Essays and Commentaries

A Teachable Moment

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The mother had been pushing for 3 hours and was close to exhaustion. The resident had been in and out of the room half a dozen times, trying to attend to this woman as well as several others on the ward whose labors were moving rapidly. While waiting in the labor and delivery area, I had used the spare time to prepare for a month's worth of lectures. But the baby still had not come out, and we had all had enough. I asked the nurse to get the vacuum. The resident's eyes gleamed with that distinct "This is great—I am going to get a procedure" look.

The resident performed the vacuum-assisted delivery flawlessly, and the baby came out with just two more contractions. As expected, the mother had some birth trauma to her perineum, but it was nothing complicated, and the resident turned all of his attention to the repair. I turned my attention to the little newborn girl, now being dried off by an obstetric nurse and lying in a warming bed.

I did a cursory exam on the infant. The baby's skin color was a little bluish gray, and the breath sounds had that distinct, wet crackling of a lung transitioning to air. But the heart sounded good, and the infant was moving all her limbs vigorously and waving her tiny fists defiantly at life. Because of the baby's color, the nurse removed the plastic wrapping from a small mask, I turned on the oxygen spigot, and together we blew some "ohs" past the child's flaring nostrils for a minute or so. Once her skin turned pink, we wrapped her up in baby blankets, put a yellow cap on her head, and handed her to her anxious father.

The new dad held the infant close to the new mother's face as my resident continued to work on his patient's perineal repair. After a few minutes, the obstetrics nurse retrieved the infant for the standard duties of giving a vitamin K shot and placing antibiotic ointment in the eyes. But, when placed back on the warming bed and unwrapped, the baby's skin was again bluish gray. The nurse and I repeated the drill with the blow-by oxygen. The infant immediately turned pink and stayed pink for a bit when the oxygen was shut off. Things looked good, so the nurse gave the baby a quick bath. When the bath was done, however, the baby had that bluish tint yet again.

Now I was worried. As we turned on the oxygen for a third time, I asked the obstetrics nurse to call someone from the neonatology ward to come help us out. I was beginning to think we might need to transfer the infant to the special care nursery for continuous oxygen therapy. A minute later, one of the hospital's new neonatology nurses calmly sauntered in. "Hello, my name's Anita. What's going on?" I quickly related recent events. She took one look at the baby and said, "Looks like persistent fetal circulation."

Fetal circulation. It had been 30 years since I first heard that phrase in an animal physiology class in college. I had been fascinated by how blood is shunted around the lungs before birth; but as soon as a baby is born, a complex series of valves and pressure changes reroutes the entire output of the heart directly through the newly expanded lungs.

"Is there a heart murmur?" Anita asked. I told her that I had not heard one. She quickly listened to the baby's heart and lungs with her own stethoscope. "Nope," she said, now thinking out loud rather than speaking to anyone in particular. "It sounds to me like there's only one tiny part of the lungs aerating." I looked more closely at the infant. I had delivered hundreds of infants and watched an equal or greater number of infant resuscitations. This infant clearly had two of the three familiar signs of distress: a subtle flaring of the nostrils and retraction of the skin above the collar bones on inspiration. The third sign was absent. The infant was not "grunting," that is, closing the glottis briefly during exhalation to generate back pressure into the under-inflated lungs.

Anita chatted amiably while she fiddled with the oxygen apparatus. "I think this will respond to a bit of PEEP." The concept of

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PEEP—positive end expiratory pressure—came into clinical use during my residency, and I recalled dialing up gauges on adult ventilators in university hospital intensive care units. At the time, PEEP had seemed like nothing more than another name on a ventilator knob. When you turned the knob, the blood gases changed. It was perhaps important as a concept, but it was not very interesting to watch.

Anita now had the baby repositioned on the warming table and the oxygen mask firmly sealed over the infant's mouth and nose. She dialed up the oxygen delivery rate to 10 liters per minute, and the little red pressure gauge on the mask quickly pointed to 5 millimeters of mercury. Anita commented, "Now let's just see how that works." I had only seen infants with this sort of persistent distress bag ventilated, which always seemed like a rough way to treat a newborn. It could also potentially blow out a lung. But here, Anita allowed only a small amount of pressure to do the work for her.

What happened next was subtle but dramatic to the experienced eye. Immediately, the baby's respiratory rate jumped from 40 to 60 breaths per minute, and her ribs, which until now had been immobile, began to expand and contract. While initially moving just a little air, with every breath the excursions of the chest wall rapidly increased. In fact, it took only about a minute for the PEEP to do its work: the lungs billowed, respiratory muscles cycled in concert, and the skin glowed pink from head to toe. The effect was so solid, so—obvious. I had the odd sensation that I could almost see what was happening underneath the skin—alveoli opening, the pulmonary artery pressure dropping, and blood flow rerouting through the heart and great vessels. Suddenly, I felt like I was back in school, watching a professor flamboyantly demonstrate a universal force like gravity or electromagnetism.

At this point, Anita set the oxygen down and propped the baby in a sitting position. Immediately the child began to spit clear bubbles. "There's that good old surfactant," she said, directing this particular comment to the baby. Surfactant is the "miracle detergent" that keeps air sacs in the lungs from deflating once air finally pops them open. I realized that I had seen babies spitting bubbles during resuscitations for years and had never understood what a good sign they could be. I had always thought the bubbles were funny. No one had ever told me that they might also be important.

I also realized that for the last few minutes I had been quite anxious, but things were going to be all right for this baby and this family after all. Anita, my inadvertent teacher, had saved the day. "What I think we need to do next," Anita said, "is some skin to skin time. Babies will synchronize their breathing with their mom's breathing. It's really helpful when they have a little trouble with transition." I wasn't sure if this was another teaching point or simply million-year-old maternal wisdom. But either way, it sounded like the right thing to do.

So, the naked baby was placed on the mother's bare chest, and the two of them were wrapped together with sheets and blankets. Some day this child must move away from her parents and establish her own life, but thankfully it would not be on her first day. Anita congratulated everyone on the new addition to the family. I thanked Anita for her quick response, invaluable assistance, and most of all, for the beautiful lesson. I had been asked to draw upon prior knowledge and experience, apply first principles to a novel clinical situation, and witness an excellent outcome with an immediate real-world benefit.

Just as Anita stepped out of the room, the resident finally finished the laceration repair. The job had been slow but meticulous and would serve his patient well. He peeked under the blankets to get his first good look at the now-healthy baby and then shook hands with the mother and the father. After completing some paperwork and computer documentation, we stepped out of the room to debrief.

We chatted for about 10 minutes about the case. As it turned out, this was the first time the resident had been able to use a vacuum in a delivery without it popping off the baby's head. It was also the first time he had been able to really "see" the tissue planes and complete a second-degree repair with only minimal assistance. He was clearly excited about his developing mastery and summarized his experience with the comment, "That was a great teaching case! Thanks for coming in." He paused for a moment and then added, "You know, I can't imagine being a faculty member. You have to just stand around while we get to do all the good stuff."

"No problem," I said, smiling. Fortunately, in the abundance of the teaching hospital, there is enough good stuff for everyone.

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