

LAMBERT'S SIMPLIFIED SPINAL ANESTHESIA

RULE NO. 1 YOUR ATTENDING IS ALWAYS RIGHT.

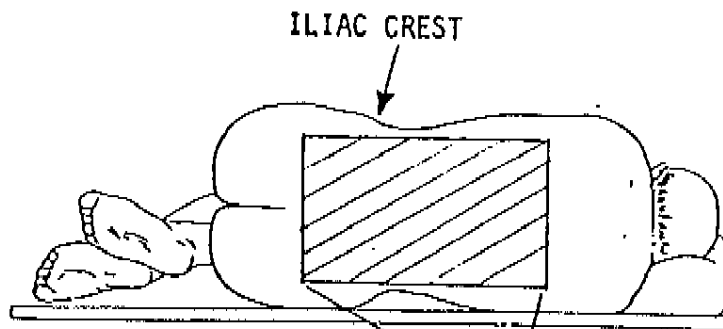
RULE NO. 2 IF YOUR ATTENDING IS WRONG, SEE RULE NO. 1.

BEFORE WE GET STARTED, THE PATIENT WILL HAVE A GOOD FLOWING I.V. - 18 GAUGE OR GREATER. FLUID DEFICITS WILL BE REPLACED WITH RINGER'S LACTATE (APPROXIMATELY 100 CC FOR EACH HOUR NPO) PLUS 500 CC OR SO FOR THE SPINAL. USE DISCRETION WITH THE PATIENT WHO IS IN INCIPIENT CHF. THE ANESTHESIA MACHINE WILL BE CHECKED AND WE WILL BE READY TO CARRY OUT GENERAL ANESTHESIA. THE SUCTION WILL BE WORKING.

I WILL PUT THE B.P. CUFF AND EKG LEADS ON (ANY DUMMY CAN DO THIS) WHILE YOU OPEN YOUR SPINAL TRAY, PUT YOUR GLOVES ON AND DRAW UP YOUR SOLUTIONS.

WHEN YOU ARE READY OR WHILE YOU ARE GETTING READY, I WILL POSITION THE PATIENT. I PREFER THE LATERAL DECUBITUS POSITION. HOWEVER, THE SITTING POSITION IS SOMETIMES USEFUL IN THE OBESE PATIENT, AND FOR PATIENTS WITH CERTAIN INJURIES.

YOU WILL NOW CLEANSE A LARGE AREA OF THE BACK TWICE. REMEMBER, IT IS THE LENGTH OF TIME THE BETADINE IS IN CONTACT WITH THE SKIN THAT IS IMPORTANT (NOT HOW HARD YOU CAN SCOUR THE BACK). AFTER YOU "PAINT" THE BACK THE 2ND TIME, THE 1ST COAT WILL HAVE BEEN ON LONG ENOUGH.

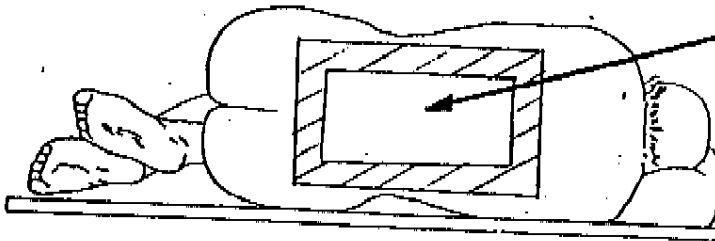


GIVE YOURSELF PLENTY OF ROOM
(THE HACHED AREA
REPRESENTS THE
PREP)

+
Suction

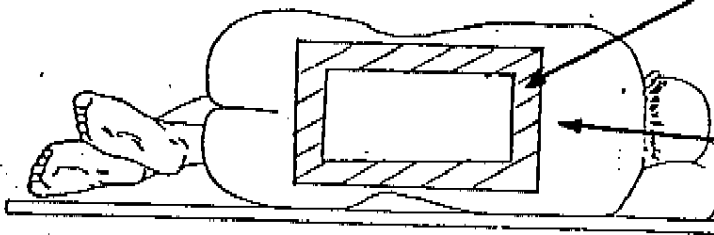
YOU WILL THEN WIPE OFF THE BACK SO THAT YOU DON'T GET BETADINE ALL OVER YOUR GLOVES.

HAVING BEEN WIPED OFF WITH A TOWEL IS



THIS AREA NOW CLEAN, YOU CAN TOUCH IT WITHOUT GETTING BETADINE ALL OVER YOUR GLOVES

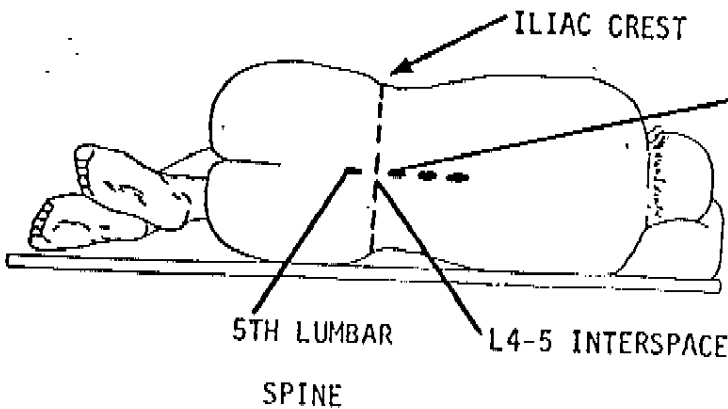
WHEN WIPING THE BETADINE OFF



NOTE: PUT TOWEL ON BETADINE HERE AND WIPE FROM HEAD TO TAIL. DON'T PUT THE TOWEL ON THE UNCLEANNED SKIN AND THEN DRAG IT DOWN OVER THE BETADINE.

IF YOU DON'T PUT A DRAPE ON THE BACK YOU'LL BE ABLE TO SEE IF THE SPINE IS SCOLIOTIC OR ROTATED AND YOUR CHANCE FOR SUCCESSFUL LP WILL BE INCREASED.

IN MOST PATIENTS YOU WILL BE ABLE TO TELL WHERE THE ILIAC CREST IS BY VIEWING. IT IS UNNECESSARY TO TOUCH IT. IF YOU CAN'T SEE IT, I WILL FEEL AND MARK ITS LOCATION WITH A PEN. THE ILIAC CREST IS USED TO LOCATE THE L4-5 INTERSPACE.



IMAGINARY PERPENDICULAR LINE DRAWN DOWNWARD FROM ILIAC CREST

BECAUSE THE SPINAL CORD ENDS AT THE L₁₋₂ INTERSPACE, MOST BOOKS SUGGEST THAT SPINAL ANESTHESIA BE PERFORMED AT L₄₋₅ - WELL BELOW THE SPINAL CORD. I FIND IT IS OFTEN EASIER TO USE THE L₃₋₄ INTERSPACE. BUT YOU WILL USE THE BEST INTERSPACE BELOW THE L₂ SPINOUS PROCESS.

WE WILL TRY TO NOT FEEL THE BACK FOR LONGER THAN 30 SECONDS. SOMETIMES I THINK WE DO MORE FEELING TO PUT OFF STICKING THE NEEDLE IN. THIS IS ESPECIALLY TRUE WHEN WE BEGIN THIS BUSINESS AND WE ARE REALLY NOT CERTAIN OF WHAT TO DO NEXT.

ONCE YOU'VE LOCATED THE INTERSPACE YOU ARE GOING TO USE, YOU WILL ANESTHETIZE THE SKIN BY MAKING A SKIN WHEEL (AN INTRADERMAL INJECTION - LIKE A PPD INJECTION) AT THE SITE WHERE THE SPINAL NEEDLE WILL GO AND THAT IS ALL. IT IS UNNECESSARY TO INJECT LOCAL INTO THE LIGAMENTS. THE ONLY PAINFUL SITES ARE THE SKIN AND PERIOSTIUM. IT IS PAINFUL TO ANESTHETIZE PERIOSTIUM. IT IS BETTER TO LEAVE IT ALONE AND TO HOPE THE SPINAL NEEDLE WILL NOT CONTACT IT.

YOU WILL NOW PLACE THE SPINAL NEEDLE INTO THE SKIN WHEEL IN THE CENTER OF THE INTERSPACE AND ADVANCE IT UNTIL IT IS SEATED IN THE INTERSPINOUS LIGAMENT. AT THIS POINT PAUSE. THE NEEDLE TRACT CAN NO LONGER BE CONTROLLED BY YOU, SO JUST ADVANCE THE NEEDLE SLOWLY, STRAIGHT AHEAD AND WITHOUT BENDING IT. IF YOU ENCOUNTER BONE OR FAIL TO GET CSF, BRING THE TIP OF THE NEEDLE BACK OUT TO THE SUBCUTANEOUS TISSUE, REDIRECT IT, REINSERT IT INTO THE INTERSPINOUS LIGAMENT, PAUSE AND ADVANCE STRAIGHT AHEAD AGAIN WITHOUT BENDING THE NEEDLE. IF YOU ARE UNSUCCESSFUL AFTER 2-3 ATTEMPTS, MOVE TO ANOTHER INTERSPACE. DO NOT SPEND EXTENDED TIME AT AN INTERSPACE THAT'S GIVING YOU TROUBLE.

THERE ARE ONLY 5 REASONS FOR NOT CONTINUING TO ADVANCE THE NEEDLE.

1. OBTAINING CSF
2. OBTAINING BLOOD
3. OBTAINING A PARESTHESIA
4. HITTING BONE

5. NO MORE NEEDLE LEFT TO ADVANCE

SOME PEOPLE LIKE INTRODUCER NEEDLES. I THINK THEY ARE UNNECESSARY AND ARE ONE MORE THING TO CONFUSE THE NOVICE.

DOING AN LP NEED NOT BE DIFFICULT. IT IS NOTHING MORE THAN ADVANCING A NEEDLE THROUGH LIGAMENTS AND BETWEEN BONES WHICH PROTECT THE DURA AND SPINAL CORD.

THE FOLLOWING FIGURE ILLUSTRATES ~~SOME OF THE REASONS FOR FAILED LPS~~ *A WELL CONDUCTED LP*

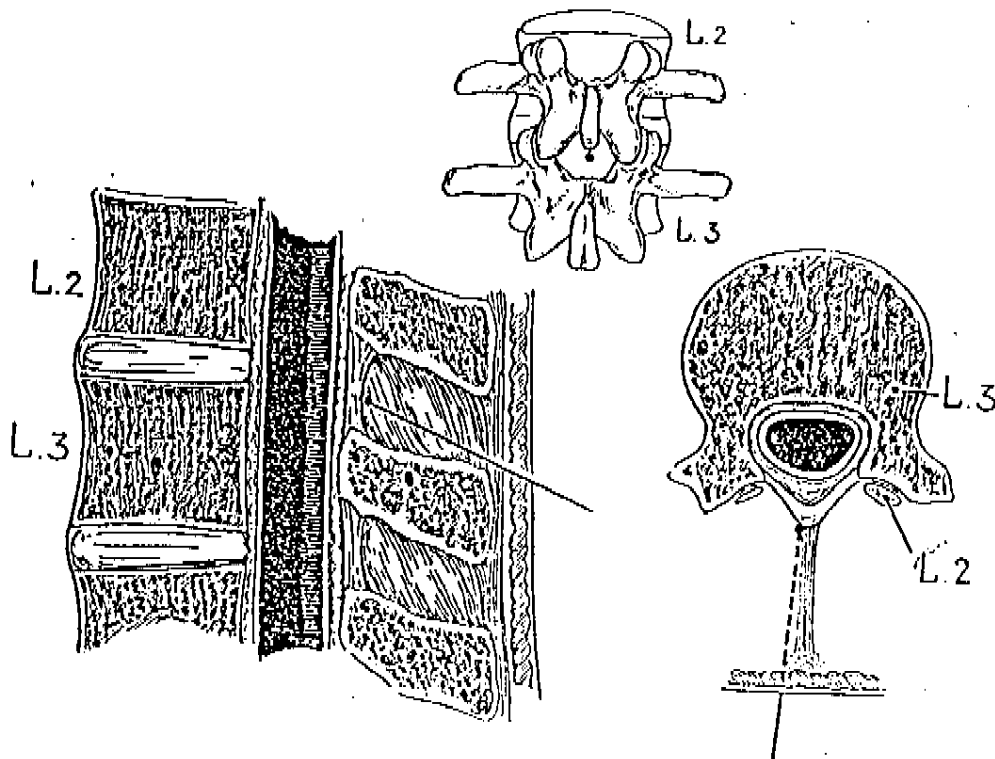


Fig. 7.21 Correct angulation of needle for lumbar puncture in an average subject.

The skin is punctured immediately to one side of the supraspinous ligament—in this case, the left side—and the needle is inclined medially enough to reach the median plane about 3 to 4 cm from the skin, and upwards enough for its slope to be slightly steeper than that of the upper margin of the spine. In the median approach, the skin is punctured over the supraspinous ligament and the needle advanced strictly in the sagittal plane.

THE FOLLOWING FIGURES ILLUSTRATE SOME OF THE REASONS FOR FAILED LPS

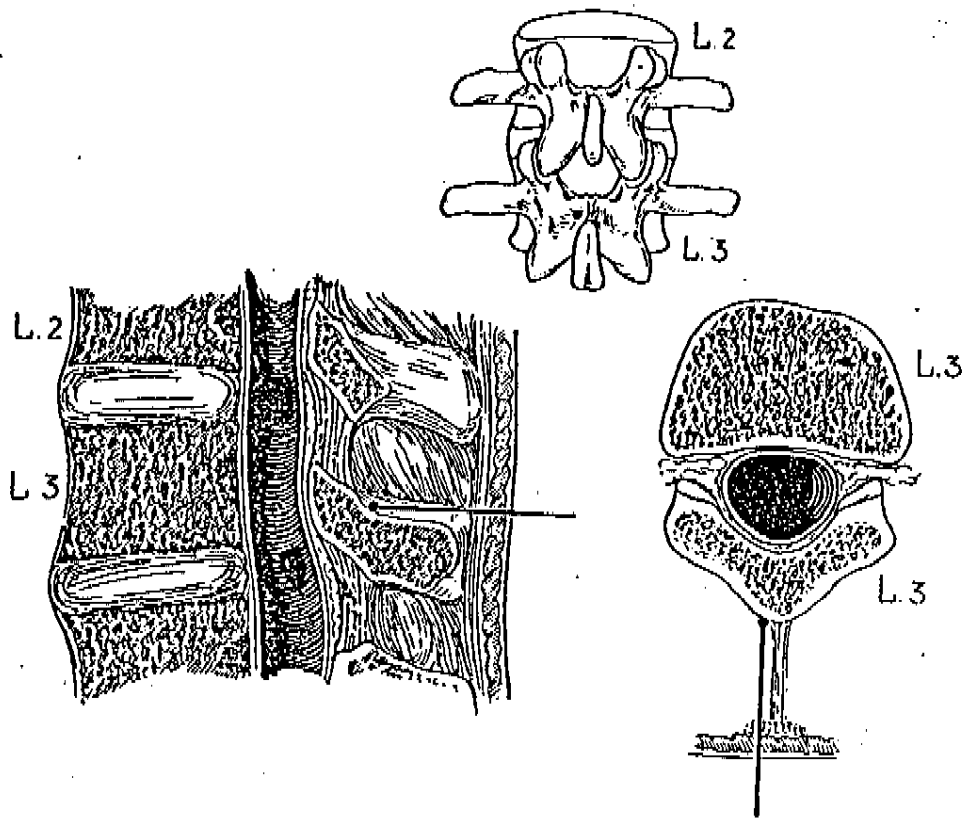


Fig. 7.22 The site of entry of the needle through the skin is good, but the point has not been directed upwards to miss the lamina of the lower vertebra. In fact, the needle has been thrust straight forwards and hits the left lamina just where it fuses with its opposite number to form the base of the spine, and below the limit of the attachment of the ligamentum flavum on the posterior aspect of the lamina.

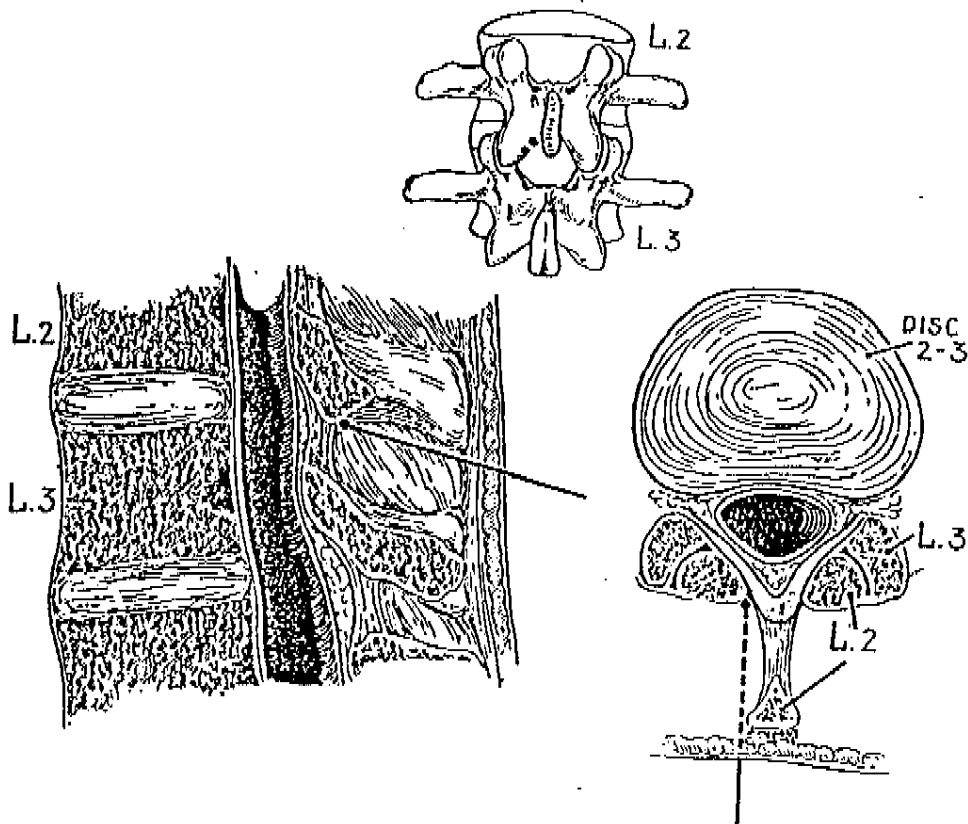


Fig. 7.23 The skin is penetrated to the left of the median plane and just below the lower margin of the spine of L.2. Even though the skin puncture is almost at the top of the gap between the two spines, the ligamentum flavum would have been pierced if the needle had been directed straight forwards and not slightly upwards, or if it had been inclined slightly medially.

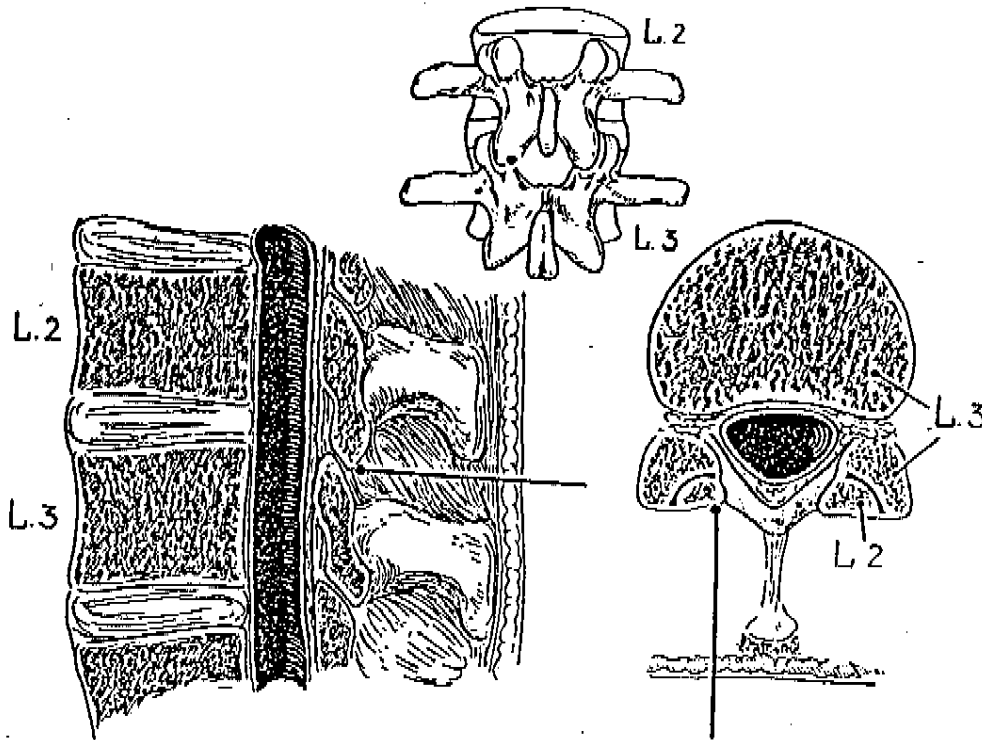


Fig. 7.24 The needle has pierced the skin just below the lower border of the spine of L.2, but allowance has correctly been made for this by keeping it in the horizontal plane. The error lies in the fact that although the skin is entered well to the left of the supraspinous, ligament, the needle has been pushed straight ahead and strikes the inferior articular process. If the needle is withdrawn and directed slightly medially to compensate for the lateral start, lumbar puncture will present no difficulty.

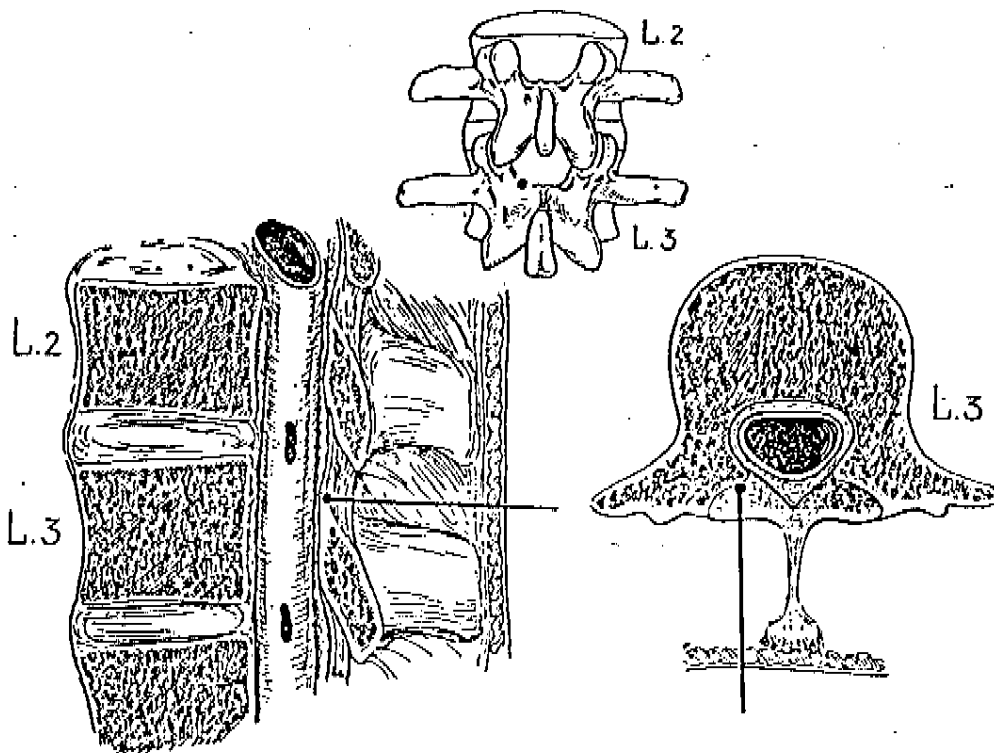


Fig. 7.25 Here the needle pierces the skin at a level corresponding almost to the middle of the gap between the two spines, but too far to the left. The needle has been pushed directly ahead and hit the left pedicle of L.3, just where it becomes continuous with the lamina. If it had been directed slightly upwards and/or medially all would have been well. In any event the anaesthetist will probably feel the tip of the needle penetrate the ligamentum flavum before it is held up by bone. This is a sure sign that the needle is directed just too low, since the ligament is attached to the posterior aspect of the superior margin of the lamina of the lower vertebra. All that is necessary is partly to withdraw the needle, tilt it slightly upwards and re-insert.

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ONCE THE NEEDLE IS PLACED IN THE CSF, THE VOLAR SURFACE OF THE NONDOMINANT HAND IS PLACED ON THE PATIENT'S BACK (TO STEADY THE HAND) AND THE HUB OF THE NEEDLE IS GRASPED BETWEEN THE THUMB AND INDEX FINGER. THE SYRINGE OF SPINAL ANESTHETIC IS SECURELY ATTACHED TO THE NEEDLE AND A SMALL AMOUNT OF CSF IS ASPIRATED GENTLY TO VERIFY THAT THE NEEDLE HAS NOT BEEN DISLODGED. THE SOLUTION IS INJECTED. I INJECT AT ABOUT 1CC PER 5 SECONDS. OTHERS INJECT MORE SLOWLY.

ONCE THE SOLUTION IS INJECTED, REMOVE THE NEEDLE AND POSITION THE PATIENT FOR SURGERY. THE ACID TEST IS WHETHER ANESTHESIA DEVELOPS NOT THAT YOU CAN DEMONSTRATE THAT YOU CAN ASPIRATE CSF AT THE END OF INJECTION. ONCE THE ANESTHETIC HAS BEEN INJECTED A VERY CRITICAL POINT HAS BEEN REACHED. THIS IS WHEN THE LEVEL OF ANESTHESIA CAN BECOME EXCESSIVE. THIS IS MORE LIKELY TO OCCUR WITH HYPERBARIC SOLUTIONS THAN WITH ISOBARIC SOLUTIONS (VIDA INFRA). WITH EXCESSIVE LEVELS, THE PATIENT COULD REQUIRE ASSISTED VENTILATION AND/OR INTUBATION AS WELL AS SUPPORT OF THE CIRCULATION, I.E. POSITIONING, FLUIDS, PRESSORS. SO DON'T TURN YOUR BACK TO THE PATIENT AND START THROWING YOUR SPINAL TRAY AWAY NOW. INSTEAD, TALK TO YOUR PATIENT AND TAKE FREQUENT BLOOD PRESSURES.

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SURGICAL SITE	SOLUTION	AMOUNT (MG)	AMT (CC)	PROBABLE PLAIN SOLUTION	DURATION WITH 0.2 MG EPI
ABOVE L1	HYPERBARIC				
	BUPIVACAINE	10-15 MG	1.5-2 CC	2 HR	2 HR
	TETRACAINE	10-15 MG	2-3 CC	2 HR	3 HR
	LIDOCAINE	50-75 MG*	1-2 CC	1 HR	1 HR
BELOW L1	ISOBARIC				
	BUPIVACAINE	15 MG	3 CC	3 HR	5-6 HRS
	TETRACAINE	15 MG	3 CC	3 HR	5-6 HRS
	LIDOCAINE	60 MG	3 CC	1-2 HRS	2-4 HRS?

* CIRCLAGES CAN BE DONE WITH MUCH LESS (40 MG?)

FOR SIMPLICITY I BREAK DOWN SURGERY INTO PROCEDURES ABOVE OR BELOW THE
1ST LUMBAR DERMATOME

ABOVE L1 DERMATOME

HERNIAS (INGUINAL, UMBILICAL)

ANY INTRA-ABDOMINAL SURGERY

E.G. HYSTERECTOMY, APPENDECTOMY,

OVARIAN CYST

RADICAL ORCHIECTOMY (THIS IS DONE

THROUGH A GROIN INCISION)

D&C

REMEMBER T10 LEVEL

CIRCLAGE

REQUIRED EVEN THOUGH

CONE BX

THESE ARE DONE VAGINALLY

BELOW L1 DERMATOME

ALL ORTHO INCLUDING

HIP SURGERY AND BELOW

G.U.

TUR

CYSTO

ORTHIECTOMY (THROUGH SCROTUM)

PENIL IMPLANT

GYN

SUPERFICIAL VAGINAL PROCEDURES

BARTHOLIN CYST

VASCULAR

FEM-POP

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AMPUTATIONS

RECTAL SURG.

ABOVE THE L1 DERMATOME I USE HYPERBARIC SOLUTIONS

HYPERBARIC SOLUTIONS:

- 1) BUPIVACAINE .75%, DEXTROSE 8.5% (PREMIXED)
- 2) TETRACAINE 0.5%, DEXTROSE 5% (MIX EQUAL VOLUMES OF 1% TETRACAINE AND 10% DEXTROSE)
- 3) LIDOCAINE 5%, DEXTROSE 7.5% (PREMIXED)

HYPERBARIC SOLUTIONS GRAVITATE TO THE THORACIC KYPHOSIS. THIS IS T₆ IN THE AVERAGE PATIENT. IT CAN BE HIGHER IN SOME PATIENTS. SPINALS WHICH ACHIEVE THESE LEVELS ARE BOUND TO BE ASSOCIATED WITH HYPOTENSION. IF YOUR PATIENT WON'T TOLERATE THIS, USE ANOTHER TECHNIQUE (EPIDURAL, GENERAL ANESTHESIA).

BELOW THE L1 DERMATOME I USE ISOBARIC SOLUTIONS

ISOBARIC SOLUTIONS:

- 1) BUPIVACAINE 0.5% (FOR EPIDURAL USE)
- 2) TETRACAINE 0.5% (MIX EQUAL VOLUMES OF 1% TETRACAINE AND PRESERVATIVE FREE SALINE)
- 3) LIDOCAINE 2% (FOR EPIDURAL USE)

ANY PROCEDURE WHICH CAN BE DONE WITH A HYPOBARIC SOLUTION CAN BE DONE WITH AN ISOBARIC SOLUTION. IT IS THEREFORE UNNECESSARY TO MAKE THINGS MORE COMPLICATED THAN THEY ARE BY BRINGING IN A DISCUSSION OF HYPOBARIC ANESTHESIA.

THOUGHTS:

1. YOU NEED A MINIMUM AMOUNT OF DRUG IN A NERVE TO BLOCK IT. SHAVING

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- THE DOSE BACK DOESN'T NECESSARILY LIMIT THE CEPHELAD SPREAD. BUT, IT DOES DECREASE THE LIKELIHOOD OF A SATISFACTORY BLOCK.
2. THE MORE YOU PUT IN THE LONGER IT LASTS.
 3. BUPIVACAINE IS QUALITATIVELY BETTER THAN TETRACAINE FOR SENSORY ANESTHESIA
 4. TETRACAINE IS THE MOST POTENT MOTOR BLOCKER (FEM-POP SURGERY IS ABOUT THE ONLY PROCEDURE I USE IT FOR NOW)
 5. BIG NERVES (THE FULLBACK) REQUIRE MORE DRUG THAN LITTLE NERVES (THE BALLERINA). I GIVE THE FULLBACK 5 MG MORE OF BUPIVACAINE OR TETRACAINE AND 20 MG MORE OF LIDOCAINE.
 6. EPINEPHRINE PROLONGS LUMBO-SACRAL ANESTHESIA (BELOW L1) BUT DOESN'T APPEAR TO PROLONG ANESTHESIA IN THE UPPER THORACIC REGION. TETRACAINE IS AN EXCEPTION AND IS ALSO PROLONGED IN THIS REGION.
 7. SHORT PROCEDURES GET LIDOCAINE. LONG PROCEDURES GET BUPIVACAINE. FOR EXTRA LONG PROCEDURES, ADD EPINEPHRINE.

NEEDLES

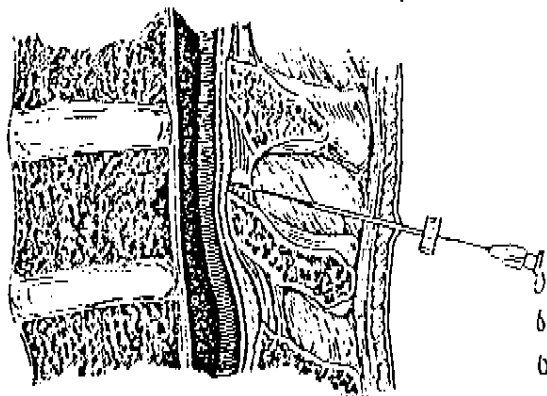
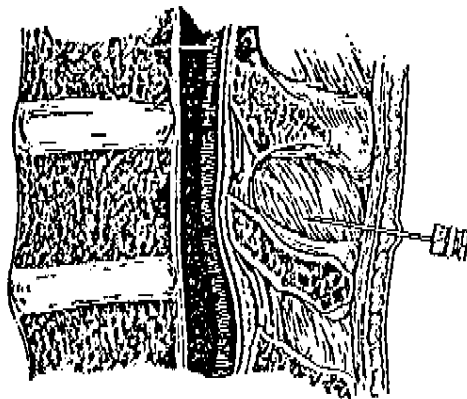
1. ABOVE AGE 60 YEARS GO RIGHT TO A 22 GAUGE. IT MAKES LIFE EASIER AND THEY WON'T GET A HEADACHE.
2. UNDER AGE 60 YEARS, USE A 25 OR 26 GAUGE TO MINIMIZE THE RISK OF HEADACHE.

PRESSORS

1. EPHEDRINE IS THE WAY TO GO. DILUTE 50 MG (ONE AMPULE) TO 10 CC WITH RINGER'S LACTATE SO THAT THERE ARE 5 MG/CC. GIVE 5-10 MG AT A TIME. IT ONLY LASTS FOR ABOUT 10 MIN. SO YOU'LL HAVE TO DO SOMETHING ELSE BEFORE IT WEARS OFF, I.E., MORE FLUID, HEAD DOWN POSITION, ETC.

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2. EPHEDRINE, 25 MG - 50 MG I.M. (PREFERABLY IN AN ANESTHETIZED AREA - ? THIGH) IS MORE GENTLE (COMES ON SLOWER) AND WILL LAST LONGER.
3. NEOSYNEPHRINE, 10 MG (ONE AMPULE) IN 250 ML GIVEN AS A DRIP CAN BE USED TO ELEVATE BLOOD PRESSURE FOR EXTENDED PERIODS.



THESE FIGURES SHOW THE INTRODUCER METHOD WHICH I DON'T USE