

Application of Kinesio Taping method for newborn swallowing difficulty

A case report and literature review

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Abstract

Background: Preterm infants are at an increased risk of sucking problems, swallowing difficulty, and poor nourishment. During the neonatal period, the neurobehavioral organization of a preterm baby is poor compared with that of appropriate gestational age infants. Kinesio Taping has been widely used for edema control, joint protection, and proprioception training. With the help of augmentation of the sensory input for muscle facilitation and inhibition through taping, the coordination of the target muscle groups can be improved. Until now, no research is available on the use of Kinesio Taping for the swallowing difficulty of infant.

Methods: We reported a preterm infant suffering from brain edema at birth and swallowing difficulty until 40 weeks. The swallowing reflex was delayed. Moreover, lip closure and rooting reflex combined with the dysfunction grade of jaw movement were poor. We performed KT methods on the baby under the theory of the direction of the tape for facilitate or inhibit the muscle.

Result: After the Kinesio Taping treatment, the sucking function was improved with good lip closure. One week later, the baby was discharged without the use of an oral gastric tube.

Conclusion: Kinesio Taping contributed significantly to the improvement of impaired sucking and swallowing and could be implemented as a regular rehabilitative approach for infants suffering from these difficulties.

Abbreviation: KT = Kinesio Taping.

Keywords: facilitation, inhibition, Kinesio Taping method, swallowing difficulty

1. Introduction

Nourishment of newborn infants relies on sucking and swallowing. When evaluating infants' development, the increasing rate of sucking and swallowing, sucking bursts, and volumes

should be considered. Preterm infants are at risk of sucking and swallowing impairment because the neurobehavioral organization of these babies is poor compared with that of appropriate gestational age infants. These infants have poor motor maturity, orientation to social stimulation, and organization, and cognitive and developmental deficits.

Kinesio Tape was first commercialized by Dr Kenzo Kase for edema control, joint protection, and proprioception training.^[1] Coordination of the target muscle groups can be improved after the augmentation of sensory input to facilitate and inhibit through taping.^[2] In clinical practices, kinesio taping (KT) is traditionally applied for sports injuries and musculoskeletal pain. Although some studies have been conducted for pediatric patients, such as cerebral palsy and development delay,^[3] none of them has focused on swallowing difficulty of infants. In this article, we report an infant with swallowing difficulty and his improvement following KT.

2. Case presentation

The preterm baby boy, who was suffering from brain edema at birth of 28 weeks' gestational age, still had difficulty swallowing until 40 weeks. He received tube feeding through an oral gastric tube. We were consulted for oral examination, swallowing training, and education for the family before feeding status. Severe drooling with poor jaw movement was noted during his observation. On physical examination, the swallowing reflex was delayed. In addition, the functions of lip closure and rooting reflex were very poor. Easily choking on milk was noted even under multiple postural adjustments, and the absence of

Editor: Somchai Amornyoitin.

C-LL and W-TW contributed equally to this work.

This work was supported in part by Taiwan Ministry of Health and Welfare Clinical Trial and Research Center of Excellence (MOHW105-TDU-B-212-133019).

The authors have no conflicts of interest to disclose.

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Medicine (2016) 95:31(e4458)

Received: 6 April 2016 / Received in final form: 22 June 2016 / Accepted: 3 July 2016

<http://dx.doi.org/10.1097/MD.0000000000004458>

movement of jaw or tongue was about 95% during examination even after oral stimulation and massage of the mandible, cheek, and temporal–mandible joint. Difficulty in initiating movements and persistence of immature suck pattern beyond the appropriate age with only twice of the continued sucking movement were also observed. The baby had a dysfunction grade as final assessment under the Neonatal Oral-Motor Assessment Scale.^[4]

We performed KT methods on the baby using KT. According to the theory of the founder of Kase, the direction of the tape from origin to insertion helps facilitate the muscle, and the inhibition function is observed when the direction is from insertion to origin. The skin of the baby was soft and fragile, and thus we used 15% pulling force as the upper limit. One grid of the tape was 5 cm, and two-thirds of a grid was 3.3 cm, for example. Then we pulled the tape to 5 cm, which achieved 15.1% pulling force to almost fulfill the setting. After cleaning the skins with alcohol pad, we waited until the evaporation of alcohol to prevent damage to the sticky layer. Subsequently, 2 I-type tapes, an eighth part in width and two-thirds of a grid in length, were used for taping on the upper and lower orbicularis oris with the anchor site at the midpoint of both tapes and lips. With pulling force of about 15% to the bilateral corner of the mouth, lip closure would be facilitated because of the shrinking direction (Fig. 1A). To improve the hyoid bone elevation through shrinking force by inhibiting the sternohyoid muscle but facilitating the mylohyoid muscle, we selected one-quarter of a Y-type tape one-fourth in width and two-thirds of a grid in length. The posterior border of the symphysis of the mandible bone was the anchor site by separating the 2 ends to prevent direct taping on the hyoid bone. Subsequently, we smoothly taped the mylohyoid and sternohyoid muscles at the direction of the mandible bone to the sternum (Fig. 1B).

For the poor jaw movement and chewing activity, we facilitated the masseter muscle with tape anchored on the lower border of the zygomatic arch and elongated to the coronoid process of the mandible bone. The tape half in width and

two-thirds of a grid in length was separated into 3 ends under 15% pulling force over the masseter muscle (Fig. 2A and B).

After 10 minutes of treatment using the KT method, secondary evaluation was performed. The sucking function was improved with 7 times of continued movement, and lip closure was better than its previous performance. The tape would be changed and adhered again in the same way every 2 days later. During the treatment period, no allergy incidence was mentioned by the nurses and families. One week later, 11 times of continued sucking movement were noted at the third evaluation, and the baby was discharged the following day without the insertion of an oral gastric tube. The baby was regularly followed up at the outpatient department, and the swallowing function and nutritional supports were sufficiently well for growth and development.

3. Discussion

KT method is known in sports medicine, and many studies have focused on its effects and mechanism. Recently, research has been conducted on the use of KT method on a child. The investigation on KT randomly conducted on 30 children with unilateral spastic cerebral palsy showed significant differences in muscle power sprint, sit to stand, attain stand through half-knee right, functional independence measure for children, and self-care scores among the groups because of increasing proprioceptive feedback.^[3]

Another research^[5] on infants with congenital muscular torticollis and muscular imbalance of the neck lateral flexors reported the performance of the facilitation technique along the sternocleidomastoid muscle and the superior aspect of the trapezius muscle or the relaxing technique on the sternocleidomastoid muscle or both. KT method had an immediate effect because of the significantly high muscle function scale scores on the unaffected side, and low scores were noted on the affected side.

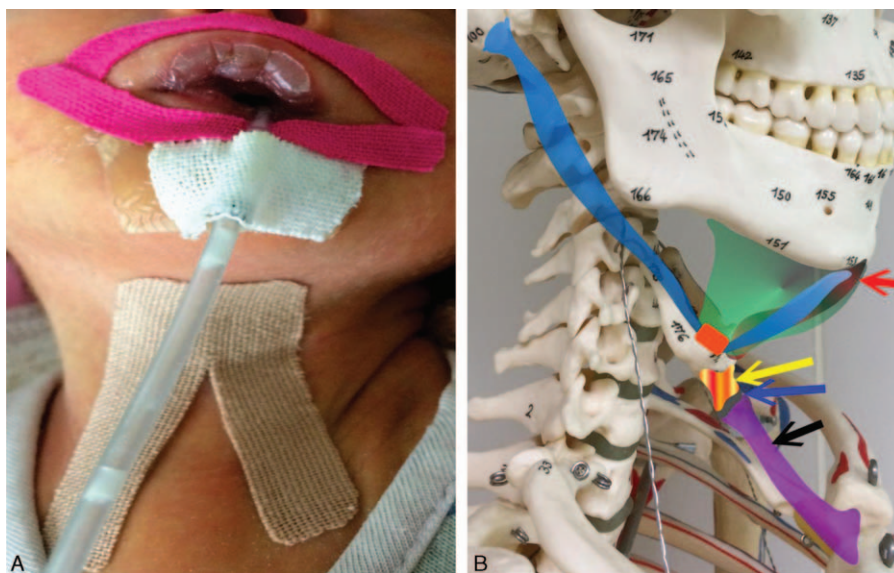


Figure 1. (A) Two pink-colored I-type tapes were used for taping on the orbicularis oris with the anchor site at midpoint. A skin-colored Y-type tape was taped on the mylohyoid and sternohyoid muscles; the anchor site was at the posterior border of the symphysis of the mandible. (B) The blue part indicates the digastric muscle, and the green part is the mylohyoid muscle. The red portion deep in the mylohyoid indicates the geniohyoid muscle (red arrow). The purple, gray, and bright orange portions indicate the sternohyoid muscle (black arrow), thyroid cartilage (blue arrow), and thyrohyoid muscle (yellow arrow), respectively.



Figure 2. (A) Skin-colored tape with 3 ends over the masseter muscle. The tape was anchored on the low border of the zygomatic arch to the coronoid process of the mandible bone. (B) The blue part indicates the masseter muscle.

To date, no specific research has performed the KT method on preterm infants and for the treatment of swallowing difficulty. As preterm infants are at increased risk of impaired sucking and swallowing, they need to rely on tube feeding for a long time because of arrhythmic sucking and swallowing as a result of their poor state organization. We should carefully evaluate the rate of sucking, sucking bursts, and swallowing. Furthermore, abnormal jaw and tongue movements would probably interfere with the effective sucking because of the poor motor maturity of these infants. Thus, we modified the Neonatal Oral-Motor Assessment Scale to investigate the sucking patterns for comparison with those of appropriate gestational age preterm infants. We assessed the sucking pattern accompanied with jaw and tongue movements, and distinguished the infants to have a normal, disorganized, or dysfunctional sucking pattern. When the coordination among sucking, swallowing, and breathing was disrupted, the tongue and jaw movements were normal. Moreover, disorganized sucking pattern was suspected. The infant should acquire a normal sucking pattern at least 2 of 3 consecutive episodes to satisfy the criteria of a normal sucking pattern. The dysfunctional sucking pattern (as in our case), almost absence of jaw or tongue movement, difficulty in initiating movements, and persistence of immature suck pattern were noted.

When traditional rehabilitation, such as oral massage, thermal stimulation, skin and soft tissue massage, and stimulation or modified pacifiers, could not immediately improve the problems, we hypothesized the use of KT method. According to theory of Rood approach, fast brushing and light moving touches on the fascia can be effective.^[6] When compressing the joints lightly in muscle–tendon junctions and keeping tendon in stretched condition,^[7] the inhibitory pattern correlated with the Golgi tendon organ inhibits its own muscle and excites the antagonist.^[8] The input of stimulation for the facilitation and inhibition mentioned above could be achieved through taping through its retraction direction. When the muscle is taped from insertion to the original site of the muscle, the retraction force stimulates inhibition; otherwise, facilitation

occurs from the original to the insertional site of the muscle. The mylohyoid muscle elevates the hyoid bone during swallowing, and the sternohyoid muscle becomes the antagonist. Therefore, we could facilitate the orbicularis oris for lip closure, facilitate the masseter muscle for jaw movement, and facilitate the mylohyoid muscle for hyoid bone elevation, but inhibit the sternohyoid muscle with the tapes.

4. Conclusion

This article was the first report in the world that used KT method on infants. We considered the KT method to be useful and could be added to regular rehabilitation for infants suffering from impaired sucking and swallowing. After the following researches, the article would be the pioneer of such topic, and would also help for the development of these infants.

References

- [1] Wu WT, Hong CZ, Chou LW. The Kinesio Taping method for myofascial pain control. *Evid Based Complement Alternat Med* 2015;2015:950519.
- [2] Kenzo Kase DC. *Illustrated Kinesio Taping Manual*. 2nd ed. Tokyo, Japan: Kent-Kai; 1997.
- [3] Kaya Kara O, Atasavun Uysal S, Toker D, et al. The effects of Kinesio Taping on body functions and activity in unilateral spastic cerebral palsy: a single-blind randomized controlled trial. *Dev Med Child Neurol* 2015;57:81–8.
- [4] Saakje P, Cees P, Mar J, et al. The development of sucking patterns in preterm, small-for-gestational age infants. *J Pediatr* 2010;157:603–9.
- [5] Öhman AM. The immediate effect of kinesiology taping on muscular imbalance for infants with congenital muscular torticollis. *PM R* 2012;4:504–8.
- [6] Firth BL, Dingley P, Davies ER, et al. The effect of kinesiotape on function, pain, and motoneuronal excitability in healthy people and people with Achilles tendinopathy. *Clin J Sport Med* 2010;20:416–21.
- [7] Kalron A, Bar-Sela S. A systematic review of the effectiveness of Kinesio Taping—fact or fashion? *Eur J Phys Rehabil Med* 2013;49:699–709.
- [8] Aguilar-Ferrandiz ME, Castro-Sanchez AM, Mataran-Penarrocha GA, et al. A randomized controlled trial of a mixed Kinesio taping—compression technique on venous symptoms, pain, peripheral venous flow, clinical severity and overall health status in postmenopausal women with chronic venous insufficiency. *Clin Rehabil* 2014;28:69–81.