Theresa: Hello and welcome to UltraSounds, a podcast by OBGYN Delivered. I'm Theresa!

Sarena: And I'm Sarena!

Today we have the pleasure of welcoming Dr. David Marzano back to UltraSounds to talk about normal labor. Dr. Marzano graduated from the University of Michigan Medical School with honors in 1998. He completed his residency in Obstetrics and Gynecology at the University of Michigan in 2002. His clinical interests include general obstetrics and gynecology, with a focus on laparoscopy and also the use of simulation for team training in the setting of obstetrical emergencies in addition to a regular OBGYN practice. He's a member of the ACOG Working Group on Simulations and has an interest in patient safety and surgical skill development. He also serves as a program director of the Obstetrics and Gynecology Residency program at the University of Michigan. His interests outside of medicine include family music and classic television.

Theresa: Now you may remember Dr. Marzano from our AUB episodes, and we are so happy to have him joining us again. Last time Dr. Marzano told us his favorite podcast was The West Wing, so we're going to switch up our question today, Dr. Marzano, if you weren't in medicine, what career path would you choose?

Dr. Marzano: Well, first I'd like to like alter the first answer, because now my favorite podcast is UltraSounds by Ob/Gyn Delivered.

Theresa: The correct answer.

Dr. Marzano: I actually think that I would write screenplays for television series. I've actually thought about diving into that a little bit. When I retire someday.

Sarena: That sounds really fun. What TV series would you do? Like what type?

Dr. Marzano: They would kind of be a kind of dramas, but probably not comedies, because I don't know that everyone necessarily gets my jokes. But like you know, someday there's gonna need to be another doctor show, could be about the life of OBGYN.

Theresa: We love it. We love it.

Dr. Marzano: Instead of, ER we'll call it OBGYN or something.

Theresa: Or we can call it L&D.

Dr. Marzano: Yeah, there we go. Right.

Theresa: Alrighty. Well, with that, let's get into our first case.

So we have a 26 year old G2P1 at 39 weeks and three days gestational age by first trimester ultrasound presenting to triage with contractions. She has a history of a spontaneous vaginal delivery of a healthy baby two years ago. She reports painful contractions that began one hour ago and are currently 5 minutes apart. She also reports a trickle of fluid down her leg just a few minutes ago, but she isn't sure if her water broke. On sterile speculum exam, you see pooling of fluid in the posterior fornix. What is the next best step?

Sarena: All right. So when I hear a patient case like this, I think that there's a couple of things we want to break down, starting with diagnosing what is causing this leaking of fluid that she has experienced. So this is concerning for possible rupture of membranes and there's a couple of things that we look for when we're trying to confirm that in a clinical setting. Those would include on a speculum exam of pooling of fluid in the posterior fornix. You can use a nitrazine paper to check for the pH level, and also you can take the fluid on microscope and see ferning, which is a classic sign and is often tested on shelf exams. So those are the main things that people usually do, but other rupture of membrane tests or ROM tests also exist, and there's some specific types like amnisure which actually detects protein markers in the amniotic fluid that wouldn't be present in vaginal secretions. So that's what you look for when you're trying to determine if this patient has in fact ruptured their membranes.

But the next step that you want to consider is management of this patient moving forward and we currently don't have enough information to be able to say that she is in active labor because the definition of labor is the process by which a fetus is expelled from the uterus, but specifically requiring regular effective contractions that lead to dilation and effacement of the cervix. So the key part here that I think that all students should remember is that there needs to be cervical change in order to be classified as labor and this patient has not had any cervical checks up to this point. So we would need to actually see active cervical change to call her actively in labor. However, given her presentation, her gestational age at 39 and 3 this would definitely be someone I would want to admit to L&D and go through those normal steps that we usually do for every patient that's admitted. That would include an ultrasound for a fetal presentation. And like I said, a cervical check to get a baseline. And when you're considering cervical checks, the things that are really helpful to know as a medical student are what those 3 numbers are. When people are calling out what the cervical check says and they will go through. Dilation, effacement and station in that order, so dilation is going to be the diameter of the cervix. How much it's widened, which is felt on the cervical exam. The effacement is measured in percentages, which is the measurement of how thin and elongated the cervix is, and station is the measurement of the baby relative to the ischial spines, which can be palpated from the vaginal canal.

Theresa: Dr. Marzano, how would you manage this patient?

Dr. Marzano: So I you know, I think I would start with all the things that Serena kind of went over. I think a couple of important things thinking about admitting this patient is one is I want to know what her GBS status was as well. So for a patient who's GBS positive then the recommendation obviously would be to start her on antibiotics, cause especially now that her membranes are ruptured. Next steps would kind of depend on how far dilated her cervix was. So if her cervix was two or three centimeters dilated and 75 or 80% of faced and was favorable, which you can do a based on a Bishop score. Then I would recommend potentially waiting for a couple of hours to see a spontaneous labor starts on its own. If not, consider starting oxytocin. If her cervix was long and closed, might consider using prostaglandin like misoprostol to begin her induction process.

One of the things that's changing in the world that I'm old enough to have seen this kind of come full circle is when I was a resident the recommendation was that once she gets into active labor, you'd want to check her every couple of hours or so, or if her symptoms kind of warranted a check sooner than that. So, for instance, if she was feeling rectal pressure or the urge to push, you might check her. If it's outside that window. Overtime, the recommendation kind of changed to try to limit the number of checks you do on a patient whose membranes are ruptured because of the fear of starting potentially seeding the

amniotic fluid of the vaginal flora. That could lead to chorioamnionitis. That pendulum is switching back over now to kind of to recommend that checking every couple hours during active labor. So for this patient kind of, depending on what her initial examination revealed during her triage event, presuming that she's not in active labor at this time, probably would wait for a bit before doing another cervical check to see where things are happening. Depending on what her contractions were and what her symptoms were. When she was inactive, then would recommend probably checking every couple hours to kind of to assess the progress of her labor, because if it's not changing, that's when you might think about adding contraction agents such as Pitocin or something like that.

Theresa: Great. And I think that brings us nicely into case two.

So next we have a 28 year old G1P0 at 40 and 2 who is admitted to L&D in spontaneous labor. Her last cervical exam was 2, 75 and -3. Two hours ago she was started on oxytocin. For labor augmentation, you go to check her cervix again and find it as 4, 80 and -2. Serena, what stage of labor is she in?

Sarena: This is an excellent question that I think really gets at a fundamental understanding that we should study as clerkship students in L&D is the different stages of labor and the phases that are the subcategories of the first stage. So just to do a brief overview of the stages overall we've got the first stage, which is labor onset to full cervical dilation, second stage which is full cervical dilation to the delivery of the baby. Third stage is delivery of the baby to delivery of the placenta. And the first stage is also subdivided into different phases and this always confused me when I was a medical student, I didn't understand the difference between a stage and a phase. The first is the latent phase, which is this early, slow cervical dilation, when the cervix is dilated less than 6 centimeters. Now you move to the active phase where you start seeing a more fast, a faster rate of cervical dilation. When the dilation is greater than 6 centimeters. And an important thing to consider is how much change you're making. And like I said, this cervical change is what helps us clue in that this patient is in active labor. There's specific rates that we expect to see based on our patient demographics. So if our patient is multiparous and has had a baby before, you would expect to see 1.5 centimeters per hour of dilation versus if they're nulliparous, then you would do expect to see 1.2 centimeters per hour, so that's an important thing to consider because you might see different rates of cervical change depending on the patient and their prior pregnancies. Additional things to consider for this patient would be if we want to augment her labor. It seems like she's making some change on her own. She's had in this time between cervical checks a 2 centimeter dilation change. About the same effacement and that her station is pretty similar from -3 to -2. So if we wanted to try to help her with this labor, labor progress, like Dr. Marzano alluded to, we can start on oxytocin, also called Pitocin or pit on the floor. That would help with the uterine contractions being strengthened. Additional things that you can consider are also maternal positioning, or if the patient doesn't have an epidural and wants to walk around, that's another option, fluids, etc. Dr. Marzano, how do you kind of help people get through this latent phase of labor?

Dr. Marzano: So I think one of the important things is patience. Number one is because the latent phase really can last anywhere from hours to days. For instance, sometimes you'll actually see a patient in your office who may be having kind of sporadic contractions, and she might even be, you know, you might have checked her one week before and she was closed and now she might be like a centimeter and a half. Not really an active labor. Once the patients admitted to the floor, generally, if they're kind of progressing nicely in that latent phase. Again, patience is a good virtue to have. She's making good progress, can continue to do spontaneous labor. If it looks like that is getting protracted, that's when I

agree with Serena that we would start oxytocin to augment her labor in the process. Other things that you know might want you, you might want to consider. Trying to shorten that latent phase is what the indication for induction is for this patient. You know, she came in to labor and delivery, but let's say this was a person who you worried about preeclampsia or something along those lines where that, you know, we don't want to have a four day induction process. So it might be worth considering starting oxytocin sooner than you might in a patient who's kind of in a spontaneous process.

The key here is, you know touching base with the patient and doing shared decision making. Many patients come in and want to kind of have the process go as naturally as possible. Others kind of are like, I'm ready to be done with this and so, I think you know having that discussion with your patient is important as well. And a lot of patients will come up with a birth plan that might spell that out because a lot of women in labor are not into having like long conversations because they're quite uncomfortable. And so I think that's one of the benefits of having patients kind of write down ahead of time what you know, what their expectations are. And you know if they could have the perfect ideal, you know labor and resetting, what would it be as far as you know during that process things you might consider is this is a patient who is interested in epidural anesthesia. Traditionally we don't really have a cut off. Or, you know, do you have to be 3 centimeters? 6 centimeters? 8 centimeters? to get an epidural. Let's say that the patient's crowning. Probably it's too late to get the epidural in. And again, traditionally in the past a patient had to be more than four or five centimeters, and the concern just was, was the epidural going to slow the labor process down? And there's pretty good published data now to show that's not the case with modern day epidurals. And so really, leaving that up to the choice of the patient about when her pain is at a point where she wants an epidural. That's something she's interested in. I think it's important to explain the patient that once you do get an epidural, that pretty much, at least at many institutions, not all, but many institutions, that leaves you confined to your bed, so that eliminates the possibility of, you know, being in the tub or in the shower or walking around the unit. There are some institutions that use walking epidural but even with that you, you know, it's not quite the same as if you didn't have an epidural and then, you know, one of the things you could do before thinking about starting labor augmentation medication like oxytocin is you could artificially rupture the patients membranes. We know that this triggers a release of prostaglandins naturally that occurs that can help spontaneous labor kind of kick in. Again, if it's been slow, obviously you need to confirm the patient's vertex and that her station is low enough that the cord is not going to slip out ahead of the fetal presenting part or what we would call cord prolapse. And even in the best of circumstances, sometimes that's going to happen. But having a patient who had the head well applied to the cervix and to the pelvis. And not what we would call ballottable, which you know, if you can imagine that you had a balloon full of water and inside that you had a, you know, maybe a grape. If you touched it, it would float away from the head, so that would be an indication that it probably wouldn't rupture her membranes, whereas if that was well applied to the cervix would feel pretty comfortable rupturing her membranes.

Theresa: I think that's like a really great overview of all the different ways you can, you know, augment labor and how you can align that with what you mentioned of a patient, some birth plan or with some of the goals that they may have for what their labor process looks like.

OK. So Serena, Are you ready for our third case?

Sarena: Let's do it.

Theresa: This time, we have a 32 year old G3P2 at 39 and 6 admitted to L&D in spontaneous labor. She's had two prior spontaneous vaginal deliveries. She ruptured spontaneously prior to admission and now has an epidural in place on exam. Her cervix is 10, 100 and you palpate the fetal head and determine fetal positioning is ROA. Fetal heart tones are category one. She begins pushing. What must the fetus do to traverse the pelvis?

Sarena: Well, this is a bigger question than a simple answer, so I think we'll break it down in a couple of ways. And the first thing that we can cover is the different factors that are required in order to make this movement of the fetus through delivery possible. And then we can go through what actual movements the fetus itself. Take steering these steps. So one good thing to think about in labor and you know the progress of Labor are the 3P's, which includes the pelvis, the passenger and power, and for the passenger that is referring to the fetus. And for power, we're referring to uterine activity. So we characterize uterine activity by the frequency and amplitude and duration of contractions and the most precise way to measure this is that intrauterine pressure catheter, IUPC. Classically, we would see three to five contractions in 10 minutes to define adequate labor, because that's been observed in approximately 95% of women in spontaneous labor. So that's one aspect to consider is the power.

Then we move on towards the passenger and that is the fetus, including the fetal size and fetal macrosomia is a concern. It's defined by ACOG as a birth weight greater than 4000 to 4500 grams for any gestational age. Generally, once you get to that range, you have concerns about any inability to traverse the pelvis. Additionally, you want to consider the fetal lie, so you want to make sure that you have ultrasounded and you can also feel the fetal presentation with the fetal part that directly is overlying the cervix and the position and station of the fetus is important to consider. As we discussed, the station is relative to the ischial spines and we say -5 is just as far up into the abdomen as you can get and +5 as the baby is basically out of the body. Typically, you'll hear people use -3 to +3 and this is centimeters relative to that ischial spine, which is the 0 mark.

And the last ingredient in this recipe is our pelvis, which is consisting of the bony pelvis, which is the sacrum, the ilium, ischium, and the pubis, and the soft tissue that surrounds. If we have concerns about the fetus being too large to pass through the pelvis, that is what we would call cephalopelvic disproportion, and we would have concerns about inability to deliver the baby vaginally and might have to convert to a C section. So that's like all of the components that are making this process of fetal movement down the birth canal happen and then we actually think about the what we call the cardinal movements of labor are for the fetus. This is something that's good to know for medical students on L&D because not only will you possibly be asked about these things, but you'll probably actually see the that final cardinal movements if the babies are being delivered vaginally. So you start with engagement. As we discussed, this is when the baby's head is engaging on top of the cervix and there is a passage through the widest diameter of the presenting part through the level of the pelvic inlet. After the babies heads engaged, we move forward with the fetal descent, where they're starting to pass down into the pelvis and the baby's head has to do a specific movements in order to get around the pubic bone and be safely delivered. So first, the baby will flex their head and I would suggest looking at a picture of the cardinal movements, I think it describes it much better than words can, but the baby will flex their head in order to get the smallest diameter possible to fit through this small area of the pelvis. Then they will internally rotate. The presenting part will rotate from the position at the pelvic inlet to the AP direction. This can also passively happen with the soft tissue surrounding the fetus. Then you can see extension the fetus will reach the level of the introitus baby's head will extend as it is being born. And then

restitution, also called external rotation, is when the baby's head will return to the position in line with its torso, and you can always check for a nuchal cord at that point, and that's probably what you will be able to visualize if you see a vaginal delivery on L&D. And then finally, there's expulsion, which is the delivery of the rest of the body with the anterior shoulder delivered first. So those are the overall steps of what's making this process happen and what the baby is doing itself. Dr. Marzano, do you have any additional clinical pearls you'd like to add?

Dr. Marzano: I think it's just really important all the time to think about the 3P's right. So if the labor's not progressing the way following the labor curve like you'd expect. You want to think about, you know, the pelvis, the passenger and the power. The only thing in those three that you can change is the power and that's again where the labor augmentation comes into play. Being able to add oxytocin so that if the contractions are not strong enough, you can sometimes augment that to increase the power. Obviously you can't change the size of the passenger, but sometimes you can change the position of the passenger. So if the patient's not coming down directly, there are maneuvers you can do to help to move the baby around or do what's called a manual rotation. That's obviously something you'd want to have a discussion with the patient, because that can precipitate sometimes a deceleration or something along those lines that may change the course of Labor. Also remembering that while we traditionally think of the gynecoid pelvis, there are different shapes of the pelvis, and realizing that a baby will move through a pelvis. Based on its size and shape, so gynecoid is most conducive to an OA presentation. There's one that's more oblong, and that's going to facilitate an easier OP delivery. And then there's the heart-shaped pelvis that's going to facilitate a little bit more of a transverse presentation, so that occiput anterior isn't necessarily the best way. It's just what's found most commonly. At least in the population in the United States, and so therefore, traditionally we think of OA position as the is the best position. It's really the right position for the right pelvis. That's what I would say about that. A lot of times students will ask, too, is should you do an episiotomy? And the answer to that is in, in most circumstances, the answer is no. There's pretty good evidence out there now that a natural tear tends to heal better and quicker than an episiotomy. There are some incidences where you may want to do an episiotomy. So for instance, if the fetal heart rate is down and not returning and you think that you need room in the pelvis to, you know, to finish that last part of extension. That may be an indication also, if you're contemplating an operative delivery, a lot of people will consider even doing what's called a medial lateral physiognomy. So the episiotomy it's kind of cut at the 9:00 o'clock. So that if there's going to be a tear, particularly with a forceps delivery, that if that were to extend, it will not extend into this or this kind of directs the extension away from the anal sphincter. Otherwise, in most circumstances, an episiotomy is really not indicated anymore, certainly not routinely. The only other time that I can really think of a time when occasionally episiotomy may be helpful, and so if you had a shoulder dystocia and you needed extra room to get in to deliver the posterior arm, most providers do not need to create an episiotomy to do that, but occasionally that could be an indication for that. Aside from that, we don't recommend routine episiotomies any longer.

Theresa: Thank you everyone for that physics lesson. You did much better than I could have.

Dr. Marzano: I will do is go back to the only thing that I remember from physics is F=MA and from that you can derive any other finding in physics.

Sarena: So then that's really all you need to know if you can. If you can derive everything else right?

Dr. Marzano: F=MA is the answer to everything.

Theresa: Alrighty. And let's do our last case here. So we have a 38 year old G2P1 at 40 and 5 who has admitted to L&D for spontaneous labor. She has had one prior vaginal delivery induced at 41 and 0 for post term dates she presented after spontaneous rupture of membranes. The cervix at 4,90,-1. With adequate contractions, she progressed to the second stage of labor and pushed for 45 minutes before delivering a healthy baby boy. How would you manage the third stage of labor?

Sarena: Yes, the third stage. So this is a very good one to know as a medical student because this is most likely where you'll have opportunity to get hands on involved with the delivery portion of L&D. And so when you are considering the third stage, we'll just have a reminder that that's from the time that the baby is delivered until the delivery of the placenta. There's a couple of ways that you can approach this, and that would be actively or passively approach to placental delivery would be waiting for the umbilical cord to stop pulsating and the placenta to deliver and clamp the cord without additional uterine manipulation or cord traction. The alternative? That would be an active management, including using the uterotonic like the pitocin or oxytocin, after the delivery of the anterior shoulder, delayed cord clamping for fetal well-being, and then the ongoing cord traction slowly until the placenta delivers with the uterine massage afterwards to try to improve uterine tone. The thing that you will most likely be able to participate in as a medical student that you should have an awareness of in order to go through these motions is the active delivery of the placenta, where you as a student can help take the cord and slowly complete the delivery of the placenta with gentle traction on the cord. After you deliver the placenta, it's important to think about if we actually have all these different products from inside the uterus completely out, because otherwise that could lead to the inability of the uterus to clamp down and a postpartum hemorrhage which we have covered thoroughly in another episode. But if you take a look at the placenta and you are able to confirm that it is complete and intact. It doesn't appear to have edges missing or anything you can look at the cord and the fetal membranes and that's the placenta and fetal side of things. Then you want to check for maternal trauma, including vaginal or cervical lacerations or tears. That would be what you would do after you've delivered the placenta.

Dr. Marzano: And I agree with all that. I think you know, cord clamping protocols in general, I think standard of care is moved to at least waiting for a full minute before clamping cord ideally allowing pulsation to stop. Sometimes there's some indications that you may want to do that, particularly like C-section. We at least try to wait for a minute before clamping the cord and cutting, there's some variations on that as well.

Some patients will want cord blood collection for cord blood banking, in which case you need a little bit of a longer segment of core to kind of collect. And obviously if there's an issue with the baby, then you would clamp the cord immediately and hand the baby off to the pediatrician. For instance, the baby that comes out not looking very well, so very floppy or not spontaneously crying, or if there was, you know, heavy meconium, think meconium, that you're worried about the baby first, you know, taking that first breath and kind of, you know, aspirating that those would be all reasons that you might clamp the cord quickly so that the baby's mouth can be cleaned out meconium prior to doing that. If the baby comes out crying, there's certainly no reason that you can’t wait. Only other things I can think of is that the mother was experiencing particularly heavy blood flow with the placenta quickly coming after or something an abruption. Those would be some reasons to kind of move along relatively quickly.

And then this repairing lacerations, just review there's first, second, third and 4th degree lacerations. A first degree laceration is a tear just in the vaginal mucosa, and so typically those are only really repaired

in the event that there's heavy bleeding from that area. If they're hemostatic, they don't always need to be repaired. As you move into your second degree, you can get into the bulbocavernosus muscles, and obviously there's a fairly decent deficit there that will need to be repaired. Third degree gets into the anal sphincter and obviously that will need to be repaired. If that's the case and a fourth degree goes all the way through to the rectal mucosa, and it's important that those are repaired correctly to prevent things like the development of fistula formation. If you don't adequately repair the sphincter, that can cause problems later in life with both fecal incontinence, but as well as flatulence incontinence as well. Quite frequently for women have who have a third or fourth degree, we actually have them follow up in short order, but we call our healthy healing clinic, but could follow up with their provider as well to assess that healing is going appropriately and also kind of go over things like kegels and things to help to strengthen that sphincter as it's healing. We found that interventions early help to prevent there to be more problems later down the road that would need further surgical repair.

Theresa: And I think it's really important to know those things because certainly in my limited experience, I think a lot of women kind of as they get close to delivery and are at their prenatal visits might ask what your cord clamping protocols are at your institution, or have those sorts of things that they want in their birth plan. So it's important to kind of know what your standard practice is or what you can offer.

Dr. Marzano: Yeah, and there's not really necessarily a right or wrong answer on that. I think working again doing kind of shared decision making with the patient and certainly you know again if the baby is looking fine the baby can come out come right up onto the chest so that the baby is getting skin and skin contact and can wait for the cord to stop pulsating.

Theresa: And I guess on the flip side too, a lot of you know pregnant people are worried about the laceration part. So kind of talking through your you know that you guys would repair it or what, you know what the postpartum plan can be for any laceration, reassure some people as well.

Dr. Marzano: And certainly the most common thing that we see is a second degree laceration. So I explain to patients is kind of a normal expectation especially for a first time mom in that process. If someone's a grandmultip, they're probably gonna have enough room there that they probably won't necessarily have a laceration.

Sarena: OK. Well, I believe that this wraps up all of our vignettes for today on our episode on normal labor. To our audience, thank you for tuning in. Subscribe to UltraSounds wherever you get your podcasts. Thank you to Dr. Marzano for participating. For more high yield topic reviews and recent news, you can follow us on Instagram or Twitter at OBGYN_delivered or find more topic review outlines and free question banks at our website www.obgyndelivered.com. And always remember, we put in the labor so you can deliver.