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Comparison of Occupational Therapy and Osteopathic Manipulative Treatment in Neonatal Intensive Care Units

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"For this discussion, we will focus on the use of Occupational Therapy (OT) and Osteopathic Manipulative Treatment (OMT) for improving breast or bottle feeding, promoting weight gain, reducing reflux and jaundice, regulating body temperature, achieving developmental milestones, correcting plagiocephaly, and reducing the length of stay of premature babies in the NICU."

Introduction

Premature babies are those born before 37 weeks gestation and can be further characterized as late preterm (34-37 weeks), moderate preterm (32-34 weeks), very preterm (28-32 weeks), and extremely preterm (less than 28 weeks) (4). Due to their smaller size and low birthweight (less than 2,500 grams or 5 lbs. 8 oz), these babies experience complications such as difficulty feeding, hypothermia, anemia, hypoglycemia, apnea, and respiratory distress from surfactant deficiency, infection, necrotizing enterocolitis, patent ductus arteriosus, retinopathy, and increased risk of intraventricular hemorrhage (1,2). For this discussion, we will focus on the use of Occupational Therapy (OT) and Osteopathic Manipulative Treatment (OMT) for improving breast or bottle feeding, promoting weight gain, reducing reflux and jaundice, regulating body temperature, achieving developmental milestones, correcting plagiocephaly, and reducing the length of stay of premature babies in the NICU. Many premature infants born before 35 weeks gestation have oral feeding difficulties and cannot latch properly, which makes it harder for them to gain weight (2). A low birth weight contributes to 60 to 80% of all neonatal deaths due to increased susceptibility to infection, hypothermia, and hypoxemia (3, 21). According to guidelines set by the *American Academy of Pediatrics*, the three major physiologic criteria for hospital discharge of preterm infants are autonomous oral feeding that results in good weight gain, maintenance of appropriate body temperature in a home environment, and mature respiratory control for sufficient oxygenation (5). Thus, these clinical indicators allow us to assess OT and OMT's effectiveness in achieving these criteria and supporting the development of preterm infants.

Occupational Therapy

Occupational therapists working in the NICU have the unique opportunity to provide habilitation to a fragile patient population. The occupational therapy objectives are to make proactive changes to the environment to promote healthy development and optimal growth, help organize behaviors, and foster trust and attachment with the caregiver (60, 61). To accomplish these goals, *The American Journal of Occupational Therapy* states that "knowledge of neonatal neurodevelopment, neurobehavioral organization, the musculoskeletal system, and advanced age-appropriate feeding practices and techniques is essential" (6).

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OT interventions enhance growth by helping premature infants acquire developmental skills, such as feeding at the breast or bottle. Each intervention also supports calm and organized behavior for improved sleep, which leads to weight gain in these patients. Feeding interventions emphasize positive experiences to increase dietary intake and enhance the infant's suck, swallow, and breathing coordination. The goal is for them to receive full oral feeds via breast or bottle and be discharged home (22). In order to monitor this progress, the day-to-day assessment examines the infant's muscle tone, reflexes, behavioral responses, and positive feeding experiences. Parent education is provided during all these activities as well. Techniques commonly used by occupational therapists include infant touch and massage, myofascial release, and assessment of feeding skills with a focus on caregiver education (23). Occupational therapists also use neurodevelopmental treatment to enhance proper positioning if the baby has thumb adduction due to increased tone or club feet. For these issues, soft splints are recommended during the NICU stay, and an orthopedics referral is given at discharge.

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Neonatal Massage

Occupational therapists use neonatal massage to enhance the parasympathetic nervous system, which improves circulation and digestion. By increasing vagal activity and gastric motility, infant massage helps promote weight gain (26). It also stimulates lymphatic circulation to boost immune function, regulates sleep-wake cycles to increase alertness, provides neuroprotection, and decreases stress hormones to improve parent-infant attachment. Educating caregivers about performing infant massage when the baby is stable (weight above 1500 grams) improves their confidence and encourages more direct participation in the neonate's care. Overall, this technique helps decrease the length of stay in the NICU (23, 25). In order to perform a neonatal massage, different motions can be utilized. The most common motion is gliding, which relaxes and stretches the muscles. It is performed by keeping the fingers together and gliding the hand down along the body's or limb's span while the palmar side maintains contact. Another motion is kneading, using the finger pads to apply firm strokes to the area. Both hands act similarly to kneading dough (25, 27). Contraindications to neonatal massage include infection, bleeding, skin disorders, autonomic medical instability, and fractured bones (26). Sick preterm infants, such as those suffering from necrotizing enterocolitis, often have poor tolerance to external stimulation and require minimal handling care. It is imperative to avoid fluctuations in blood pressure and unsynchronized breathing with a ventilator that can be induced by handling (26).

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Figure 1: Neonatal massage depicting the gliding motion. Source: Emanate Health Queen of the Valley Hospital, NICU

Myofascial Release

An additional practice beneficial for babies in the NICU is myofascial release (MFR). Occupational therapists can use myofascial release with additional, specialized training. This technique utilizes fascia, the connective tissue that forms a continuous three-dimensional web throughout the body, to enhance function and support. Fascia envelops every muscle, nerve, blood vessel, and organ (28). Premature infants tend to overuse muscles due to poor positioning, which can develop tight fascia that further worsens their posture. MFR aims to increase tone and range of motion and decrease asymmetry and tenderness due to irritability. In order to perform this hands-on technique, the restriction is identified, and gentle pressure is slowly applied in that direction to lengthen the fascia. The stretch is held until a release is felt, and then there is a reassessment of the tissue's mobility. The goal of stretching fascia is to break down abnormal collagenous crosslinks and allow relaxation by reducing molecular colloidal friction drag. Contraindications to MFR are hypotonia, systemic or local infection, open wounds, or if the neonate is febrile. (15, 16, 29).

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Figure 2a: Assessment of shoulder to examine tone and identify the restrictive barrier, shown in a superior direction. Figure 2b: Treatment of shoulder, using indirect MFR to apply a gentle pressure inferiorly into the position of ease. Source: Emanate Health Queen of the Valley Hospital, NICU

Neurodevelopmental Treatment

Neurodevelopmental treatment reduces abnormal postures and movement patterns in premature infants. The goal is to encourage them to normalize their posture and improve sensory stimulation (32, 33). Treatment is based on the concept that muscle tone is changeable and dictates posture and coordination (31). A common issue for neonates is that they demonstrate thumb adduction and maintain this position due to increased tone. Occupational therapists will passively re-position the thumb and improve overall movement. Soft thumb splints can support the desired position when the baby is sleeping (31).

Another problem that can occur for premature infants is club feet. In treating this, the first step is to assess ankle movement to see if it can be brought to the midline. Placing the ankle and hip at midline through a passive range of motion promotes eversion, and this position should be maintained when the baby is at rest. If the therapist cannot bring the ankle to the midline, re-positioning with kinesiotape may improve circulation (31, 32). For both scenarios, follow-up care with Orthopedics is required. However, caregiver education is the most important factor in the treatment plan for thumb adduction and club feet. It is essential to teach parents about proper positioning, home exercise plans, and how to provide a passive range of motion throughout the day, depending on the baby's adjusted age (30, 31).

Kangaroo Care

Kangaroo Mother Care is a technique in which the baby is positioned in skin-to-skin contact with the caregiver's chest for variable periods. Occupational therapists utilize this technique in the NICU to help promote breastfeeding for premature infants. Furthermore, skin-to-skin care significantly increases the mother's milk production and is associated with a longer duration of breastfeeding (24). It has also reduced maternal stress, anxiety, and postpartum depression. This is significant because 28 to 51% of parents with babies admitted to the NICU reported symptoms of acute stress and post-traumatic stress disorder (7). Kangaroo care increases parental satisfaction and improves sleep organization and quiet sleep duration for neonates. It has also decreased pain perception during procedures, such as endotracheal tube placement or other forms of life-saving therapy (24).

Figure 3: Mother utilizing "kangaroo care" or skin-to-skin contact with the neonate. Source: Emanate Health Queen of the Valley Hospital, NICU

In summary, occupational therapy for premature infants includes the following modalities: neonatal massage, myofascial release, neurodevelopmental treatment, skin-to-skin, and most impor-

tantly, caregiver education. These treatments focus on weight gain, improving oral feeding, decreasing hospital length of stay, enhancing neuroprotection, and promoting parental bonding. Parent education for developmental care protocols is emphasized because it builds their confidence when interacting with their infant.

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Osteopathic Manipulative Treatment

Osteopathic physicians are trained to treat musculoskeletal disorders by using manual contact to correct structural imbalances, improve circulation, and relieve pain caused by muscle, bone, or tendon misalignment (8). Using this hands-on approach, Osteopathic Manipulative Medicine (OMM) promotes the body's intrinsic ability for self-healing. Osteopathic Manipulative Treatment (OMT) uses various forms of neuromuscular stimulation, ranging from passive massage to applying an active force to manipulate the muscles, soft tissue, and joints (8). The objectives of OMT for premature infants during the first few days of life are to gain weight, improve latching and physiological function, reduce reflux and constipation, increase range of motion, treat jaundice, and achieve homeostasis, such as temperature regulation if it has been altered by somatic dysfunction (2,9,19, 64). OMT serves as complementary medicine to help reduce the newborns' length of stay in the NICU (10). As these hospitalized infants reach term gestational age, OMT can also assist in reaching developmental milestones or improve cosmetic appearance for positional plagiocephaly and torticollis (9). The immediate indications of OMT's success are macroscopic changes to the affected area discovered on re-examination (11). More gradual indications of success, such as weight gain or improved oral feeding, may occur 1-2 weeks after treatment (2,9).

OMT begins with the osteopathic structural exam, which helps the physician identify somatic dysfunction (11). Somatic dysfunction is "restriction in joints, muscles, and fascia that can affect blood supply, lymph flow, and nervous system function" (11). It is associated with abnormal palpatory findings, known as tissue texture changes, asymmetry, altered range of motion, and tenderness (TART). Acute somatic dysfunction is characterized by the affected area's warm, erythematous, boggy tissue. Restriction can cause sharp pain and asymmetry without anatomic compensation. Chronic somatic dysfunction can cause tissue to be cool, dry, or ropey. Dull pain and asymmetry with anatomic compensation are characteristic of this dysfunction (11). OMT techniques used for premature infants focus on improving acute somatic dysfunction.

Due to the delicate nature of preterm infants in NICU, the techniques utilized are often indirect and passive. An indirect technique moves the restriction into a position of ease, and a passive technique does not involve the patient in the treatment. Instead, the physician manipulates the dysfunction without incorporating patient assistance (12). Commonly used indirect and passive techniques in this population are soft tissue, myofascial release (MFR), and balanced ligamentous tension (BLT) (9,18). These techniques have been shown to improve oxygenation, achieve developmental milestones, and reduce symptoms of jaundice, GERD, and torticollis (17, 35, 37, 38, 39, 43). These gentle techniques can be combined with Cranial OMM techniques, such as v-spread and condylar decompression, to treat infants with positional plagiocephaly and latching issues, respectively (44,45, 46, 48).

Soft Tissue

The soft tissue of the thoracic spine is similar to the gliding motion used in neonatal massage by occupational therapists. While the patient lies prone, the osteopathic physician will first assess the paraspinal musculature for TART changes, indicating somatic dysfunction. Upon identifying the somatic dysfunction, the physician can employ a unilateral prone pressure to the area, known as perpendicular stretching. This is done by placing the thenar eminence lateral to the spinous processes of the vertebrae and contacting the medial border of the injured paraspinal tissue. The other hand is placed on top for additional support. Then, anterior and lateral pressure is applied to induce perpendicular stretch. This force can be a sustained pressure until tissue release is noted or rhythmic kneading for a few seconds at a time (41).

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Almost all premature infants born less than 35 weeks gestation will have elevated total serum and plasma bilirubin levels. Most neonates experience physiologic jaundice in the first few days of life, which is typically harmless. However, jaundice seen in premature infants can be pathologic due to higher bilirubin levels. Hyperbilirubinemia is treated with phototherapy or exchange transfusions. The major risks are acute bilirubin encephalopathy or kernicterus (42, 43). One study found that infant massage in full-term babies significantly lowered total serum bilirubin compared to infants who received standard care (43). This may be due to massage therapy, and soft tissue techniques increasing parasympathetic tone through vagal nerve stimulation and increased bowel movement frequency. This allows neonates to pass greater amounts of bilirubin-containing meconium (34, 43). Neonatal massage and soft tissue also increase blood flow throughout the intestines, further improving waste product excretion (34, 39, 43).

Figure 4: Soft tissue of the thoracic spine demonstrating the perpendicular stretch motion. Source: Claire Oosterbaan, MS-4

Myofascial Release

MFR is a technique provided by both occupational therapists and osteopathic physicians. As discussed previously, MFR is a gentle form of stretching and compression that reduces fascial restrictions and uneven tightness (16). For infants, these restrictions are often linked to in-utero position or if induction of labor, C-section, forceps, or vacuum-assisted delivery occurred (15). MFR can help infants with respiratory distress by releasing the fascia around the diaphragm. This allows for improved oxygenation of the blood supply. This diaphragmatic fascial restriction can be caused by the baby's rotational twist in the birth canal (17). MFR can also help infants reach developmental milestones, such as improved head control and sitting up without support. This can be done by releasing restrictions around the sternocleidomastoid muscle (SCM), which can occur from a twisted neck in-utero or gastroesophageal reflux. It is known as acquired torticollis if this presentation occurs after birth (40). Releasing the shortened muscle helps improve the infant's head posture and cervical spine mobility and supports symmetrical cranial bone growth (17).

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Balanced Ligamentous Tension

Balanced Ligamentous Tension (BLT) is based on the theory that ligaments provide both proprioception and an anatomical framework that guides the muscle response for joint positioning and subsequent motion (36). BLT seeks a "balance point" for the joint or somatic dysfunction by inducing the lowest possible strain to the affected area. This allows the body to restore function to the injured tissue (18). The first step is disengagement, which means the physician applies either compression or decompression to disengage the somatic dysfunction. The next step is to find the balance point by moving the somatic dysfunction through the range of motion in every direction to discover its restrictions. The third step is to monitor the affected area once it is brought to the balance point. The last step is tissue release, where temperature and joint mobility increase at the somatic dysfunction's site to indicate healing (18).

BLT can treat various conditions, but the two we will focus on are congenital muscular torticollis and reflux. Congenital torticollis is present at birth and commonly associated with SCM fibrosis or birth defects such as Klippel-Feil Syndrome (40). A case study published by the *International Journal of Osteopathic Medicine* discovered that BLT could potentially treat congenital muscular torticollis rather than resorting to invasive surgery (38). Similarly, a study in Italy investigated if using indirect OMT procedures, such as BLT, on premature infants in the NICU would decrease either the incidence of gastrointestinal dysfunction or length of stay (37). Gastrointestinal dysfunction incidence was defined as the number of episodes of vomiting, regurgitation, and gastric reflux and the frequency of stooling and enema administration per patient care encounter (37). They discovered that premature infants who received BLT had significantly fewer episodes of gastrointestinal dysfunction and days in the NICU compared to the routine care group. The average number of daily gut symptoms for the OMT group was 28, and the average length of stay was 28 days. For the routine care group, the average number of daily gut symptoms was 60, and the average length of stay was 55 days (37).

Figure 5: OMT for torticollis in a pediatric patient. Techniques used can be a combination of MFR and BLT. Source: Claire Oosterbaan, MS-4

Paraspinal Inhibition

Paraspinal inhibition is a technique that aims to restore the imbalance between the sympathetic and parasympathetic nervous systems. It utilizes the relationship between the thoracic paravertebral musculature and its encompassed sympathetic ganglia (62). While the patient is supine, the physician applies intermittent pressure to the lower thoracic and lumbar spine's paravertebral muscles by flexing their metacarpophalangeal joints and approximating the palms and finger pads. This position is held until warmth and softening are appreciated along the entire lower thoracic and lumbar musculature and surrounding fascia. This treatment affects the sympathetic ganglia within the targeted paraspinal region, leading to medullary-induced inhibition of sympathetic outflow and allowing the parasympathetic function to predominate (63). This treatment was initially used to treat and prevent postoperative ileus in adults by increasing colonic transit time and quickening the passage of stool (62).

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Healthy full-term neonates commonly pass their first stool within 24-48 hours after birth; however, premature infants often take several days. Functional ileus of prematurity is the delayed passage of meconium that occurs in very low birth weight (VLBW) infants. This predisposes them to intestinal perforation with an increased risk of morbidity and mortality (64). Delayed passage of meconium can be a sign of diseases such as cystic fibrosis or Hirschsprung's disease, or it can be caused by medications, anorectal malformations, and maternal conditions like gestational diabetes (65). In order to use paraspinal inhibition for heightened sympathetic activity in premature infants, the technique is modified with a gentle, static pincer grasp to accommodate for their smaller paravertebral muscular and overall size (66). Although further research is needed to investigate this treatment for the ileus of prematurity, clinical anecdotal evidence suggests that modified paraspinal inhibition can hasten the passage of meconium and flatus in premature infants. This serves to decrease the risk of perforation and relieve neonatal abdominal discomfort.

"In order to use paraspinal inhibition for heightened sympathetic activity in premature infants, the technique is modified with a gentle, static pincer grasp to accommodate for their smaller paravertebral muscular and overall size (66)."

Figure 6: Paraspinal inhibition in a pediatric patient. Source: Claire Oosterbaan, MS-4

Cranial OMM: V-spread

Cranial OMM is based on the theory that cranial sutures are mobile in relation to the skull (49, 50). Just as TART changes indicate somatic dysfunction in the body, the cranial rhythmic impulse (CRI) provides information on the dysfunction of the primary respiratory mechanism (PRM). The PRM is an interrelated unit of the cranial bones, sacrum, dural membrane, and cerebrospinal fluid (49, 50, 51). The normal rate of movement for CRI is 8-14 times per minute. This is felt on palpation as widening and narrowing of the skull by the osteopathic physician (49, 50). Known factors that increase CRI include vigorous exercise, fever, and OMT, while those that decrease CRI are stress, chronic infection, fatigue, and depression. Various cranial strain patterns are also separated into physiologic and pathologic categories (13). The osteopathic physician assesses these patterns through palpatory findings, where the relationship between the sphenoid and occiput and their rotation around different planes is appreciated (49, 50). Many Cranial OMM techniques that target specific strain patterns or decreased CRI exist. A simple yet effective and commonly used one is V-spread, which aims to separate restricted or impacted cranial sutures. It is performed with the patient supine and the physician seated at the head of the table. The physician places two fingers on each side of the restricted suture to create a V-shape. Then, a distracting force and separating traction are applied and held until a release is felt. This manipulation spreads the restricted suture and allows decompression and realignment (50, 51).

Positional, or deformational, plagiocephaly is when an infant has a flattened head shape due to fusion of the coronal suture, which causes the forehead and brow to stop growing (52, 54). Fusion of this suture and subsequent flattening occurs when there is repeated pressure on one part of the head, such as when babies sleep supine in one position. The supine sleeping position is encouraged because it decreases the risk of sudden infant death syndrome (SIDS); however, the tradeoff is an increased risk of plagiocephaly for premature infants who spend extended periods in a fixed position while they recover in the NICU (9, 53). Other common causes of positional plagiocephaly are congenital torticollis and the infant's position in the womb being affected by a multiple gestation pregnancy or if the mother has a small uterus (53, 54). Treatment for plagiocephaly includes exercis-

es, varying sleep positions, and wearing a corrective helmet to direct the regrowth of the baby's skull. However, to receive the most benefit from the helmet, most babies need to wear it for 23 hours a day for 3-6 months (14, 53). For parents concerned about a helmet, the V-spread technique can be used as a complementary or alternate therapy, depending on the degree of flattening. One study found that infants with nonsynostotic occipital plagiocephaly (NSP) significantly decreased cranial vault asymmetry, skull base asymmetry, and transcranial vault asymmetry. This was after receiving Cranial OMT and standard positioning recommendations for eight weeks (48)

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Figure 7: V-spread in a pediatric patient. This technique is typically used for positional plagiocephaly in an infant. Source: Claire Oosterbaan, MS-4

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Cranial OMM: Condylar Decompression

Another type of Cranial OMM technique is condylar decompression. The purpose of this technique is to decompress the occipital condyles and balance tension at the hypoglossal canal to normalize cranial nerve XII function (49, 50, 51). This technique is performed with the patient supine and the physician seated at the head of the table. The physician's forearms should be on the table to establish a fulcrum while the patient's head rests in their palms. The physician uses their index and middle fingers to contact the condylar processes on both sides and then applies a gentle cephalad and lateral traction. This traction is maintained until a release is felt (50, 51).

"One study found that infants who received Cranial OMM, such as condylar decompression, in addition to the mother receiving regular lactation consultations, had better nipple feeding and a higher LATCH score than the control (46, 47). "

It is well-known that premature infants who receive breast milk have a shorter length of stay in the NICU and decreased risk of necrotizing enterocolitis, sepsis, feed intolerance, lung disease, retinopathy of prematurity, neurocognitive delays, and readmission rates (55). However, almost 50% of mothers stop breastfeeding in the first month, even with lactation support, due to biomechanical issues (46, 56, 57). It is reported that the ability to swallow develops at 13 weeks gestation and the ability to suck at 18 weeks gestation. However, the suck and swallow coordination does not occur until 32-34 weeks of gestational age (20). Thus, premature infants born before 35 weeks' gestation struggle with nipple feeding, which requires coordinated suck and swallow (2, 56). This suck and swallow coordination depends on cranial nerves IX, X, and XII for intrinsic muscles of the tongue to function properly (56). One study found that infants who received Cranial OMM, such as condylar decompression, in addition to the mother receiving regular lactation consultations, had better nipple feeding and a higher LATCH score than the control (46, 47).

Figure 8: Condylar decompression in a pediatric patient. This technique is typically used for improved latching in an infant. Source: Claire Oosterbaan, MS-4

Osteopathic manipulative treatment for premature infants includes the following modalities: soft tissue, MFR, BLT, paraspinal inhibition, V-spread, and condylar decompression. These techniques have been shown to help reduce jaundice and GERD, induce passage of meconium, reach developmental milestones, correct torticollis, and plagiocephaly, and improve oxygenation and latching. Osteopathic physicians use palpation to identify somatic dysfunctions and manipulation to improve physiologic function. OMT can be offered as a less invasive and cost-beneficial adjunct to the standard of care for these conditions.

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Discussion

Premature infants often have stressful and adverse experiences in the NICU. They are exposed to many procedures, some very painful, and various stimuli (bright light, noise, and temperature fluctuations) heighten their sympathetic nervous system (34). Additionally, the parasympathetic nervous system remains underdeveloped since its completion does not occur until the third trimester. However, research studies from the last decade demonstrate that gentle touch can reduce the amount of cortisol produced and dampen sympathetic tone in premature infants (34). Occupational therapy and osteopathic manipulative treatment capitalize on this knowledge by employing gentle techniques, such as MFR, neonatal massage in OT, and soft tissue and paraspinal inhibition in OMT to increase vagal activity leading to parasympathetic stimulation. These techniques increase gastric motility and effectively treat gastroesophageal reflux and jaundice (34, 43). They also help improve immune function, oral feeding, and range of motion, leading to weight gain and a faster NICU discharge (58).

Occupational therapy differs from OMT because it emphasizes neurodevelopmental treatment, kangaroo care, and caregiver involvement. Family bonding and parental participation in this social component of the infant's care leads to better outcomes for the neonate and mother. In contrast, premature infants who experience a lack of maternal touch have higher levels of negative emotions (34). One study found that the negative consequences of an epigenetic change (methylation of serotonin transporter gene, SLC6A4) were intensified during NICU-related stress for very preterm newborns (59). Therefore, there is a need for future studies to investigate how the absence of parents due to hospital policy changes in response to the COVID-19 pandemic affected the days to discharge for preterm infants.

Osteopathic manipulative treatment focuses on correcting somatic dysfunction found during the physical assessment. The techniques specific to OMT include balanced ligamentous tension, paraspinal inhibition, V-spread, and condylar decompression. The treatment plan does not center around parental involvement to the same degree that it does for occupational therapy. Instead, there is a growing emphasis on incorporating OMT as adjuvant therapy into the standard of care for the NICU. Osteopathic physicians who perform OMT should coordinate with specialists, such as lactation consultants or physical therapists, to improve biomechanical sucking difficulties and positional plagiocephaly (34, 46).

Furthermore, a systemic review with meta-analysis demonstrated OMT as a safety procedure that could potentially reduce the number of days of hospitalization for premature infants (34). Although several studies have shown the positive influences of OMT, it is also important to note their limitations and the need for further research. For instance, the case study that suggested BLT may be more effective than surgery in treating congenital muscular torticollis admitted that investigating torticollis patients without abnormal cranial strain patterns is also warranted (38). This comparison would help analyze the overall validity. Similarly, the study that examined the use of Cranial OMT for nonsynostotic occipital plagiocephaly used a small sample size (*n=12*), which affects its reliability (48).

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Conclusion

The occupational therapy and osteopathic manipulation treatment objectives are similar in that they both address dysfunction to promote healing and redirect the body towards homeostasis. In the fragile population of premature newborns, the techniques of neonatal massage, MFR, Kangaroo Care, soft tissue, BLT, paraspinal inhibition, V-spread, and condylar decompression all provide a noninvasive and gentle treatment option. While many techniques of OT and OMT are similar, the main differences are that OT places a more significant emphasis on social components of parental education and bonding as part of the therapeutic approach, while OMT relies more on the physical technique to address somatic dysfunction and restore health.

A common core tenet between both approaches is the importance of touch. Whether the soft tissue technique of OMT or the neonatal massage by OT, these treatments rely on a therapeutic touch via techniques such as gliding or kneading to promote healing. Furthermore, techniques like Kangaroo Care are also highly dependent on touch as its benefits are seen with skin-to-skin contact.

These techniques have shown numerous benefits cultivating with the shortening of NICU stays for newborns. However, they are

still underutilized in most settings. In order to move forward, steps need to be taken to encourage these treatment modalities in the NICU and all newborn physical exams when indicated, as they are quick, noninvasive methods that are proven to prevent, treat, and improve patient outcomes.

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Disclosures: *The authors have no financial disclosures to report.*

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