Department of Anesthesia Techniques

Title of the lecture: - spinal epidural needle

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Spinal, Epidural, and Combined Spinal–Epidural Anesthesia

regional anesthesia with central neuraxial blockade has gained widespread popularity and is commonly used nowadays. Hence, a knowledge of the various techniques to achieve these blocks and needles and catheters used for administering spinal, epidural or combined spinal-epidural anesthesia is required for a safe and effective central neuraxial blockade.

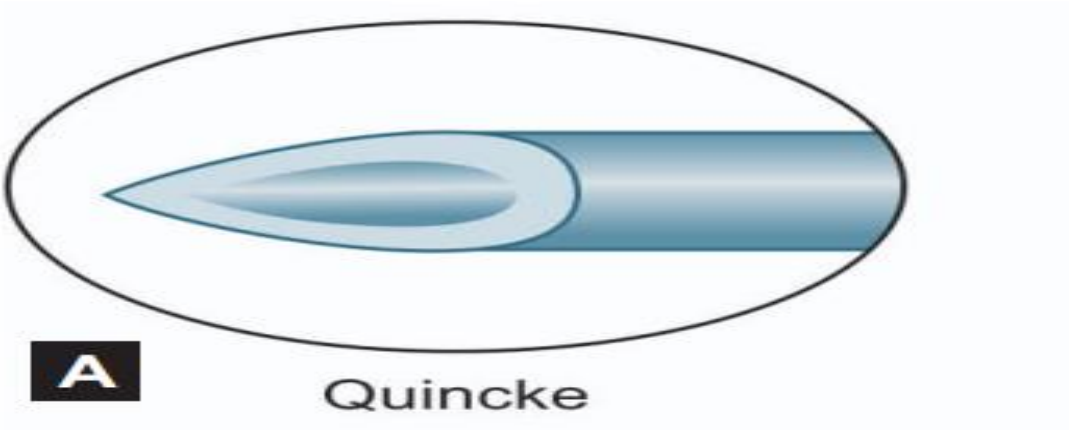
SPINAL NEEDLES:

Quincke: cutting needle used for drainage of cerebrospinal fluid (CSF) in patients with intracranial hypertension. Also technique of LP.

* Easy used

* Cutting = more CSF leak= more PDPH

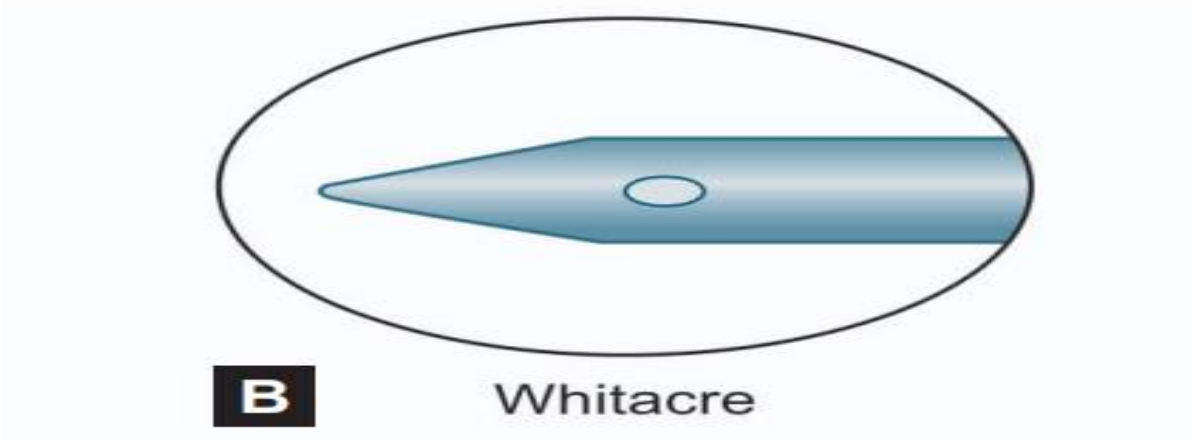
*splitting insertion used to reduce PDPH



Whitacre: developed conical pointed needles described as “resembling a sharpened pencil” and a distal side orifice next to it. They were popularly called “pencil point needles”

* Difficult to used

* pencil point= less CSF leak = less PDPH



INDICATIONS FOR SPINAL ANESTHESIA:

• In lower abdominal, inguinal, urogenital, rectal, gynecological and lower extremity surgeries. • Obstetrics—cesarean sections

CONTRAINDICATIONS

Absolute:

• Patients refusal

• Significant coagulopathy

• Raised intracranial pressure (ICP)

• Infection at the site of puncture

• Valvular heart diseases (severe stenotic or ventricular outflow tract obstruction)

• Severe untreated hypovolemia.

Relative

• Surgical scars • Spinal deformities (Scoliosis)

• Sepsis

• Neurological deficits or demyelinating diseases

• Uncooperative patient.

Controversial

• Major blood loss

• Previous spinal surgery at the site of injection.

** It is difficult to teach a technique by describing it. Only through experience one can obtain a "feel" for the technique. We shall however cover some important and practical points that will be helpful when administering spinal anesthetics.

Preparation:

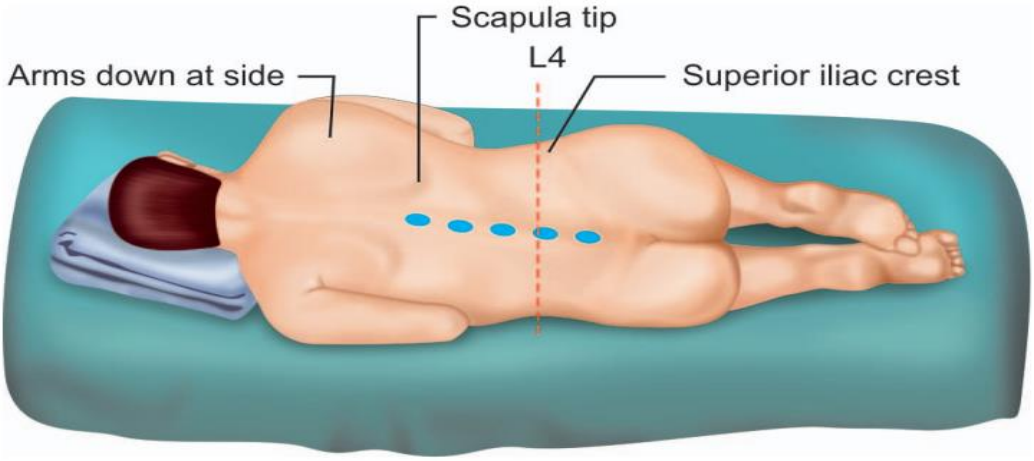
• Explain the procedure in short to the patient. Explain to him the risk and benefit of SA/EA versus GA, sensory and motor block.

• The patient should be attached to the standard monitors including electrocardiogram (ECG), noninvasive blood pressure (NIBP) and pulse oximetry. Record an initial set of vital signs.

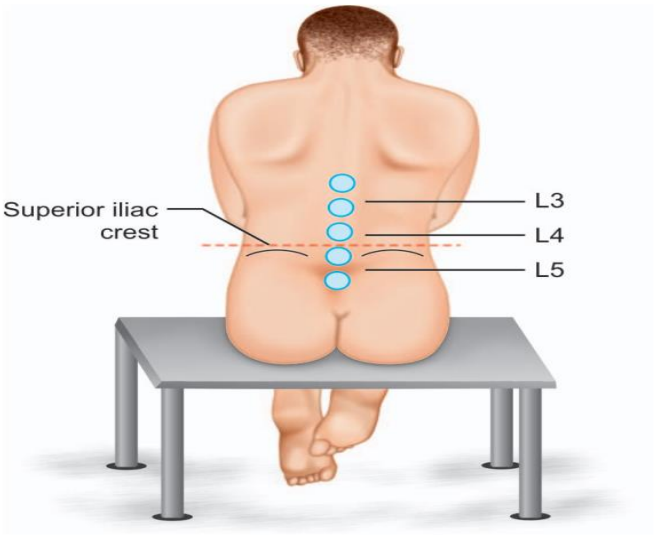
• Secure an intravenous (IV) access with a large bore needle (20G/18G) and coload the patient with 1–1.5 liters of crystalloid IV solution. Now the patient is ready to receive the spinal anesthetic.

Position for Spinal Injection:

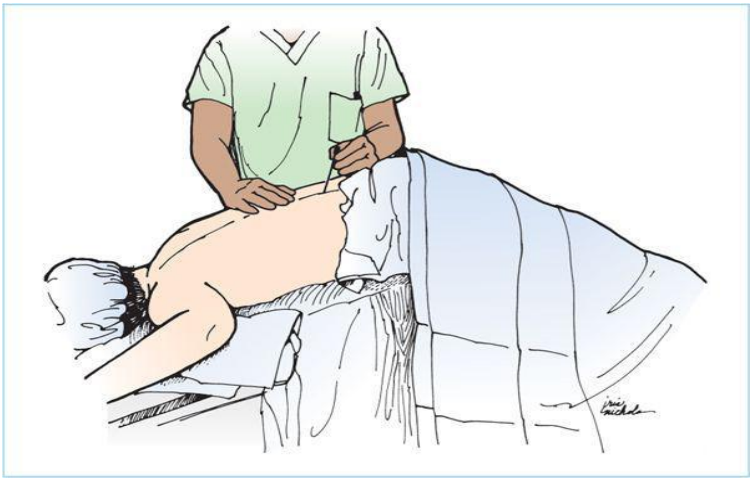
1. Lateral decubitus:



2. Sitting:



Prone position:



There are two approaches for accessing the subarachnoid space:

* The midline and

* The paramedian approach.

Skin • Subcutaneous tissue • Supraspinous ligament • Interspinous ligament • Ligamentum flavum • Epidural space • Dura.

Monitoring After successful placement of spinal anesthetic, the patient should be monitored for:

• Block progression and its complications

• Hemodynamics, i.e. blood pressure (BP), pulse rate

• Problems with breathing

• Sensorium.

Predictors	Scores			
	0	1	2	3
Age (year)	20–40	41–60	> 60	
Body mass index (kg/m x m)	< 22	22–27	> 27–34	> 34
Spinal bony landmarks	Clear	Unclear		
Spinal bony deformity	No	Yes		
Radiological characteristics of lumbar vertebrae	Easy	Difficult		

A score of ≥4 will be a difficult spinal block

COMPLICATIONS OF SPINAL ANESTHESIA: They range from transient neurologic symptoms to cauda equina syndrome to backache.

• Nausea/vomiting

• Postdural puncture headache

• Neurological (cauda equina syndrome)

• Meningitis

• Retention of urine

• Paralysis of 6th cranial nerve

• Subdural block.

Postdural Puncture Headache

Although not life-threatening, PDPH carries substantial morbidity by restricting activities of daily life. It occurs because of leak of CSF from dural puncture with resultant loss of CSF pressure, gravitational traction of brain structures and painful neurovascular response from meninges. Spontaneous resolution of PDPH takes 1–6 weeks.

Postdural puncture headache is common in:

• Young age

• Patients with lesser body mass index (BMI)

• Female gender

• Pregnancy and labor

• Patients with history of recurrent headaches

• Patients with history of previous PDPH.

Postdural puncture headache is:

• Less with fine pencil point spinal needles

• More common in young adults13 and decreases with increasing age

• Less with use of small diameter spinal needles and with noncutting tips

Factors contributing to headache after LP are:

• Needle size

• Direction of bevel

• Needle design

• Number of LP attempts.

The noninvasive treatment of PDPH is with bed rest, fluids, analgesics, caffeine and sumatriptan whereas the invasive treatment is epidural blood patch.

EPIDURAL NEEDLES:

The epidural needles are designed to allow the passage of epidural catheters through them. Tip with a blunt bevel having a curve at 15–30o through which passes the epidural catheter at an angle and not straight hitting dura or spinal canal.

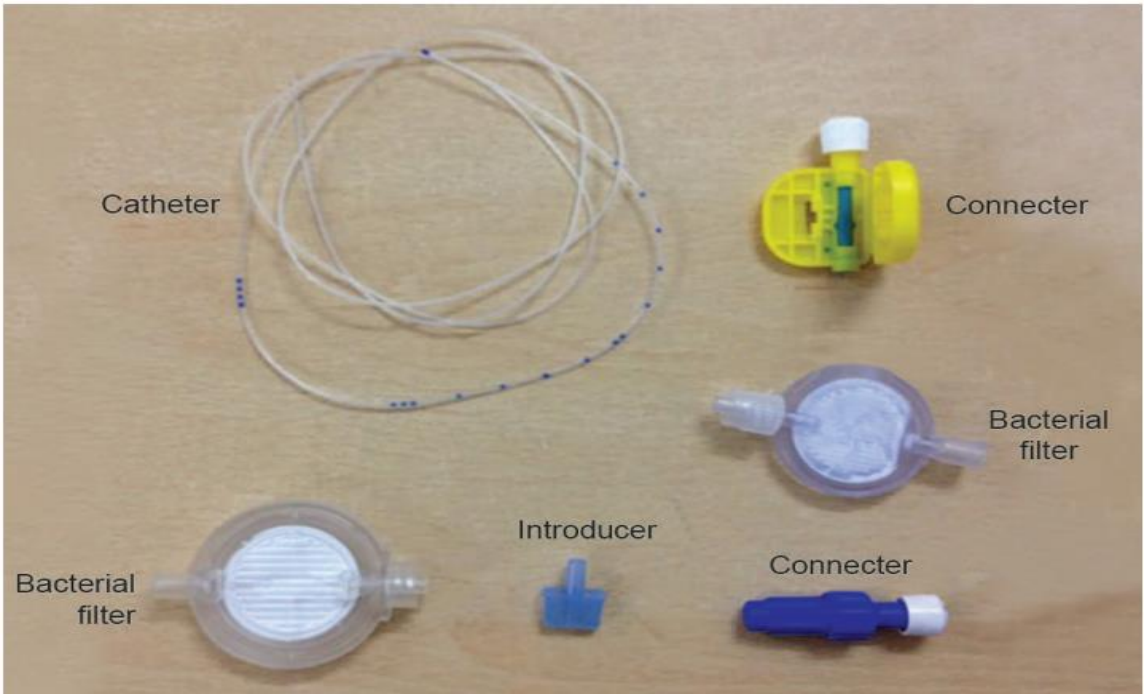
EPIDURAL CATHETER:

• Made up of nylon or polyvinyl chloride.

• Radiopaque. • Tip is atraumatic, rounded having lateral holes and closed end.

• Connector with Luer-lock cap

• Catheter length: 90–100 cm with markings at 5 cm, 6 cm, 7 cm, 8 cm, 9 cm, 10 cm, 15 cm, 20 cm from the tip.



Color coded: Dark blue (18G), light blue (16 G).

Catheter distance from tip to the epidural space is 3–4 cm. The catheter should be advanced only 3–5 cm into the epidural space.

Catheter should appear 15–18 cm at the hub of the needle.

	Spinal	*Epidural*
1.	Simple to perform	Difficult to perform
2.	Has rapid onset of action	Has slower onset of action
3.	Requires small doses of LA	Requires larger doses of LA
4.	Gives reliable analgesia and muscle relaxation	At times, does not provide reliable analgesia and muscle relaxation
5.	Has shorter duration of action	Because of epidural catheter, prolongation of duration of block is possible
6.	Inability to extend the height of the block once fixed	Extension of the height of the block is possible
7.	Can cause precipitous drop in BP	Drop in BP is gradual
8.	Inability to provide postoperative analgesia	Ability to provide postoperative analgesia

COMPLICATIONS OF EPIDURAL NEEDLES

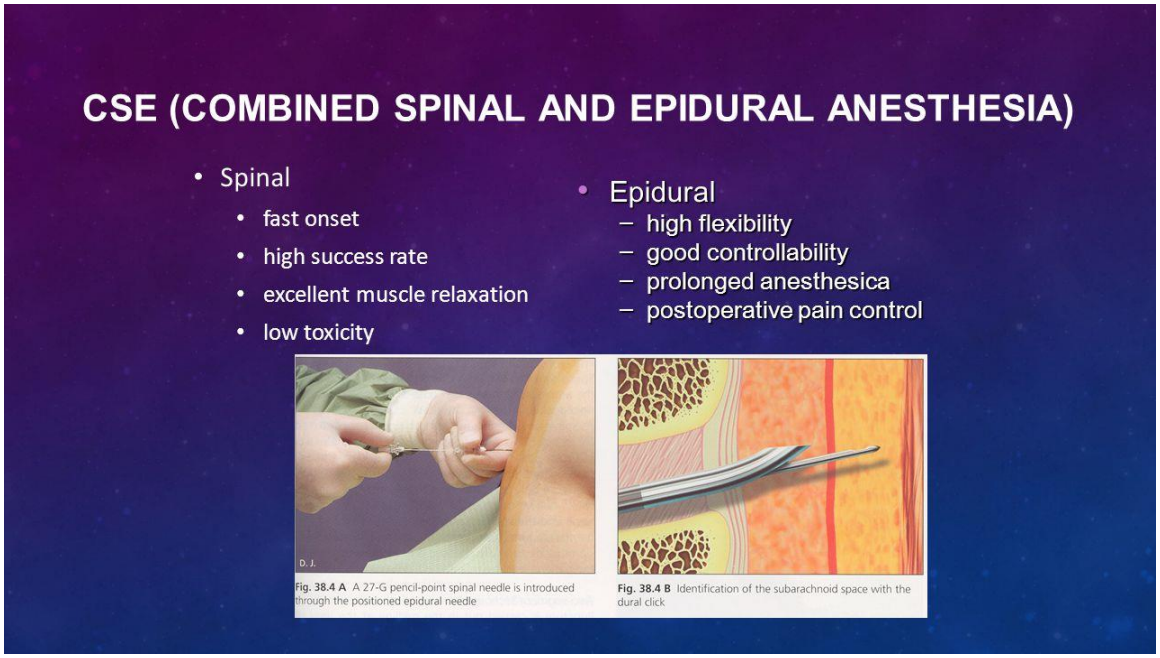
• Epidural hematoma

. Postdural puncture headache—due to accidental dural puncture.

• Backache.

• Epidural abscess

COMBINED SPINAL–EPIDURAL NEEDLES:



ADVANTAGES OF COMBINED SPINAL– EPIDURAL ANESTHESIA

• Rapid onset, reliable and profound block due to spinal.

• Prolongation of duration of block using epidural catheter.

• Postoperative analgesia for pain relief.

DISADVANTAGES OF COMBINED SPINAL– EPIDURAL ANESTHESIA

• Difficulty in passing the epidural catheter after spinal LA is given in needle-through-needle single space technique.

• Displacement of epidural catheter in subarachnoid space.

• Time consuming if technical difficulties like in obese patients.

INDICATIONS

• Orthopedics—especially hip and knee replacements, lower limbs surgeries.

• Gynecological, urogenital, rectal, perianal, pelvic, upper and lower abdominal surgeries.

• Microvascular surgeries of lower limbs.

• In labor analgesia (walking epidural) with intrathecal opioids and later continued with epidural doses of bupivacaine if cesarean section required.