

LAMBERT'S UPDATED SIMPLIFIED SPINAL ANESTHESIA

RULE NO. 1 YOUR ATTENDING IS ALWAYS RIGHT.

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

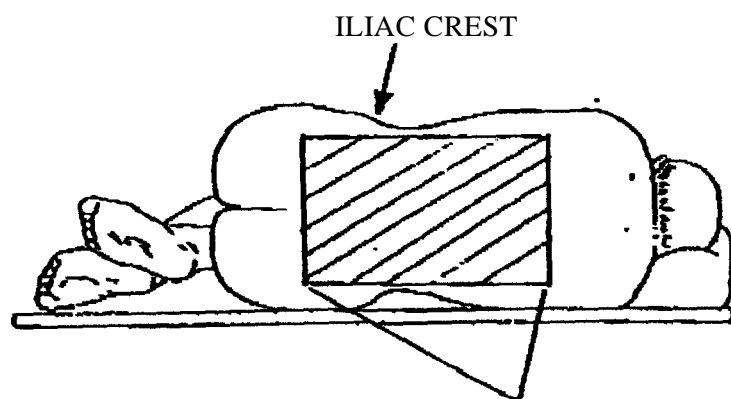
*THESE TONGUE-IN-CHEEK RULES ARE NOT MEANT FOR HOW YOU AND I INTERACT. THEY ARE INTENDED FOR HOW YOU INTERACT WITH OTHER ATTENDING. PLEASE DON'T TELL ANOTHER ATTENDING, "LAMBERT DOES IT THIS WAY OR HE DOES IT THAT WAY." OTHER ATTENDING DON'T WANT TO HEAR THAT AND THEY WANT YOU TO DO IT THEIR WAY. SO, RULES 1 AND 2 REFER TO OTHER ATTENDING AND NOT TO ME, PER SE.*

BEFORE WE START, 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 NP0) 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 (EVEN AN ATTENDING CAN DO THIS) WHILE YOU OPEN YOUR SPINAL TRAY, PUT YOUR GLOVES ON AND DRAW UP YOUR SOLUTIONS.

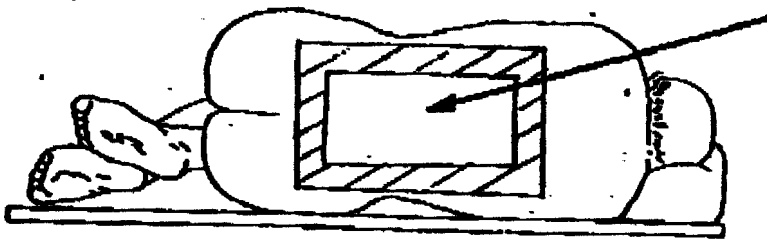
WHEN YOU ARE READY OR WHILE YOU ARE GETTING READY, I WILL POSITION THE PATIENT. I PREFER THE LATERAL DECUBITUS POSITION. HOWEVER, THE SITTING POSITION IS SOMETIMES USEFUL IN THE OBESE PATIENT, AND FOR PATIENTS WITH CERTAIN INJURIES.

YOU WILL NOW CLEAN 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 SCRUB THE BACK). AFTER YOU "PAINT" THE BACK THE 2ND TIME, THE 1ST COAT WILL HAVE BEEN ON LONG ENOUGH.



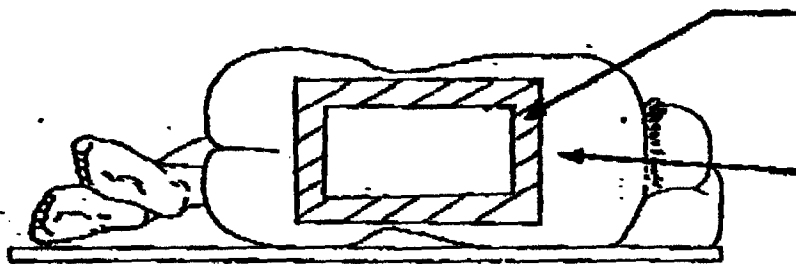
GIVE YOURSELF PLENTY OF ROOM  
(THE HATCHED AREA REPRESENTS THE PREP)

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



THIS AREA, HAVING BEEN WIPED OFF WITH A TOWEL IS NOW CLEAN. YOU CAN TOUCH IT WITHOUT GETTING BETADINE ALL OVER YOUR GLOVES.

NOTE: WHEN WIPING THE BETADINE OFF, PUT THE TOWEL ON THE BETADINE HERE.

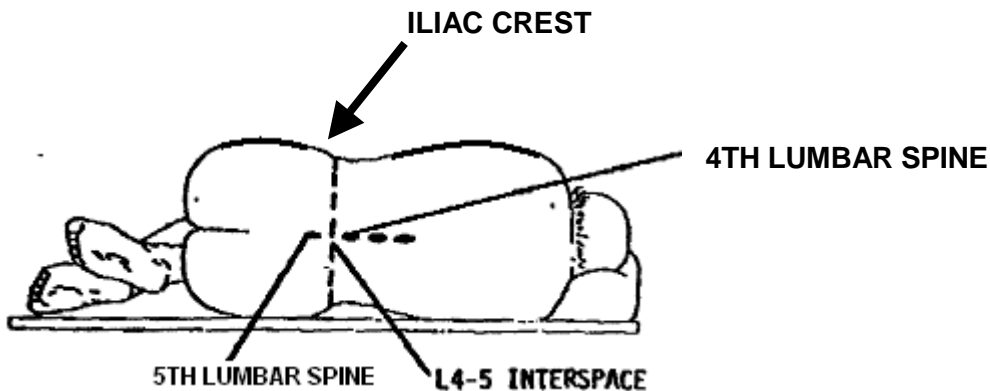


WIPE FROM HEAD TO TAIL.

DON'T PUT THE TOWEL ON THE UN-CLEANED SKIN AND 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 A SUCCESSFUL LP WILL BE INCREASED. **THE FIRST THING I DO WHEN A RESIDENT IS HAVING TROUBLE OBTAINING CSF WITH AN OPAQUE DRAPE ON THE PATIENT'S BACK, IS TO REMOVE THE DRAPE.** THAT WAY WE CAN SEE WHAT WE ARE UP AGAINST.

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



AN IMAGINARY PERPENDICULAR LINE DRAWN DOWNWARD FROM THE ILIAC CREST IS USED TO IDENTIFY THE L4-L5 INTERSPACE.

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,

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.

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. I SAID THIS WHEN WE USED QUINCKE

NEEDLES EXCLUSIVELY. NOW WE USE PENCIL TIP NEEDLES ALMOST EXCLUSIVELY AND AN INTRODUCER IS NECESSARY.

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 A **WELL-CONDUCTED** LUMBAR PUNCTURE.

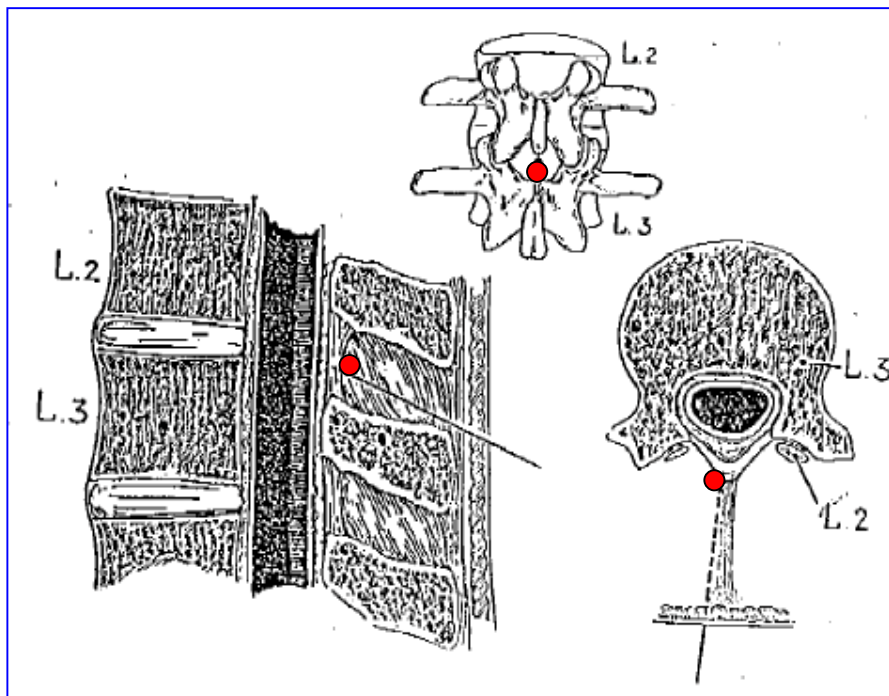


Fig. 7.21 Correct angulation of needle for lumbar puncture in an average subject. The skin is punctured immediately to one side of the supraspinous ligament - in this case, the left side - and the needle is inclined medially enough to reach the median plane about 3 to 4 cm from the skin and upwards enough 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 advance: strictly in the sagittal plane.

THESE IMAGES ARE TAKEN FROM MACINTOSH'S *LUMBAR PUNCTURE AND SPINAL ANESTHESIA* TEXT. NOTICE THAT MACINTOSH USES A SLIGHT PARAMEDIAN ATTACK EVEN IN THE MIDLINE APPROACH

THE FOLLOWING FIGURES ILLUSTRATE SOME OF THE REASONS FOR **MIDLINE FAILED** LUMBAR PUNCTURES.

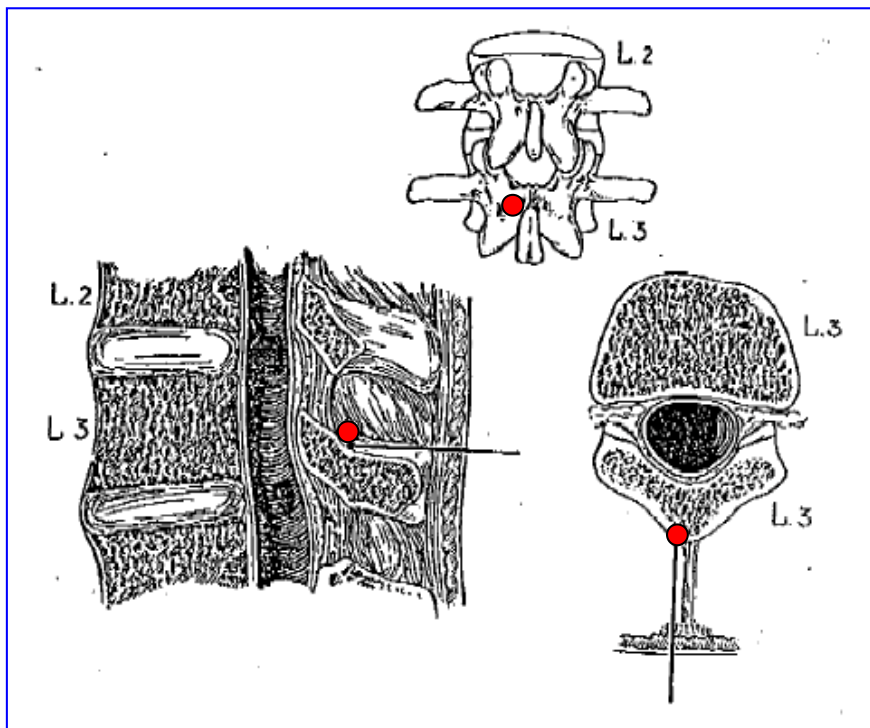


Fig. 7.22 The site of entry of the needle through the skin is good, but the point has not been directed upwards to miss the lamina of the lower vertebra. In fact, the needle has been thrust straight forward and hits the left lamina just where it fuses with the opposite member to form the base of the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

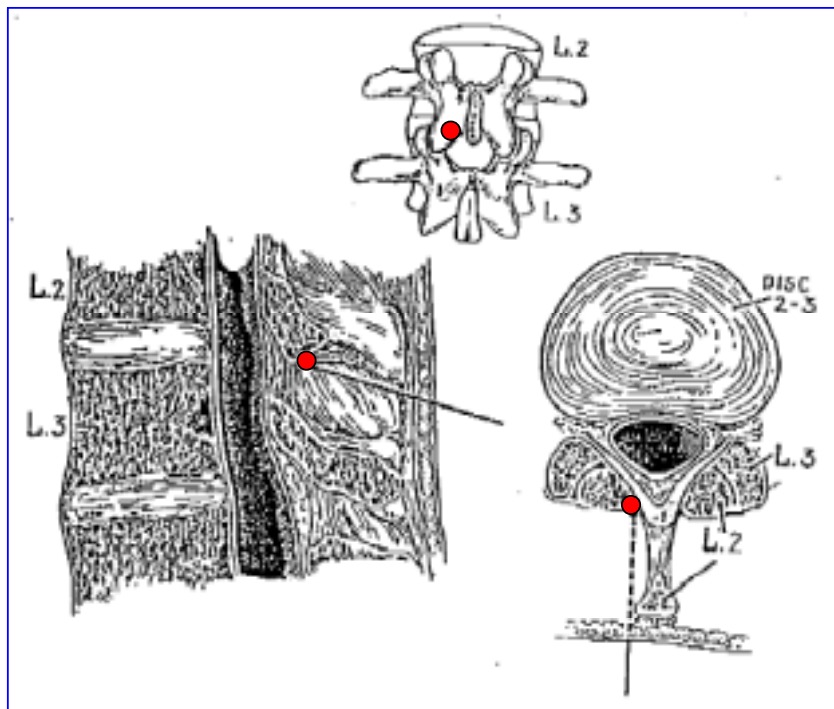


Fig. 7.23 The skin is penetrated to the left of the median plane and just below the lower margin of the spine of L2. Even though the skin puncture is almost at the top of the gap between the two spines the ligamentum flavum would have been pierced if the needle had been directed straight forwards and not slightly upwards, or if it had been inclined slightly medially.

THE FOLLOWING FIGURES ILLUSTRATE SOME OF THE REASONS FOR **FAILED PARAMEDIAN LUMBAR PUNCTURES**.

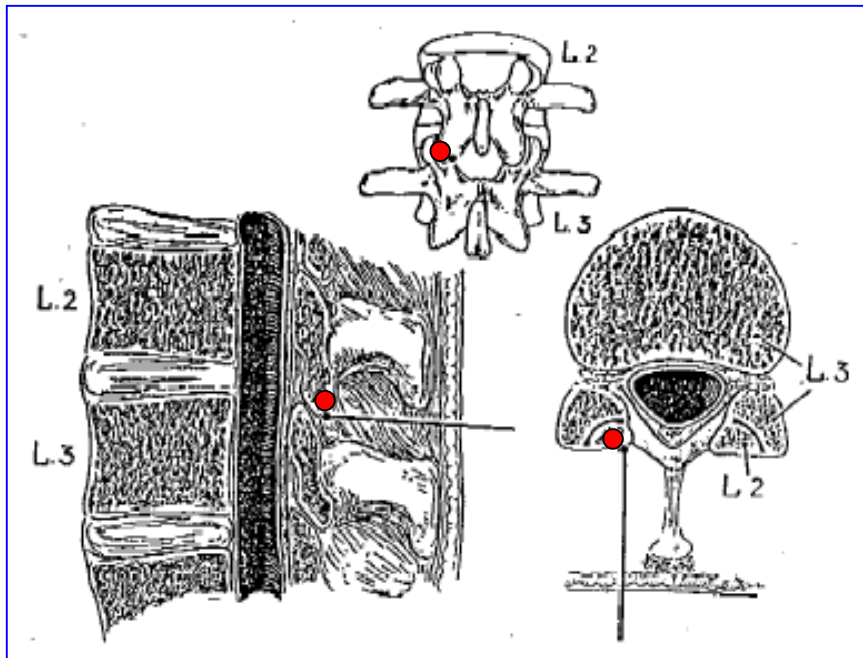


Fig. 7.24 The needle has pierced the skin just below the lower border of the spine of L2, but allowance has correctly been made for this by keeping it in the horizontal plane. The error lies in the fact that although the skin is entered well to the left of the supraspinous ligament the needle has been 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.

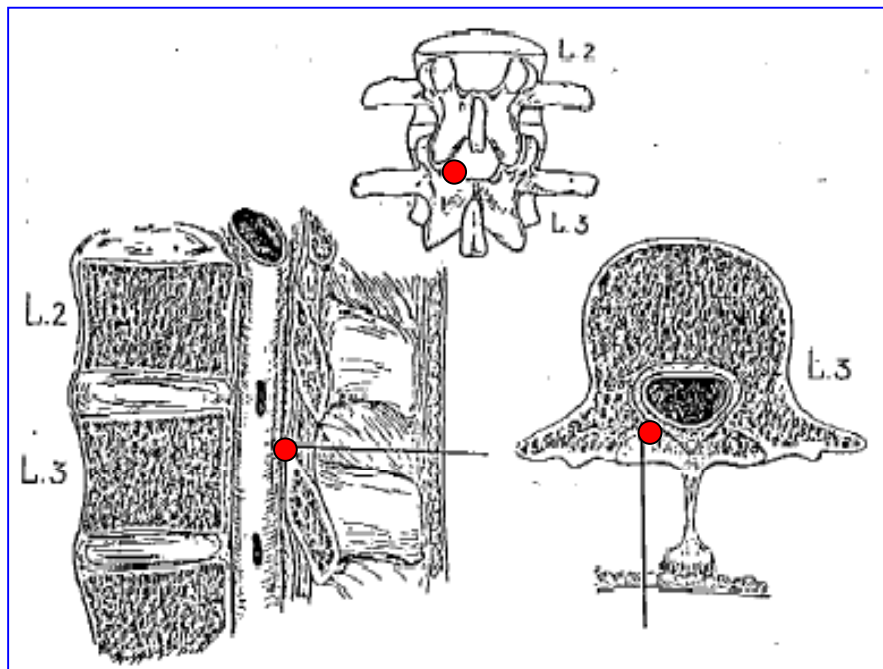
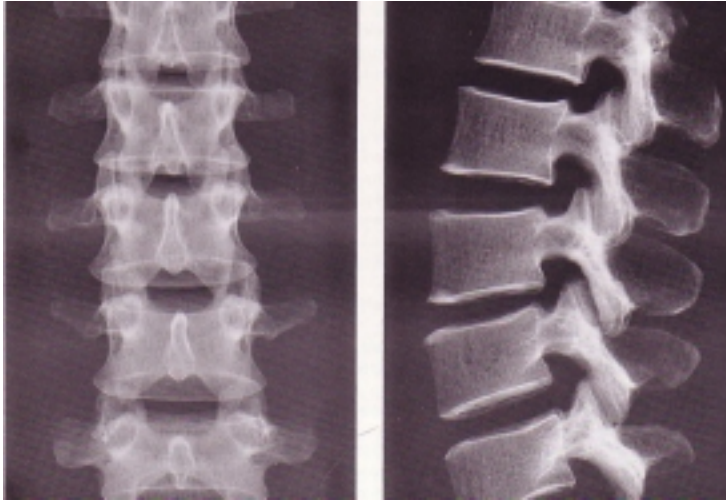


Fig. 7.25 Here the needle pierces the skin at a level corresponding almost to the middle of the gap between the two spines, but too far to the left. The needle has been pushed directly ahead and hit the left pedicle of L3, just where it becomes continuous with the lamina. If it had been directed slightly upwards and/or medially all would have been well. In any event the anesthesiologist will probably feel the tip of the needle penetrate the ligamentum flavum before it is help up by bone. This is 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.



WOULDN'T IT BE NICE IF ALL OF OUR PATIENT HAD SPINES THAT LOOKED LIKE THIS ONE?



THE REALITY IS THAT WE ARE MORE LIKELY TO HAVE TO PERFORM A LUMBAR PUNCTURE ON SPINES THAT LOOK LIKE THESE.

DON'T BE DISCOURAGED IF YOU ARE HAVING TROUBLE GAINING ACCESS TO THE CSF. IT TAKES PRACTICE AND EXPERIENCE TO BECOME PROFICIENT ESPECIALLY WITH PATIENTS WITH ABNORMAL SPINES AND WHO CANNOT BE POSITIONED PERFECTLY FOR LUMBAR PUNCTURE.

IF YOU ARE HAVING TROUBLE GETTING INTO THE CSF AT A GIVEN INTERSPACE, DO NOT PERSIST. **AFTER TWO UNSUCCESSFUL ATTEMPTS AT ONE INTERSPACE, TRY ANOTHER INTERSPACE OR A PARAMEDIAN APPROACH.** THERE ARE FOUR INTERSPACES TO CHOOSE FROM -- L5-S1, L4-L5, L3-L4, AND L2-L3. I HAVE FOUND OVER THE YEARS FOR ONE REASON OR ANOTHER THAT L3-L4 IS THE EASIEST SPACE FOR ME TO GET INTO.

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, PRESSOR'S. 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.



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 AN CYST

RADICAL ORCHIECTOMY (THIS IS DONE THROUGH A GROIN INCISION)

D&C CIRCLAGE CONE BX

[REMEMBER T-10 LEVEL REQUIRED FOR THESE OPERATIONS EVEN  
THOUGH THESE ARE DONE VAGINALLY]

BELOW L1 DERMATOME

ALL ORTHO - INCLUDING

HIP SURGERY AND BELOW

G.U.

TUR

CYSTO

ORCHIECTOMY (THROUGH SCROTUM)

PENILE IMPLANT

GYN

SUPERFICIAL VAGINAL PROCEDURES

BARTHOLIN CYST

VASCULAR

FEM-POP

AMPUTATIONS

RECTAL SURGERY

ABOVE THE L1 DERMATOME, I USE HYPERBARIC SOLUTIONS

HYPERBARIC SOLUTIONS:

- 1) BUPIVACAINE 0.75%, DEXTROSE 8.5% (PREMIXED)
- 2) TETRACAINE 0.5%, DEXTROSE 5% (MIX EQUAL VOLUMES OF 1% TETRACAINE AND 10% DEXTROSE)
- 3) ROPIVACAINE 0.75% (MIX WITH DEXTROSE TO MAKE HYPERBARIC)
- 4) LIDOCAINE 5%, DEXTROSE 7.5% (PREMIXED)
- 5) PROCAINE 10% (DILUTE 2 ML TO 5 ML WITH SALINE = 40 MG PER ML)
- 6) CHLOROPROCAINE (3% EPIDURAL SOLUTION IS HYPERBARIC)

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) ROPIVACAINE 0.75% (FOR EPIDURAL USE)
- 4) LIDOCAINE 2% (FOR EPIDURAL USE)
- 5) PROCAINE DILUTED TO 2% WITH SALINE
- 6) CHLOROPROCAINE (2% EPIDURAL SOLUTION)

ANY PROCEDURE THAT 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.

SURGICAL SITE	SOLUTION	AMOUNT (MG)	AMOUNT (CC)	PROBABLE DURATION PLAIN SOLN	PROBABLE DURATION WITH EPI (0.2 MG)
<u>ABOVE L1</u>	<u>HYPERBARIC</u>				
	BUPIVACAINE	10-15	1.5-2	2	2
	TETRACAINE	10-15	2-3	2	3
	ROPIVACAINE	?10-20		?1.5	???
	LIDOCAINE	50-75	1-2	1	1
	PROCAINE	40-80	1-2	1	?
	CHLORO-PROCAINE	??? 40-60	1-3	1	?
<u>BELOW L1</u>	<u>ISOBARIC</u>				
	BUPIVACAINE	15	3	3	5-6
	TETRACAINE	15	3	3	5-6
	ROPIVACAINE	?10-20		?2	???
	LIDOCAINE	60	3	1-2	2-4
	PROCAINE	40-60	1-2	1-2	?
	CHLORO-PROCAINE	???40-60	1-3	1-2	?

ANY LOCAL ANESTHETIC WILL PRODUCE SPINAL ANESTHESIA. THE ISOBARIC SOLUTIONS ARE THE SOLUTIONS INTENDED FOR EPIDURAL ANESTHESIA AND MAY BE LABELED "*NOT FOR SPINAL ANESTHESIA.*" TO MY KNOWLEDGE (AND THE ASA CLOSED CLAIMS PROJECT CONFIRMS), THERE HAVE BEEN NO REPORTS OF SUITS INVOLVING THE "OFF LABEL USE OF EPIDURAL SOLUTIONS THAT WERE USED FOR SPINAL ANESTHESIA. IN FACT THE ISOBARIC EPIDURAL SOLUTIONS ARE PROBABLY SAFER THAN THE SPINAL ANESTHETIC SOLUTIONS INTENDED FOR SPINAL ANESTHESIA BECAUSE EPIDURAL SOLUTIONS ARE USED IN LOWER CONCENTRATIONS AND WILL NOT MALDISTRIBUTE IN THE SPINAL CANAL THE WAY THAT HYPERBARIC SOLUTIONS CAN.

THOUGHTS

1. YOU NEED A MINIMUM AMOUNT OF DRUG IN A NERVE TO BLOCK IT. SHAVING THE DOSE BACK DOESN'T NECESSARILY LIMIT THE CEPHALAD SPREAD. BUT, IT DOES DECREASE THE LIKELIHOOD OF A SATISFACTORY BLOCK.
2. THE MORE YOU PUT IN THE LONGER IT LASTS. AND THE BETTER THE BLOCK.
3. BUPIVACAINE IS QUALITATIVELY BETTER THAN TETRACAINE FOR SENSORY ANESTHESIA.
4. TETRACAINE IS THE MOST POTENT MOTOR BLOCKER (I HAVE NOT USED THIS DRUG IN TEN YEARS).
5. BIG NERVES (THE FOOTBALL PLAYER) REQUIRE MORE DRUG THAN LITTLE NERVES (THE BALLERINA). I GIVE THE FOOTBALL PLAYER 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 CHLOROPROCAINE. LONG PROCEDURES GET BUPIVACAINE. FOR EXTRA LONG PROCEDURES, GIVE MORE DRUG. I HAVE NOT USED EPINEPHRINE IN SPINAL ANESTHESIA FOR YEARS.

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 GAUGE OR SMALLER WHITACRE 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.
2. EPHEDRINE, 25 MG – 50 MG IM (PREFERABLY IN AN ANESTHETIZED AREA LIKE THE THIGH) IF MORE GENTLE (COMES ON SLOWER) AND WILL LAST LONGER.
3. NEOSYNEPHRINE, 10 MG (ONE AMPULE) IN 100 ML GIVEN AS A 1 ML BOLUS (100 UG) OR AS AN INFUSION CAN BE USED TO ELEVATE BLOOD PRESSURE FOR EXTENDED PERIODS.

## NARCOTICS

INTRATHECAL NARCOTICS ARE USED WITH SPINAL ANESTHESIA TO:

- 1) IMPROVE THE QUALITY OF THE BLOCK.
- 2) DECREASE THE DURATION OF SPINAL ANALGESIA BY USING LESSER AMOUNTS OF LOCAL ANESTHETICS.
- 3) PROVIDE LONG LASTING POSTOPERATIVE PAIN RELIEF.

THE MOST OFTEN USED AGENTS ARE:

- 1) FENTANYL 10 - 25 UG
- 2) SUFENTANIL 10 UG
- 3) MORPHINE 100-300 UG (EXCELLENT POST OP ANALGESIA FOR 18 HOURS)

SIDE EFFECTS INCLUDE:

- 1) RESPIRATORY DEPRESSION
- 2) SOMNOLENCE
- 3) PRURITUS

AT THESE DOSES THE MOST PROBLEMATIC SIDE EFFECT IS ITCHING, WHICH CAN BE TREATED WITH NALOXONE, PARTIAL AGONISTS, PROPOFOL, ONDANSETRON, DIPHENHYDRAMINE, ALTHOUGH NOTHING WORKS VERY WELL.

I DO NOT WITHHOLD IV NARCOTICS IN PATIENTS WHO HAVE RECEIVED INTRATHECAL NARCOTICS IF THEY HAVE POSTOPERATIVE PAIN. IF THEY HAVE PAIN THEY WILL NOT HAVE RESPIRATORY DEPRESSION AND THEY NEED ANALGESIA.

## COMBINED SPINAL-EPIDURAL ANESTHESIA (CSE)

THIS IS A WONDERFUL TECHNIQUE FOR THE OUTPATIENT IN WHOM THE DURATION OF THE OPERATION IS UNCERTAIN. IT ALLOWS US TO GIVE A SPINAL THAT WILL WORK WELL BUT FOR NOT AN EXTENDED PERIOD AND GIVE US THE OPPORTUNITY TO CONTINUE THE ANESTHETIC IF THE OPERATION BECOMES PROLONGED. IT IS ALSO VERY USEFUL IN LABOR ANALGESIA.

## CHLOROPROCAINE

SEE REFERENCES FOR RECENT STUDIES OF CHLOROPROCAINE SPINAL ANESTHESIA.

## LOW DOSE LOCAL ANESTHETIC SPINALS SUPPLEMENTED WITH NARCOTICS

I AM NOT A FAN OF THIS METHOD. THE READER INTERESTED IN THIS TECHNIQUE IS REFERRED TO THE REFERENCES.

**GOOD LUCK!**

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