NARRATIVE REVIEW

Effect of physical therapy treatment in infants treated for congenital muscular torticollis — a narrative review

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Abstract

Congenital muscular torticollis is a problem that arises at birth or immediately after birth in which the sternocleidomastoid muscle is shortened on the afflicted side, leading to an ipsilateral rotated of the head and a contralateral rotation of the face and jaw. To determine the effectiveness of physical therapy treatment in infants treated for congenital muscular torticollis, relevant articles published between 2011 and 2020 were located using electronic databases. A total of 9 studies out of 24 potentially relevant articles were reviewed. All studies were randomised controlled trials with 6-8 score on the Physiotherapy Evidence Database scale (Pedro scale) which showed high quality of methodology. The studies typically found significant statistical effects in the management of congenital muscular torticollis. Additionally, most of the studies reported increased adherence to exercise as another essential advantage. Conservative physical therapy management showed positive outcomes, and early physiotherapy referral showed significant reduction in treatment duration.

Keywords: Conservative management, Congenital muscular torticollis, Infants, Paediatric physiotherapy, Physical therapy.

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Introduction

Torticollis, which means "wry neck" in Latin, was first described by Tubby in 1912 as "an abnormality, either acquired or congenital, described by a lateral bending of a head to the shoulder, with a bending of the neck and a deformation of the face."[1,2] Congenital muscular torticollis (CMT) describes a problem that arises at birth or immediately post-birth in which the sternocleidomastoid muscle (SCM) is shortened on the afflicted side, leading to an ipsilateral rotated of the head and a contralateral rotated face and jaw.[3]

Neck pain is a common musculoskeletal disorder (MSD) and its prevalence is 85% in the general population.[4] CMT is an idiopathic condition that causes SCM shortening, resulting in a rotation and flexion abnormalities of the neck in infants.[5] It is an abnormality that causes a deviation of the infant's head to one side, as well as a limitation in the body's range of motion (ROM).[6] The incident rate of CMT is 0.3-1.9% and it is reported as the 3rd most prevalent congenital MSD in neonates and babies.[7,8] CMT has also been correlated with a malfunction in the upper cervical spine and is often related to as a structural imbalance due to suboccipital tightness.[9]

CMT has been categorised into three groups: palpable sternomastoid tumour, SCM tightness of Muscular Torticollis group, and postural torticollis with all clinical characteristics of torticollis without the SCM muscle stiffness or tumour.[10]

CMT can result from shortening or extreme tightening of SCM with a restricted ROM.[11,12] The SCM muscle plays an important part in the movement of the neck and lateral flexion in the same way as the flexion of the neck. Tension at the impaired side bends the head towards the unimpeded side and inclines the head laterally, resulting in an asymmetrical position.[13] Treatment requires observation, orthotics, an intensive home treatment plan, mild stretching, intense manual myotomy, and a variety of surgical techniques.[14]

It is preferable to treat CMT as early as possible with stretching and strengthening exercises. Contracted sternocleidomastoid and upper trapezius muscles are more likely to respond to stretching in children, preventing surgical correction. This early rehabilitation is suggested to be performed by parents under the instruction of a physical therapist. Physical therapy (PT) effectively treats 54-70% cases of moderate CMT at 1 year of age. However, up to 36% patients have more rigid deformities that continue following six months of PT and up to a year of age. Surgical correction has usually been the technique of choice in these situations. In more resistant CMT, persistent PT alone, even though done

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cautiously, may lead to damage to the patient.[15]

Manual stretching is stated to be the most effective treatment for CMT, with just 10% seeking surgery.[16] Previous researchers have identified that stretching exercises in combination with ultrasound and microcurrent treatment is more beneficial in CMT children than stretching exercises with ultrasound only, increasing the neck ROM, and promoting therapeutic adherence.[17]

Soft tissue mobilisation (STM) is a procedure commonly used in clinical practice for the treatment of stiff muscles, known as muscle mobilisation or fascial mobilisation.[18,19]

The aim of CMT therapy is to inhibit skull and facial asymmetry, increase the mobility of the neck and to improve long-term posture. Therapy requires assessment, active positioning, stretching and strength exercises, and severe cases may require surgery.[20] At present there are many different PT techniques for CMT treatment, but there are no specific recommendations on which intervention is beneficial for CMT management. The current narrative review was planned to gather all possible information about PT treatment for CMT, and to evaluate which treatment is more effective in CMT infants.

Materials and Methods

The narrative review comprised relevant articles published between 2011 and 2020, using search strategy developed for different databases, including the National Centre for Biotechnology Information (NCBI), PubMed and MEDLINE. Search strategy was designed for each database by combining the key terms and Boolean operators i.e., AND, OR and NOT. Full text articles were retrieved for eligibility, and in case conflict existed over an article, the researchers took the final decision about its inclusion or otherwise. Indexing terms, synonyms and population, intervention, control and outcomes (PICO) format[21] terms were used and filters were applied, like Full Text, Clinical Trials, randomised controlled trials (RCTs), Humans and English. Study eligibility were based on PICO format. Relevant information from the included studies was extracted and reviewed. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[22] guidelines were followed. Studies included were RCTs or controlled clinical trials having human CMT infants exposed to PT treatment and published in English-language professional and scientific journals. Studies excluded were those with participants diagnosed with some other pathological conditions, studies using PT treatment with surgical intervention, studies with any other design, studies that did not have full text available, and studies published in language other than English.

Search records were saved in EndNote X7 software. Duplicate records were removed, followed by screening conducted on the basis of abstracts and full texts. The shortlisted studies were reviewed and variables, like methodology, sample size, demographic data, were noted. The differences were compared to generate quality scores using the PEDro scale[23] having 11 closed-ended questions, with total score ranging 0-11 and higher score indicating better quality. Risk of biasness for the studies was assessed using the Cochrane tool.[24] Selection bias was assessed by allocation concealment and random sequence generation, while detection bias was assessed by blinding of outcome assessment and marked as unclear (?), low risk (+) and high risk (-) for each study.

The main outcomes were head positioning and ROM, and cervical ROM. Clinical analysis measured improvements in head deflection angle and active passive cervical ROM before and after therapy. The secondary outcome was the functional status of the subjects.

Results

Of the 2078 studies initially found through the databases,

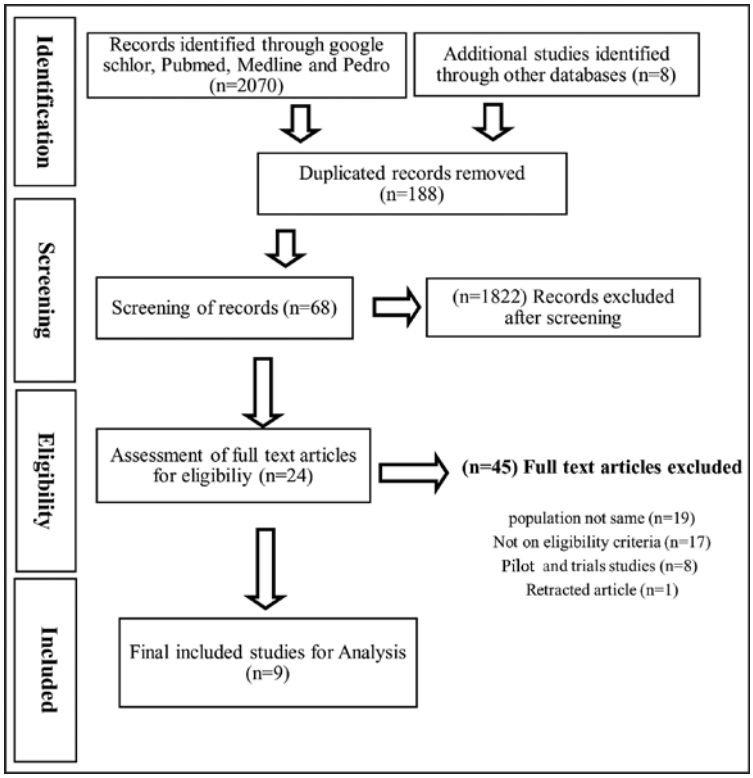

Figure: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow-chart.

Table-1: Demographic data of the studies reviewed.

No.	Author	Country	Year	Age Mean (SD)	Gender (M/F)	Dropouts	Participants
1	(He et al)[31]	USA	2017	G1: 42.76 (12.13) G2:44.75 (15.17)	M:24 F:26	5	55 G1: 28 G2: 27
2	(Kwon and Park)[34]	Korea	2014	G1: 17.9 ± 4.5 days G2: 18.3 ± 4.7 days	M:12 F:13	5	25 G1: 13 G2:12
3	(Öhman et al)[36]	Sweden	2011	4.5 months	M: 17 F: 20	4	37 G1 G2 G3
4	(H. Keklicek and F. Uygur)[29]	Turkey	2018	SG:97 ± 42 days CG:103 ± 42 days	M:16 F:13	4	29 SG: 14 CG: 15
5	(Michael Wilhelm Jung et al)[37]	Germany	2017	G1:7.16(0.77) weeks G2:7.61 (0.61) weeks	NM	0	37 G1: 19 G2: 18
6	(Xu Min)[38]	China	2017	OG:4.2 ± 1.6 CG:5.1 ± 0.7	M:48 F:32	0	80 OG: 40 CG: 40
7	(Kang et al)[39]	China	2011	NM	M: 280 F: 220	0	500 EG: 265 CG:235
8	(L-n.CUI and et al)[40]	China	2019	< 1 year	M:33 F:68	2	68 G1:34 G2:34
9	(Anna Öhman)[33]	USA	2015	IG: 6.0(2.8) CG: 6.1 (2.2)	M:13 F:16	0	29 IG:16 CG:13

M: Male, F: Female, SD: Standard deviation, EG: Experimental group, CG: Control group, OG: Observational group, IG: Intervention group G: Group, SG: Study group NM: No mention.

Table-2: Characteristics of the studies reviewed.

No.	Author	Method	Dropouts	Participants	Interventions	Outcomes	Conclusion	Vote Counting
1	(He et al)[31]	RCT With random number table	5	55 G1: 28 G2: 27	Stretching treatment of 2 dosages 100-times stretching 50-times stretching	physical examination ultrasonography of SCM muscle growth	Stretching treatment of 2 dosages effectively improve head tilt, cervical passive ROM and SCM muscle growth	Positive Effect
2	(Kwon and Park)[34]	RCT Blocked randomization	5	25 G1: 13 G2:12	G1: therapeutic exercises with ultrasound G2: therapeutic exercises with ultrasound and microcurrent therapy	Passive cervical rotational ROM	Microcurrent Therapy increases the efficacy of therapeutic exercise with ultrasound in treatment of CMT	Positive Effect
3	(Öhman et al)[36]	RCT Sealed envelope method	4	37 G1 G2 G3	G1: handling strategies G2 and G3: Handling strategies and strength exercises	Muscle function balance symmetric head posture	Handling strategies and specific strength exercise achieve a symmetric head posture	Positive Effect
4	(H. Keklicek and F. Uygur)[29]	RCT Sealed envelope method	4	29 SG: 14 CG: 15	• Positioning • Handling strategies • Stretching • Strengthening • Environmental adaptations	Head tilt passive cervical rotational ROM	STM technique are effective in getting faster positive results in the treatment of CMT	Negative Effect

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No.	Author	Method	Dropouts	Participants	Interventions	Outcomes	Conclusion	Vote Counting
5	(Michael Wilhelm Jung et al)[37]	RCT Blocked randomization	0	37 G1: 19 G2: 18	● Soft tissue mobilization G1: Vojta therapy G2: neurodevelopmental treatment	Postural asymmetry	Vojta therapy and NDT are effective in the treatment of infantile postural asymmetry.	Positive Effect
6	(Xu Min)[38]	RCT Randomization	0	80 OG: 40 CG: 40	Conventional paediatric tuina therapy OG: Bai mai ointment CG: common lubricating oil	SCM muscle activity	Bai Mai ointment has better curative effect than the common lubricating oil as a massage medium in the treatment of CMT	Positive Effect
7	(Kang et al)[39]	RCT Computer based randomization	0	500 EG: 265 CG:235	EG: PMTMOF CG: Conventional tuina manipulation	SCM muscle Morphology SCM muscle blood flow	PMTMOF more obvious treatment effect in infantile muscular torticollis than conventional tuina manipulation	Positive Effect
8	(L-n.CUI and et al)[40]	RCT With random number table	2	68 G1:34 G2:34	G1: stroking and circular kneading manipulation G2: tuina	Colour doppler US provided to observe the changes in lump diameter of SCM muscle.	Modified Tuina Manipulation achieves the satisfactory clinical effect on CMT infant	Positive Effect
9	(Anna Öhman)[33]	RCT Randomization	0	29 IG:16 CG:13	Kinesiological Taping	MFS For muscular imbalance in the lateral flexors of the neck	KT has immediate effect on the MFS for muscular imbalance in the lateral flexors of the neck	Positive Effect

STM: Soft tissue mobilization, NDT: Neurodevelopmental treatment, PMTMOF: Primary massage of twining manipulation with one finger, SCM: Sternocleidomastoid muscle, CMT: Congenital muscular torticollis, MFS: Muscle function score, KT: Kinesiological taping.

Table-3: Risk of bias for each of the studies reviewed.

No.	Author	Random sequence generation (Selection bias)	Allocation concealment (Selection Bias)	Blinding of outcome assessment (Detection bias)
1	(He et al)[31]	+	?	+
2	(Kwon and Park)[34]	+	+	+
3	(Öhman et al)[36]	+	+	-
4	(H. Keklicek and F. Uygur)[29]	+	+	?
5	(Michael Wilhelm Jung et al)[37]	+	+	+
6	(Xu Min)[38]	?	?	?
7	(Kang et al)[39]	+	+	+
8	(L-n.CUI and et al)[40]	+	?	?
9	(Anna Öhman)[33]	?	+	+

? = Unclear, + = Low risk +, - = High risk.

68(3.27%) were shortlisted, and, of them, 9(13.23%) were reviewed and analysed in detail (Figure).

Data, like age, dropout rate, country, year, sample size, related to each of the selected study was noted and compared (Table-1). Like methodological characteristics of the studies, like method, study design, etc., were compared (Table-2). Pedro scale for all the studies ranged 6-8, showing high quality.

Risk of biasness in all the studies were recorded (Table-3).

Discussion

The current narrative review was done to assess the effect of PT treatment on CMT infants. Although it is difficult to find controlled study evidence in this particular area, the current analysis was excellent in verifying the commonly accepted view that the tightness of SCM, which may have been the common and most probable cause, involves intrauterine malposition and birth trauma of the baby, which plays an important role. Also, the studies analysed in the current review provided positive evidence that CMT can lead to facial asymmetry and tilting of the head. All the 9 studies used different treatment with different strategies. It is rather important for the generalisation of the findings of the current review.

PT is effective in the treatment of CMT and accelerates recovery. In medical practice, physiotherapists use

manual therapy to mobilise the tight muscles. All the studies in the review indicated that the use of STM increased ROM, helped reduce tightness, encouraged myofascial development, and decreased pain. However, the efficacy of soft tissue therapies or other manual therapeutic approaches for babies has not been proven because there are not sufficiently controlled randomized trials relevant to this procedure. Recent studies have found that conservative therapeutic approaches, including passive stretching, constructive activity away from tightness, management techniques and parent education for home services, are effective in treating CMT.[25] According to previous studies, a home regimen consisting of positioning the neck and head, handling techniques, strengthening and stretching exercises, optimising neurodevelopmental exercises, and environmental adaptations are beneficial in CMT management.[26]

A study using CMT clinical practice guideline (CPG) suggested similar management for non-operative CMT treatment.[27]

A study was conducted in 2005 to help relieve the patient's cervical musculature on the affected side after finding symptoms of weakness on the uninvolved SCM.[28] When compared to a research in 2018, the outcomes of the study showed that physiotherapeutic intervention through STM is beneficial in CMT management and speeds up recovery.[29]

A 2010 study comprised CMT infants who achieved adequate ROM and symmetrical head posture earlier when treated by a qualified PT professional instead of parents.[30] When compared to a 2017 study, stretching therapy at two dosages was beneficial for the cervical passive ROM and head tilt, for both lateral flexion and rotation of the spine, as well as bilateral SCM development in CMT infants.[31]

A 2012 study observed an immediate impact from kinesiological taping (KT) application in CMT children.[32] When compared to a 2015 study, KT can play a significant role in the treatment of CMT infants.[33]

A 2014 study found that incorporating microcurrent therapy to a clinical regimen that involved therapeutic activity and ultrasound greatly shortened the length of treatment in CMT children.[34] When compared to a 2009 research, microcurrent therapy in CMT children tends to be more successful in improving tilting angle and rotation range of motion of neck and demonstrates greater clinical adherence than conventional therapy.[35]

The basic aim of the physiotherapist as well as the patient is the same, which is to return to the pain-free active state. The vital role of PT professional is to correctly identify and manage the patient, which often involves the recognition of a tight and weak structure, thereby providing a PT treatment plan, such as stretching exercises, strengthening exercises and STM.

Confidence in evidence-based PT is growing with time. The current used the PEDro scale to assess the methodological quality of the studies reviewed. Overall, there was a high level of evidence for CMT since the review comprised only RCTs and good-quality trials.

Very few studies have been done on CMT in infants. Further studies should be conducted with variation in parameters, and clinical trials should also be conducted to find the effect of PT treatment on the quality of life of CMT infants.

Conclusion

All the studies reviewed supported PT treatment which showed positive outcome CMT management. Early PT referral significantly reduced the treatment duration. Studies on the natural course and long-term impacts of muscle imbalances must be explored in future studies.

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References

1. Tonkaboni A, Mirzashahi B. Neglected adult torticollis and maxillofacial deformity. [Online] [Cited 2018 July 27]. Available from: URL:https://www.researchgate.net/profile/Arghavan-Tonkaboni/publication/327163468_Neglected_Adult_Torticollis_and_Maxillofacial_Deformity/links/5b7dac46a6fdcc5f8b5c519b/Neglected-Adult-Torticollis-and-Maxillofacial-Deformity.pdf
2. Kaur S. Congenital Torticollis and Its Physiotherapy Management. Int J Health Sci Res. 2020; 10:94-101.
3. Gundrathi J, Cunha B, Mendez MD. Congenital Torticollis. Treasure Island Florida Stat Pearls Publishing; 2022.
4. Amjad F, Shahid HA, Batool S, Ahmad A, Ahmed I. A Comparison on Efficacy of Transcutaneous Electrical Nerve Stimulation and Therapeutic Ultrasound in Treatment of Myofascial Trigger Points. KMUJ. 2016; 8:3-6.
5. Hahn HM, Cook KH, Lee IJ, Park DH, Park MC. Use of acellular dermal matrix in treatment of congenital muscular torticollis in patients over eight years of age. J Craniofac Surg. 2017; 28:610-5. doi: 10.1097/SCS.0000000000003425.
6. Kaplan SL, Coulter C, Sargent B. Physical therapy management of congenital muscular torticollis: a 2018 evidence-based clinical practice guideline from the APTA Academy of Pediatric Physical Therapy. Pediatr Phys Ther. 2018; 30:240-90. doi: 10.1097/PEP.0000000000000544.
7. Zhang C, Ban W, Jiang J, Zhou Q, Li J, Li M. Two Dimensional

Ultrasound and Shear Wave Elastography in Infants With Late Referral Congenital Muscular Torticollis. J Ultrasound Med. 2019; 38:2407-15. doi: 10.1002/jum.14937.
8. O'Connell MD. Descriptions of physical therapy management of infants with congenital muscular torticollis in the United States of America: Rutgers University-School of Health Professions, 2016.
9. Ellwood J, Draper-Rodi J, Carnes D. The effectiveness and safety of conservative interventions for positional plagiocephaly and congenital muscular torticollis: a synthesis of systematic reviews and guidance. Chiropractic & manual therapies. 2020; 28:31. doi: 10.1186/s12998-020-00321-w.
10. Han MH, Kang JY, Do HJ, Park HS, Noh HJ, Cho YH, et al. Comparison of clinical findings of congenital muscular torticollis between patients with and without sternocleidomastoid lesions as determined by ultrasonography. J Pediatr Orthop. 2019; 39:226-31. doi: 10.1097/BPO.0000000000001039.
11. Park S, Kim SA, Song JH, Kim H. Congenital Torticollis with Bilateral Sternocleidomastoid Muscle Contracture. Soonchunhyang Med Sci. 2020; 26:95-7. DOI: https://doi.org/10.15746/sms.20.023
12. Oledzka MM, Kaplan SL, Sweeney JK, Coulter C, Evans-Rogers DL. Interrater and intrarater reliability of the congenital muscular torticollis severity classification system. Pediatr Phys Ther. 2018; 30:176-82. doi: 10.1097/PEP.0000000000000510.
13. Lee K, Chung E, Lee BH. A study on asymmetry in infants with congenital muscular torticollis according to head rotation. J Phys Ther Sci. 2017; 29:48-52. oi: 10.1589/jpts.29.48.
14. Monreal J. Functional and Aesthetic Recovery of Congenital Muscular Torticollis with Intramuscular Stromal Vascular Fraction Enriched Fat Grafting. Cureus. 2017; 9:975. doi: 10.7759/cureus.975.
15. Limpaphayom N, Kohan E, Huser A, Michalska-Flynn M, Stewart S, Dobbs MB. Use of combined botulinum toxin and physical therapy for treatment resistant congenital muscular torticollis. J Pediatr Orthop. 2019; 39:343-8. doi: 10.1097/BPO.0000000000001302.
16. Kim SM, Cha B, Jeong KS, Ha NH, Park MC. Clinical factors in patients with congenital muscular torticollis treated with surgical resection. Arch Plast Surg. 2019; 46:414-20. doi: 10.5999/aps.2019.00206
17. Suhr MC, Oledzka M. Considerations and intervention in congenital muscular torticollis. Curr opin Pediatr. 2015; 27:75-81. doi: 10.1097/MOP.0000000000000175.
18. Bitra M, Sudhan S. Instrument Assisted Soft Tissue Mobilisation in the Management of Musculoskeletal Pain: A Literature Review with Implications for Clinical Practice Guidelines. J Clin Diag Res. 2019; 13:1-5. DOI: 10.7860/JCDR/2019/42687.13356
19. Cheatham SW, Lee M, Cain M, Baker R. The efficacy of instrument assisted soft tissue mobilization: a systematic review. J Can Chiropr Assoc. 2016; 60:200-11.
20. Antares JB, Jones MA, King JM, Chen TMK, Lee CMY, Macintyre S, et al. Non surgical and non pharmacological interventions for congenital muscular torticollis in the 0 5 year age group. Cochrane Database Syst Rev. 2018; 2018:CD012987. doi: 10.1002/14651858.CD012987
21. Yensen J. PICO search strategies. J Nurs Inform. 2013; 17:12-3.
22. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev. 2015; 4:1-9. doi: 10.1186/2046-4053-4-1.
23. Maher CG, Sherrington C, Herbert RD, Moseley AM, Elkins M. Reliability of the PEDro scale for rating quality of randomized controlled trials. Phys Ther. 2003; 83:713-21.
24. Drucker AM, Fleming P, Chan AW. Research techniques made simple: assessing risk of bias in systematic reviews. J Invest Dermatol. 2016; 136:e109-e14. doi: 10.1016/j.jid.2016.08.021.
25. Kaplan SL, Coulter C, Fetters L. Physical Therapy Management of Congenital Muscular Torticollis: An Evidence-Based Clinical Practice Guideline From The Section On Pediatrics Of The American Physical Therapy Association. Pediatr Phys Ther. 2013; 25:348-94. doi: 10.1097/PEP.0b013e3182a778d2.
26. Kaplan SL, Coulter C, Sargent B. PHYSICAL THERAPY MANAGEMENT OF CONGENITAL MUSCULAR TORTICOLLIS: A 2018 EVIDENCE-BASED CLINICAL PRACTICE GUIDELINE FROM THE AMERICAN PHYSICAL THERAPY ASSOCIATION ACADEMY OF PEDIATRIC PHYSICAL THERAPY.Pediatr Am Phys Ther. 2018; 30:240-90. doi: 10.1097/PEP.0000000000000544.
27. Oledzka M, Suhr M. Postsurgical Physical Therapy Management of Congenital Muscular Torticollis.Pediatr Phys Ther. 2017; 29:159-65. doi: 10.1097/PEP.0000000000000375.
28. Rahlin M. TAMO therapy as a major component of physical therapy intervention for an infant with congenital muscular torticollis: a case report. Pediatr Phys Ther. 2005; 17:209-18. doi: 10.1097/01.pep.0000179176.20035.f0.
29. Keklicek H, Uygur F. A randomized controlled study on the efficiency of soft tissue mobilization in babies with congenital muscular torticollis. J Back Musculoskelet Rehabil. 2018; 31:315-21. doi: 10.3233/BMR-169746.
30. Ohman A, Nilsson S, Beckung E. Stretching treatment for infants with congenital muscular torticollis: physiotherapist or parents? A randomized pilot study. PM R. 2010; 2:1073-9. doi: 10.1016/j.pmrj.2010.08.008
31. He L, Yan X, Li J, Guan B, Ma L, Chen Y, et al. Comparison of 2 Dosages of Stretching Treatment in Infants with Congenital Muscular Torticollis: A Randomized Trial. Am J Phys Med Rehabil. 2017; 96:333-40. doi: 10.1097/PHM.0000000000000623.
32. Öhman AM. The immediate effect of kinesiology taping on muscular imbalance for infants with congenital muscular torticollis. PM R. 2012; 4:504-8. doi: 10.1016/j.pmrj.2012.04.006.
33. Öhman A. The immediate effect of kinesiology taping on muscular imbalance in the lateral flexors of the neck in infants: a randomized masked study. PM R. 2015; 7:494-8. doi: 10.1016/j.pmrj.2014.11.010
34. Kwon DR, Park GY. Efficacy of microcurrent therapy in infants with congenital muscular torticollis involving the entire sternocleidomastoid muscle: a randomized placebo-controlled trial. Clin Rehabil. 2014; 28:983-91. doi: 10.1177/0269215513511341.
35. Kim MY, Kwon DR, Lee HII. Therapeutic effect of microcurrent therapy in infants with congenital muscular torticollis. PM R. 2009; 1:736-9. doi: 10.1016/j.pmrj.2009.06.008.
36. Ohman A, Mårdbrink EL, Stensby J, Beckung E. Evaluation of treatment strategies for muscle function in infants with congenital muscular torticollis. Physiother Theory Pract. 2011; 27:463-70. doi: 10.3109/09593985.2010.536305.
37. Jung MW, Landenberger M, Jung T, Lindenthal T, Philippi H. Vojta therapy and neurodevelopmental treatment in children with infantile postural asymmetry: a randomised controlled trial. J Phys Ther Sci. 2017; 29:301-6. doi: 10.1589/jpts.29.301.
38. Xu M. Comparison of curative effect of different media in pediatric tuina for infantile muscular torticollis. J Acupunct Tuina Sci. 2017; 15:451-6.
39. Kang Y, Lu S, Li J, Meng F, Chang H. Primary massage using one-finger twining manipulation for treatment of infantile muscular torticollis. J Altern Complement Med. 2011; 17:231-7. doi: 10.1089/acm.2010.0176.
40. Li-na C, Xiao-ya Z, Zhong-tia L. Tuina for infant congenital muscular torticollis: A randomized controlled trial. W J Acupunct Moxibust. 2019; 29:186-9.