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

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Events of Normal Labour

Hello students. Welcome you all to yet another 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 Medical College and Medical Research Center, IIT Kharagpur. Today we are going to discuss regarding the events taking place in the different stages of normal labor. In the previous classes, we have discussed the antenatal care, the different investigations to be done during the antenatal period, the antenatal fetal assessment protocols and now we are discussing the intranatal period, right.

So that involves the process of labor as well as the delivery of the fetus along with the placenta and the membranes outside the uterine cavity into the outside world through the vagina. So we have already discussed the labor portion, the four phases of parturition of which the third phase revolves around the four stages of labor. We have discussed the theories behind the onset of labor at the end of pregnancy as well as the different paracrine autocrine factors acting from the maternal as well as the fetal compartment that together working in synchrony brings about the process of labor. So today we are going to discuss particularly the different stages of labor as well as the events taking place in each stage.

It is very important to have a clear idea regarding the stages of labor in order to know the process of normal delivery, the different steps of normal delivery as well as to diagnose any abnormality in each step, right. So we need to know the events that occur in the different stage of labor. So the concepts covered in today's class will be the events of normal labor that is particularly the first, second and third stage of labor. Here I want to add that there is also a fourth stage of labor which is you know one hour period of observation of the mother as well as the baby after the delivery of the fetus and the placenta. So during this one hour observation we look into the vitals of the mother, the pulse, blood pressure, SpO2, respiratory rate, temperature as well as the parvaginal bleeding in order to know note or early detect any complication of the third stage, right.

So the fourth stage any you know in the fourth stage any complication in the form of postpartum hemorrhage or in the form of vulval hematoma or in the form of any say retention of urine, right. Any such complications occurring just after the delivery of the baby can be elicited early if the fourth stage is taken into account. And here the one hour period after the delivery of the mother and the fetus the mother is kept in a observation room near the labor ward where we can monitor the mother continuously for at least one hour, right. So the keywords are as given. Coming to the events taking place in labor.

So just I will write it here. What is labor? Labor is the process, right. The series of events that take place within the birth canal of the mother and which help in the expulsion of the fetus outside the uterine cavity through the vagina, right. And this has four stages I have told first stage, second stage, third stage and the fourth stage, right. And these first stage when is the onset of labor there is a definition.

So when the labor is starting, when the labor has initiated, how to diagnose that? That is diagnosed from the onset of uterine contraction. That means the onset of true labor pain. In the previous class we have discussed regarding the false labor pain which is characterized by irregular non rhythmic, right, uterine contraction and which are haphazard which know this pain can be subsided with medication like sedative or enema. And the pain is mostly in the lower abdomen which is not radiating towards the thighs of the mother as well as it is not associated with any cervical dilation or effacement or it is not associated with no blood tinge mucus plug excretion from the vagina. That is it is not associated with show, but with the onset of labor that is with the true onset of true labor pain which means that the uterine contractions now is becoming more regular rhythmic.

They are increasing in intensity, no it can be as high as 40 to 50 millimeter of h g. They are increasing in intensity, they are increasing in frequency. Previously it was coming haphazardly to say you know one in 10 to 15 minutes. Now it is coming you know every uterine contraction coming in every 2 to 3 minutes. So, it is increasing in frequency, it is increasing in intensity as well as it is increasing in duration.

And it is associated with show, it is associated with cervical dilatation and effacement as well as it is you know that pain the true labor pain will not be subsided with sedative or with enema and it radiates towards the lower thighs. So, that marks the onset of labor that is that start of first stage of labor and it continues till full dilatation of the cervix right. Next is the second stage which is actually from the full dilatation of the cervix to the delivery of the fetus. Third stage will be starting after the delivery of the fetus and it includes the delivery of placenta and membranes. And after the delivery of the placenta the fourth stage is one hour of observation period after the delivery of placenta and after membranes.

So, that were the different stages of labor. Coming to the first stage of labor I have told what is first stage start of onset of labor to full dilatation and it is actually the preparation of the birth canal right. It is the preparation of the birth canal so that you know the fetus the preparation of the birth canal in such a way that the fetus is expelled out to the second stage of labor right. So, that leads to expulsion of the fetus to the second stage of labor. So, it is actually leading to the second stage of labor.

And what are the events that occur in the first stage? Main events occurring is dilatation and effacement of the cervix and number 2 is the formation of the lower uterine segment. This first stage is also called as the cervical stage of labor. So, what happens here? What are actually the factors responsible for this first stage? Number 1 is the uterine contraction and retraction. In the physiology of labor we have read that the uterine muscle or the uterine myometrium is this uterine myometrium has 3 layers of muscle cells right. It is arranged in 3 layers.

This is the outer longitudinal layer. So, this is the uterus and this is the cervix. So, the outer longitudinal layer, this is the outer longitudinal layer, then inside is the inner circular layer and in between are the crisscross pattern of myometrial cells arranged which is called as the living ligature right. So, this is the middle layer in the crisscross pattern arrangement of muscles and this is the inner circular layer. Now what happens? As there is uterine contraction, as the uterine muscles are contracting, the uterine muscles are contracting and retraction.

So, both contraction and retraction is occurring and this will lead to descent of the fetal presenting part, blow down below down right into the maternal pelvis. So, what happens? This is this forms this uterine contraction will be forming an upper uterine segment which will continuously undergo contraction and retraction and it becomes thicker, it becomes thicker right. There is more muscle contraction. So, it is becoming thicker and shorter, but the lower uterine segment, the lower uterine segment, this lower uterine segment is actually. So, this is the lower uterine segment.

So, this lower uterine segment, this is the cervix. So, this is the lower uterine segment. So, here the muscle layers are thicker, they are contracting, but here the lower uterine segment is actually less contractile. It is not so much, it does not have so much contractility. So, there is a phase of relaxation in the lower part right and also this lower uterine segment is you know mostly inert right and there is it know it becomes more thinner.

It is more thinner and wider right. So, that is the lower uterine segment and where from this lower uterine segment is formed. So, this lower uterine segment is actually formed from the isthmus. So, this is the isthmus which is bounded above by the anatomical internal ores and below by the histological internal ores and in non pregnant state this isthmus is 0.5 centimeters that is 5 millimeters.

During the process of labor, it becomes 5 centimeter and in the second stage of labor, it becomes approximately 10 centimeters. So, this becomes a wider and thinner and it is less contractile, it is mostly inert and so this causes you know wider part which will help to you know accommodate this will help to accommodate the fetal presenting part right. This will help to accommodate the fetal presenting part low down as there is fetal descent. So, that is the formation of the you know that is that that is caused by the uterine contraction and retraction. Number 2 is the fetal number 2 is the fetal axis pressure right.

So, factors responsible number 2 is the fetal axis pressure. So, what happens the fetal and also another part is here contraction and retraction forming the lower uterine segment and also taking up of the cervix. Taking up of the cervix meaning the cervix is gradually merged into the uterus above the cervix, this cervix will be gradually merging. So, the cervix was tubular and gradually as the pregnancy progresses as the pregnancy progresses so this is the cervix gradually it will be taken up. So, length of the cervix will gradually decrease so that is called as cervical effacement right.

So, this whole part is due to uterine contraction and retraction the 5 the uterus from above tries to pull up the cervix and the cervix is gradually merging with the lower uterine segment ok. Now, number 2 is the fetal axis pressure. So, in longitudinal lie the fetus is like this and this is say cephalic presentation this is the head of the fetus, this is the podalic end of the fetus and so this fetal axis pressure that will also help in cervical dilatation right. So, as the myometrial cells contract as the myometrial cells contract there is a downward pressure which is transmitted through the podalic end through the vertebral column through the fetal head and this fetal head will be you know giving the pressure on the cervix helping in cervical dilatation and effacement. Number 3 is the bag of membrane formation right we have a picture here.

So, see this is the upper uterine segment and as the uterine muscles are contracting as the uterine muscles are contracting this is the cervix and as the uterine muscles are contracting this is you know before the onset of labour before the onset of labour and this occurs during the labour or after the onset of labour the cervix is gradually being taken up. So, this cervix is gradually it is being taken up into the uterine muscles right. So, the contraction and retraction of the uterine muscles are helping to take up the cervix right and that will lead to cervical dilatation and effacement and this is the fore water bag of membrane formation. So, here the fetal skull this is the fetal presenting part in case of cephalic presentation and what happens this sits you know comfortably into in the lower uterine segment thereby dividing the amniotic cavity into two parts. This is the amniotic fluid within the amniotic cavity which is you know below low down the fetal head which is called the fore waters and a part of the amniotic fluid is present behind that is the hind waters.

So, as the uterus is contracting this hind water will be passing into the fore water and this will form the bag of membranes and this bag of membranes will give now you know pressure uniform pressure all throughout the cervical rim helping in cervical effacement and dilatation. So, that was the bag of membrane and lastly you have the vis-a-tergo which is cervical effacement right cervical effacement due to the pushing effect of the fetus, pushing effect of the fetus. So, you know the fetus is also pushing that will lead to the cervical effacement and a time will come when you cannot separately delineate the cervix at the end of the first stage when the cervix is fully dilated you feel only a rim like structure only a rim like structure which is the cervix right. So, no cervical tubular structure is present it is only a rim and the rest part has been taken up by the lower uterine segment.

So, that was the first stage. So, effacement you have already know we have already done it is the taking up of the cervix into the lower uterine segment into the lower uterine segment and this helps in cervical dilatation and this occurs in first stage of labour. So, this you can see you know that cervical effacement procedure is separate for primiparas and multiparas. So, what happens this is the cervix this is the cervix which is approximately 2.5 centimeter in length during pregnancy and it is tubular right. So, the internal os is closed the external os is also closed it is tubular or cylindrical.

Now during know just before the onset or you know in the early first stage early first stage see there is the process of taking up of the cervix has already been started and the cervical length is decreasing more you know more as the stage progresses the cervix is further being taken up into the lower uterine segment and this is followed with cervical dilatation right. So, this here the cervix is totally effaced cervix is totally effaced and this is the external os. So, cervical dilatation occurs late cervical dilatation occurs or cervical dilatation know it is it occurs after cervical effacement in primiparas, but whereas, in multiparas you can see here the internal here the internal os is closed, but the external os is open. So, this is a paras cervix in case of multipara and as the labor process progresses there is effacement of the cervix and along with the effacement there is also dilatation of the cervix. So, effacement occurs along with dilatation in case of multipara, but in case of primi in case of primi effacement is followed by dilatation right.

So, that is the difference. Lower uterine segment formation I have already told that yes lower uterine segment is formed from the isthmus which is in the non pregnant state it is bounded above by the anatomical internal os and below by the histological internal os. And during labor during labor this forms the lower uterine segment which is bounded above by the physiological retraction ring. So, above by the physiological retraction ring and below by the junction between the cervix and the uterus. And why it is important because it helps to accommodate the you fetal presenting part during the fetal descent during the process of labor. Also this lower uterine segment is you know it can be it can be identified by the loose fold of peritoneum right.

So, this is the loose fold of peritoneum which covers the lower uterine segment that is the vesicouterine fold of peritoneum. During the caesarean section we put the incision on the lower uterine segment right. So, incision this is the incision site in case of lower uterine caesarean section. Other importance is this lower uterine segment is less retractile. So, if there is placental formation in the lower uterine segment then this placenta is there is more chance of morbid adherent of placenta right.

So, low lying placenta or placenta in the lower uterine segment is more prone to adherent placenta that will lead to PPH following delivery. So, these are the different features or importance of the lower uterine segment. Another thing is this is the physiological retraction ring which is you know common in case of normal labor, but say in case of obstructed labor. In case of obstructed labor so, this is the cervix. In case of obstructed labor the upper uterine segment will be continuously contracting and the fetus is more you know it there is caefalo pelvic disproportion.

So, this is the fetus and it cannot go down due to cephalopelvic disproportion. So, what happens the upper uterine segment continues to contract, contract, contract and the lower uterine segment will be dilating and this will lead to formation of pathological retraction ring which is called as the Bandel's ring. This can be palpated per abdomen you know outside per abdomen we can see the Bandel's ring and this means that it is a case of obstructed labor if left untreated, if left untreated it will lead to rupture uterus right. So, what is the treatment of Bandel's ring or obstructed liver? It is only caesarean section you know sometimes we also go for classical caesarean section, but delivery has to be by caesarean section delivery by caesarean section. So, that was regarding the physiological retraction ring and the pathological retraction ring or the Bandel's ring right.

So, we have discussed the first stage of labor. So, this was what I have already drawn this is the in during the pregnancy this is the now this part is the isthmus right. So, in between the histo anatomical internal loss and the histological internal loss this is the isthmus and this is the cervix and this during labor during the onset of labor this will actually be forming the lower uterine segment right. So, this part will be forming the lower uterine segment right and as the upper segment this is contracting this is contracting the lower uterine segment is expanding. So, in between there will be formation of the physiological retraction ring right and in the say at second stage second stage what happens there this is the active segment which is continuously contracting and this is the passive segment or the lower uterine segment which is less retractile which is you know which is getting slowly dilated it is becoming thinner and wider right and the cervix is also being taken up into the lower uterine segment right.

So, this is you know at the end of the second stage right now at the end of the first stage right there the cervix is only a rim it has totally been taken up by the lower uterine segment. So, that

was the first stage from the start of onset of labor from the start of uterine contractions from the start of cervical dilatation and effacement continuing till full dilatation of the cervix that is 10 centimeter. Then comes the second stage which is from the full dilatation of the cervix to the delivery of the baby outside the birth canal right through the vagina. This also can be divided into two parts the propulsive phase and the expulsive phase. Propulsive phase is mostly the fetal descent right.

So, the fetus now the cervix is fully dilated and the fetus comes down and it you know presses on the pelvic floor on the pelvic floor right and this pelvic floor will you know give a resistance to the fetus to go you know and it this resistance will make the fetus to go inside the uterine cavity again. But this is you know counteracted by the continuous uterine contraction. So, increase in upper segment contraction and retraction force right. So, that will increase and that will you know negate the pelvic floor resistance the soft tissue of the vagina and the perineum that will all pose a resistance to the you know to the to the descent of the fetus. But the above from above the uterus the upper uterine segment is continuously contracting and retracting and this intensity will also increase during this propulsive phase leading to more fetal descent and into the pelvic floor right.

So, the fetal head now touches the pelvic floor and what is the expulsive phase? This is actually the expulsion or birth of the baby right. So, birth of the baby and this occurs due to both the uterine contraction as well as the abdominal muscle contraction. So, the mother is actually the uterus is contracting and the mother will also try to bear down this is called as the bearing down effect bearing down effect. So, I will show you know the I will you know more explicitly we will discuss during the vaginal delivery, but what happens the mother will try to you know contract the abdominal muscles and she will try to she will be doing a forceful expiration against a closed glottis.

So, thereby increasing the intra abdominal pressure. So, this abdominal muscles together with the uterine muscles they are creating a force a expulsive force that will help to you know that will help in the expulsion of the fetus through the birth canal to the outside world. So, that is the second stage of labour. This diagram is showing that there are two forces acting number one is the uterine muscle force which is trying to you know expel out the fetus and also the abdominal muscles. This abdominal muscles will also give a thirst right and this thirst will expel out the fetus against the resistance which is provided by the pelvic floor as well as the soft tissues of the vagina and the perineum right.

So, that was the second stage. Now coming to the third stage third stage is after the delivery of the fetus to the placental separation followed by its expulsion along with the membranes from the uterine cavity. So, that is the third stage of labour. So, three events are taking place number one is the placental separation from the uterine musculature or uterine myometry right. So, the

placenta was implanted and it gets separated from the decidua it gets separated from the decidua that is the placental separation then the separation of the membranes that is amnion and chorion and ultimately expulsion of the placenta from the uterine cavity to the exterior. So, why there is placental separation during the period of pregnancy say this is the placental surface area.

So, that was the placental surface area where the placenta was implanted right. So, this is the decidua basalis. So, the whole this is the placenta. So, this whole placenta was actually implanted and this was the placental surface after the birth of the baby after the birth of the baby what happens the uterus is contracting uterus has contracted this whole uterus this whole uterus this is the whole uterus and this has contracted and it has become globular it has decreased in size considerably and, but this you know retractile property of the uterine muscles this is not present with the placenta placenta is not elastic. So, now, the placental surface area it is decreased because the uterine surface on which the placenta was attached that has decreased in size.

So, the placenta will you know fold upon itself see the placenta is folding upon itself this is not elastic. So, it will fold upon itself and it will gradually separate from the uterine wall right. So, this is the placental separation. Now, there are two types of placental separation one is central separation starting from the center the placenta starts to separate and followed by blood clot retroperitoneal blood clot formation right I have this picture. So, from the center from the center the placenta is starting to separate and just behind the placenta this is the retroperitoneal blood clot formation.

So, that will form and this will increase and with the weight of the placenta it will gradually gradually get dislodged from the uterine wall this is see what happens as it getting as it is getting dislodged. So, first to see is the placental membranes the amnion. So, the shiny surface comes out first. So, the name given to this method of separation is Schul's method. The shiny surface is coming out first right and here the blood loss is less in this type of separation right.

This is more common in 80 percent of cases right and here this is marginal separation this is this is central separation this is marginal separation marginal what does that mean placenta is starting to separate from the margin right. So, it has started to separate and what happens this blood this you know this layer comes out first. So, this is the maternal surface. So, maternal surface is dirty.

So, dirty surface is coming out first. So, the name given to this type of separation is Matthew Duncan. Duncan D for dirty. So, Matthew Duncan's method of separation which is marginal separation in this case blood loss is more and this is less common right. So, these are the two types of placental separation.

Now coming to the separation of the membranes. So, the placenta has separated placenta this is the umbilical cord I will use another color. So, this is the uterine cavity the placenta this is the placenta this has already separated and the membranes the membranes which were covering the amnion the chorion they will also gradually separate from the upper uterine segment that will also come down along with the placenta why because due to weight of the placenta number one weight of the placenta that will take out the placental membranes also along with it right. So, the amnion and chorion will gradually dislodge from the upper uterine segment and the membranes will be separated and ultimately they will get expelled out from the uterus. So, the whole placenta this is the uterine cavity.

So, the whole placenta will get separated out. So, this is the umbilical cord. So, this is the whole placenta this will ultimately get separated out of the uterine cavity by number one uterine contraction. The uterus after the delivery it will become hard and it will sit like a dome over the separated placenta and it will contract and try to expel out the placenta. So, it can be spontaneously expelled out due to the uterine contraction or it can be manually removed by controlled cord traction by pulling this cord this is called as controlled cord traction we will also we can also do the placental separation and we do this controlled cord traction in active management of third stage of labour.

So, that was the expulsion of placenta in the third stage of labour. Now at the end fourth stage I have already told one hour of observation after the expulsion of placenta to note the vitals of the mother and to assess for any complication in the form of bleeding following delivery which is called as postpartum hemorrhage. Now our discussion is the mechanisms which help to control the bleeding following delivery. So, that will prevent postpartum hemorrhage what are they? Number 1 these are actually showing the uterine middle layer of myometrium cells. So, the middle layer has crisscross arrangement.

So, this crisscross these are one one one myometrial cells. So, the crisscross arrangement and in between are these spiral arterioles right. So, these are the branches of the radial artery or branches of the uterine artery which are supplying the decidua right. So, these vessels as after delivery after delivery what happens there is contraction of this middle myometrial layer which is also called as the living ligature. So, these will contract this will contract and this will obliterate the vessels see the vessels are getting compressed and so that will decrease the blood loss.

So, this is one mechanism. Number 2 mechanism. So, this is one the living ligature figure of 8 living ligature you know contracting and forming the figure of 8 which will prevent or which will compress the blood vessels in the form of figure of 8 that will decrease the blood loss. Number 2 is thrombosis of the bleeding vessels due to the hyper coagulable state during pre pregnancy there will lead to thrombosis of the bleeding vessels that will decrease the blood loss.

And number 3 is myo tamponade that means, that the anterior and posterior layers of the uterus will compress right the circular muscle layer will contract and that will lead to you know obliteration of the uterine cavity by opposing the anterior and posterior layers of the uterus and that will also help to decrease the blood loss following delivery of the fetus. So, these are the different mechanisms that help in control of bleeding following delivery, but still there is a chance of PPH in case of multigravida where the uterine muscles are more relaxed you know the tone is less and this causes you know less force of contraction of the uterus. Uterus remains flabby after delivery and you know there are various medications which will increase the uterine muscle contractility like oxytocin, misoprostol, methergine, carboprost which we give very commonly to increase the uterine muscle contraction thereby leading to decrease in the chance of PPH right.

So, PPH is a emergency condition and if suspected that there is excessive bleeding. Now, bleeding which is in excess compared to normal cases then we should always be extra vigilant because we can lose the mother in few minutes time right. So, thus we should be very very cautious. So, these were the different stages of labour and the events taking place in each stage of labour.

So, that was all for today's class. References mainly has been taken from D.C.Dutta book of obstetrics also from Williams 26th edition and James book on high risk pregnancy. Now, after we have discussed the events of labour we will continue with the mechanism of normal labour and how the process of delivery occurs in our next class. So, thank you for today. Keep doing well in your studies, keep reading the books and hope to meet you in our next session. Thank you.