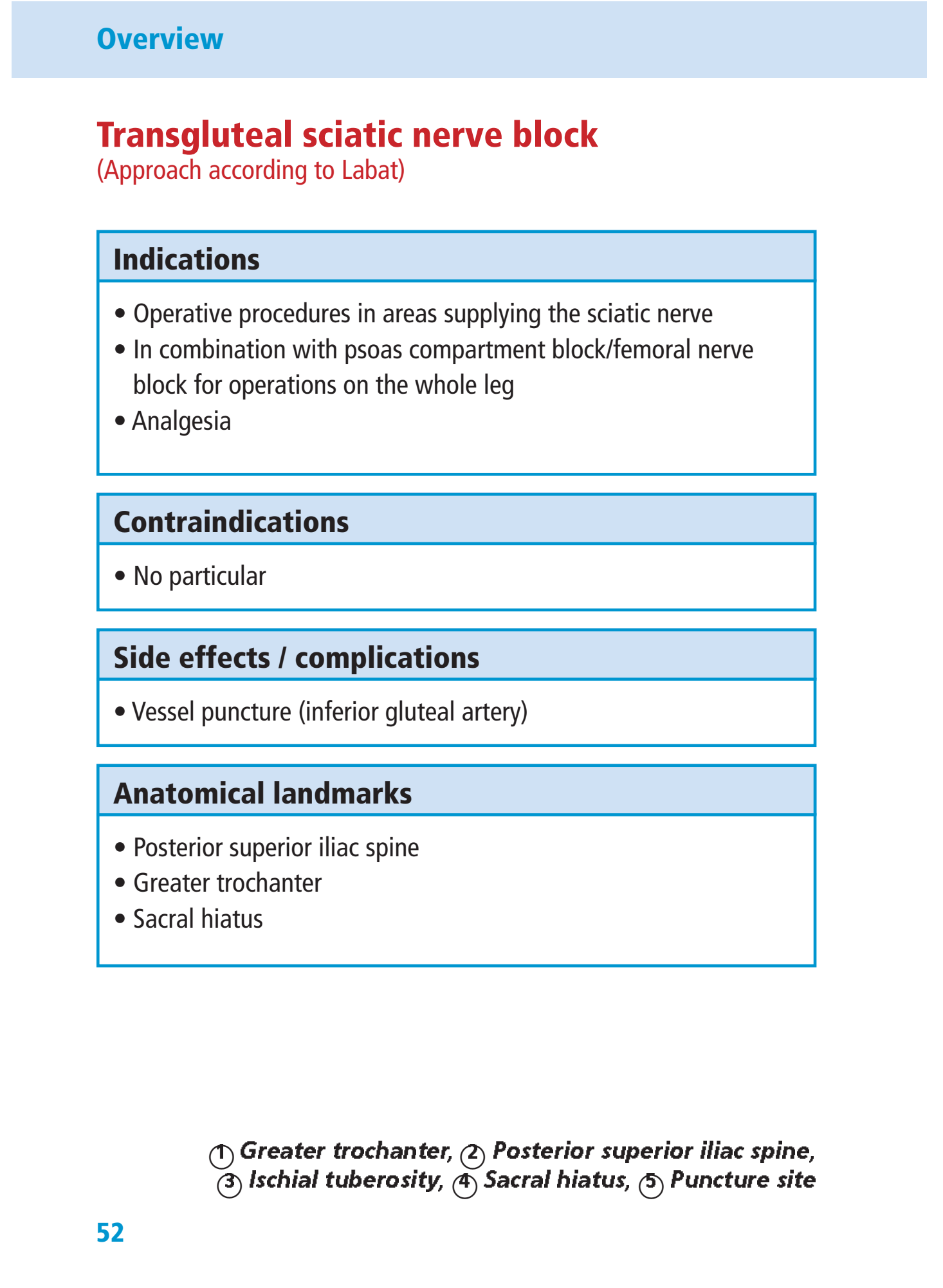
- No particular

Side effects / complications

- Vessel puncture (inferior gluteal artery)

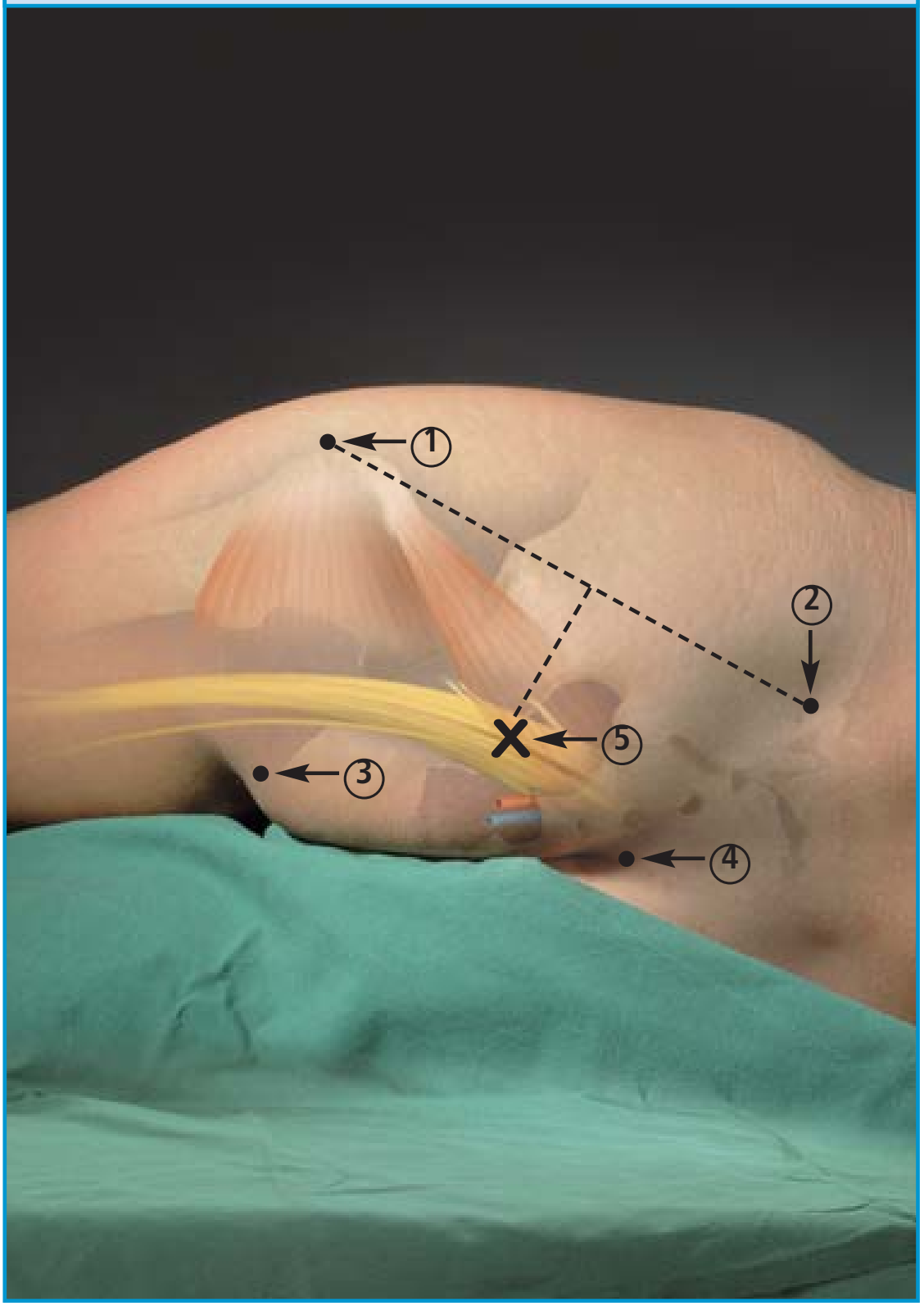
Anatomical landmarks

- Posterior superior iliac spine
- Greater trochanter
- Sacral hiatus



(1) Greater trochanter, (2) Posterior superior iliac spine, (3) Ischial tuberosity, (4) Sacral hiatus, (5) Puncture site

Anatomical landmarks



Transgluteal sciatic nerve block

Blockade technique

The patient is placed in the lateral recumbent position; hip flexed 45°, knee flexed 70° ("stable recumbent position").

Puncture site:
4 – 5 cm mediocaudal on the mid-perpendicular lines between greater trochanter and posterior superior iliac spine; connecting line between the greater trochanter and sacral hiatus intersects the insertion point at the mid-perpendicular line. Insertion direction perpendicular to the surface.

Puncture depth: 5 – 8 cm.

Positive stimulatory response from the peroneal or tibial nerves: extensors or flexors of the foot/toes.

Dosage

20 – 40 ml LA

Single shot technique

e.g. Stimuplex® D, 80 – 100 mm

Catheter technique

e.g. Contiplex® D-Set, 80 – 110 mm
Advance the soft plastic catheter 5 cm beyond the end of the introducer sheath.

What to do when ...?

Contraction of gluteus maximus muscle (= direct muscle stimulation) occurs: Continue to advance the needle until the typical response is elicited.

Stimulatory response from the ischiocrural muscles group: LA injection possible Delayed onset of action.

Bone contact, no stimulatory response: Correct insertion direction to midline between greater trochanter and ischial tuberosity.

Potential errors and hazards

- LA injection upon stimulatory response from the gluteal muscles.

Anterior sciatic nerve block
(Approach according to Meier)

Indications

- Operative procedures in the area supplying of the sciatic nerve
- In combination with psoas compartment block/femoral nerve block for operations on the whole leg
- Analgesia

Contraindications

- No particular

Side effects / complications

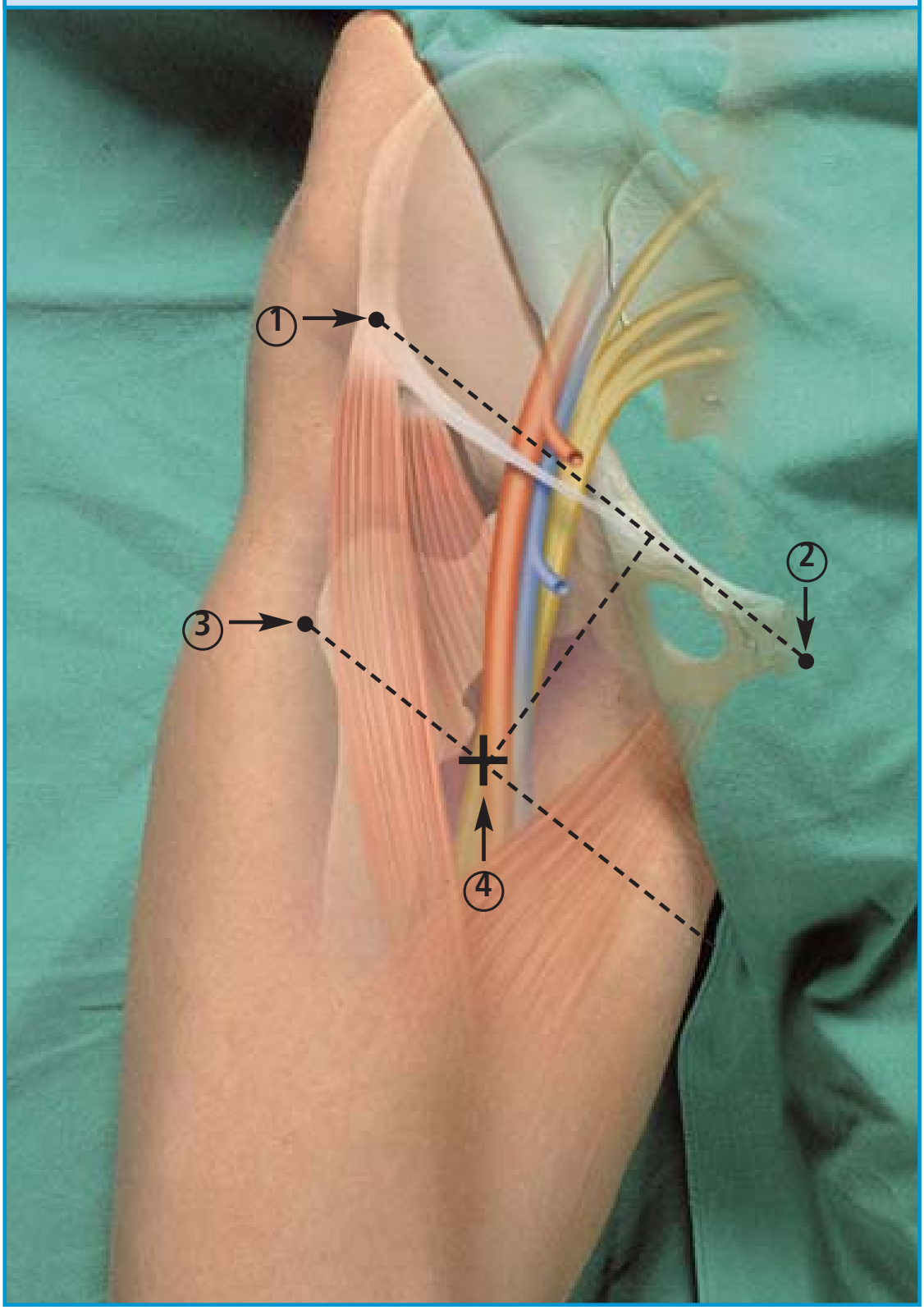
- Vessel puncture (femoral artery and vein, inferior gluteal artery and vein)
- Neural injury (femoral nerve)

Anatomical landmarks

- Anterior superior iliac spine
- Pubic symphysis
- Greater trochanter
- Compartment between sartorius and rectus femoris muscles.

① Anterior superior iliac spine, ② Pubic symphysis, ③ Greater trochanter, ④ Puncture site

Anatomical landmarks



Anterior sciatic nerve block

Blockade technique

The patient is supine on his back, with the leg in a neutral position.

Puncture site:
Divide into thirds the line connecting the anterior superior iliac spine and the middle of the pubic symphysis. A perpendicular line at the transition from the medial to the middle third intersects a parallel line to the inguinal ligament through the greater trochanter at the insertion point. Palpate the muscle compartment and press against the femur with two fingers. This forces the vessels to the medial. Insertion direction is sagittal and 70 – 80° cranial without any femur contact.

Puncture depth: 8 – 15 cm.

Positive stimulatory response from the peroneal or tibial nerves: extensors or flexors of the foot/toes.

Dosage
20 – 40 ml LA

Single shot technique
e.g. Stimuplex® D, 100 – 150 mm

Catheter technique
e.g. Contiplex® D-Set, 110 mm Advance the soft plastic catheter 5 cm beyond the end of the introducer sheath.

What to do when ...?

Primary femur contact occurs: Insertion point too far to the lateral Retract the needle and shift insertion to the medial.

Primary vessel puncture (femoral vein or artery): Insertion too far medial Retract the needle and shift the insertion to the lateral.

Deep vessel puncture (gluteal artery and vein): Correct insertion direction slightly to the lateral.

Stimulation of femoral nerve branches: Retract the needle and "bypass" stimulation area.

Potential errors and hazards

- A neutral leg position is imperative.

Subtrochanteric sciatic nerve block

(Approach according to Guardini)

Indications

- Operative procedures in the area supplying of the sciatic nerve
- In combination with psoas compartment block/femoral nerve block for operations on the whole leg
- Analgesia

Contraindications

- Status secondary to total ipsilateral hip replacement (relative)

Side effects / complications

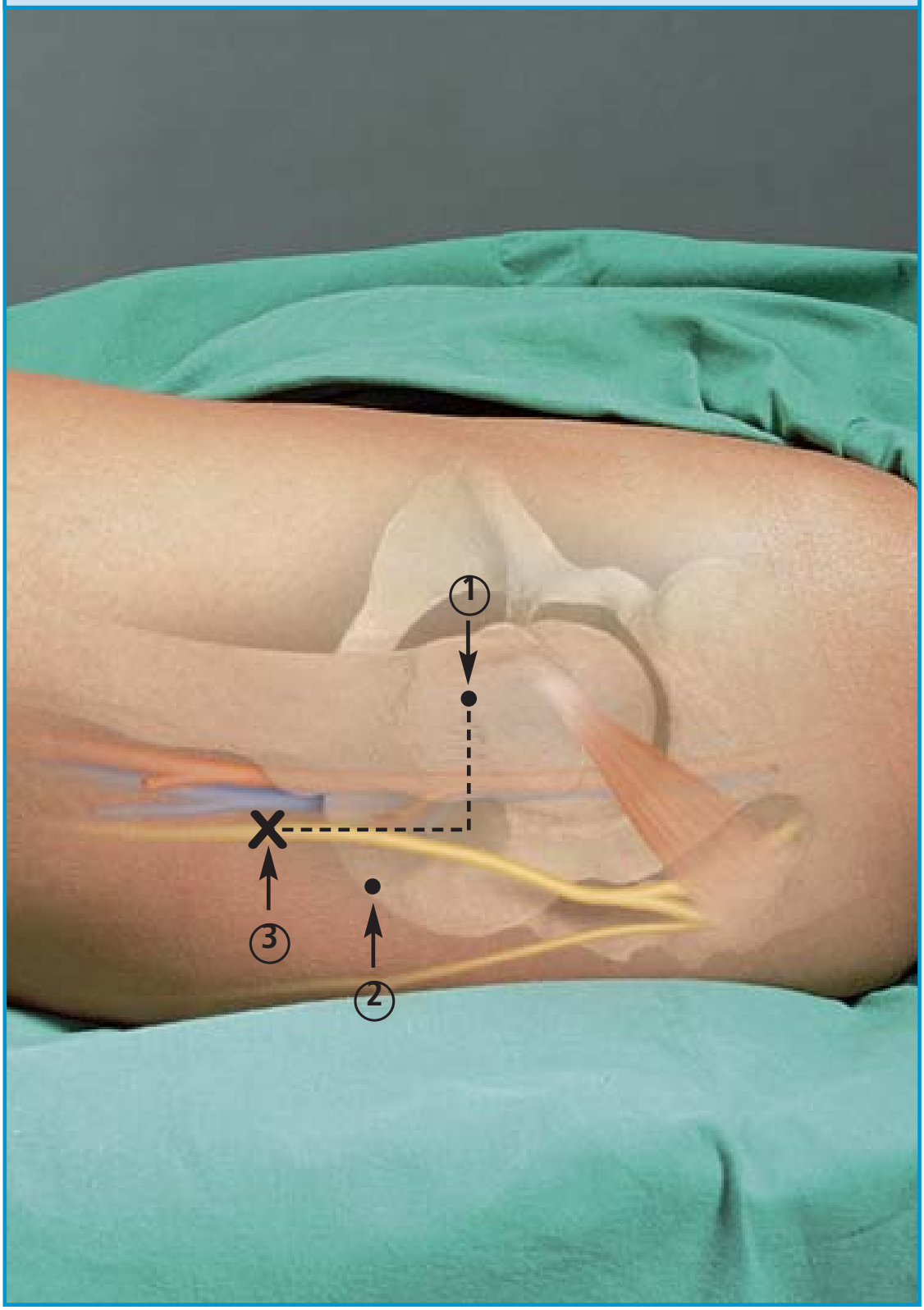
- No particular

Anatomical landmarks

- Greater trochanter
- Ischial tuberosity

① Greater trochanter, ② Ischial tuberosity, ③ Puncture site

Anatomical landmarks



Subtrochanteric sciatic nerve block

Blockade technique

The patient is supine, with the leg in a neutral position or rotated slightly inwards. Padding under the lower leg and pelvic helps with orientation.

Puncture site:
Approx. 2 cm dorsal and 3 – 4 cm distal to the greater trochanter. Insertion direction horizontal and somewhat cranial towards the ischial tuberosity without femur contact.

Puncture depth: 6 – 10 cm.

Positive stimulatory response from the peroneal or tibial nerves: extensors or flexors of the foot/toes.

Dosage

20 – 40 ml LA

Single shot technique

e.g. Stimuplex® D, 80 – 100 mm

Catheter technique

e.g. Contiplex® D-Set, 80 – 110 mm
Advance the soft plastic catheter max. 5 cm beyond the end of the introducer sheath.

What to do when ...?

Femur contact occurs: Insertion too far ventral
Move insertion more to the dorsal.

No stimulatory response is elicited: Direct insertion a little to the ventral and emphasize inward rotation in the hip joint.

Alternative technique:
Leg is rotated slightly inward with flexed knee joint "upright" on the table.

Puncture site: 2 – 3 cm caudad from the mid-point of the line connecting greater trochanter and ischial tuberosity. Insertion direction is cranial and slightly medial.

Potential errors and hazards

- Make sure that the leg is in a neutral position (with a slight inward rotation).

Lateral distal sciatic nerve block

Indications

- Operative procedures in the areas supplying the sciatic nerve on the whole lower leg and foot
- In combination with saphenous nerve block for operations of the whole lower leg
- Analgesia

Contraindications

- Stent (relative)

Side effects / complications

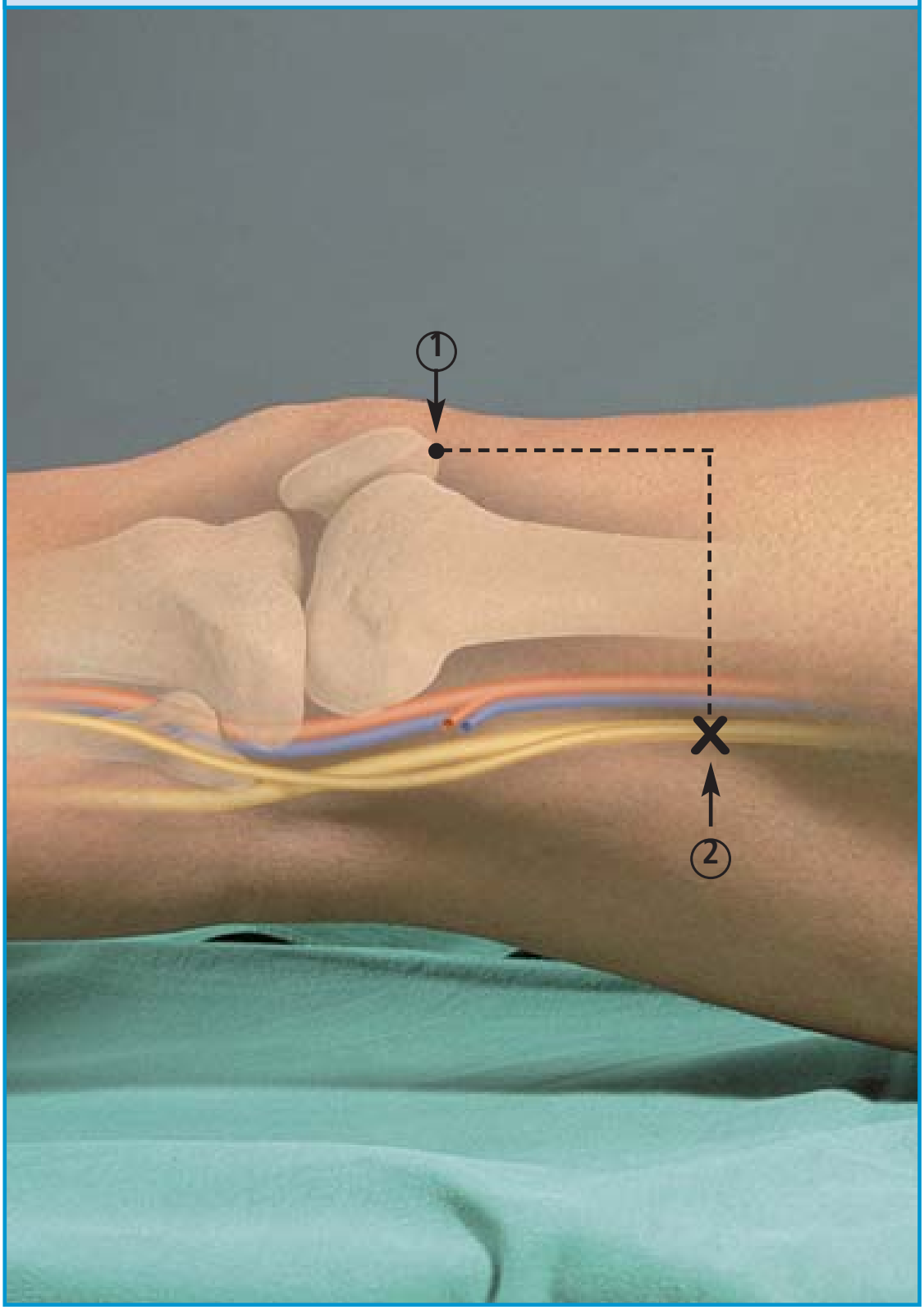
- Vessel puncture (popliteal artery/vein)

Anatomical landmarks

- Patellar crest
- Vastus lateralis muscle
- Long head of the biceps femoris muscle

① Patellar crest, ② Puncture site

Anatomical landmarks



Lateral distal sciatic nerve block

Blockade technique

The patient is supine on his back, with the leg in a neutral position (rotated slightly inwards), padding under the lower leg.

Puncture site:
Approx. 3 – 8 cm above the patella in the lateral muscle compartment between lower edge of the vastus lateralis muscle and biceps femoris muscle. Insertion direction slightly dorsocranial.

Puncture depth: 3 – 5 cm.

Positive stimulatory response from the peroneal or tibial nerves: extensors or flexors of the foot/toes.

Dosage

30 – 40 ml LA

Single shot technique

e.g. Stimuplex® D, 50 – 80 mm

Catheter technique

e.g. Contiplex® D-Set, 55 – 80 mm
Advance the soft plastic catheter max. 5 cm beyond the end of the introducer sheath.

What to do when ...?

No stimulatory response is elicited:
Insertion direction is usually too far ventral
Correct to the dorsal.

Femur contact occurs:
Puncture site and/or insertion direction too far to the ventral Check puncture site, correct to dorsal if needed; shift insertion direction more to the dorsal.

Vessel puncture popliteal artery/vein:
Puncture too deep and too ventral Retract the needle, correct insertion direction to the dorsal, reduce insertion depth.

Potential errors and hazards

- Make sure that the leg is in a neutral position (with a slight inward rotation).

Popliteal sciatic nerve block

Indications

- Operative procedures in the area supplying the sciatic nerve of the lower leg and foot
- In combination with saphenous nerve block, operations on the whole lower extremity
- Analgesia

Contraindications

- Stent (relative)

Side effects / complications

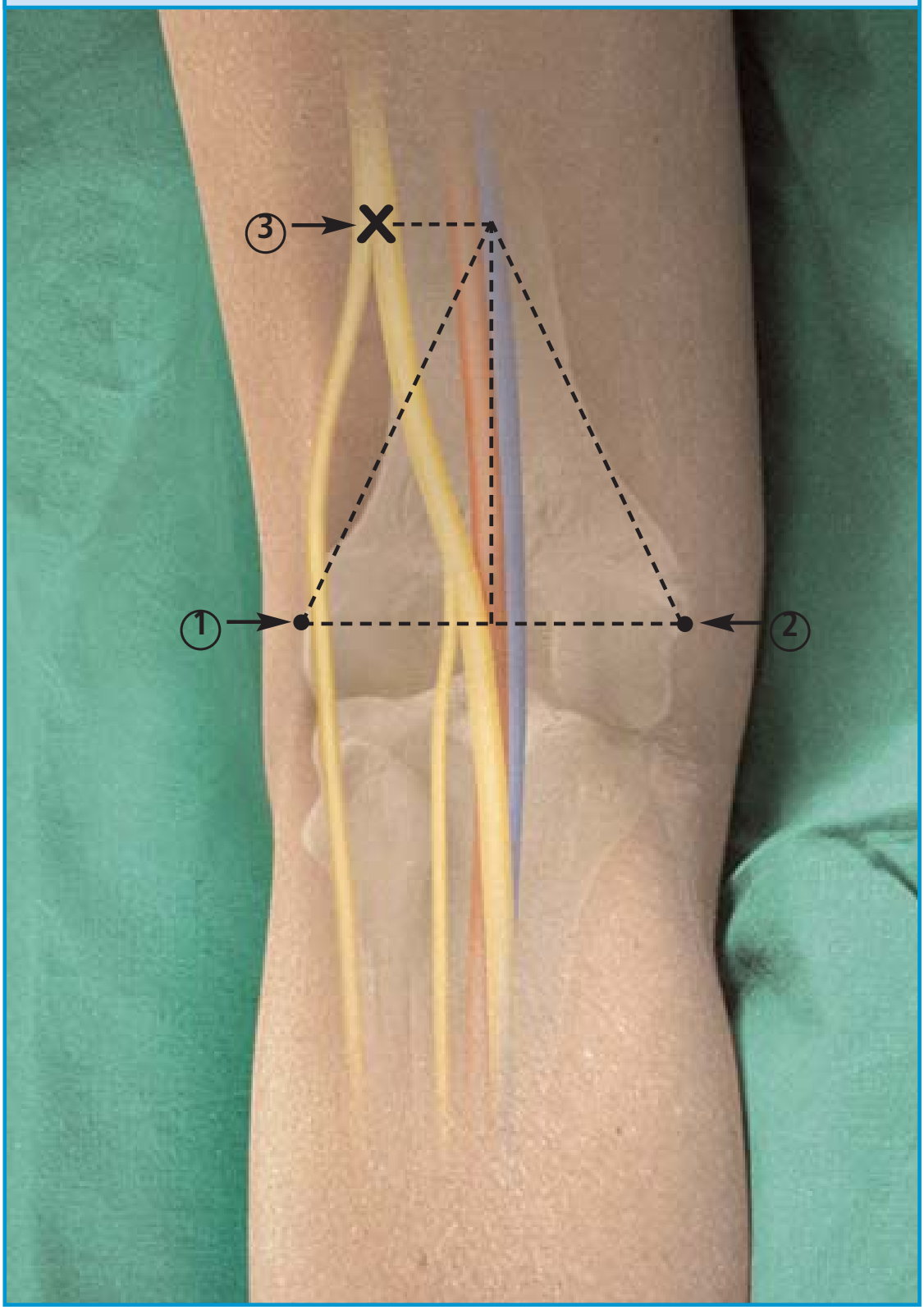
- Vessel puncture (popliteal artery/vein)

Anatomical landmarks

- Popliteal fossa
- Popliteal fold
- Long head of the biceps femoris muscle
- Medial and lateral epicondyle of the femur

(1) Lateral epicondyle of the femur, (2) Medial epicondyle of the femur, (3) Puncture site

Anatomical landmarks



Popliteal sciatic nerve block

Blockade technique

The patient is either in the prone position or lying on his side, leg extended.

Puncture site:
Approx. 8 – 12 cm above the fold of the popliteal fossa at the medial edge of the biceps femoris muscle, laterally marking the popliteal fossa. Insertion direction approx. 30° cranial and slightly lateral.

Puncture depth: 2 – 4 cm.

Positive stimulatory response from the peroneal and tibial nerves: extensors or flexors of the foot/toes.

Dosage

30 – 40 ml LA

Single shot technique

e.g. Stimuplex® D, 50 mm

Catheter technique

e.g. Contiplex® D-Set, 55 mm
Advance the soft plastic catheter max. 5 cm beyond the end of the introducer sheath.

What to do when ...?

Femur contact occurs:

Insertion too deep and too medial Retract the needle
Correct puncture direction or insertion site to the lateral, reduce insertion depth.

Vessel puncture popliteal artery/vein:

Puncture too deep and too medial Retract the needle
Correct insertion direction to the lateral, reduce insertion depth.

Potential errors and hazards

- Puncture site is too far caudad (popliteal fold):
  It may be that the tibial nerve (med.) and peroneal nerve (lat.) are separated so far apart that complete blockade cannot be achieved with a single LA injection at the two sciatic branches.

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