Alexander's Preterm Birth

How Constructive Conscious Control (CCC)[1] solved his breathing issue and how CCC holds the key to breathing for preterm[2] infants today

Jennifer Kellow

In 1984, seven years into my career as a nurse, I was working at a New York hospital, in the biggest neonatal intensive care unit (NICU) on the east coast of the United States. In addition to the infants who came from our labour and delivery room, preterm infants were transferred to our NICU from five outlying hospitals. The infants under our care were so fragile, a nurse had to be beside them 24 hours a day; they were never left unattended. It was not unusual for my nursing cohorts to see an infant die every week from complications due to its preterm birth.

That year, I began Alexander Technique lessons and was able to practise projecting directions for a new use of myself while inhibiting my habitual use.[3] I carried out this practice during my shifts in the hospital. I soon began to notice almost miraculous changes in my tiny patients. I observed the following: infants who had not been able to breathe without supplemental oxygen and other medical interventions could suddenly breathe room air; infants who had never been able to eat could bottle- and breast-feed; and those infants who had been unable to stay asleep could sleep soundly. The only change that had occurred was the applied directing of my use that I was learning in Alexander lessons.

I related these events to my Alexander Technique teacher, Anne Waxman, and asked if she thought these results were due to the Alexander Technique. She replied, 'I don't know, but I think you should become an Alexander teacher and find out.' I did, and so began a personal exploration into the effect of the Alexander Technique on preterm infants.

Baby Duncan[4]

Duncan was born earlier than term, with a large hole in his heart. The oxygenated blood in his heart mixed, as it should not have done, with blood filled with carbon dioxide. When he was upset or feeding, his skin turned from pink to a deep blue colour that indicated decreased oxygen in his body. The surgery needed to repair his heart was dependent on his being able to gain weight, but when he ate, he turned blue. To remedy this situation, we directed oxygen-enriched air toward his face during feeding time.

As I directed my use of myself while feeding and holding Duncan, I looked at his oxygen monitor and noticed that his oxygen level had climbed too high. I turned off the oxygen, and he remained pink. I resumed feeding him, and he remained pink. This was improbable, seemingly impossible, given the size of the hole in his heart.

He remained pink throughout the feeding. His mother, nervously watching from across the room, had been afraid to hold or even touch him since his birth two weeks prior. Now, she rushed forward to hold her baby for the first time.

For the past twenty-four years, I have used Alexander's process of CCC while caring for preterm infants at all stages of development in the NICU, with infants and toddlers with severe brain injury and with infants born preterm and considered healthy who later developed asthma and developmental delay.

I wish to stress that as Alexander teachers, we possess something unique and profound. Our skill of constructive conscious control (CCC) could benefit infants with problems resulting from preterm birth.

My use of CCC while caring for these children is distinct from any other therapy or treatment these children receive. By using this process, I make a change in the quality of my coordination and movement. I consciously alter the habitual relationship of my head and neck: the primary control.[5] This change in myself then effects a change in the infant or child's coordination and movement.

Alexander himself was born preterm[6] and was a sickly child until he was between the ages of eight and nine years[7], with recurrent respiratory issues.[8] In his book, *The Use of the Self,* he said:

> After I had worked on this plan for a considerable time, I became free from my tendency to revert to my wrong habitual use in reciting, and the marked effect of this upon my functioning convinced me that I was at last on the right track, for once free from this tendency, I also became free from the throat and vocal trouble and from the respiratory and nasal difficulties with which I had been beset from birth.[9]

I believe that when Alexander solved the respiratory issues for himself, he solved it for all preterm infants.

Frederick Matthias Alexander was born 20 January 1869 at seven months gestation.[10]

Foetal development is measured in weeks. An infant is considered full-term at 37 to 42 weeks, and any infant born prior to 37 weeks is considered preterm.[11] Alexander would have been 30 to 34 weeks' gestation at birth and was therefore preterm. For many years it has been standard medical practice to give all infants a detailed physical examination at birth to determine the exact week of gestation.[12] Alexander's symptoms of respiratory problems and feeding difficulties[13] are classic issues of infants born before 34 weeks.[14]

One of the last organ systems to develop is that of the lungs. Before 25 to 28 weeks' gestation, the lungs are not sufficiently developed to support breathing outside the womb.[15] F. M. Alexander, born at 30 to 34 weeks of gestation, would have just passed the stage of development where extra-uterine breathing became possible. Born before the advent of the field of neonatology, the infant Alexander survived only by his mettle and because of the skill and devotion of his mother.[16]

Here is a diagram (fig. 1) of the last two of the four stages of foetal lung development.[17] Between 24 weeks' gestation and full-term the lungs are in the third, or terminal sac, stage; from full-term to the age of eight years, the lungs are in the fourth, or

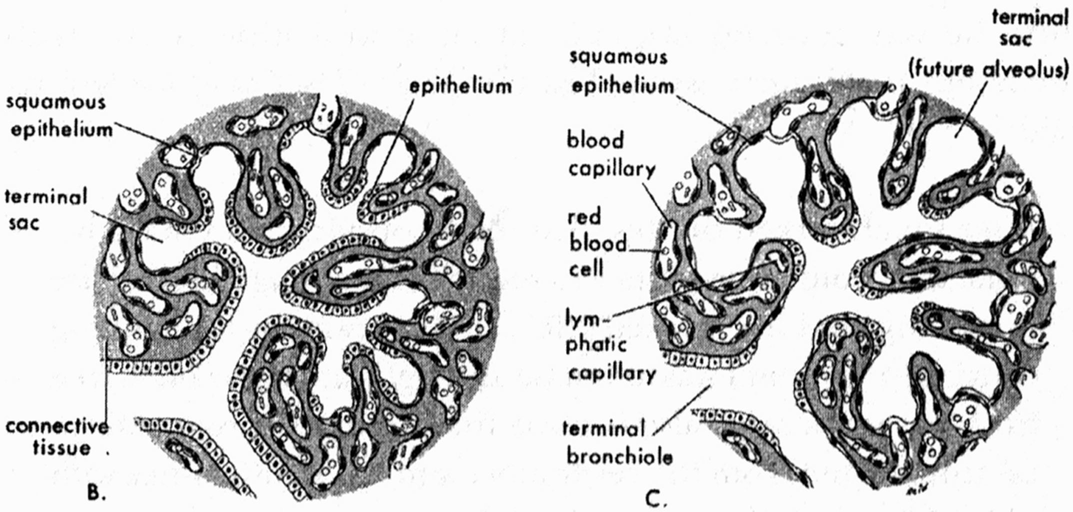

Fig. 1 Foetal lung development. B. Early terminal sac period (about 26 weeks). C. Newborn infant. Early alveolar period. Note the thin alveolar-capillary(respiratory) membrane. Note also that some of the capillaries have begun to bulge into the terminal sacs. (From Moore 1977.)

alveolar, stage. As previously stated, Alexander's health did not improve until he was between eight and nine years old, the very end of lung development. At birth, Alexander's lungs would have been slightly more mature than the 26-week lung pictured here, but not as advanced as the picture of the full-term lung. There are several significant differences between these two stages of lung development – differences that affect the breathing of a preterm baby. The earlier the infant is born, the more severe the respiratory issue.

Of the differences between the last two stages of lung development, the first I want to point out is in the lining, or membrane of the lung tissue. At the start of the third, the terminal sac stage, much of the lining of the lung is still referred to as cuboidal epithelium, as it is composed of cube-shaped cells which act as a wall rather than a flexible, permeable membrane. Breathing requires the exchange of the gases oxygen (O_2) and carbon dioxide (CO_2) through a membrane. Attempting to breathe with this thick epithelium is like blowing up a thick balloon without first stretching it. As the lungs develop, more of the cells that compose this lining change to squamous (flat) cells, thinning it and making it an ideal membrane for gas exchange.

The second difference is in the size of the airways and the air sacs. The smaller and narrower the airways are, as in a preterm infant, the less air can enter the lung. The smaller the air sacs, the smaller their surface area; thus, fewer blood capillaries can meet the air sacs for gas exchange.

The third difference in the preterm lung is that there are fewer air sacs than in a full-term lung. With each week of gestation, the size and number of airways and air sacs increase, as does the number of blood capillaries, so that more gas exchange can occur.

The last and most significant difference in the lung of a preterm infant that I would like to mention is in the production of surfactant. The lung's surfactant functions in the same way as soap added to a bottle of water. The soap decreases the surface tension of the fluid in relation to the air. If air is pumped through that soapy liquid (as for example in the child's toy Magic Bubbles), bubbles can be formed and blown away. The soap prevents the bubbles from collapsing. In the lung, surfactant helps the lining to remain flexible and inflatable, and prevents the airs sacs from collapsing when we exhale. Surfactant changes the surface tension of the moist air sac in relation to the air, so the air sac does not collapse, in the same way soap keeps a bubble intact as it floats on the air.[18] The continual production of surfactant depends on oxygen.[19] With each week of gestation after 34 weeks the infant lung has a greater capacity for consistent levels of oxygen and therefore, surfactant.[20]

Therefore, in the preterm lung, the airways and air sacs are smaller and fewer, with less surface area to interface with capillaries, the lining of the lungs is thicker and less conducive to gas exchange, and the air sacs begin to collapse due to the lack of surfactant. This results in less oxygen coming into the body. The diminished level of oxygen decreases the production of surfactant, and the infant is in an increasingly severe struggle to breathe and survive.[21] The earlier the infant's gestational age, the less developed his lungs and the greater the struggle to breathe.

Birth demands rapid adaptation to an environment that is very different from the womb. We go from darkness to light, fluid to air, a tight and compact womb to wide-open space, and non-breathing to breathing.

The need for rapid adaptation is even greater in the preterm infant, who must develop, in hours, systems that would normally have taken weeks in the womb. In the NICU, we closely monitor infants for the first 72 hours of life, this time of rapid adaptation. The infant's progress in that time period tells us how he is likely to fare for the remainder of his hospital stay. If the infant needs neither oxygen nor artificial ventilation during that time period, then he will probably not need either during his entire hospitalisation, and his hospital stay will not be long. If the baby grows tired from the work of breathing in the first few hours of life and requires increasingly greater levels of respiratory support with oxygen or a ventilator, his hospital course will be considerably longer.

How might it feel to breathe while one's air sacs are collapsing? Imagine taking that thick balloon, blowing it up on one breath, and then letting the air out. Repeat again and again… for 72 hours. How do preterm babies keep on breathing?

Initially the infant will attempt to keep breathing by grunting during exhalation.[22] Grunting increases the pressure in the baby's lungs and keeps the air sacs open. This is similar to you squeezing the near end of that thick balloon in order to keep the air enclosed until you can blow in a second breath. We hear this little grunt each time the baby exhales. This is our first sign that the air sacs are collapsing. To produce a grunt, the infant depresses her larynx. The effort of grunting leads to pulling in air through her nose when inhaling, and we see nasal flaring. Infants are obligate nose breathers, meaning they breathe through their nose rather than through their mouth and nose. This is because the structures at the back of their throat are designed to let them drink lying on their backs without aspirating fluid into their lungs. As babies gain head control and sit up, these structures undergo a change, and they lose this ability. In adults, who can inhale through both nose and mouth, air forcibly pulled into the lungs during inhalation will be seen as mild nasal flaring and heard as a gasp.

The third sign we see in an infant who is experiencing increased respiratory distress (which happens when a larger number of air sacs are collapsing at the end of each exhalation) is the use of accessory respiratory muscles located in the neck. These muscles raise the chest and narrow the back. With this added effort, we see contraction of the infant's intercostal muscles, or 'rib retraction'.[23]

This is the same description Alexander gave us of his reciting in the mirror. He noticed he depressed his larynx, raised his chest, narrowed his back and pulled his head back and down. His friends told him that when he was reciting, they could hear him gasp at the back of the theatre. Eventually he discovered the demand of reciting was exaggerating his habit of speaking.[24] *I assert that this habit was actually a pattern of respiratory distress he had since birth as a preterm infant with incomplete lung development.*

Why didn't Alexander adopt an easier breathing pattern (normal breathing) after his lungs had developed more air sacs and thinner walls to those sacs, and begun producing adequate surfactant? I believe that is because he had *never experienced a normal breath.*

To investigate the experience of breathing for healthy adults born preterm, I interviewed people who had been born preterm in the 1940s – 1970s, before the advent of infant ventilators. These individuals were interviewed separately. None suffered from asthma or any other respiratory condition. They had no anxiety or depressive disorders. They each told me of the struggle it is to breathe. In their own words, 'Not breathing is a piece of cake, it is taking a breath at all that is the hard part', 'I have to think about breathing and if you have to think about breathing, it is a Sisyphean task', and 'Oh, you know what I do with that breathing thing? I just pretend I died already, and then I can breathe'.[25]

If this is the breathing experience for *healthy* adults born preterm, how do you imagine breathing is for those adults born preterm who develop asthma and other respiratory conditions?

It is my contention that preterm infants develop a breathing pattern based on their struggle to breathe in the first 72 hours of life. They do not breathe normally when their lungs mature because they already have a breathing pattern that supports their survival. The adaptive pattern works; they breathe, they live. Successful habits survive. This pattern becomes 'normal' for them. To experience truly normal breathing, they would first have to stop breathing the way they are already breathing.

Do preterm infants who have received oxygen and ventilation breathe normally? Technology to the rescue?

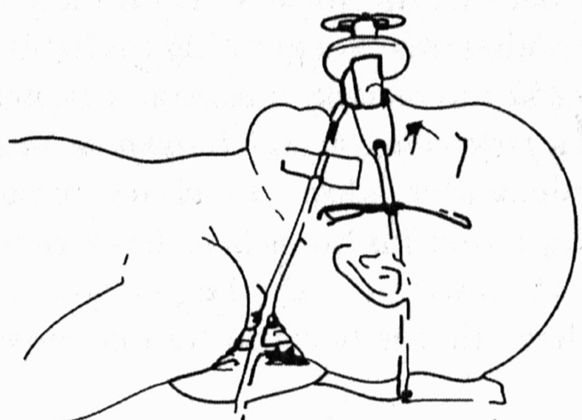

Fig. 2 Head–neck alignment with respiratory support.

Here is a picture (fig. 2) of the position of the infant's head and neck when the infant is on respiratory support, as most preterm infants are at some point in the first three days of life. Many remain in this head–neck relationship for weeks or even months. The rotation of the head back and down creates the greatest airway opening, so that a tube can be passed into the lungs and artificial breaths delivered. Even when tubes are only inserted in the nose to deliver oxygen and pressure, against which the baby exhales, his head must remain rotated back and down. The trachea or windpipe of the preterm infant is so soft that if his head were set forward in relation to the spine, he could occlude his own airway.

Technology in the field of neonatology is always advancing, allowing ever younger infants to survive. Since the widespread use of synthetic surfactant began in 1990, about 50% more infants, born 34 weeks and earlier, survive.[26] Included in this percentage is an increased number of infants born between 24–26 weeks gestation.[27] This suggests many more 'Alexanders' – many more adults with preterm breathing patterns – are surviving. (Recently, it has become common practice with the youngest preterm infants to use vibration from a machine called an oscillator to stimulate gas exchange in the lungs, so that no apparatus need be inserted into an infant's nose or mouth. In my experience, although the oscillator helps infants adapt to breathing independently, those infants' subsequent breathing and eating is interrupted by frequent and severe spasms of the diaphragm.)

How can we help infants to experience normal breathing? We can't talk them into it. We can't teach them to breathe differently by holding them against our chests. And after the use of all our technology, they still demonstrate an exaggerated breathing pattern perhaps reinforced by the very machines used to save them. As more and younger infants survive their preterm births, the incidence of asthma and respiratory issues in their toddler years increases.[28]

What is the solution? What will change the course of their lives?

The solution is inhibition of the breathing pattern by which they survived, and the only way for them to learn this is through someone who can demonstrate it to them, someone trained in the process of inhibition of previously acquired habits and the direction of primary control, the process of CCC.

When I approach a baby with whom I am going to work, I begin to direct my use. As I approach the baby, I assess her stability by looking at her and her monitors. If she is stable, I call the baby's name and watch her response. If she becomes distressed, I back away and try later. If she shows an approach cue, such as opening an eye or turning her head toward my voice, I will continue to direct myself as I approach. I then touch her with one hand on her lower ribs. (I have learned never to touch babies' necks, as they may stop breathing or, depending on their medical condition, vomit.)

I continue to direct my use as I would in any Alexander lesson. My goal is to assist the infant in releasing the struggle associated with breathing without imposing my own habitual tension on her.

Some infants pull their head back and down, raise their chest and narrow their backs so insistently that they nearly flip out of your arms when you try to hold them, so strong is their need to keep breathing this way. To allow the caregiver to enfold them, they must challenge this breathing pattern. With their heads thrown back and down, it is nearly impossible for infants to eat without aspirating food into their lungs, swallowing air and vomiting. Should an occupational therapist, nurse, or their mother try to feed this infant, he will resist enfolding and will fight the caretaker with all of his strength, struggling to assume the 'back-and-down' posture. In this battle, the caregiver ends up following the infant, pulling her own head back and down, raising her own chest and narrowing her back. The infant wins that postural battle, but loses the war, because he can now breathe but not eat. Before having the benefit of CCC, I did not realise that I was responding to the infant. I thought my chronic neck tension was just a response to my job in general. Working with Alexander's process, I also began to realise that I was not only pulling my head back and down repeatedly, in response to the infants, but by doing so, I was reinforcing this pattern back to them.

What I have learned to do is to inhibit my immediate response to follow the infants and to remain with my primary control. I direct my neck to be free, allowing lengthening throughout my musculature. Now I am moving more easily than they are, which they respond to by decreasing the effort of their posture. As this continues, they make less and less effort, until they are actually inhibiting that posture and allowing the freedom of their own primary control. Finally, a normal free breath occurs.

This first easy breath generates a curious response in the baby. The eyes widen. The baby looks directly at me, as if in wonder. However, the next moment, in response to my continuing to direct my primary control, the baby protests and goes back to how she was breathing before, and may even use her tiny hand to push me away. I withdraw, pause, and wait for a cue to approach her. A turning of her head or looking toward me may communicate an infant's desire for me to engage with her. Then, she again follows the kinaesthetic example of my primary control and breathes easily, now letting her primary control dictate her breathing.

Once babies have followed this lead, there is progress. The infants need less respiratory support, and they sleep deeply despite the surrounding noise of the NICU. The eat quickly, in greater quantity, with less regurgitation. However, the longer they have been outside the womb, the more they resist making the change in their breathing. In the first few months of life, it can take one hour for me to help a baby learn to inhibit this breathing pattern and continue with normal breathing. With babies older than five months, this change may take several lessons. At one year of age, months of work may be required before they are willing to give up their ingrained pattern of breathing.

Once the change in breathing has been established, I put the baby in the mother's arms, and the baby's calm breathing calms the mother. I work with the mother's neck and back to help her inhibit the tension that generally occurs in response to the sounds of alarms in the NICU, and help her to turn all her attention to her baby, who is now demonstrating that her precious infant has achieved normal breathing. Together, they begin to breathe calmly and to interact the way they would have, had the baby been born full-term and not been separated from the mother.

Baby Christopher[29]

Christopher was born at 25 weeks gestation. He had been in the NICU for more than three months, with a worsening prognosis.

He was on the respirator with high levels of oxygen, pressure and artificial breaths, and was prone to recurrent life-threatening infections. His parents were deeply involved with him, and some of the nurses were heard to say that it was only the parents' will that was keeping Christopher alive.

When Christopher was assigned to me as my patient, he was in a coma. He had not had a bowel movement in over two weeks, and had not urinated for 24 hours. His liver was enlarged, his body was swollen, and his abdomen was extremely distended and tight, with the skin over it shiny in appearance. He had been resuscitated thirteen times in the preceding 24 hours. The report given me was 'expect him to die today'.

My first goal was to make him comfortable, so he could rest and have a chance to stabilise. Since he was unresponsive, I decided to use my body as a feedback mechanism to tell me whether or not he was at rest. I directed my neck to be free in response to my own tension when in contact with him. Thereafter, when my neck returned to tension, I assumed that it was happening in response to his tension. I then looked to the environment to see what might be causing him distress, and addressed the issue I found, such as a bright light reflecting on his face, or an increase in the sound level in the room. When I was able to continue to allow my neck to be free while near Christopher, I took it as a cue that he was at rest. I continued in this manner for a twelve-hour period.

Working this way, I made changes such as deterring other personnel from disturbing him until after he had rested an hour or two, and timing my nursing interventions in the same manner. By the afternoon his heart, breath rate and blood pressure had stabilised. When my neck was free and I approached him, I did not notice an increase in tension in my neck. At this point, I started a light fingertip touch in concentric circles to his distended abdomen in order to stimulate sensory nerves in the skin related to peristalsis (intestinal movement). As I traced the third circle on his abdomen, my neck began to tense. I withdrew my touch and moved away from him. An hour later, I approached him for a second contact. Again, I traced three circles before tension returned to my neck. This time, however, I could easily allow my neck to be free and I therefore thought he might have returned to a quiet, calm state. Soon, I could trace many more circles in an ever-widening pattern on his abdomen. I did this every hour on the hour while taking his vital signs and completing other nursing tasks, continuing to use my neck tension as a guide to his comfort. Other than that, I left him alone, not interacting with him in any way.

The next day, I resumed my plan of care of using my neck muscles as a guide to his experience. By the afternoon his intestines began to work and he had a bowel movement. His father was ecstatic.

The next day, I was told that both his bowel and his kidneys were working, and he was so stable that he was given to a student nurse as her patient for the day. He had also come out of his coma and was responsive to touch.

Christopher was sent home two weeks later, with no respiratory or other problems apart from a slightly enlarged liver that was expected to heal without further medical care.

All of my findings are the result of my own clinical observations. I have compiled enough anecdotal case notes to support my observations, but have not yet proven them scientifically. Although I am certain that Alexander's process of CCC is the determining factor in these infants' changes, I have not tested my findings using an Alexander teacher other than me.

I believe I have changed the course of many infants' lives using Alexander's discoveries.

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