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Review Article

Exploring the Complexity of Breastfeeding and Latching Dysfunction with the Application of Osteopathic Manipulative Treatment (OMT) as a Therapeutic Alternative to Traditional Medicine

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Abstract

Introduction: Worldwide incidence of ACL tear increased with increasing of contact-sport activity and increasing of RTA injuries and its management depend on arthroscopic with variety of methods, in this study our aim to determine the clinical and functional outcome of anatomical trans-portal arthroscopic ACL reconstruction with quadruple hamstring tendon auto-graft.

Material &Methods: Cross sectional observational study hospitally based, it took Two years since 2019.Data taken from the patients directly.

A total 51 male and female patients their age ranges from 18 years to 46years the mean age 27 years having ACL injury confirmed by clinical examination and MRI scan were included in this study. Patients' check list detailed demography including age, sex, causes of injury and duration of symptoms pre-operative were recorded after written consent from every patient. Lachman, anterior drawer and Pivot-shift tests were performed before surgery. All patients filled subjective Lysholm Knee form before surgery and at final follow up post-operative. In all patient arthroscopic trans-portal technique was used for ACL reconstruction with Hamstring auto-graft.

Results: There were 48 (94.1%) males and 3 (5.9%) females. Right knee was injured in 34(66.6%) cases and left knee 17(33.4%) cases. At final follow-up, 68.6% patients achieved full ROM flexion, all of them have no giving way symptoms after 2 to 3monthes post-operative. There was significant improvement in Lysholm score. Out of 51 patients, 8 (16%) patients developed post-operative infection complication.

Conclusion: Arthroscopic ACL reconstruction with quadrupled Hamstrings graft will give very good result if used as management procedure for knee instability after ACL injury. Because it uses anatomical placing the graft and tensioning it, so it has less morbidity, highly stability in coronal & sagittal plan and excellent range of motion and functional outcome.

Key words: anterior cruciate ligament arthroscopic; reconstruction; trans-portal

Introduction

Infants can reap a myriad of benefits from breastfeeding, including resistance against infections and decreased incidence of chronic diseases, such as obesity, leukemia, asthma, and diabetes as well as gaining optimal nutrition [1]. It is the ideal source of nutrition for an infant, because breastmilk contains adequate nutrients, growth factors, and antibodies for the health of a newborn [2]. For this reason, the World Health Organization recommends solely breastfeeding in the first six months of life [3].

As such, one of the most important functions that newborns must master is feeding, which requires a complex coordination of sucking, swallowing, and breathing. This can be a challenging process for newborns and their mothers

alike. Feeding difficulties occur in approximately 5% of infants (4), as well as 70% of infants with chronic medical conditions [5]. In the case that there are complications with or preferences against breastfeeding, parents opt for formula. In the United States, by the age of three months, a minority of infants (33%) are breastfed [6]. The most common reasons given by parents for utilizing formula as opposed to breastfeeding are low breast milk supply, breast pain, nipple pain, unsettled infant behavior, infant weight concerns, and difficulty with latching and sucking [7, 8, 9]. In this article, these obstacles will be discussed in terms of anatomic difficulties and other complications.

In the initial days postpartum, the baby and the mother can learn to breastfeed together. It can also be the case that the baby latches to the breast without assistance and self-attaches. However, in collaborative breastfeeding, the baby and the mother work together to achieve the latch [10]. When problems arise in latching there are currently a multitude of treatment options and remedying factors, including biological nursing, prenatal education, lactation management, application of olive oil and breast shields, and cup/pacifier use [7, 11]. The success of these treatments is variable and could be enhanced in combination with Osteopathic Manipulative Treatment (OMT) [12]. This is because structure and function are inherently interrelated and OMT aims to resolve medical issues on the basis of this principle [13]. In this article, we will describe how OMT on anatomic structures involved in “latching” can assist infants experiencing lactation dysfunction.

Anatomy & Physiology of Breastfeeding

Breast milk formation is governed by mammary glands, the anterior pituitary gland, and the posterior pituitary gland [13]. Notable external structures, such as the dermis, areola, Montgomery tubercles, and nipple can exhibit a remarkable degree of variability [14]. Similarly, the internal structures, which consist of the adipose tissue, glandular-ductal system, and extracellular matrix which is supported by the fibrous Cooper’s ligaments, also display variability which can contribute to the different breastfeeding experiences and hindrances encountered by mothers and infants alike [14]. Adipose tissue is found within lobes; the building blocks of these lobes are smaller lobules, consisting of clusters of alveoli [15]. At an even more microscopic level, the alveoli, which encompass mammary secretory epithelial cells [15]. It is these epithelial cells which proliferate, marking the inception of the milk production process [13]. Furthermore, alveoli connect to ducts which progressively get larger, branching outwards to drain the lobules and eventually the lobes [15]. The large duct, which is the final product of all these small ducts merging, is labeled the lactiferous sinus and advances until it reaches the surface of the nipple [15].

The nipple areola complex is one of most relevant components of the breast as it pertains to breastfeeding. Within it, there is the areola which is 3 to 6 centimeters and it has sebaceous glands which together form the areolar glands [13]. As these glands magnify during pregnancy, they give way to tubercles of Montgomery [13]. Instead of sebaceous tissue, the NAC consists of the skin then a thin layer of smooth muscle, and muscle fibers [13]. The muscle of Sappey consists of circular fibers of areolar muscle and the muscle of Meyerholz consists of radial fibers in the areolar muscle [13]. Under the muscle, there is pre-mammary fat [13]. As for the neurovasculature of the NAC and breast as a whole, the internal mammary artery branching off the subclavian artery and the first to sixth intercostal nerves need to be in working order for proper breast function, including breastfeeding [13]. Lymphatic drainage of the breast occurs via the superficial and deep plexus [13].

There are a set of critical hormones which play a major role in breastmilk being secreted from the nipples. It is necessary to highlight prolactin as this is the hormone that stimulates milk production [13]. Prolactin levels markedly increase during pregnancy, leading to epithelial proliferation within alveoli [13, 15]. Still, milk is not formed while progesterone and estrogen levels are high at the time of pregnancy [13]. Thus, the effect of increased prolactin only comes to fruition as the levels of progesterone and estrogen decrease following the delivery of the newborn when milk secretion begins [13]. Another significant hormone is oxytocin, which causes contraction of myoepithelial cells leading to the physical discharge of breastmilk [13]. If these hormone levels are not ideal, breastfeeding can be challenging.

There are ideal anatomic proportions for proper breastfeeding which lead to more favorable outcomes. To cite an example, a nipple length of at least seven millimeters is more likely to yield successful breastfeeding [15]. In the same way, there are noted anomalies that discourage a seamless breastfeeding experience. For instance, mothers with short, wide nipples, denser areolas, and other anatomic deviations are more likely to experience difficulties breastfeeding disproportionately [16]. Furthermore, there are an array of common breast abnormalities that may or may not contribute to breastfeeding difficulties, such as accessory nipples, which are found in one to five percent of the population as well as athelia, being the absence of the nipple areolar complex (NAC), amastia, which is the absence of all breast structures, and inverted nipples [13]. Although most of these abnormalities are difficult to address via treatment they are notable challenges to consider.

The anatomy of a newborn is also a significant consideration when treating breastfeeding dysfunctions. Specifically, it is necessary to elaborate on the muscles and neurovasculature required for a newborn's reflexes to prompt suckling the nipple [17]. Following the nipple backwards, there is a teat that the baby makes contact with between the upper gum and tongue [17]. As a result, the lower gum is covered and the tongue can wrap around the nipple as milk begins to flow into the infant’s mouth from the lactiferous sinuses [17]. When the tongue curves up as such and the lower jaw ascends, this creates a vacuum to trap milk and pull it towards the newborn in a wave of negative pressure [17]. Simultaneously, an indent forms on the nipple, causing it to widen and increase the flow of milk moving outward [17]. Innervations of the aforementioned anatomy are as follows: the soft palate is innervated by the mandibular and vagus nerves, the tongue is innervated by the hypoglossal and vagus nerves, and the muscle of the lips that creates the seal during feeding (orbicularis oris) is innervated by the facial nerve [18].

The milk travels downwards and into the gastrointestinal tract of the newborn by the following three phases: oral, pharyngeal, and esophageal [18]. In the oral phase, the breast milk enters the mouth [18]. In the pharyngeal phase, the soft palate elevates to block off the nasal passage while the larynx moves up to close the trachea [17]. In turn, there is one clear path for the milk to flow down the esophagus. Thereby, as the epiglottis moves down, the breast milk moves down the esophagus without going through any respiratory system.

Complications of Breastfeeding

Breastfeeding can be a stressful process for both mother and infant, especially when unsuccessful latching contributes to the problem [19-22]. Latching dysfunction not only disrupts the transfer of milk but can lead to milk stasis as well as other complications in the nursing mother such as blocked milk ducts, reduced milk supply, and painful mastitis [19-21]. A study in the Department of Obstetrics and Gynecology at the University of Iowa Hospitals and Clinics has indicated improper latch and ineffective milk removal as predisposing factors to breast tissue inflammation in addition to increased risk for infection-based lactation mastitis [19]. *Staphylococcus aureus* and *Streptococcus* species commonly found on the skin and within an infant’s oropharynx demonstrate bacterial seeding, giving rise to nearly 50% of mastitis cases amongst lactating individuals [19]. Furthermore, untreated infectious mastitis may develop into an abscess, further complicating the feeding process and exacerbating the probability of early breastfeeding cessation [23].

A study in the UK with over 1500 participants analyzing breastfeeding has indicated feeding complications involving poor latching, nipple trauma, pain, and mastitis/abscess/cyst as the most common types of difficulty reported by 74% of their subjects [21]. The pain and discomfort arising from

latching hardships dampen the breastfeeding process, leading many mothers to discontinue it soon after their infant's birth [24-25]. Although the benefits of breastfeeding for example, reduced risk of breast and ovarian cancer [26], appear favorable to a nursing mother, the goal of exclusive breastfeeding for the first 6 months and continued in combination with complementary foods for at least 1 year as recommended by the CDC is rarely achieved [26,27]. Many mothers attempt to breastfeed their infant according to this objective; however, the reality of its difficulties are often seen by the third day postpartum [24]. As mentioned by the CDC [27] and the National Immunization Survey [28] in 2019, only 55.8% of infants are still being breastfed at 6 months, which has gone down from 58.3% in 2017. Additionally, of those infants being breastfed throughout their first 6 months, only 24.9% were nourished exclusively by breastmilk. We attribute this trend to the unfavorable complications that surround breastfeeding.

Other challenges to breastfeeding and latching include pediatric health issues such as ankyloglossia or "tongue tie", failure to thrive reflux, and general reflux as reported by 546 participants in an analytical research study [21]. Signs of these dysfunctions include inability of the infant to form a complete seal onto the mother's breast, agitation during feeding, needing to nurse more frequently, and milk spilling out of the infant's mouth or nose while feeding [29-31]. The LATCH tool examines 5 key components of breastfeeding (latching, audible swallowing, nipple type, comfort, and hold) and is frequently used by health-care professionals (HCPs) to identify the exact nature of breastfeeding dysfunction [29-32]. Latch Scores are determined by observing each factor and assigning a numerical score ranging from 0 – 2, with 0 being the least ideal (i.e., painful cracked nipples and no latch achieved) and 2 being optimal (i.e., everted nipples, rhythmic sucking, and no assistance required) [32]. Composite scores between 0 – 10 are calculated with LATCH scores <6 after 48 hours being significant indicators soliciting medical intervention [29-32].

OMT and Breastfeeding

International Board-Certified Lactation Consultants (IBCLC) are common resources utilized in early breastfeeding and latching dysfunctions, as they provide exceptional advice on positioning and management protocols [33,34]. However, some insurances do not cover the services provided by outpatient visits, and out-of-pocket expenditures can create economic burdens to vulnerable populations [34,35]. Furthermore, the skills of an IBCLC are limited, especially in cases where assisting with positioning fails to alleviate symptoms [33]. In the event of pediatric health issues such as ankyloglossia or "tongue tie", it is necessary to physically examine the infant for contributing musculoskeletal and biomechanical dysfunctions [33]. This is where osteopathic medicine and its therapeutic techniques become integral in the diagnostic and treatment stages of a patient's case.

Osteopathic manipulative treatment (OMT) is a holistic practice of hands-on medicine first created by Andrew Taylor Still (A.T. Still) in the late 19th century [36, 37]. His philosophy is to treat the person as a whole, examining each body system and recognizing that every individual element is dependent on the others for the maintenance of one's health [36, 37]. There are various manual techniques that encompass osteopathic medicine such as craniosacral therapy, myofascial release (MFR), soft tissue manipulation, counterstrain (CS), muscle energy (ME), high-velocity/low-amplitude (HVLA), balanced membranous tension (BMT), and articulatory methods which help improve physiologic function and/or restore homeostasis in a patient with altered somatic function [33, 36, 37]. As stated in a study analyzing 97 infant-mother dyads with breastfeeding issues, OMT was shown to be promising in terms of latching and feeding times [12, 38]. Especially noted in high-risk infants who were born prematurely or have a low birth weight, OMT was proven to increase volume and reduce duration of breastfeeding [12, 38]. This was attributed to the enhanced breastfeeding mechanics secondary to OMT intervention which significantly improved the average LATCH score in the treatment group [12]. Furthermore, it was concluded that combining OMT with a lactation consultant improved overall latching by 20% and holding by 15%, in comparison to a group that only received care from an IBCLC [38]. This study demonstrates the benefits of OMT and its application in breastfeeding/latching difficulty.

Osteopathic cranial manipulation (OCM) is a form of OMT that uses BMT with primary respiratory mechanisms (PMR) for the treatment of cranial-related somatic dysfunctions [37, 39]. OCM was created by William G. Sutherland, D.O., D.Sc. who was a student of Dr. A.T. Still and studied the various articulations of the skull, with special attention to the sphenoid and squamous portions of the temporal bones [37]. Sutherland's formulation of PRM was based on the integration of anatomic configurations with physiologic components, focusing on the inherent rhythmic movements of the central nervous system (CNS), fluctuation of cerebrospinal fluid (CSF), motion of intra-cranial/spinal membranes, mobility along the articulations of the cranial bones, and the autonomic motion of the sacrum between the ilia [37]. These mechanisms of physiologic motion were registered with "seeing, feeling, thinking, and knowing fingers" as expressed by Dr. Sutherland to identify and address dysfunction with OCM [37]. A common OCM technique is OA release (aka. OA decompression) which reduces tension in the posterior neck muscles to then diminish pressure on the vagus nerve [37]. As noted in a study analyzing cranial dysfunction in babies admitted to the neonatal ICU, it was found that 97.9% of infants presented with occipital dysfunction correlated to breastfeeding issues [12]. Herzhaft-Le et al. proposed that rebalancing the occipital bone and related tissues would improve head motion and free the 12th cranial nerve (hypoglossal) which is needed for motor functions of the tongue [12]. In another study, 94% of neonates with ankyloglossia displayed a minimum of one cranial suture that was restricted, mostly involving the area between the skull and the atlanto-occipital joint [39]. As noted by Roland et al. [39] and Posadzki et al, OCM has potential to reduce ankyloglossia and treat other pediatric conditions [40].

Discussion

This literature review highlights the legacy of the DO profession as an evidence-based approach to healthcare by spreading awareness of A.T. Still's and Sutherland's philosophies. Bringing knowledge of osteopathy and bringing attention to its efficacy on breastfeeding dysfunction. The current literature highlights OMT as more cost effective and less invasive than traditional treatment options [39, 42]. Traditionally, lactation consultants are the ones to address latching problems. Research demonstrates the efficacy of adding OMT to the work a lactation consultant does to improve the biomechanical issue for a successful latch [12, 38, 41, 43]. This collaborative work has been highlighted in past research but there is limited research on the impact of OMT alone in treating breastfeeding dysfunctions [12]. While OMT and OCM are effective at treating an infant's problems with latching, future study can focus on the breastfeeding dysfunction these treatment options are most suitable for [41]. While various professions exist and have various approaches to treating latching dysfunctions similar to osteopathy, the uniqueness of osteopathy is the holistic approach the physician takes in assessing, diagnosing and treating the patient through the 5 models of care [36, 42]. Thus, exploring the biomechanical structures of both mother and infant and finding a solution for both that can alleviate the struggles of breastfeeding [36, 42].

The mothers general health, mental health and breast anatomy are working variables that can significantly add to the complexity of treating an infant's inability to successfully breastfeed [44]. The mother-baby dyad has two working parts; the mother and baby. With a physician's time constraint this adds a complexity to the treatment process that can be overlooked. Taking a whole-person approach to treatment considers all aspects of a mother-baby dyad but one limitation is the limited empirical evidence surrounding the various dynamic pieces that play a role in assessing, diagnosing and treating breastfeeding dysfunction.

The last limitation we would like to mention is the need for greater awareness of the field of Osteopathy and its work. We have highlighted some of the work that has been done to add to the empirical evidence that OMT/OCM

helps with latching dysfunctions. But, how does information get relayed to the breastfeeding mother as a treatment option?

Conclusion

This research aimed to explore the literature for the benefits and the difficulties that come with breastfeeding. There are countless benefits that an infant obtains from breastfeeding. Dysfunction in latching prevents the infant from exclusively breastfeeding for the first 6 months of life, as recommended by the World Health Organization. Unsuccessful latching can add further stress to the breastfeeding process that affects both mother and infant. Leading to unwanted complications like mastitis causing disruption of milk flow from mother to infant all stemming from the latching dysfunction. Additionally, anatomical variations in the mothers breast can lead to a suboptimal breastfeeding experience for mother and infant. Similarly, variations in the infant's anatomy such as ankyloglossia, craniocervical subluxation, or other biomechanical issues arising from childbirth compromise the function and ability of the infant to effectively breastfeed. This highlights the osteopathic principle that structure and function are reciprocally interrelated. OMT takes a holistic approach and explores the biomechanical structures of both mother and infant and finding a solution for both that can alleviate the struggles of breastfeeding. The success of current treatment options to assist with latching is variable. The current literature of the therapeutic benefits of Osteopathic Manipulative Medicine is limited but show promising results that can improve latching dysfunction in infants. Craniosacral therapy or cranial osteopathy have shown improvement in somatic strain patterns found in newborns and consequently resolved the suckling dysfunction allowing effective breastfeeding. Further research should be considered evaluating Osteopathic Manipulative Treatment as a therapeutic alternative to traditional medicine for difficulties surrounding breastfeeding and lactation dysfunction.

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