NEURAXIAL BLOCKS AND PERIPHERAL BLOCKS OF THE BODY

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CEEA Targu Mures 2015

Pediatric regional anesthesia

- Provides analgesia and relaxation in surgery and pain therapy
- Used in more than ½ of ped anesthetic protocols
- Development; safety.
- Complementary to general anesthesia, not an alternative
- Practiced under general anesthesia or heavy sedation

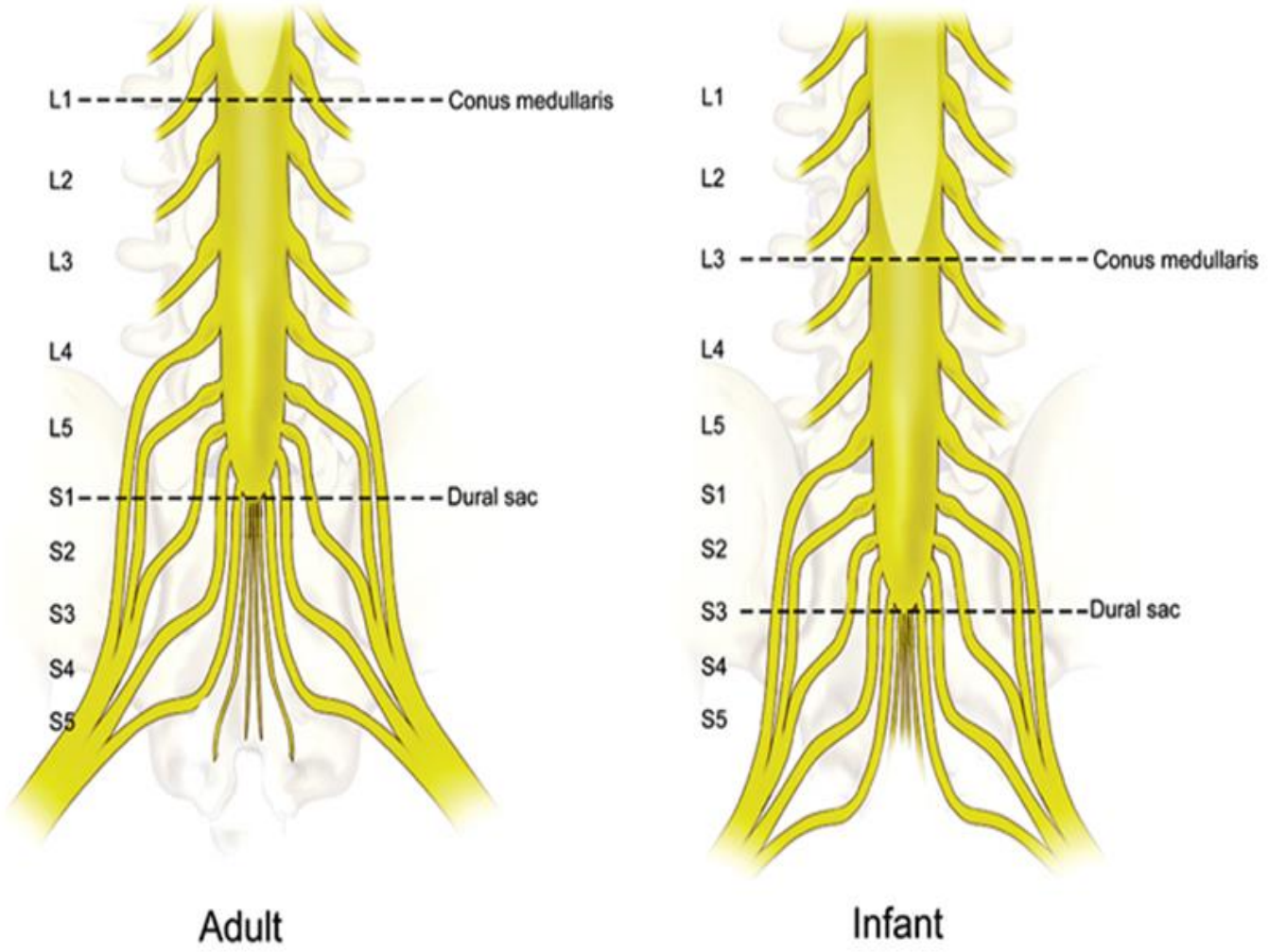
Specific in Children

- Lower clearance of local anesthetics (LA) , in free forms require dosage adjustment
- Poor adherence of muscular sheaths - better diffusion of the AL
- Incomplete myelination - diluted solutions
- CNS immaturity, low systemic vascular resistance, lower limbs volemic territory - better hemodynamic stability

Specific in Children (2)

- Distances between the skin and perineural or epidural spaces vary
- Incomplete ossification of vertebrae
- Lower limits of spinal cord and meninges
- Spinal curvatures evolve
- Children do not cooperate
- Higher dilutions of AL limit motor block

Comparisons between levels of the conus medullaris and the dural sac in the infant versus the older child or adult.



Echography

- Recognising and guiding, appreciating the diffusion AL in the target area.
- Linear probes 8 - 13 Hz
- Fine and superficial structures
- Vessels can be easily compressed
- Aponeuroses - more echogenic
- Incomplete ossification of the newborn makes him "transparent" to ultrasound.

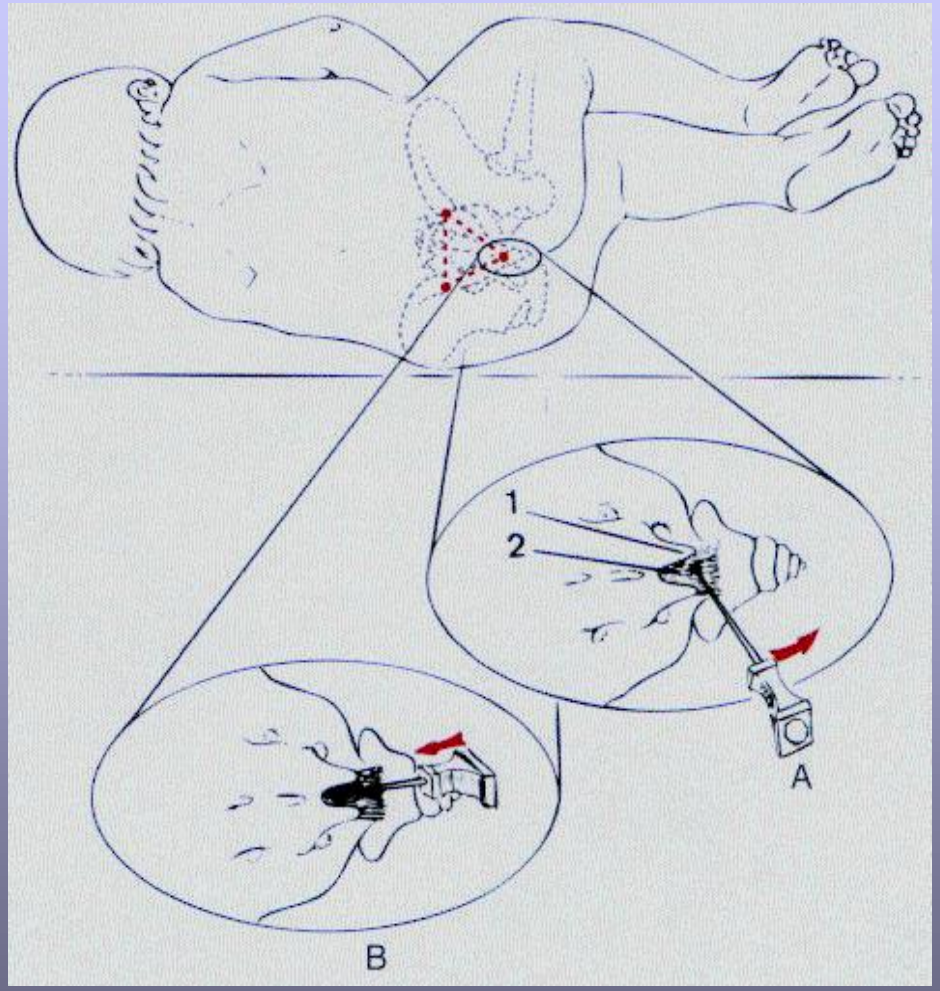
LOCAL ANESTHETIC	Concentration (%)	Usual doses (mg/kg)	Maximal doses (mg/kg)	Maximal adrenalinated doses (mg/kg)	Onset time (minutes)	Duration of analgesia (hours)
Lidocaine	**0.5-2**	**5**	**7.5**	**10**	**5-15**	**0.75-2**
Mepivacaine	**0.5-1.5**	**5-7**	**8**	**10**	**4-10**	**1-1.25**
Bupivacaine	**0.25-0.5**	**2**	**2.5**	**3**	**15-30**	**2.5-6**
Levobupivacaine	**0.25-0.5**	**2**	**2.5**	**3**	**15-30**	**2.5-6**
Ropivacaine	**0.2-1**	**2-3**	**3.5**	**Not used**	**5-12**	**2.5-5**

Local anesthetics frequently used in children; doses

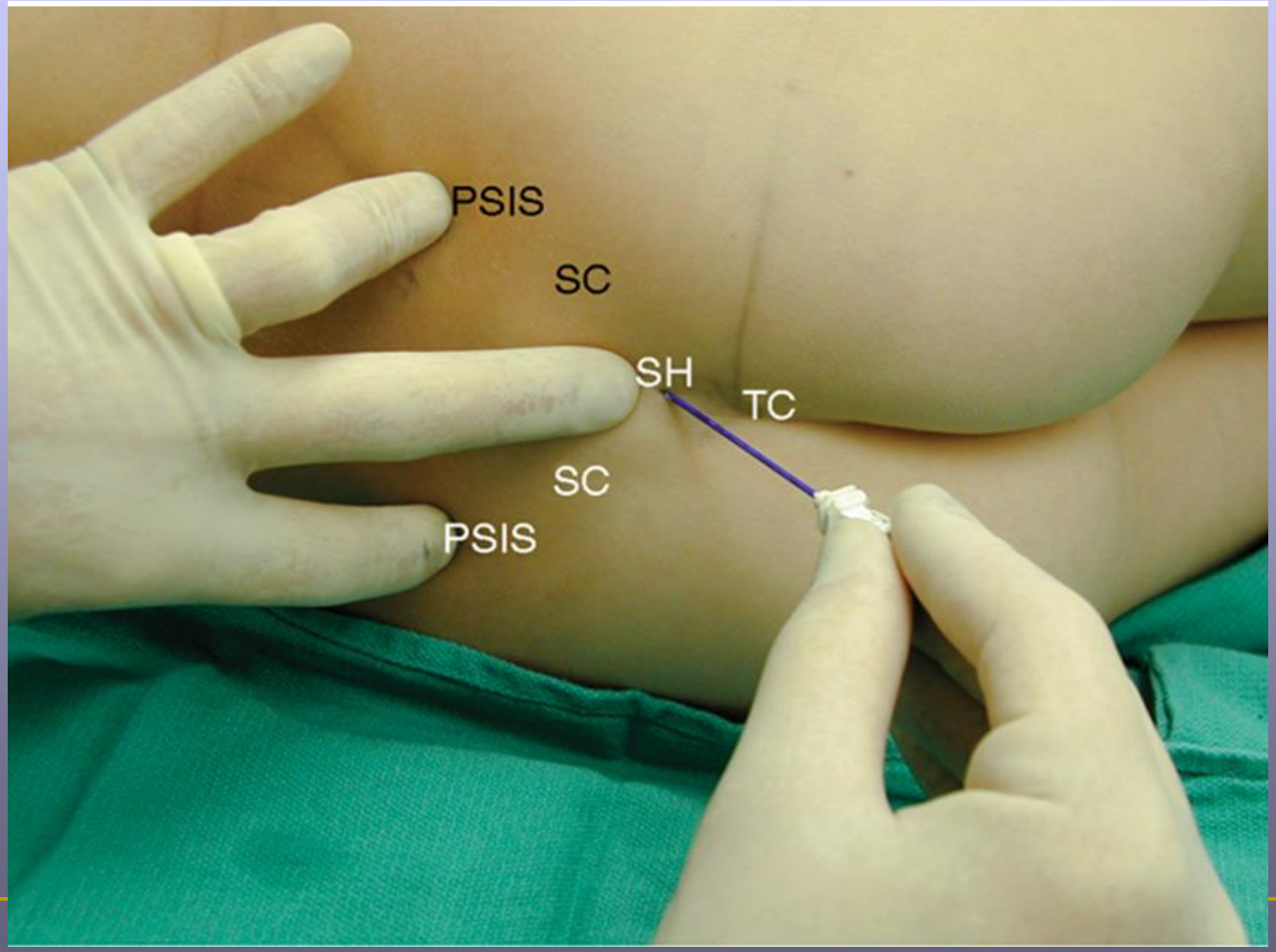
TECHNIQUES

Caudal block

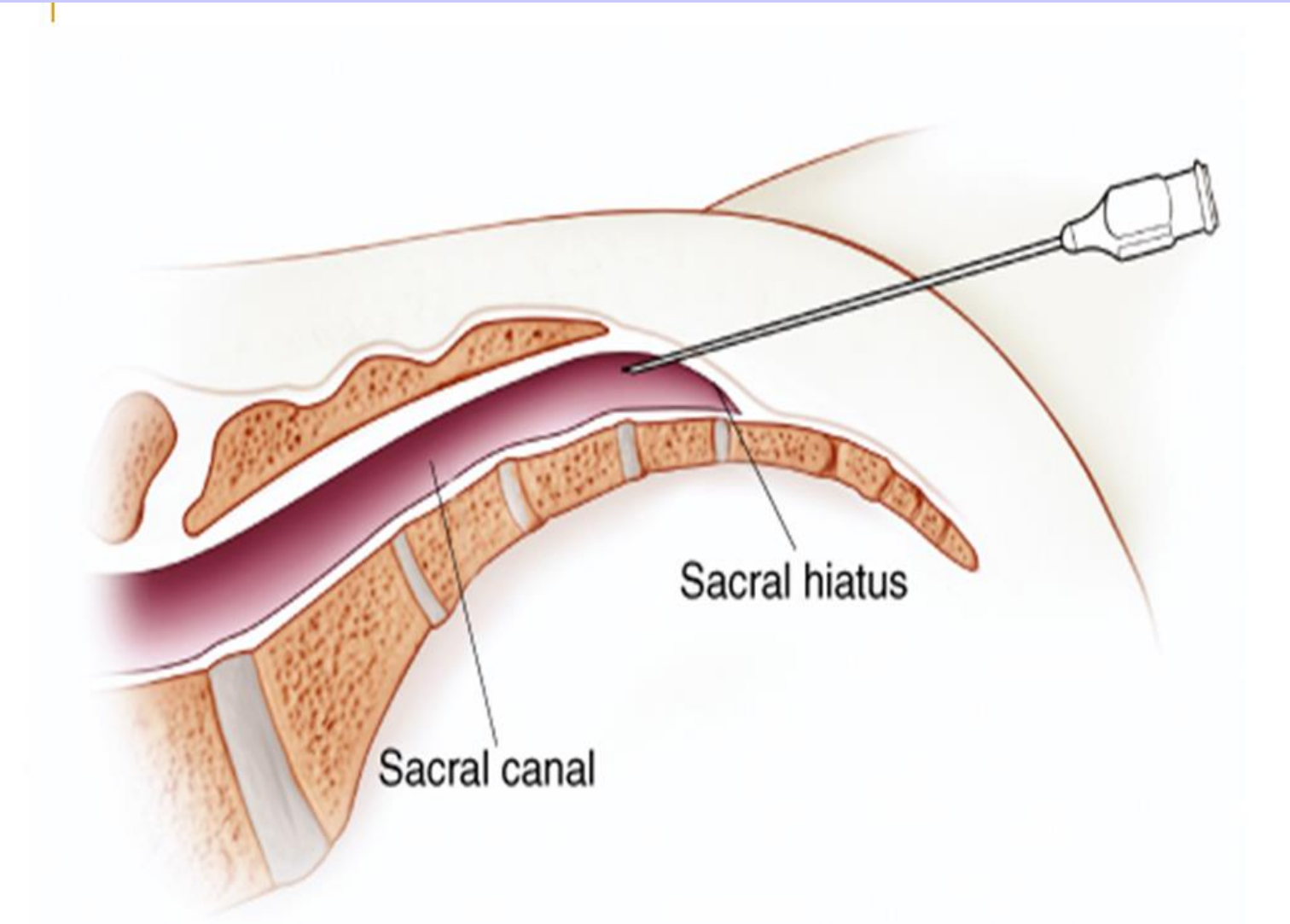
- Most used technique
- adapted needles
- flexible connection tubes
- Bupivacaine 0.25%, ropivacaine 0.2%, 1 ml/kg (inguinal incisions)
- Children less than 25 – 30 kg



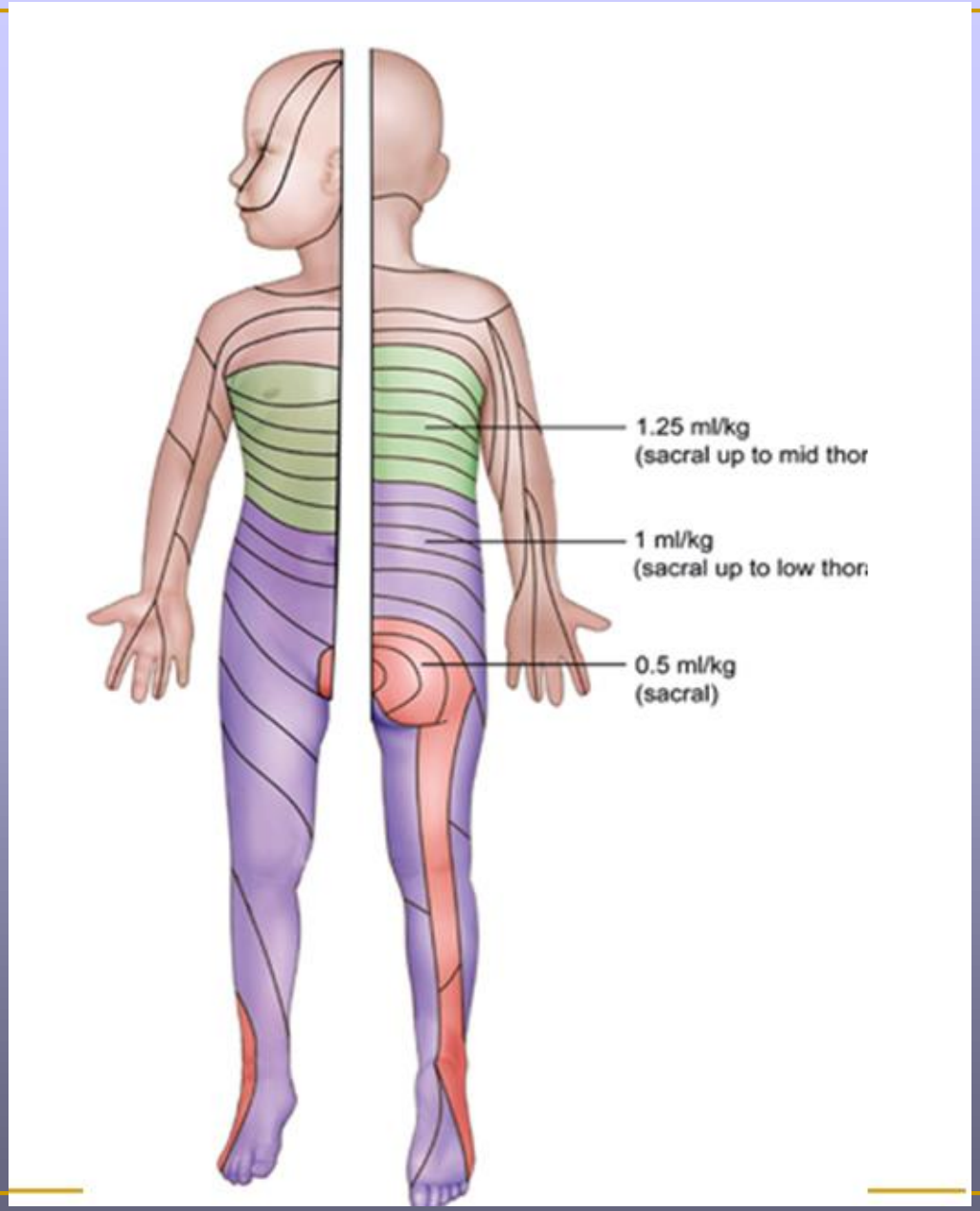
Performance of caudal block. SC, sacral cornua; PSIS, posterior superior iliac spine; SH, sacral hiatus; TC, tip of coccyx. Note that an equilateral triangle is formed with the fingertips from PSIS to PSIS to needle insertion at SH.



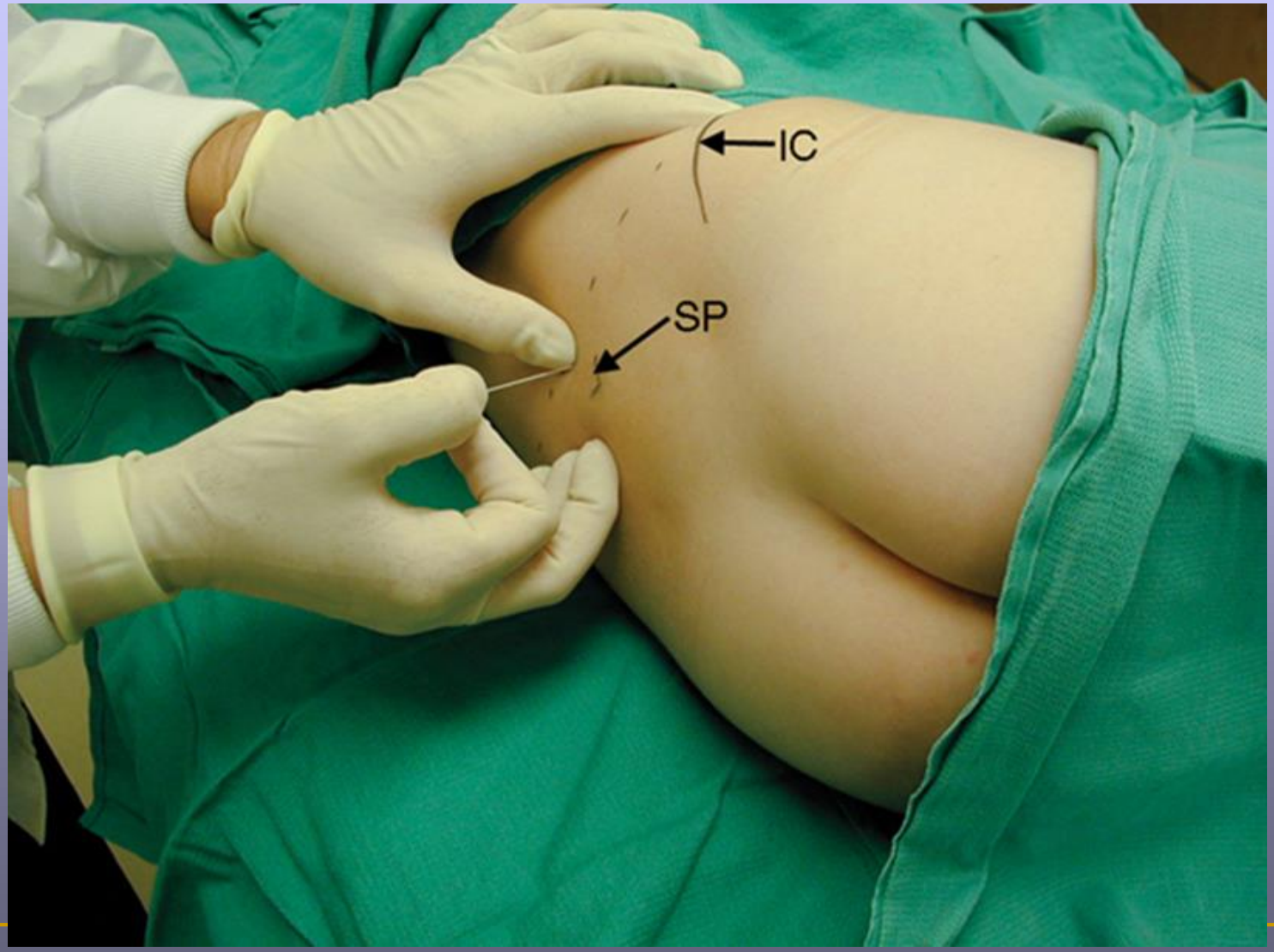
Lateral view of the caudal space and needle insertion.



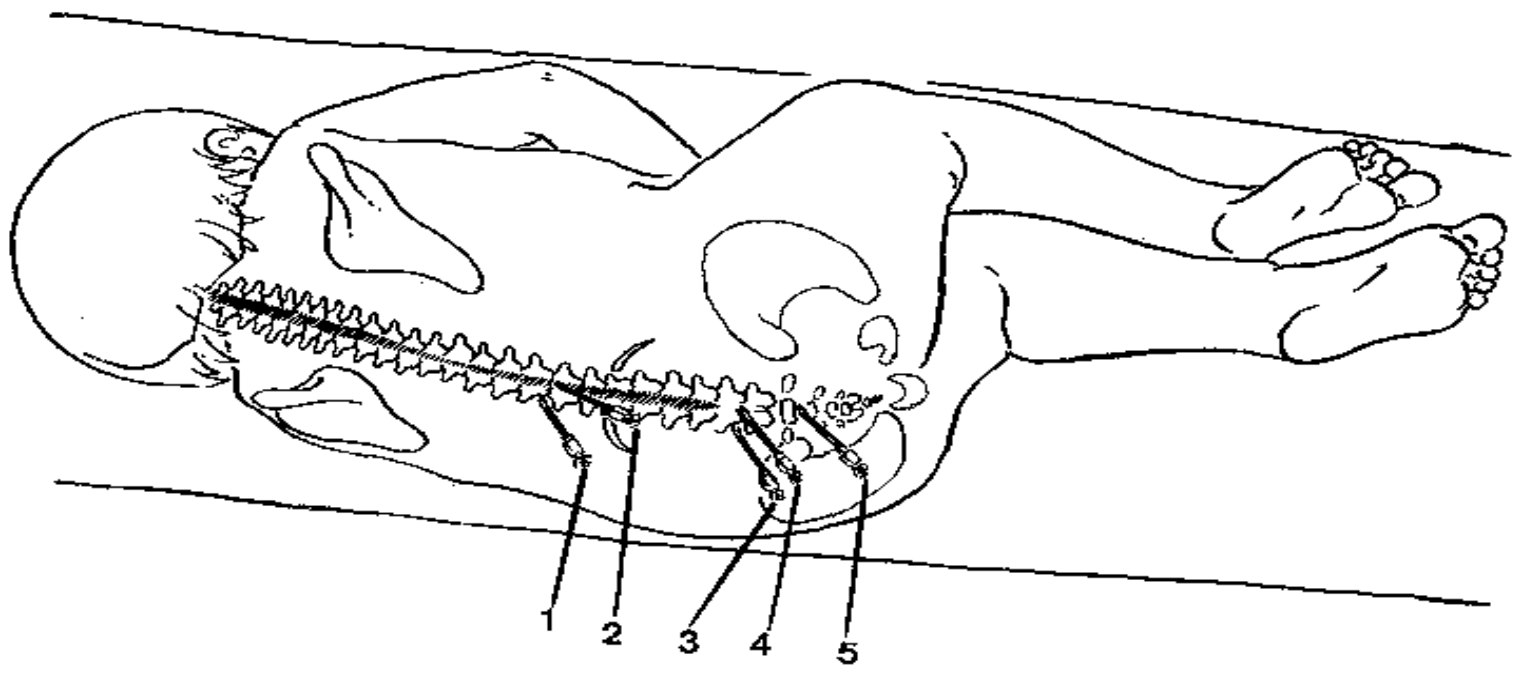
Dermatomal distribution of different volumes of local anesthetic for single-shot caudal block.



Performance of the **epidural block**. IC, iliac crest; SP, spinous process.



Thoracic epidural block



- Thoracic surgery (T2-T4), surgery of superior (T6-T8), respectively inferior abdomen (T10-T12).
- Touhy needles 22 G (0-1 years), 20 G (1-6 years) 18-19 G (>7 years), catheters as thin as 24 G

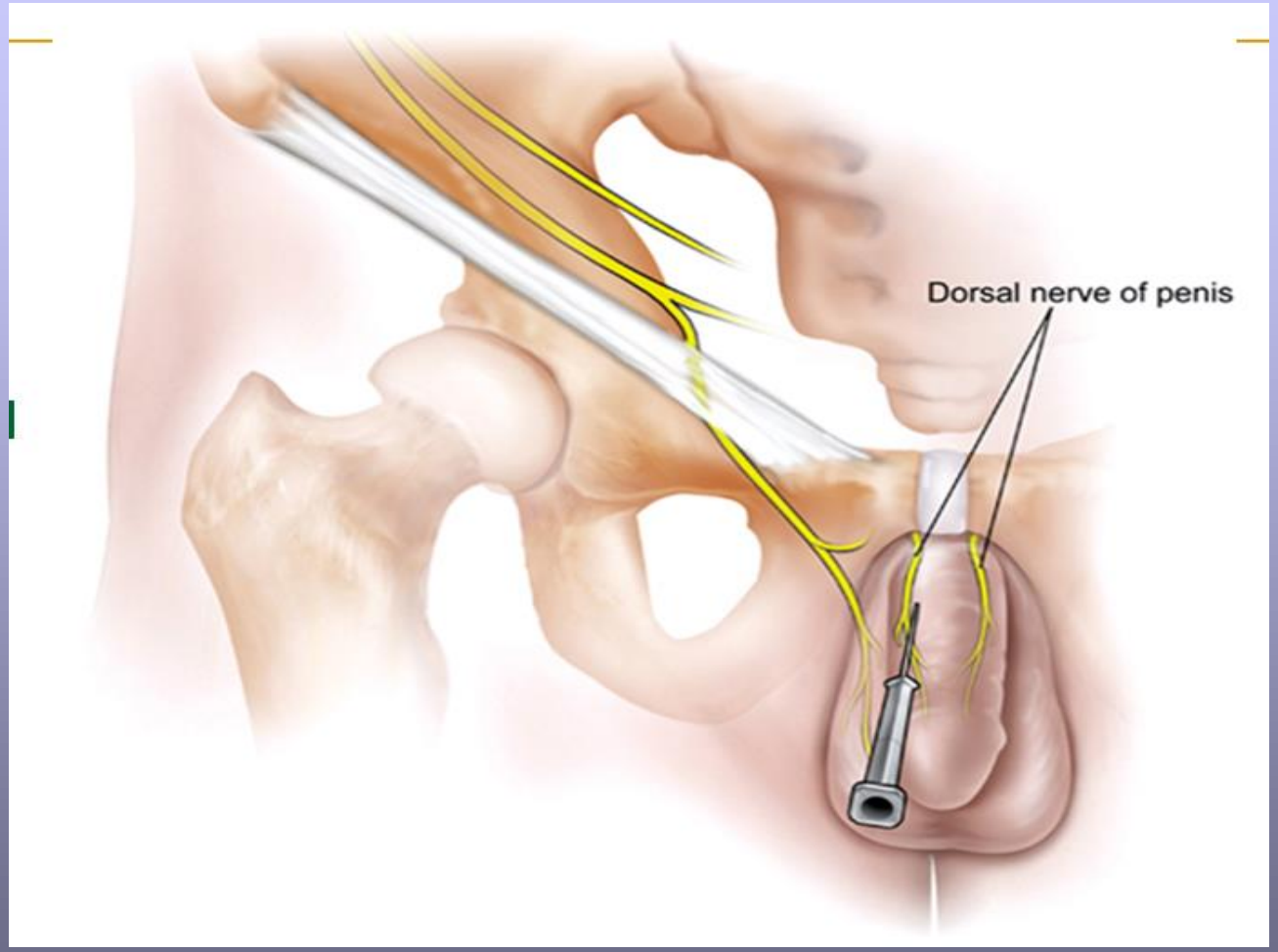
Spinal blocks in former prematures

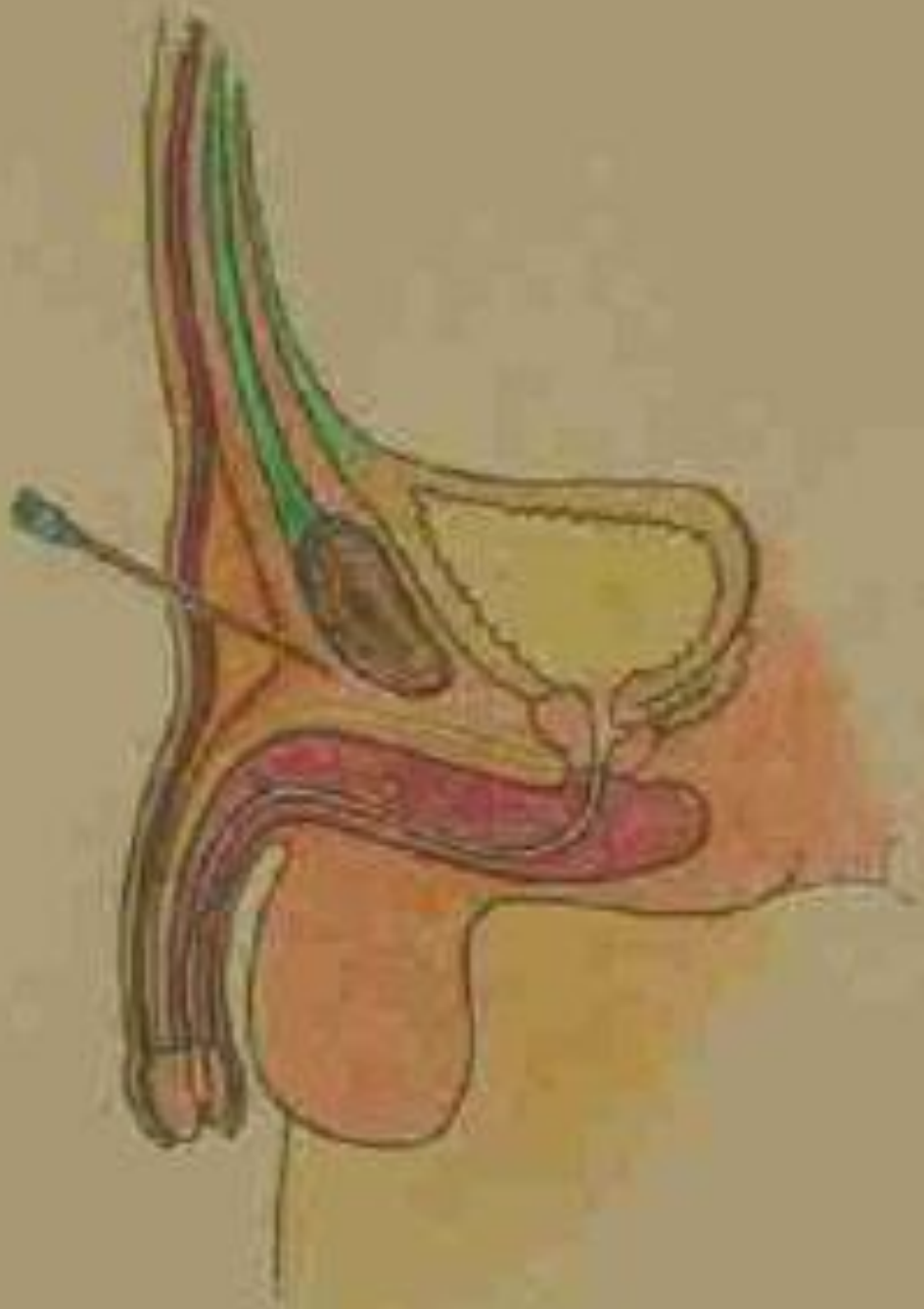
- Prems (less than 32 weeks), with inguinal hernia, operated until 44 weeks
- General anesthesia can lead to respiratory disfunctions
- technicaly difficult, sometimes less satisfactory results

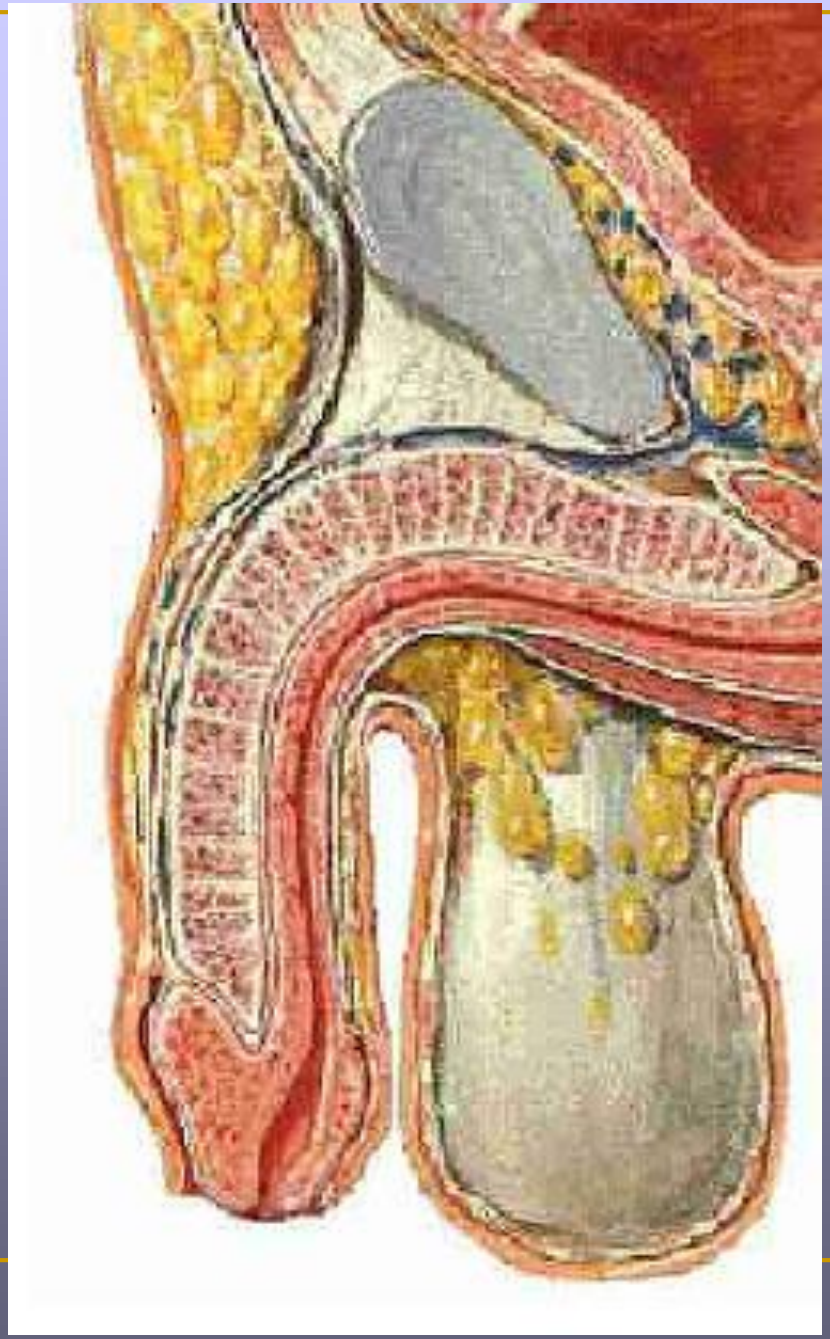
Performance of spinal anesthetic in the neonate. Note how the back is flexed, but the neck remains extended for airway patency. IC, iliac crest.

Penile block

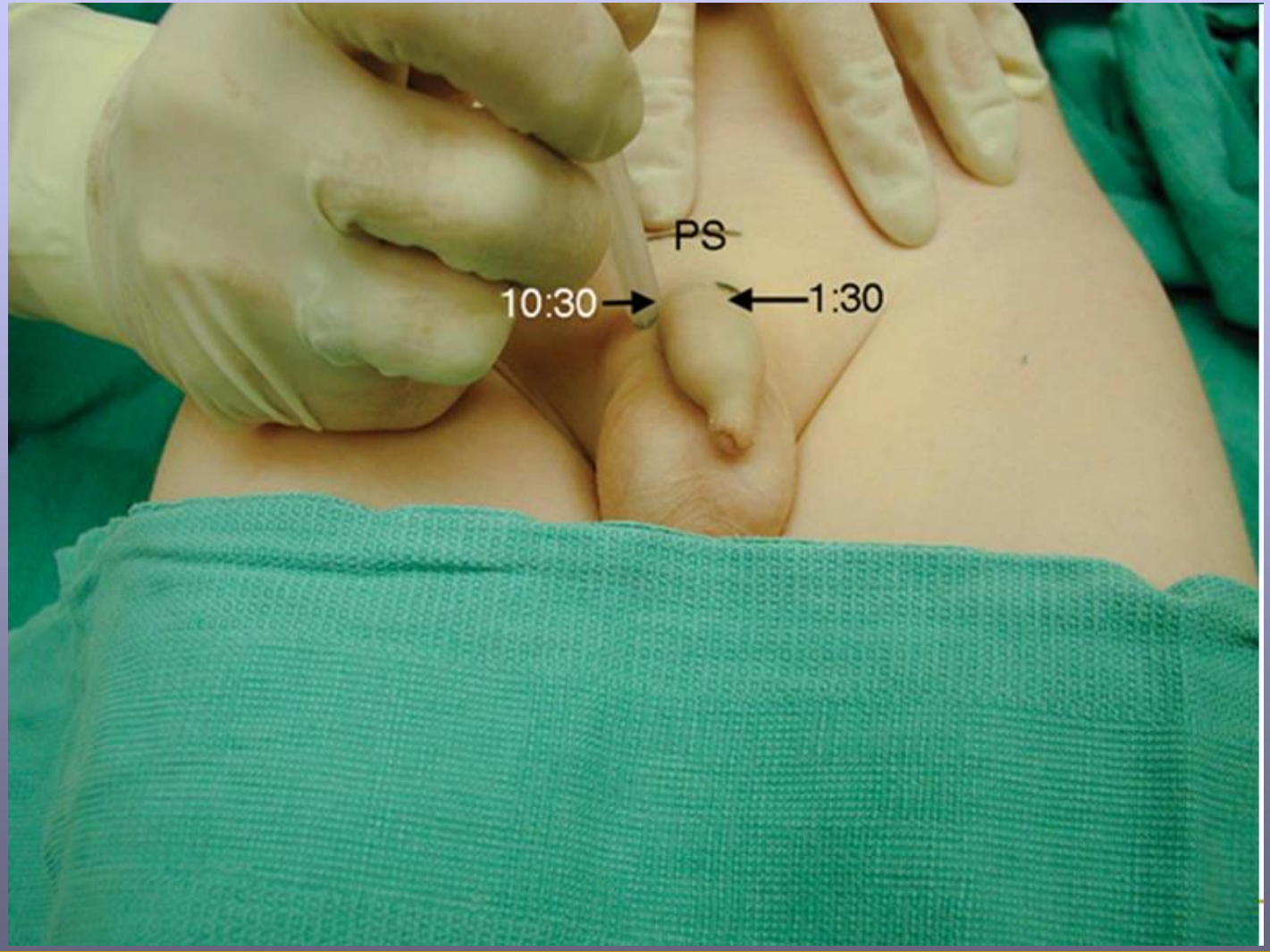
- Anatomy for dorsal nerve penile block.



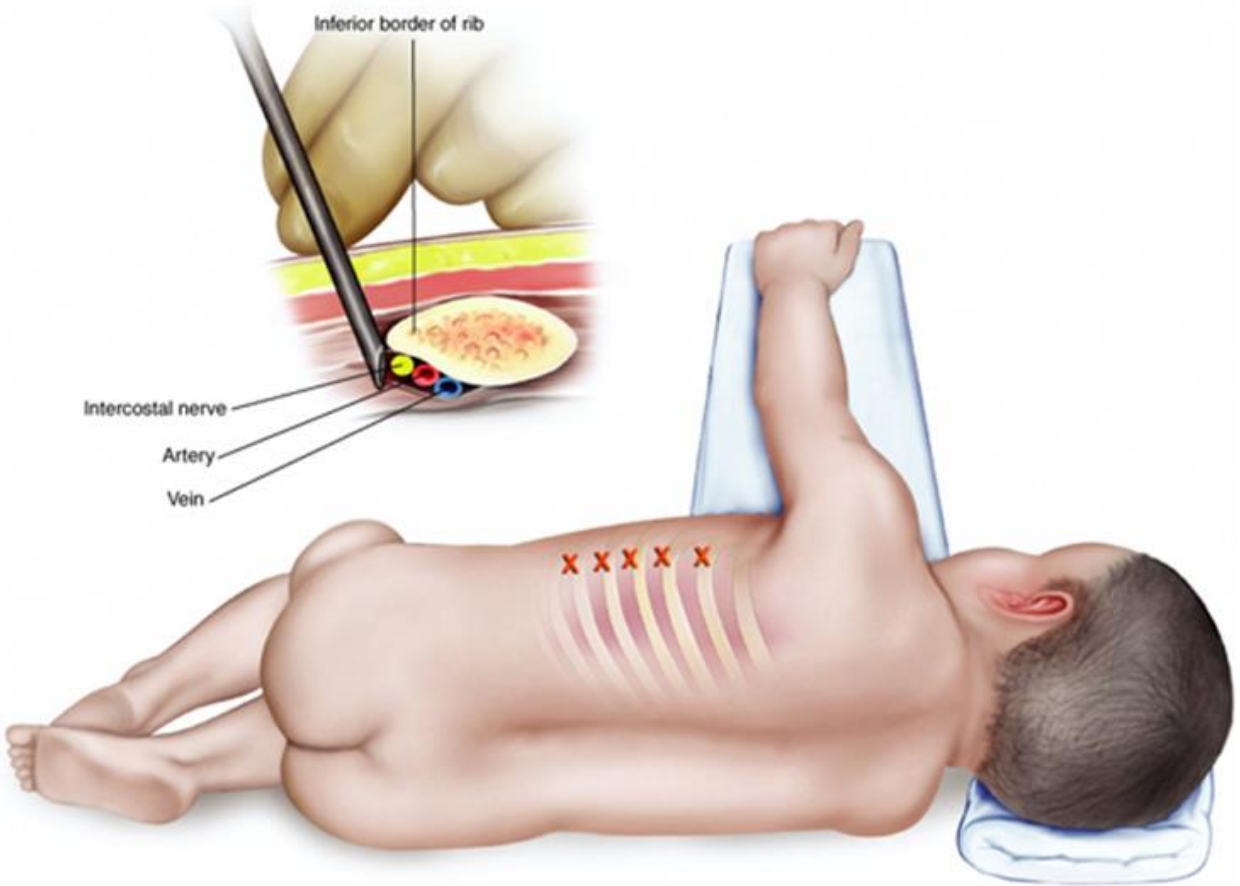




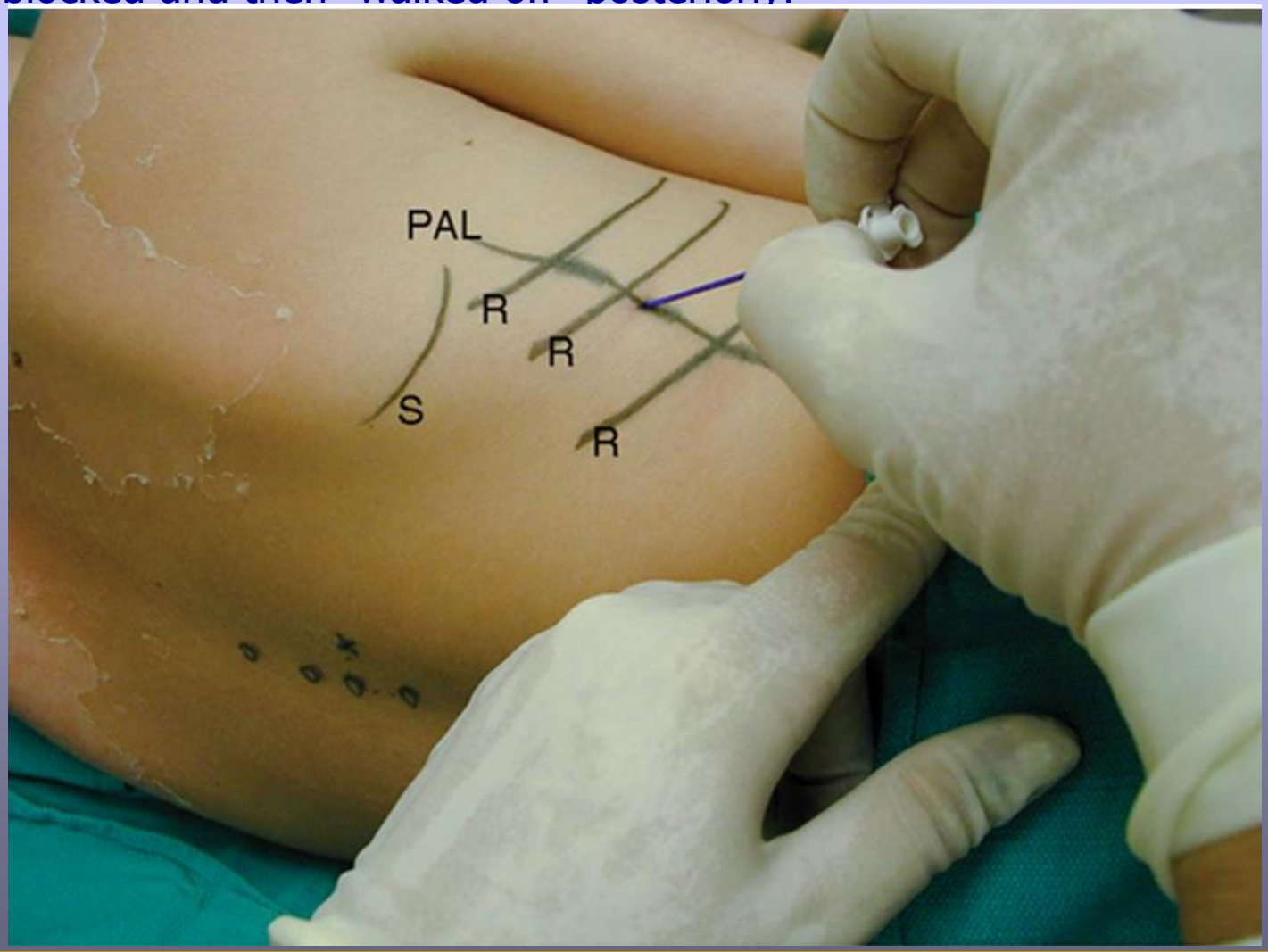
Performance of dorsal nerve block. PS, pubic symphysis. Point of needle insertion is at 10:30 and 1:30 o'clock at the base of the penis.



Anatomy of intercostal nerves.



Performance of **intercostal block**. PAL, posterior axillary line; S, scapula; R, inferior border of rib. Needle is directed to contact inferior border of each rib to be blocked and then "walked off" posteriorly.



Periumbilical block (fascia of the rectus abdominis) (1)

Indication: umbilical hernia

Contraindication: omphalocele şi a gastroskisis

Subcutaneous branches from X-th pair of intercostal nerves for the skin around umbilicus, contained in rectus abdominis fascia compartment.

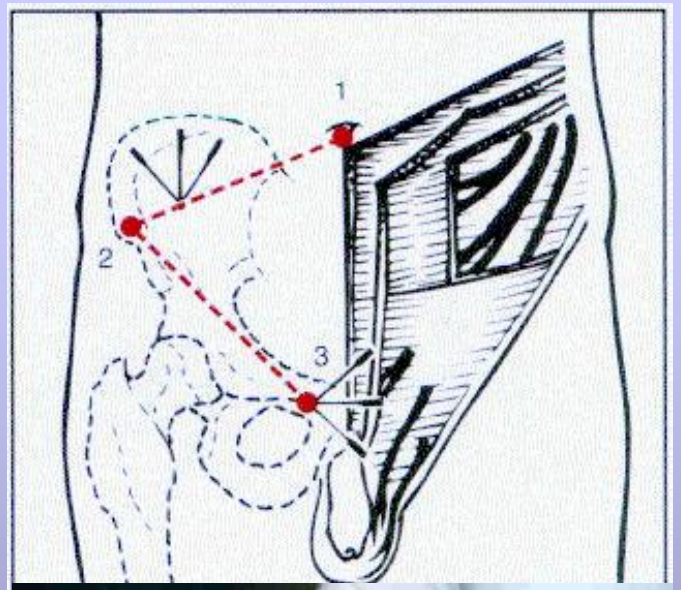
Periumbilical block (fascia of the rectus abdominis) (2)

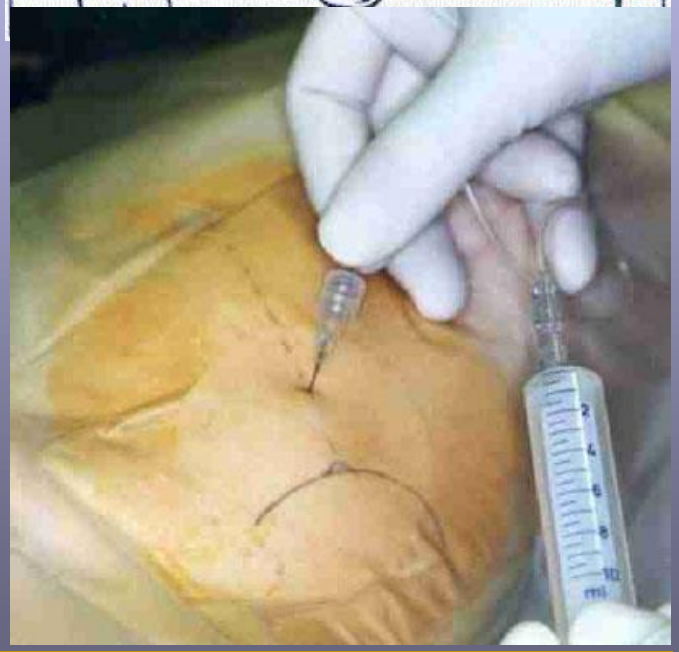
Technique

- Landmarks: umbilicus and lateral edge of both rectus abdominis muscles.
- Punction point: intersection of muscle edge with horizontal line tangent to inferior edge of umbilicus
- Short beveled needle angled 60 degrees against superior edge of umbilicus, until fascial perforation
- Bupivacaine 0.5 % (+/- adrenaline), ropivacaine 0.75-1 %, 0.2 ml/kg each part; +/- clonidine 1 µg/kg

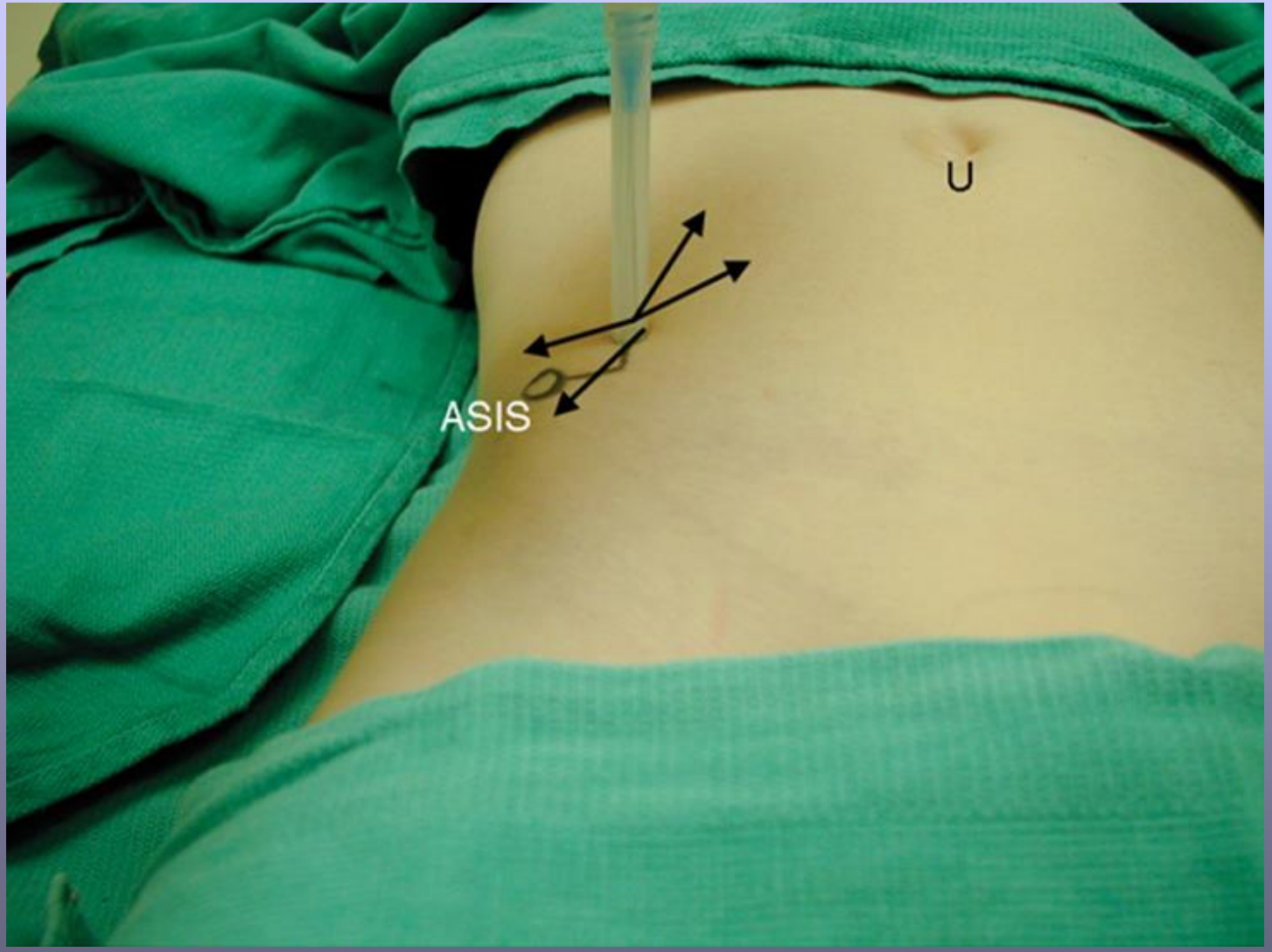
Ilioinguinal / iliohypogastric nerve block

- inguinal zone analgesia - by blocking the 2 nerves + genital branch of genitofemural nerve.
- cases of intraabdominal penetration, or undesired extension (blocking femural nerve)
- Other technique (simplified): fan injecting of the LA, close to inguinal channel





Ilioinguinal / iliohypogastric nerve block



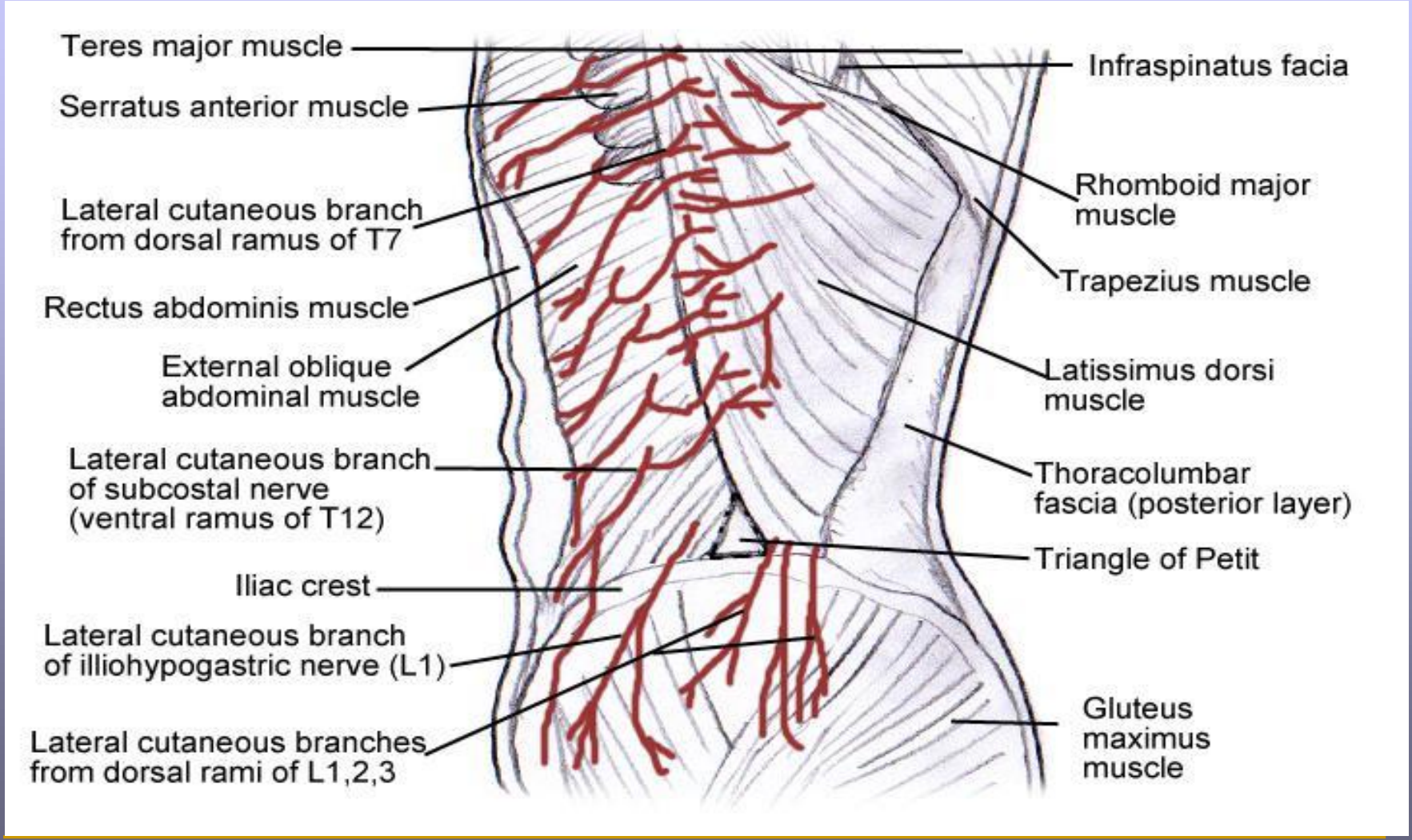
Transversus Abdominis Plane Block

Nerves supplying the anterior abdominal wall (T6 to L1).

2001 (Rafi) blind landmark technique using the lumbar triangle of Petit

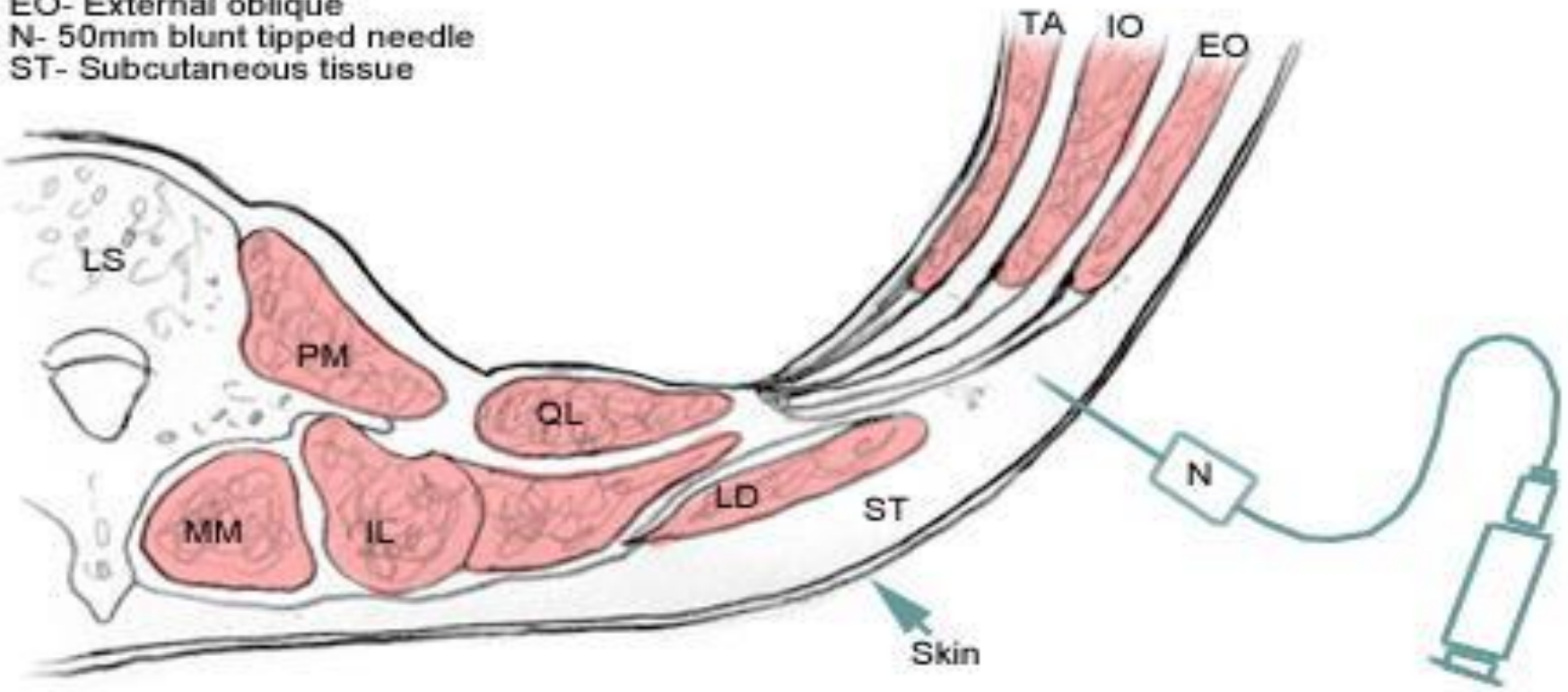
Local anesthetic injected between the internal oblique and transverse abdominis muscles just deep the fascial plane between

T A P


Teres major muscle
Serratus anterior muscle
Lateral cutaneous branch from dorsal ramus of T7
Rectus abdominis muscle
External oblique abdominal muscle
Lateral cutaneous branch of subcostal nerve (ventral ramus of T12)
Iliac crest
Lateral cutaneous branch of illiohypogastric nerve (L1)
Lateral cutaneous branches from dorsal rami of L1,2,3
Infraspinatus facia
Rhomboid major muscle
Trapezius muscle
Latissimus dorsi muscle
Thoracolumbar fascia (posterior layer)
Triangle of Petit
Gluteus maximus muscle

T A P

LS- Lumbar spine
LD- Latissimus dorsi
PM- Psoas major
QL- Quadratus lumborum
MM- Mulitfidus muscle
IL- Longissimus, Iliocostalis
TA- Transversus abdominis
IO- Internal oblique
EO- External oblique
N- 50mm blunt tipped needle
ST- Subcutaneous tissue



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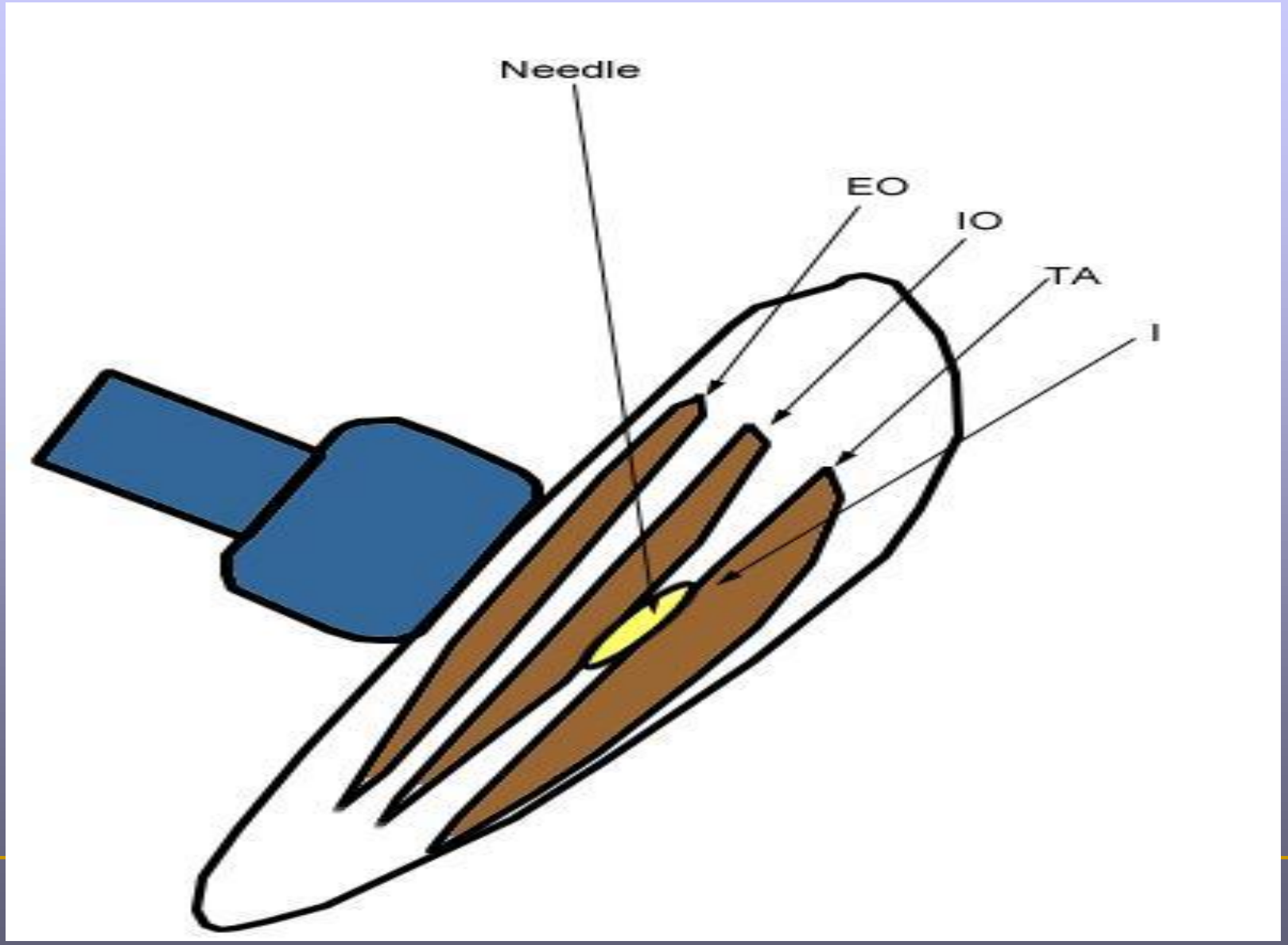

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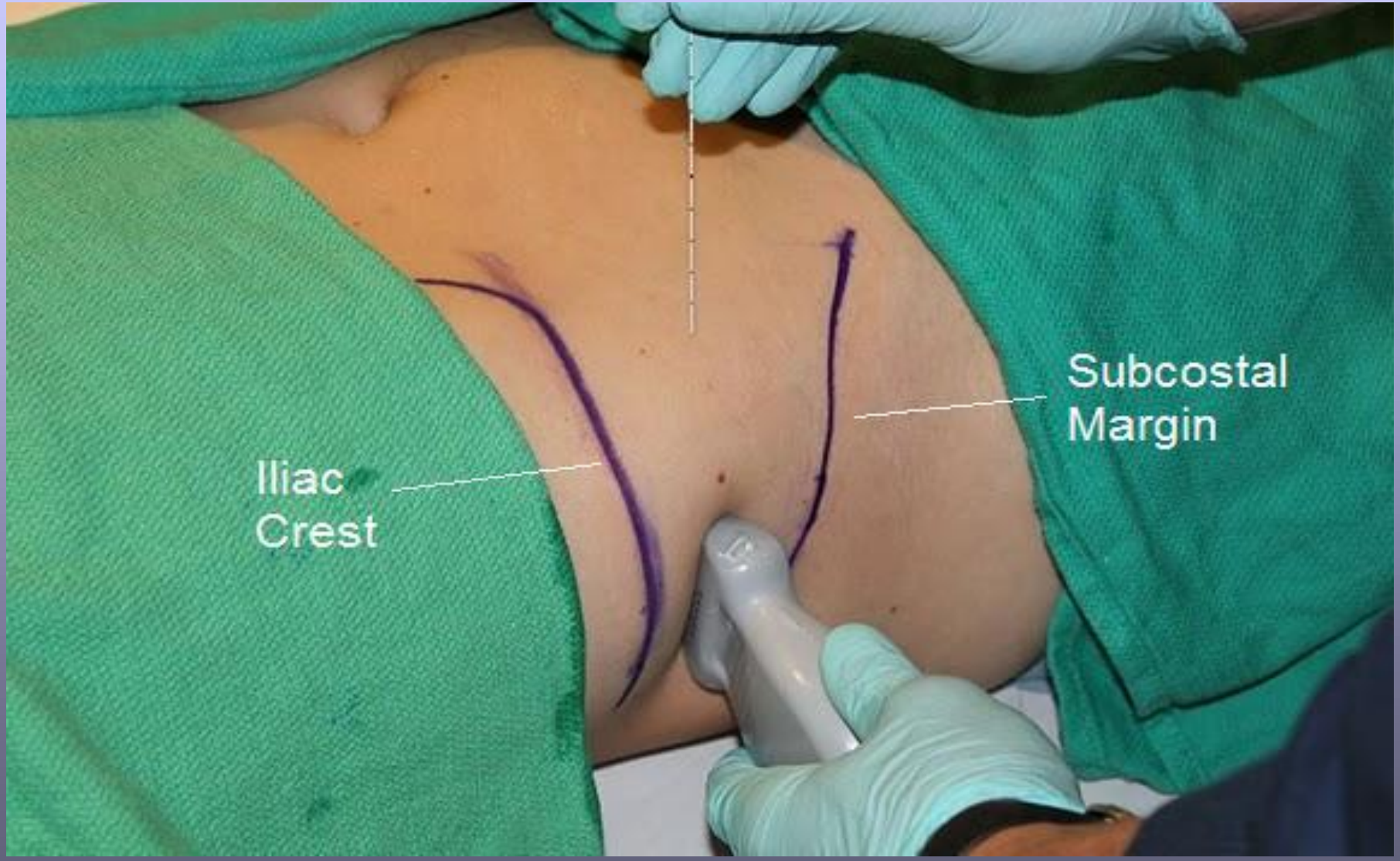


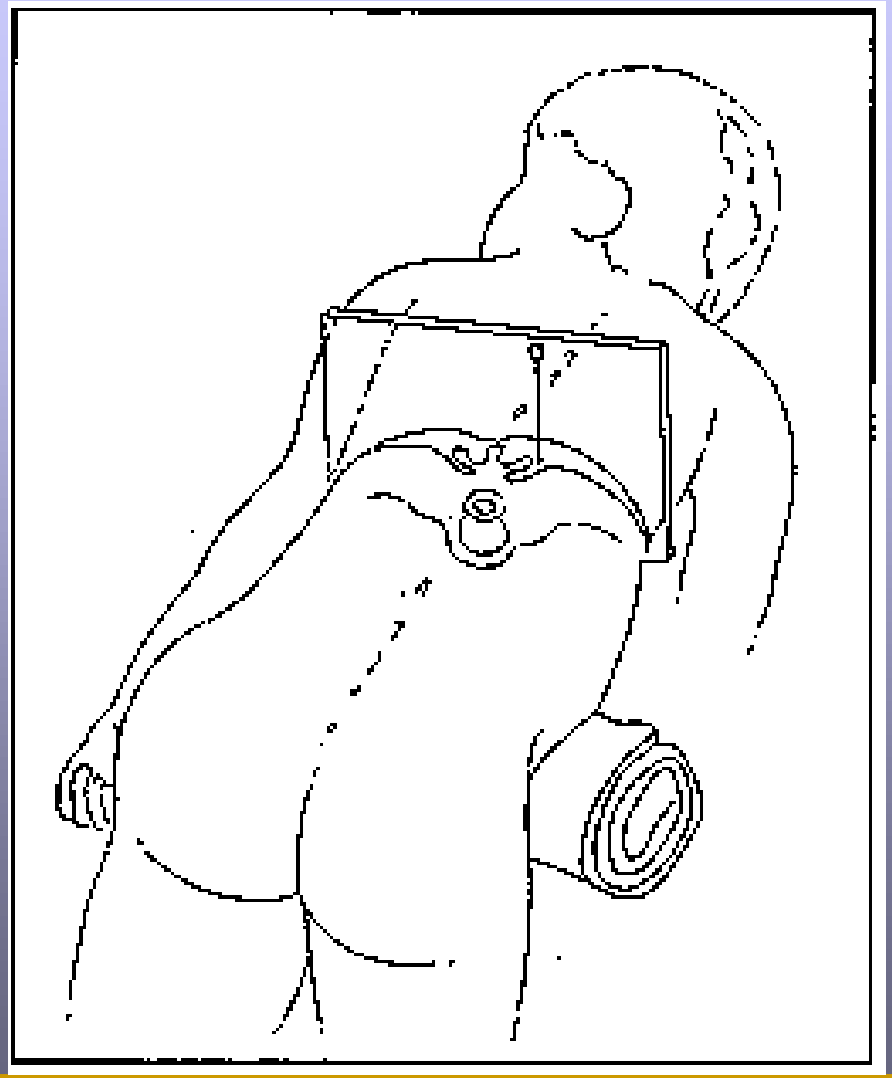
Pudendal nerves (perineal) block

(peri)anal and labium minus pudendi surgery, complete ilioinguinal / iliohypogastric block for scrotum, complete penile block for supeficial penis surgery.

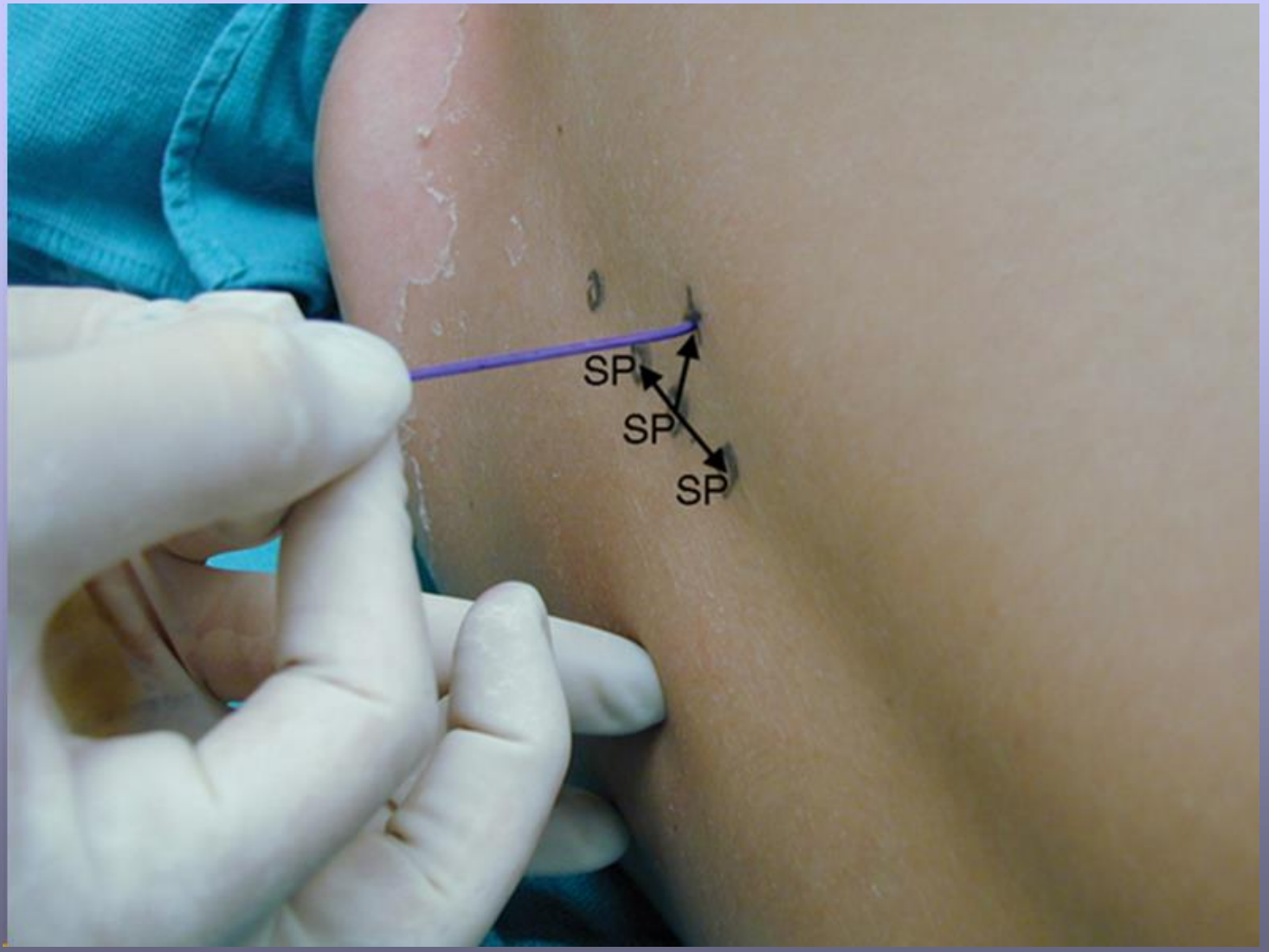
punction: frontal skin projection of ischium tuberosity; short beveled needle 60-80 degrees from medial towards laterally, pointing the upper part of medial aspect of the tuberosity, until punctioning pelvine fascia; bupivacaine 0.5% 0.1-0.2 mg/kg, max 5 ml nonadrenalinated.

Paravertebral nerve block

- thoracic paravertebral space continues, LA passes freely until T12
- psoas muscle insertion stoppes difusion towards L1.
- new techique - same L1 punction 1-2 cm laterally from spinous process, 2 LA shots above and beneath transvers process L1.
- total dose 0.5 ml/kg bupivacaine or levobupivacaine 0.25 %
- lateral decubitus, operating zone upwards.

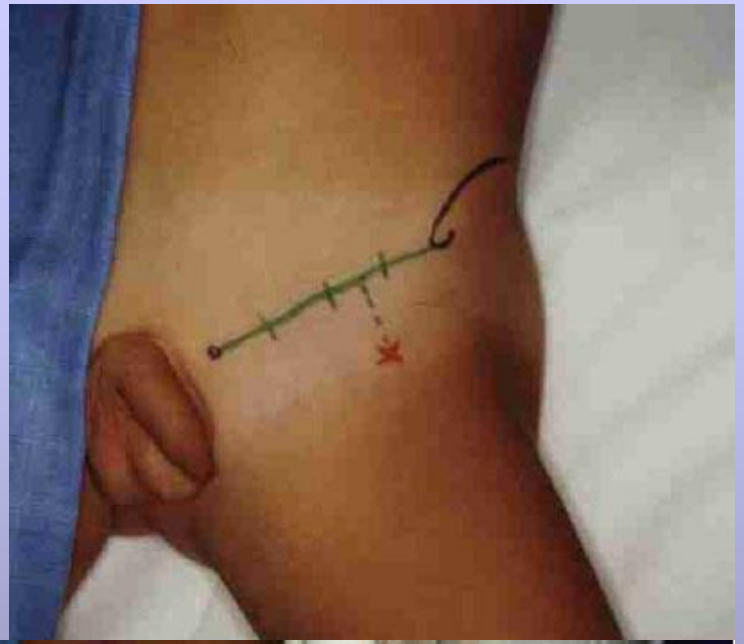


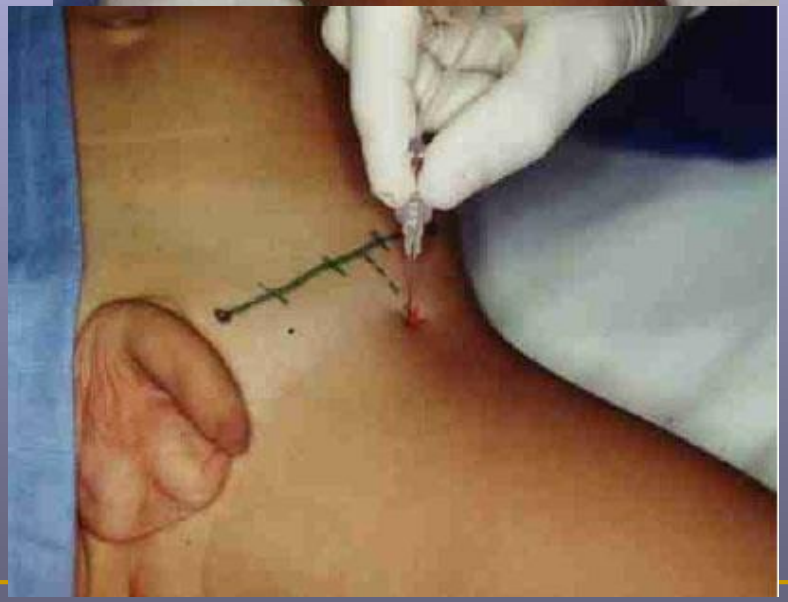
Paravertebral nerve block

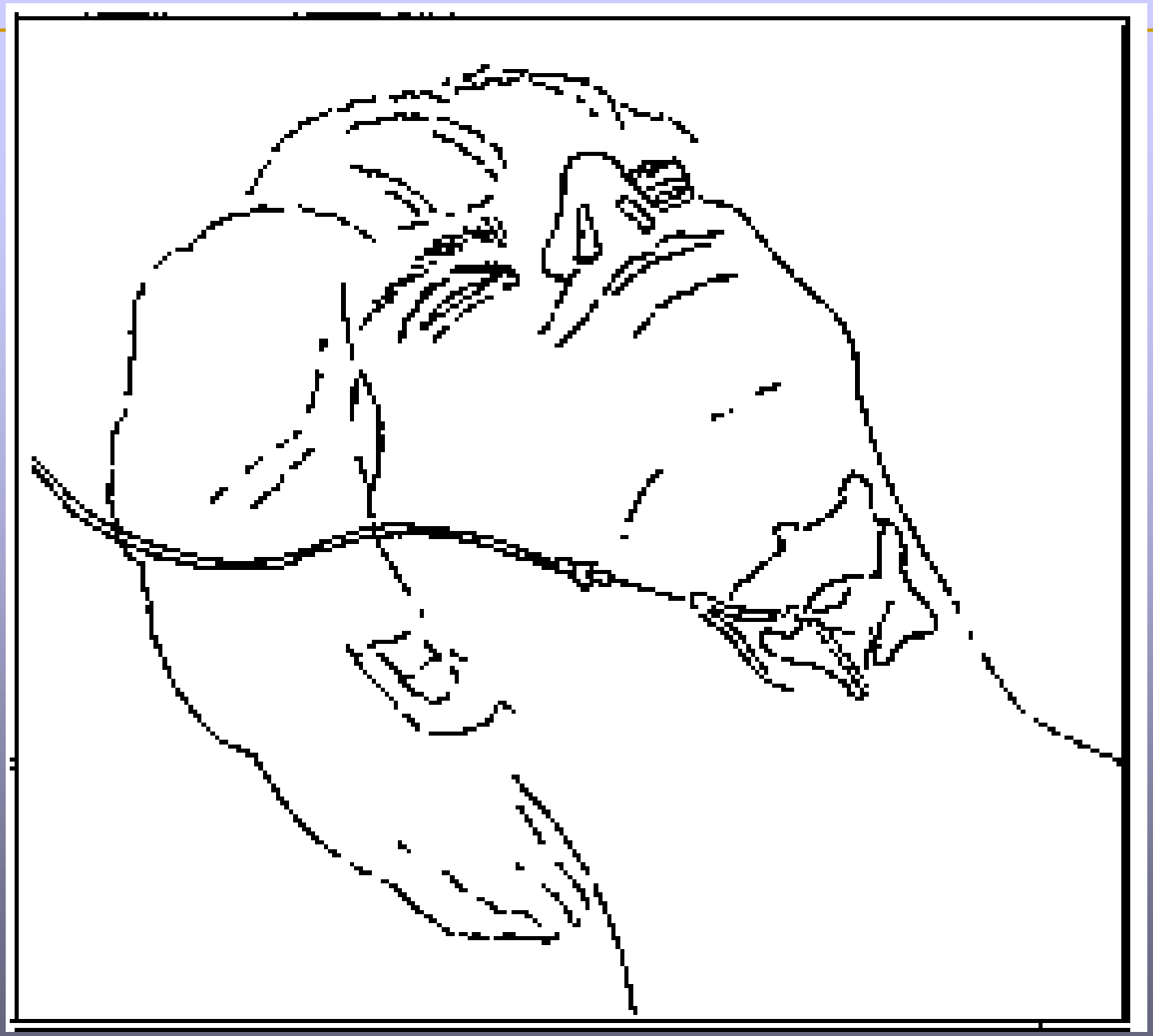


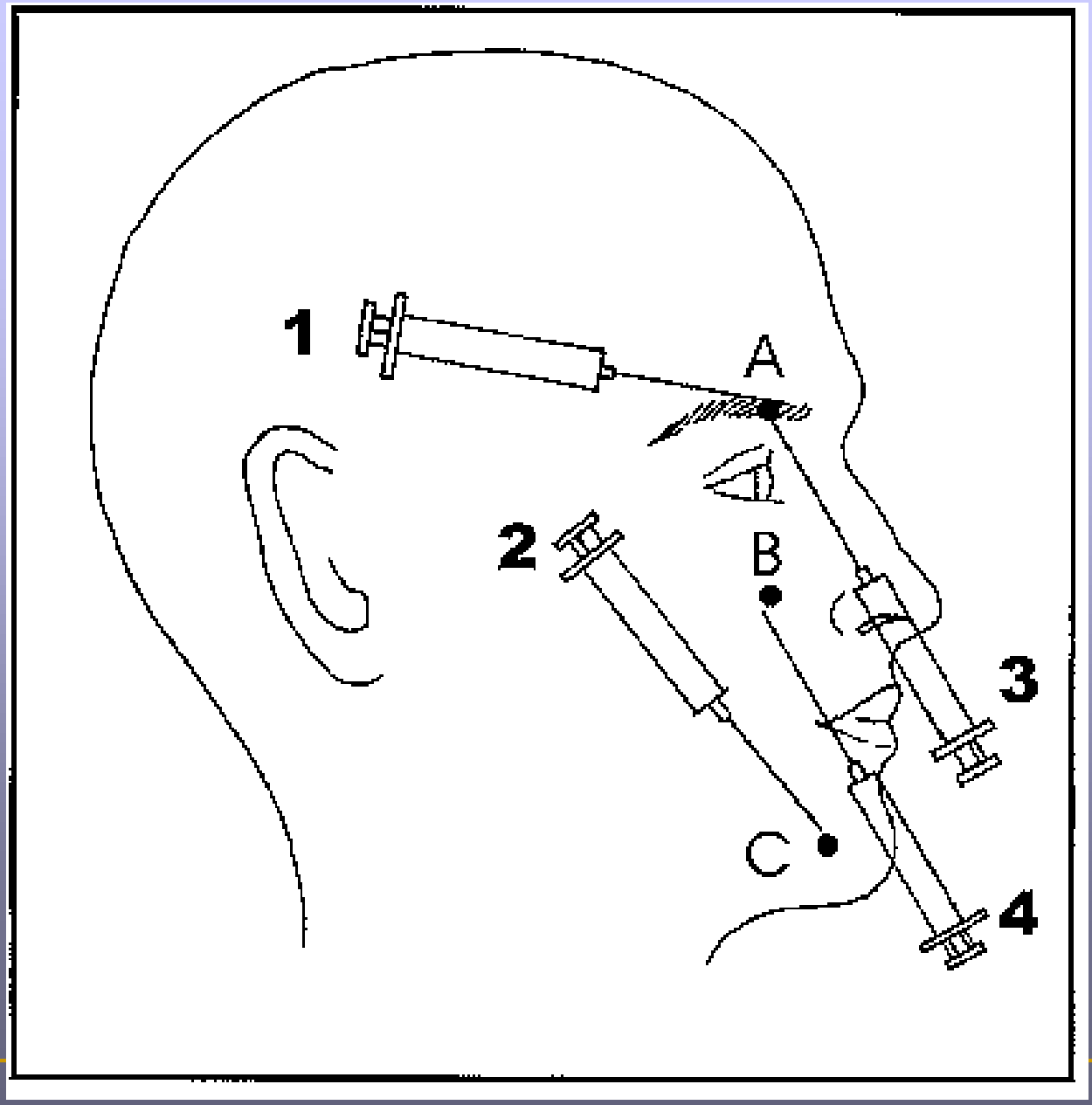
Fascia iliaca compartment block

- Blocking lumbar plexus nerves : LA along the inner aspect of fascia iliaca.
- Pain control in femural fracture
- Thigh surgery
- Canulla or catheter beneath fascia iliaca: reinjections or continuous infusion de LA
- Significant vascular absorbtion.





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