

Course Name :An Overview on Maternal Health Antenatal, Intranatal and Postnatal Care

Professor Name: Dr. Barnali Ghosh

Department Name: Multidisciplinary

Institute Name: IIT Kharagpur

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Labour Analgesia (contd.)

Hello students. Welcome you all for today's session for the NPTEL online certified course on the topic and overview on maternal health, the antenatal, intranatal and postnatal care. I am Dr. Barnali Ghosh, an obstetrician and gynecologist working as assistant professor at B.C.roy Multi Super Speciality Hospital and Medical Research Center, IIT Kharagpur. So we will continue our discussion with labor analgesia today.

So in the previous class we have seen the three main pathways of labor pain that is the visceral component which involves the nerve roots of T10 to L1 and mostly carrying the nerve fibers, the afferent nerve fibers from the viscera that is the uterus and cervix and it carries the pain sensation in the first stage of labor. In the second stage due to the stretching on the perineum, the stretching of the vagina and the pelvic floor muscle stretching caused due to the fetal descent, there is pain and this pain is carried by the pudendal nerve and the sacral nerves involving the nerve roots S2, S3 and S4 and also there is a supraspinal component which involves the limbic system of the cortex and thus you know it has an effect, right, the emotional support, emotional support on the part of the mother, positive feeling and positive outlook to the labor procedure, cognitive therapy, you know education regarding the labor process, these all have an effect on this cortical response of pain and thus labor pain is fully individualized and it is different for different pregnant females during hard process of labor and delivery. So we in the last class have discussed the different agents. Number one, the non-pharmacological agents which involves mostly you know emotional support then your different you know injection, nerve stimulation or nerve injection, the form of H2O injection or tense therapy, massaging and very importantly hot compression over the perineum during the second stage, these all has been shown to decrease the amount of pain perceived, right.

Also you have the acupuncture and acupressure, right, points which has been shown to decrease the labor pain and also to decrease the labor interval, right and helping in smooth progression of labor. So, these were the non-pharmacological aspect of labor pain, analgesia. Coming to the pharmacological agents, we have discussed the parenteral drugs, mostly the opioids of which pethidine or meperidine can be administered along with promethazine in IM or

IV route of which IM is more preferred, but nowadays opioid infusion or parenteral injection is not used because of its side effects that is the neonatal respiratory depression which leads to low apgar scores at 1 minute and 5 minutes following the delivery of the baby. Also, it requires prolonged NICU admission and intubation sometimes, right and out of which all the out of the opioids injection tramadol is somewhat safe and you know sometimes we do give tramadol injection along with an antiemetic which will decrease the vomiting and chance of aspiration of the mother. Coming to the non-opioid infusion, paracetamol infusion is safe and it has been shown to decrease the labor pain to some extent.

Today, we will be going through the inhalational agents as well as the your regional anesthesia of which most important is the epidural anesthesia. Also you know, neuraxial block the para cervical and pudendal block will also be discussed, right. So, coming to the inhalational agent. So, inhalational agent what drug is used? It is the Entonox which is actually 50 percent oxygen and 50 percent N₂O and here you must remember that it is a self-administered anesthetic drug. The patient you know holds the face mask over her nose and face and she will you know inspire, right.

As she holds the face mask, there will be a one-way valve and she inspires. See this is the picture. So, she this is the valve one it has a one-way valve and when there is you know pain sensation increases or when she perceives pain just at the start or at the peak of uterine contraction, she will inspire through this face mask, right which will allow the oxygen and N₂O gas to go inside and it will take some time takes about 1 minute to start, right and what is important. So, this is self-administered when she feels the pain, she will take the mask and to importantly it does not interfere with uterine contraction. N₂O we know sometimes there is it is associated with vasodilatation, but there is no effect on the uterine contraction and thereby the progress of labor.

Also there is no neonatal depression, but there is significant pain relief, right. So, inhalational agent using N₂O which is 50% oxygen and 50% N₂O. Other inhalational drugs are desflurane, isoflurane, enflurane and sevoflurane. Sevoflurane is most commonly used and most effective of them all, right. So, this was the inhalational analgesia in labor pain.

Now, coming to the most important discussion that is a regional or neuraxial block. Regional block is epidural, spinal and epidural plus spinal, right. So, epidural mostly it is utilized in labor, but spinal is utilized for caesarean section, right. For caesarean section because you know it is associated with motor block. So, there is total block both sensory and motor from the level of the umbilicus that is the T10 and it will persist for another say 90 to 120 minutes.

So, this is for caesarean section mostly preferred, spinal anesthesia. Epidural is being used for the pain analgesia in the process of labor and sometimes epidural with spinal is also given.

Now, coming to epidural analgesia it is most commonly used type of analgesia in the process of labor pain and it is also most effective, right. It is very effective and why it is so much preferred because it will block the sensory pain, the sensory nerve fibers. It blocks the sensory nerve fibers thereby decrease the pain perception, but there is no motor block it, right.

So, this is the gold standard for pain relief in labor, right. Now, coming to the drugs used in epidural analgesia it is mostly the opioids with local anesthetic agents, right. So, local anesthetic agents low concentration of local anesthetic agents plus or minus with or without opioids given in the epidural space outside the dura matter. It care should always be taken not to puncture the dura. So, outside the dura matter in the epidural space and what are the used drugs bupivacaine, ropivacaine these are the local anesthetic drugs and with or without opioids that is fentanyl and remifentanyl combination.

Most commonly used combination is bupivacaine plus fentanyl, right. So, this is the most commonly used combination. Now, coming to the procedure what is the procedure? Firstly, you have to preload preload mother with 5000 ml of normal saline very very important because there is a chance of hypotension. Now, what is the level of epidural analgesia? This is the L 3 and L 4 between L 2 to L 3 or L 3 and L 4. Right, in this space epidural needle is inserted.

This is a 16 to 18 gauge needle and this has a name called as tuohy needle, right. This needle is inserted inside after number 3 is aseptic precautions. Now, cleaning with povidone, iodine the skin should always be clean and aseptically without any contamination it is done and the first the needle is pierced and it goes goes and there is some loss of resistance then it is just in the epidural space. So, this is the dura. This violet colored structure is the dura.

So, this space this space this space is the epidural space right outside the dura inside the dura this is the spinal cord right. So, this is the subarachnoid space which is punctured in spinal anesthesia. This is punctured in spinal anesthesia. So, in the after we reach the epidural space the catheter here is this is the needle and through this needle the epidural catheter is passed and immediately after the passing the catheter we will fix the catheter right. We fix the catheter and then we go for loading dose infusion.

Loading dose is given plus we can go for continuous infusion or intermittent infusion right and to say here commonly used is loading dose first is given and then we go for intermittent bolus infusion, but in this case the anesthetist or the provider should always be present by the side of the mother right. So, this is the positioning of the patient either in sitting posture or in lying down posture the patient is you know hunched back the head and the lower limb are towards the abdomen. So, that the spine is hyper flexed hyper flexed to increase the space in between the vertebra and we go between L2 L3 this space L2 L3 or L3 L4 right. Here is the puncture side we palpate the vertebra the spine of the vertebra and then through the needle the two of high

needle we will reach the epidural space and through that we will pass the epidural catheter and then we will start and you know when it starts as early as 5 to 10 minutes after the infusion right after the loading dose infusion and maximum effect is within 15 to 20 minutes of loading dose administration. So, there are different types it can be patient controlled epidural analgesia it can be computer integrated patient controlled epidural analgesia.

Patient control meaning we give the you know increase or decrease or stopping that valve is in the hand of the patient and she controls the amount of drug that is being you know that is going through into the epidural space depending upon the pain sensation of the mother and number 3 is mobile or walking epidural here the you know it is given in case the mother wants to be ambulatory during the period of first stage of labor. Here we decrease the concentration lower concentration of your local anesthetics. So, we lower the concentration of say bupivacaine we decrease bupivacaine concentration and we can increase somewhat to some extent opioids. Opioids is with bupivacaine we use mostly fentanyl. So, this will spare this will spare the motor nerves and thus the mother can be ambulatory or walking or mobile during the process of labor.

So, prerequisites yes pre anesthetic checkup is a very important before epidural analgesia and consent to be taken IV access and monitoring should be there and facility of resuscitation in case there is high spinal or the drug has gone higher up high at a higher level there can be respiratory depression on the part of the mother. So, the equipment the resuscitation equipments should be available oxygen should be available suction apparatus, intubation equipment, intermittent positive pressure ventilation all these should be available and also anesthetist. Now, what is the most common your I will say obstacle in this epidural analgesia number 1 is cost right the cost high cost associated and number 2 unavailability of round the clock anastasia anesthetist. Anastasia should always be present in case there is any mishap or any difficulty in this epidural analgesia and the anesthetist has to monitor her right. Now, coming to the contraindication where we cannot go for epidural analgesia number 1 is in case of any coagulopathy number 2 in case of thrombocytopenia right thrombocytopenia.

So, decreased platelets will also be a contraindication for epidural anesthesia administration of anticoagulant sorry anticoagulant therapy. Anticoagulant therapy in the form of heparin in last say 12 to 24 hours. Number 4 raised intracranial pressure this is also a contraindication for spinal anesthesia. So, in these patients you cannot go for epidural analgesia if there is any infection of skin and soft tissue at the site of injection of the epidural anesthesia. So, at the site of puncture if there is infection of the skin or soft tissue we cannot go for epidural analgesia because that will invite you know infection inside the epidural space right leading to epidural abscess epidural hematoma which is much more life threatening.

So, we cannot go for that and also to decrease the risk of infection we should always go you know be very meticulous in the aseptic cleaning of the skin before the puncture. So, these are

the pre I mean contraindications. Now, coming to the precaution number 1 is preloading with fluid. Preloading of mother with fluid you know approximately 500 to 1000 ml of normal saline because there is a chance of hypotension after epidural analgesia and that can lead to fetal heart rate abnormality.

So, with 500 to 1000 ml of NS. Now, number 2 precaution is BP monitoring every 5 to 15 minutes you know for at least first hour and then every 30 minutes till the infusion is continuing right BP monitoring is important because we need to track any hypotension or hypotensive episodes in the mother because that will lead to decreased utero placental perfusion leading to fetal hypoxia leading to fetal distress. And number 3 is continuous CTG monitoring right CTG monitoring of the fetal heart rate and the uterine contraction over the cardiotocography machine the you know the graph comes and this CTG monitoring should be done throughout the labor and we need to assess the fetal heart rate every 15 minutes in the first stage and every 5 minutes in the second stage of labor. So, these were the precautions. Now, coming to the complication what can be the complication there are 2 types immediate and delayed. In immediate complication it can so happen that the drug has gone IV leading to cardiac arrest leading to convulsions right.

So, local anesthetic drugs when given in your IV can lead to these then there can be hypotension or decreased blood pressure which I have already told for that we as a precaution we go for preloading with 500 to 1000 ml of NS right. So, it can so happen instead of epidural it becomes subdural or intravenous or intrathecal right. So, it is not in the perfect space the epidural space and it can you know may happen that it has become a intravenous injection right or sometimes it can lead to high spinal or total spinal block. So, that will lead to respiratory depression of the mother and you need to immediately intubate the mother right. So, these were the immediate complications coming to the delayed complication this is postdural headache post puncture sorry postdural puncture headache postdural puncture headache due to you know this also occurs with spinal anesthesia due to leakage of some CSF.

So, postdural puncture headache is very common occurs after say 24 hours of the delivery occasional low back pain low back pain can occur at the injection site there can be urinary retention after the delivery there can be transient headache and sometimes it can lead to hematoma right sometimes it can lead to epidural hematoma or abscess formation. So, these are the complications of epidural analgesia and we should try to avoid them by going for preloading by maintaining aseptic conditions by you know when just before puncture we should be very meticulously palpating the vertebra. So, as to confirm the level of puncture between L2 to L3 or L3 L4 space right and it should not be intravenous right we should be very confirmed that we are in the epidural space before giving the drug. So, and also we will also negate the contraindications there is no coagulopathy there is no thrombocytopenia there is no history of anticoagulant injection in the previous 12 to 24 hours right. So, there is no allergy of local

anesthesia or drugs on the part of the mother there is no associated raised intracranial pressure right.

So, you must also you know have a proper pre anesthetic checkup. So, that was with epidural anesthesia just short discussion for spinal anesthesia, spinal anesthesia here we punctured the dura right we punctured the dura and we reached the subdural space where you know the CSF is present and there we go for spinal anesthesia right and this is you know give done mostly for cesarean section or say obstetric hysterectomy in case of uncontrolled postpartum hemorrhage. All these cases we go for spinal anesthesia and we go for anesthesia both motor both motor and sensory blockade sensory blockade from the level of T10 right. Now, so that was complete with the epidural analgesia.

Now, coming to pudendal block. So, we have 2 types of block I have told that is these are the neuraxial block right neuraxial block and they are 2 types that is the pudendal nerve block and the paracervical block. Now, here in this picture so, what we need to know that this perineum this is the perineum and this whole perineum this whole space this total space this total space this total space is innervated by 4 nerves right this total space is sorry this total space is innervated by 4 nerves. Number 1 is the pudendal nerve which is the main nerve number 2 is the 3 4 nerves is there right I will go here for you for better explanation. So, see here is the perineum here is the labia majora this is the labia minora right. So, this is the vulva and here is the perineum when we have 4 nerves this part the mons pubis is supplied by the ilioinguinal the anterior labial branch of ilioinguinal nerve ilioinguinal nerve right then is your genitofemoral number 2 is the genitofemoral genitofemoral nerve number 3 is the pudendal nerve pudendal nerve.

So, I will draw this with red color. So, see this is the pudendal nerve and pudendal nerve will give 3 branches right. So, number 3 is the pudendal nerve pudendal nerve has 3 branches the inferior rectal nerve which supplies the skin around the rectum the perineal branches which are supplying the vulva and the skin around the perineum and number 3 is the dorsal nerve of clitoris the rest pudendal nerve will be the continuing as the dorsal nerve of clitoris to supply the clitoris right and number 4 number 4 is this nerve number 4 is this nerve what is this nerve this is the posterior cutaneous nerve of thigh right. So, just from this picture I want to you know highlight that it is not only the pudendal nerve there are also 3 other nerves. So, when we go for pudendal block it is not that whole of the perineum is anesthetized only the pudendal supply only the skin having the pudendal nerve supply will be anesthetized and pudendal nerve we know is a mixed nerve it has both sensory and motor fibers right.

So, that was the pudendal. Now, how to go for the pudendal nerve block we will palpate the ischial spine. So, this is the ischial spine we palpate the ischial spine and this is the sacrospinous ligament right. So, this is the from the spine to the sacrum this is the sacrospinous ligament and

we will palpate through the vagina right. So, see sorry. So, I have not drawn that picture you have to go your finger your finger will go through the vaginal opening right.

So, your finger will grow this is the thumb this is the index finger and you go through the vagina and you palpate the ischial spine which is somewhere here you palpate the ischial spine and you go posterior laterally to palpate the sacrospinous ligament and then keeping the index finger of your hand inside the vagina and this index finger will guide the entry of the needle. So, this is the needle and what needle this is also your say it is approximately 20 gauge right. So, this needle is this this needle this needle is a 20 gauge spinal needle 15 to 16 centimeter in length 20 gauge needle and you know you you have to go for both the sides the pudendal nerve on both the sides when you go for the left side you palpate it through your left hand the left ischial spine and then you palpate the post laterally the sacrospinous ligament right and then keeping your hand there you pass the needle with the other hand see here you are passing the needle with the other hand and this is the guiding finger this will guide the needle and you reach the ischial spine right in the ischial spine you just palpate the sacrospinous ligament and you will go a little inside say 1 to 1.5 centimeter inside the ischial spine and this pudendal nerve is just beneath here.

So, here is the pudendal nerve right. So, here is the pudendal nerve this is the pudendal nerve here see this is the hooking this nerve this pudendal nerve is hooking the sacrospinous ligament right. So, you introduce the needle a little further into the sacrospinous ligament and there you give you attach the syringe with the drug. So, you attach the syringe with the drug and you push say around you know 3 ml of 1 percent xylocaine and then you will know just before pushing you have to aspirate whether it is intravascular or not you push the drug and then after pushing the maximum amount of drug infiltrating that area you go for another 0.5 centimeter inside and the rest 1 ml is given a little inside into the soft tissue right and then you take out and this process is repeated on the other side. So, this will anesthetize the pudendal nerve on both the sides and this pudendal nerve is actually a sensory nerve and with the nerve roots S2, S3, S4 which plays a main role in the second stage of labor pain.

So, during the second stage of labor pudendal nerve analgesia will decrease the labor pain also when we give episiotomy when you give episiotomy this area is supplied by the pudendal nerve. So, episiotomy or during you know very instrumental delivery where you need to go for a larger episiotomy or you have some lacerated deeply lacerated vaginal wounds in those cases pudendal nerve block is handy. Coming to the next part that is the para cervical block. So, that was pudendal nerve block right and what are the complications you know it is a blind procedure. So, obviously, it can be associated with hematoma at that area when you puncture a blood vessel or it can lead to abscess formation or it can sometimes lead to you know injection at a different space right.

So, you have not punctured the nerve or now you have not in not sorry you know you will not puncture, but infiltrate. So, the nerve is not infiltrated and so, there will be failure of the block. So, these are the complications. Now, coming to the para cervical block what is para cervical block it is actually this is the cervix and you have the para cervical plexus on all sides. So, say this is the cervix you have the para cervical plexus of nerves on all sides right.

Say this is the cervix and you have the para cervical plexus of nerves this is called as Frankenhauser plexus and you go for this plexus you infiltrate in the nerves of this plexus and that will prevent the pain sensation that is being carried by the afferent nerve fibers to T10 to L1 and this is occurring in first stage of labor due to cervical dilatation, cervical stretching right. So, that pain will be obliterated or that pain will be reduced by the para cervical block. Now, where to go for the para cervical block we know at the 3 o'clock and so, this is the 3 o'clock and 9 o'clock position we have the cervical vessels right. So, at these 2 positions there are the cervical vessels the descending cervical artery which is the direct branch of the uterine artery. So, these 2 extremes should be avoided because it can lead to intravascular injection or intravascular trauma leading to hematoma and massive bleeding right.

So, what is the you know point at 4 o'clock and 8 o'clock position there we infiltrate. So, in this picture which is the 4 o'clock here is the 4 o'clock position and here is the 8 o'clock position. So, these 2 positions the 4 o'clock and 8 o'clock position we will infiltrate with this syringe right and here also we have to aspirate before infiltrating to note that we are not inside any vessel. So, here are the vessels this is the cervical vessel going through at 3 o'clock and 9 o'clock position. So, that was all for the para cervical block and I have told that para cervical is mostly alleviating the pain of the first stage of labor and this para cervical block has to be repeated right every 2 hours to have adequate analgesia and it has many side effects or complications in the form of hematoma in the form of massive bleeding from the para cervical vessels in the form of say abscess formation infection and also repeated injection you know causes you know more trauma to the mother.

So, para cervical block is not used nowadays right and also it sometimes may lead to post block fetal bradycardia right para cervical block after you have given the block it can lead to post block fetal bradycardia in that case we need to give fluids to the mother ask her for left lateral position and wait for the fetal heart rate to become normal right and already hematoma abscess broad ligament hematoma can occur with this para cervical block and of course, infection also is a very important complication of this block. So, that was all for para cervical block. Now, coming to spinal anesthesia you want to add one point that what is the level of spinal anesthesia that is also L1 L2 or L2 L3 right sorry L3 L4 epidural we have studied that it is L2 L3 or L3 L4 space for spinal it is L3 L4 or L4 L5 right and we generally we do not go above or high up because there is a chance of high spinal which can lead to respiratory depression of the mother leading to you know causing more damage to the mother and in that case we need to

go for intubation right. So, high spinal complication should be avoided and that is the space L3 L4 for spinal anesthesia. So, that was regarding the labor analgesia it is a very important topic of which epidural is most commonly used during the labor process in most centers and sometimes you know we need to go for continuous fetal tocography that is the CTG monitoring during the process of epidural analgesia and though epidural analgesia does not have any effect on the progress of labor it does not have as such any effect on the fetal complications it does not have any fetal effect, but it has been shown that it can increase the duration of labor by 1 hour.

So, in our definition we already read you know we have already discussed that if the patient is given epidural anesthesia we will wait for another 1 hour before we say that the labor process is prolonged right. So, that was all and epidural analgesia is safe and it has you know it increases the patient satisfaction in our institute we have seen that yes it increases the patient satisfaction the patient is very you know happy at the end of the delivery and it has been a smooth experience for her right. So, that was all for all types of analgesia and the references has been taken from D.C dutta book of obstetrics the Williams book 26th edition and the James book on high-risk pregnancy. So, that was all for labor analgesia.

Thank you all and looking forward to our next class. Thank you.