

Frequency-Specific Microcurrent for Treatment of Longstanding Congenital Muscular Torticollis

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Purpose: This case describes the first episode of care, using conservative treatment, massage, and frequency-specific microcurrent (FSM), for a 19-month-old boy with grade 8 left congenital muscular torticollis with fibrotic nodules.

Methods: Ten weeks of physical therapy provided stretching, strengthening, massage, and parent education, adding FSM in weeks 3 to 10 for this patient.

Results: Full passive cervical rotation and lateral flexion, 4/5 lateral cervical flexion strength, improved head tilt, and inability to palpate fibrotic nodules were achieved by week 8, with partial home program adherence.

Conclusions and Recommendations for Practice: Excellent outcomes were achieved with conservative care in a patient with poor prognosis and likelihood of surgical referral. Combining stretching, strengthening, massage, postural reeducation, and FSM resulted in full range and good strength in an exceptionally short time. The combination of massage and FSM, not previously reported, are tools that may be effective in congenital muscular torticollis treatment. (*Pediatr Phys Ther* 2019;00:1–8)

Key words: frequency-specific microcurrent, grade 8 CMT, torticollis

INTRODUCTION

Congenital muscular torticollis (CMT) is a common musculoskeletal disorder of infancy, with an incidence of 3.92%^{1,2} to 16%.³ It is characterized by cervical lateral flexion and ipsilateral rotation limitations, with or without a sternocleidomastoid (SCM) muscle mass.⁴ Concomitant conditions may include cranial deformation¹ and cervical spine musculature imbalances.⁵⁻⁷ While one SCM is shortened, evidence suggests that both sides are affected. The shortened SCM has fibrotic tissue and disorganized muscle fibers,⁸ but animal models suggest strength changes on the opposite side due to overlengthening.⁹

Best treatment outcomes for CMT result when infants are referred to physical therapy before 3 months of age.¹⁰⁻¹² Better outcomes are inversely correlated with the amount of rotation restriction and type of CMT (postural, muscular, or fibrotic).¹ The 2013 clinical practice guideline provided a severity classification scale with 7 grades.¹³ The 2018 added an eighth

classification for children older than 12 months with any asymmetry in posture, range of motion (ROM), or an SCM mass.⁴ Children younger than 6 months who start treatment receive “early” and lower severity grades; those referred between 7 and 12 months receive “later” and higher grades; those referred after 12 months are classified as “very late.”⁴ Children referred after 12 months of age with cervical rotation restrictions greater than 30 degrees, and SCM fibrotic nodules, typically have incomplete recovery, and are often referred for surgical consults following a trial of conservative therapy.^{11,13,14}

Conservative management includes stretching cervical, trunk, and upper extremity (UE) muscles to gain passive ROM (PROM); active ROM (AROM); strengthening; and parent/caregiver education for home program activities to promote symmetry, facilitate age-appropriate development and participation, and positioning to prevent cranial deformity.⁴

Massage techniques are appropriate for infants with CMT younger than 6 months.¹⁵ Infants who received ultrasound, massage, and stretching to the involved SCM sustained improvements in head tilt and Torticollis Overall Assessment scores when assessed at 3 and 6 months.¹⁵ Soft tissue mobilization (STM), a technique to mobilize facial tissue, initially increased cervical rotation after 6 weeks of STM combined with a home exercise program as compared with a home exercise program alone, with no difference in cervical ROM at 12 or 18 weeks.¹⁶

Electrical stimulation is effective in wound healing and tissue regeneration,¹⁷ and pain reduction in athletes,¹⁸ attributed to enhanced ATP (adenosine-5'-triphosphate) production¹⁹ that promotes tissue repair and intracellular

0898-5669/110/0000-0001

Pediatric Physical Therapy

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The authors declare no conflicts of interest.

DOI: 10.1097/PEP.0000000000000576

muscle function.^{17,20} In humans, muscle disuse has been associated with degradation of myofibrils and intracellular Ca^{2+} elevation.²¹ Microcurrent's therapeutic action may be twofold. It is posited to be the same as transcutaneous electrical nerve stimulation (TENS) by reducing pain perception,²² which may allow for greater SCM stretching without discomfort. It is also hypothesized to correct Ca^{2+} dysregulation in the muscle tissue.²³ High cellular Ca^{2+} levels activate calpain, a protease involved in programmed cell death.²¹ Ca^{2+} dysregulation and increased calpain activation are thought to disturb muscle and connective tissue structure,^{8,20,21,24} trigger atrophy and necrosis of muscle tissue, and disturb muscle excitation-contraction coupling.^{20,24} Clinical studies^{23,25} rationalized using microcurrent (MC) with CMT to restore intracellular Ca^{2+} homeostasis as the key to improving muscle function, although Kim et al²³ demonstrated reduced infant crying with MC, consistent with concepts of pain reduction.

MC is considered a supplemental intervention to conservative care based on 2 level 1 randomized controlled trials.⁴ The first demonstrated effectiveness on 7- to 8-month-old infants ($n = 15$) using 30 minutes of MC combined with only 2 minutes of manual stretching; the control group received 30 minutes of manual stretching.²³ Both groups had home programs administered by their parents. The results of 6 visits over 2 weeks support that MC was, on average, more effective than stretching in reducing head tilt angle (from 16 to 7 degrees), improving passive cervical rotation (from 70 to 80 degrees), and improving infant tolerance of interventions (with significantly less crying).²³ Despite the small sample, the MC group improvements are notable for occurring within 2 weeks with minimal stretching.

The second randomized controlled trial compared 20 infants younger than 3 months with CMT who received ultrasound and therapeutic exercises; 10 additionally received MC.²⁵ Infants receiving MC had significantly greater increases in passive cervical rotation at 1, 2, and 3 months, shortened average treatment duration (2.6 months vs 6.3 months), and greater reductions in SCM thickness.²⁵

Traditional MC, as described by Kim et al²³ and Kwon and Park,²⁵ delivers current through 1 frequency channel using 2 body contacts. Alternating current flows from one electrode to the other using a ramped square wave. Voltages of 1 to 600 μA match the electrical current found in human tissue. Frequency-specific microcurrent (FSM) uses the same ramped square wave and voltages as traditional MC, but is delivered through 2 channels, using 4 body contacts, either with wet towels, gel electrodes, or a combination of both. Channel A frequencies target clinical conditions while channel B targets the tissues with the condition.¹⁸ For example, channel A frequencies can target edema while channel B can target the edematous muscle. The FSM frequencies are thought to cause biologic resonance with the electromagnetic bonds in living tissue, similar to vibration.¹⁸ When FSM frequencies match the electromagnetic bond frequencies in the targeted tissue, oscillations of the bonds may disrupt them, allowing for reorganization (<https://frequencyspecific.com/faq/>). Frequencies have been established for different conditions and tissue types. Correctly diagnosing

the condition causing the tissue impairments is critical to FSM success and may require trial and error.

This case study describes the successful use of conservative treatment (stretching, strengthening, and positioning) coupled with massage and FSM to correct CMT in a toddler.

DESCRIPTION OF CASE

This 19-month-old male toddler was referred for a first episode of physical therapy for left (L) CMT. Parents reported performing some stretches given by the pediatrician during infancy, but admitted low adherence. He presented with 12 degrees of L head tilt in sitting, 25 degrees restriction of passive L cervical rotation compared with the right (R), mild postural cervical hyperextension that increased with active L rotation, and L upper trapezius restriction compared with the R. He was classified as grade 8 CMT⁴ due to referral age, cervical rotation restrictions, postural preference for left lateral cervical flexion/right cervical rotation, and 2 pea-sized palpable nodules in the middle and distal thirds of the SCM.

An initial comprehensive systems review revealed no other confounding conditions, age-appropriate developmental skills (independent walking, running, and jumping), good bilateral hand use, and 2- to 3-word sentences. A Peabody Developmental Scales-II at week 10 confirmed age-appropriate gross motor skills during the last session. Fine motor skills were not assessed.

The clinical impression of this patient was a longstanding, untreated grade 8 L CMT with a poor prognosis for full recovery using only conservative methods; most late-presenting patients with grade 8 CMT are considered surgical candidates.^{26,27} His mother gave written consent to publish his case in accordance with the Health Insurance Portability and Accountability Act, using an institutionally approved consent form.

Examination Processes

The following measures were taken at the start of each session. Passive ROM (PROM) was measured bilaterally in the supine position, with an arthrodiagonal protractor.²⁸ Overpressure was not applied if the child resisted; thus, some values may be lower than actual PROM. Bilateral active cervical rotation was measured using the rotating chair test.²⁹ Active lateral cervical flexion against gravity was measured in degrees to measure weekly progress and with the Muscle Function Scale (MFS).⁵

This toddler was not cooperative lying in the supine position; therefore, resting head tilt was measured via photography in sitting, with the parent stabilizing the toddler's pelvis.³⁰ The photographs were printed, and head tilt was measured as otherwise described by Rahlin and Sarmiento.³⁰

INTERVENTIONS

Weekly, 1-hour outpatient sessions were combined with a home program for the parents. Conservative treatment consisted of stretching with massage, strengthening, and instruction for the home program. After 2 weeks, FSM was added to each clinic visit.

Stretching

This active, inquisitive toddler disliked being held for long periods. Stretches were held for 30 to 120 seconds as tolerated, with at least 2 repetitions per stretch. Right lateral cervical flexion stretch was obtained while carrying him in the L side-lying position, with his shoulder stabilized, applying gentle overpressure to facilitate PROM. Cervical rotation was achieved in a variety of ways, such as by holding his trunk against the physical therapist's (PT's) trunk and rotating his head left, or positioning him prone in the PT's lap with toys on his left (interventions—Figure 1a). Cervical extensors were stretched in the supported supine position and approximating his head toward his pelvis while playing.

Strengthening

Strengthening and postural reeducation exercises included tipping or swinging him to the L for R lateral flexion responses, backward tipping for symmetrical SCM activation, transitioning to sitting through R lateral trunk flexion, prone wheelbarrow positioning for bilateral shoulder girdle activation and scapular depression, and R UE reaching in the prone position to load the L UE for stabilization and postural control. Combinations of whole body flexion or extension with rotation included reclined sitting with toys on the left, supported side plank, and overhead L UE reaching (interventions—Figure 1b). Manual cues to correct head tilt were provided for postural reeducation throughout treatment. To keep the patient engaged and promote the highest quality movement patterns, the treatment area was well prepared with toys.

Massage Techniques

Massage and STM during stretching and play activities were performed throughout the 10 weeks. Techniques included gentle longitudinal and cross-friction massage, trigger point release, and muscle bending to the L SCM, scalenes, and upper trapezius (interventions—Figure 1a).

Frequency-Specific Microcurrent

A Custom Care© microcurrent unit (Precision Distributors Inc, Newberg, Oregon, <https://precisiondistributing.com/frequency-specific-microcurrent-products/customcare/>) was used to deliver the treatment protocol. This, and other

microcurrent machines, is approved by the Food and Drug Administration as TENS devices for the treatment of pain; its contribution to tissue reorganization may be an additive effect. Gel electrodes did not adhere well to the small neck contours and interfered with massage, so the 2 channel A leads were attached to a wet terrycloth bib secured gently around the patient's neck using alligator clip adaptors; current was conducted through skin contact with the bib. Gel electrodes on the anterior chest distal to the SCM insertions provided conductivity for the 2 channel B leads. Electrode placement is intended to drive current through the targeted tissue. For this patient, the bib and gel electrodes directed current from the origins to the insertions (electrode placement—Figure 2) to treat both SCMs. Setup took less than 5 minutes and remained secure without interfering with treatments (interventions—Figure 1).

The standard protocols provided with the Custom Care software did not address the combination of fibrosis and SCM tissues associated with CMT, so the first author, trained and experienced in FSM application and programming, customized a protocol based on the hypothesized Ca^{2+} issues and the apparent fibroma in the L SCM. A sequence of 4 channel A frequencies was programmed for 5 minutes each, to treat 3 calcium conditions and the fibroma. Channel B treated muscle tissue. Table 1 describes the frequency pairings of channels A and B, totaling 20 minutes, at an undetectable intensity of 50 μA .

Typically, the first 30 minutes of a session was spent on measurements and a combination of stretching and massage in preparation for functional activity. The remaining 30 minutes was spent facilitating movement patterns, developmental activities, and providing parent education. Beginning in week 3, FSM was added to the first half of the session. With progress, less time was spent on stretching and massage, with more time given to strengthening and postural awareness.

Home Program Intervention

The home program emphasized stretching into L cervical rotation, R lateral flexion, and midline cervical flexion. A picture booklet and activity descriptions were provided with hands-on training of the parents to ensure their understanding of the recommendations. A frequency of 100 stretches distributed over 10 sessions per day, holding for 10 to 15 seconds, is more effective than 50 stretches per day for increasing ROM in infants with CMT.³¹ This stretching schedule (100 stretches \times 10 seconds)

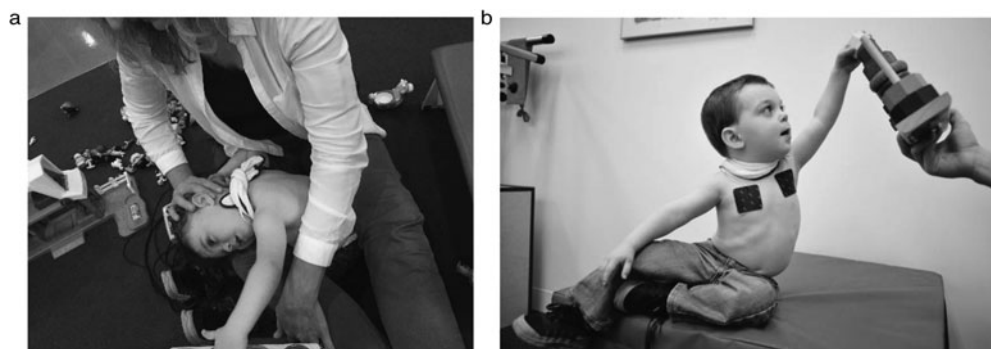


Fig. 1. (a) Massage while stretching with frequency-specific microcurrent. (b) Patient reaching with frequency-specific microcurrent.

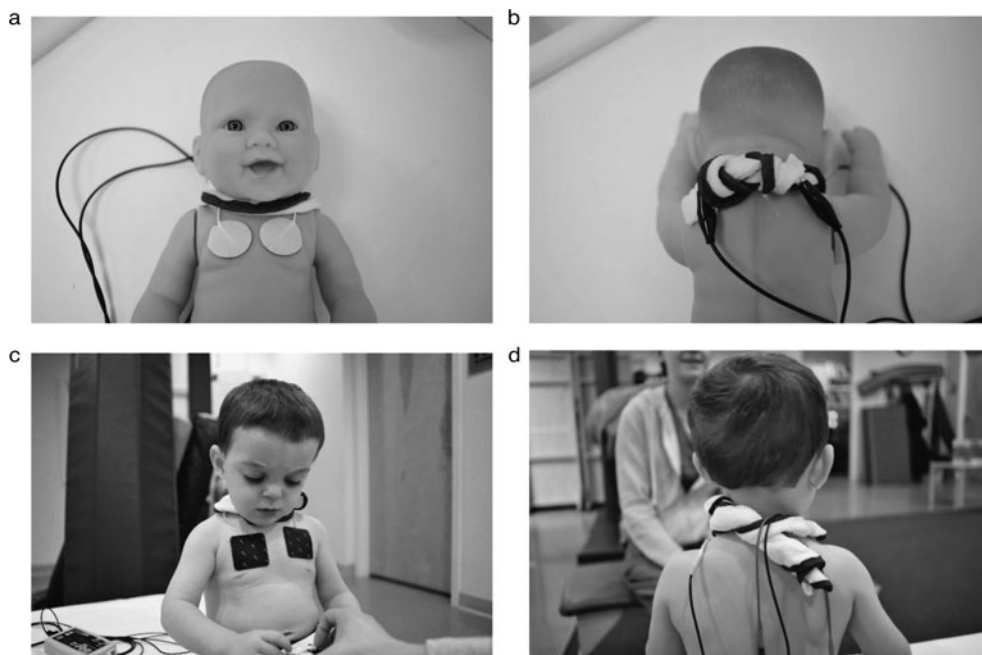


Fig. 2. Frequency-specific microcurrent electrode placement illustrated on a doll and patient. (a) Gel electrode placement on a doll. (b) Alligator clip adaptors attached to wet bib on a doll. (c) Electrode placement on patient. (d) Alligator clip adaptors attached to wet bib on patient.

equates to 1000 seconds or 16.67 minutes of stretching per day, nearly 2 hours per week. For this case, the parents were advised to perform each of the 3 stretches 4 times each day, holding 1 to 2 minutes for 2 repetitions. This schedule ranged from 720 to 1440 seconds of stretching per day (12-24 minutes total) and was felt to provide an adequate dosage that would increase the likelihood of parental adherence due to scheduling and family demands.

The home stretches taught to the parent included cervical flexion, performed with the child positioned supine in the parent's lap, approximating his shoulders and pelvis in trunk flexion while he was entertained with toys. Lateral flexion was most easily performed holding the child in the L side-lying position with his L shoulder stabilized and while the parent stood or walked, as this facilitated his cooperation for 1- to 2-minute holds. Cervical rotation stretching was achieved as shown in Figure 1a, by placing the child in long sitting on the floor at a 90-degree angle to the parent, resting his head on the parent's leg during the stretch, and offering toys for distraction. Alternately, the child could be upright, with the parent placing both hands on either side of his head to guide him into L rotation. To ensure cervical rotation without compensations, gentle sta-

bilization was applied to his trunk using the parent's legs on his anterior and posterior trunk.

Strengthening activities to promote midline head orientation, full active rotation, and lateral flexion were included in the home program, with ongoing revisions to increase degrees of challenge and variety in play. Exercises included carrying the child on a parent's L hip to promote active R lateral cervical flexion tipping to the L in sitting or while suspended and facilitating upright orientation, wheelbarrow positioning during play, and active neck flexion with L rotation in reclined sitting to promote R SCM activation. The parents were advised to engage in targeted strengthening activities after each stretching session.

Treatment Timeline

The treatment timeline and interventions are presented in Table 2, which reports 10 weekly measures of PROM, AROM, strength, head tilt, the presence or absence of the SCM masses, home stretching program adherence, and the approximate time spent on treatment components. ROM and strength measures of the unaffected side are included for comparison. In week 3, active L cervical rotation and R cervical lateral flexion were less than week 2, attributed to resistant behavior that week. Parents reported better home program adherence with AROM and strengthening than stretching.

OUTCOMES

Cervical Range of Motion

The guidelines of greater than 100-degree rotation⁴ and 70-degrees lateral flexion²⁸ were used as normal passive ROM. This patient achieved complete PROM resolution, despite his advanced age at referral. The patient's presentation before and after treatment is depicted in Figure 3, at 2 months, 18 months

TABLE 1

Case Report of Frequency-Specific Microcurrent Treatment Plan

Channel A (Condition)	Channel B (Tissue)	Duration, min
359—calcium	46—muscle	5
606—calcium	46—muscle	5
217—calcium oxalate crystals	46—muscle	5
601—fibroma	46—muscle	5

TABLE 2

Treatment Timeline and Interventions

Week	Examinations—Range of Motion Reported in Degrees (5-10 min/Session After First Visit)										Interventions, min		
	L Cervical Rotation PROM (R baseline)	L Cervical Rotation AROM Swivel Test (R Baseline)	R Cervical Lateral Flexion PROM (L Baseline)	R Cervical Lateral Flexion AROM (L Baseline)	Sitting Head Tilt— Measured by Photography (Visual Estimate)	R MFS (L Baseline)	SCM Masses	Home Program Adherence	Passive Stretching	Strengthening	Manual Therapy	FSM (Not Inclusive of 5 Setup min/Session)	Developmental Activities
1	75 (110)	60 (85)	50 (70)	25 (70)	12	3 (5)	Nodule in middle and another nodule in distal one-third SCM	Gave HEP	15	20	15		10
2	80	65	55	45	(10)	4		Stretched 3 d, 1 rep	15	20	15		10
3	95	60	55	25	10	3		No stretching performed	15	20	15	20 min	10
4	95	70	60	55	(10)	4		Stretched 1 d, 1 rep	15	20	15	20 min	10
5	95	70	55	45	10	4		Stretched 5 d, 1-2 reps each	15	20	15	20 min	10
6	95	70	65	60	10	4		Stretched 5 d, 1 rep each	15	20	15	20 min	10
7	105	65	65	65	6	4		Stretched 4 d, 1 rep	10	20	10	20 min	20
8	110	70	65	70	5	4	Nodules no longer palpable	Stretched 4 x/wk, 1-2 reps each	10	20	10	20 min	20
9	110	70	70	70	2	4		No report of adherence	10	20	10	20 min	20
10	110 (110)	75 (85)	70 (70)	60 (70)	2	4 (5)		Father reported he did not stretch, could not report if mom stretched this week	10	20	10	20 min	20

Abbreviations: AROM, active range of motion; FSM, Frequency-Specific Microcurrent; HEP, home exercise program; L, left; MFS, Muscle Function Scale; PROM, passive range of motion; R, right; reps, repetitions; SCM, sternocleidomastoid.



Fig. 3. (a) Patient at 2 months. (b) Patient at 18 months prior to treatment. (c) Patient at 21 months after the 10th week of treatment.

(before referral), and at 21 months after 10 weeks of treatment. By week 8, passive L cervical rotation increased 35 degrees, from 75 to 110 degrees; passive R lateral cervical flexion increased from 50 to 70 degrees; and resting head tilt reduced from 12 to 2 degrees, with intermittent increases noted during challenging motor tasks, such as running or bimanual activities.

Active ROM in the seated swivel test increased from 60 to 75 degrees. Cervical hyperextension was noted at the patient's end ROM, so the measurements taken reflect rotation without compensation. Active ROM measurements were within 10 degrees of the uninvolved side for rotation and lateral flexion by week 10.

Strength

The patient's ability to hold his head in R lateral flexion against gravity improved from 25 to 70 degrees above the horizon, and from an MFS score of 3 to 4.⁵ During the 10 weeks, he never surpassed the 75-degree threshold for an MFS score of 5. Active midline neck flexion improved as noted by his ability to hold a chin tuck for 5 to 10 seconds without a head tilt when tipped backward.

Posture

Seated head tilt angle reduced from 12 to 2 degrees at rest, with an increased ability to hold his head in midline. Since vision was not assessed prior to treatment to rule out ocular causes of torticollis, his persistent intermittent head tilt was indication for a referral.

Tissue Quality

The 2 fibrotic nodules in the middle and distal SCM present at evaluation were not palpable by week 8. Initially, the L SCM tissue quality felt more firm and dense than the R, with palpable strands of muscle. By week 10, these muscle strands were reduced in diameter and the muscle was more pliable, feeling like thread rather than piano wire. The reduction in size of palpable nodules may have reduced pressure on pain-sensitive structures, improving tolerance to massage and stretching.

Home Programming Adherence

Throughout the 10 weeks, the parents reported low adherence to the recommended stretching program, with no more than 4 days and 1 repetition per stretch completed at home

during any week, averaging about 1 hour of stretching per week. Stretching was more successfully completed when one adult positioned him, and the other played with him. Barriers to stretching included the child's resistance to stretching, apartment living and not wanting to disturb neighbors if the child cried, and limited time for both parents to participate due to work schedules. Greater consistency occurred with positioning, especially carrying on the L hip, and strengthening activities because they could more easily be worked into play and family activities. Despite the reduced home program intensity, improvements were obtained in all measures and sustained from week to week.

DISCUSSION

Three variables have been consistently identified as predictive of longer treatment durations in torticollis: older age at referral, the presence of fibrotic nodules, and greater rotation restriction.^{10,14,26} Treatment duration for CMT can range from 6.9 months with fibrotic nodules¹¹ to 10.3 months in children referred after 12 months of age.²⁷ Consults for more aggressive interventions are warranted if 6 months of conservative treatment does not resolve ROM and strength asymmetry, the child is older than 12 months at evaluation, or presents with SCM masses.⁴ This case describes conservative management of a patient referred very late for a first episode of physical therapy. His complete recovery of PROM and good recovery of strength in only 10 weeks are a fraction of the 7- to 10-month episodes previously reported for younger patients. The key differences between this case and other reports of conservative care are the addition of massage and FSM to traditional stretching, strengthening, and home programming. Both studies on single-channel MC^{23,25} resulted in significantly shorter times for achieving PROM; it is posited that FSM likely accounts for the rapid gains in ROM in this case.

FSM Mechanisms of Action

The mechanism for pain relief is unknown; however, it has been suggested that low-amplitude current may have an effect on human cell signaling, and increase endorphin release.³² Thus, FSM may reduce stretching discomfort, consistent with evidence supporting pain relief in athletes,¹⁸ and greater tolerance of interventions in infants by less crying.²³ Microcurrent has been reported to reduce nonspecific neck pain in adults by

80%.³³ In this case, pain management may have improved tolerance to stretching farther, holding the stretches longer, or massaging more deeply, resulting in the rapid ROM gains. The more plausible explanation may be on a cellular level, since this boy's response to stretching and massage prior to the use of FSM were the same as after its introduction.

At the tissue level, when Ca^{2+} homeostasis is disrupted in skeletal muscle, as reported in muscle trauma,^{20,34} disuse,²¹ and specific diseases (Parkinson disease,³⁴ Huntington's disease,³⁴ limb girdle muscular dystrophy,^{21,35} and torticollis⁸), the strict regulation of calpains is disturbed. Tissue samples from 185 patients with CMT (age 4 months to 16 years) had an average composition of 55% fibrous tissue to total muscle and significantly higher positive staining for calpain than controls.⁸ These histological changes may explain the clinical findings of increased SCM fibrosis and the associated reduction in muscle function.³⁶ Restoring Ca^{2+} homeostasis in the injured tissue may balance calpain activation and facilitate muscle fiber healing and SCM extensibility. The FSM frequencies in this study were chosen to target calcium and fibroma in the SCM, and are theorized to have provided a stimulus or created a favorable environment for tissue repair and regeneration of the SCM.³⁵ Although objective measures of fibrosis through ultrasound images were not obtained, the fibrotic nodules dissipated by week 8. Adding FSM, STM, and massage to standard conservative interventions appears to have hastened improvements.

Home Programming Effect

The home program is considered an important first-choice intervention component recommended for all patients with torticollis.⁴ Parent education for positioning, stretching, and strengthening is thought to ensure consistency of the stimulus needed for CMT resolution, prevention of *motor* delays and cranial deformity.¹ Evidence supports that treatment duration is shorter when a PT performs stretching as opposed to parents; however, ROM can still be increased in either case.³⁷ In this study, the home stretching program was delivered at approximately 50% of the recommended time per week, but the active strengthening activities were more consistently used throughout the day. Despite less home stretching, PROM increases were maintained following each treatment, and aside from 1 low measure in week 3 due to cooperation, the AROM steadily improved as well. More studies are needed to determine whether parental stretching can be substituted with active strengthening when FSM and massage are used during clinical visits.

Treatment Practicality

Adding FSM to conservative care requires knowledge of the equipment and frequency parameters, but its use with this toddler was well tolerated. Early in treatment, resistance occurred during the 5-minute setup; however, during subsequent sessions once engaged in play, he was undaunted by the electrode placement, and they did not interfere with treatment activities. The use of the wet bib is practical for young children who are accustomed to wearing bibs, as electrodes do not conform well

to the small contours of the neck and can interfere with access of muscle tissue during massage.

Combining massage with FSM was well tolerated and easy to deliver during a range of activities. Massage is thought to provide a mechanical stimulus to increase PROM, while FSM is postulated to stimulate cellular changes in the muscles and reduce pain signals if stretching causes discomfort.

Limitations

This is a study of one patient-PT dyad. The approach to care is relative to the PT's training and the changes reported may not be representative of other children. Behavioral cooperation may have affected some ROM measures, but the error more likely resulted in lower ROM measures than higher.

WHAT THIS CASE ADDS TO THE EVIDENCE

The uses of FSM and massage in torticollis treatment have not previously been reported. They were effective in obtaining excellent results in a child with grade 8 CMT whose prognosis would have been for an extended episode of conservative care and a high likelihood for surgical referral.

CONCLUSIONS

This case describes a 19-month-old male toddler, grade 8 CMT, who was referred very late for a first trial of physical therapy. Conservative care combined with FSM and massage resulted in full ROM recovery, 4/5 strength in lateral flexors, and reduction in head tilt by the eighth week of care. Gains in ROM were maintained from week to week, allowing strength and head tilt to improve. This rate of range and strength recovery is much faster than expected for a child of this age and CMT severity.

ACKNOWLEDGMENTS

The authors sincerely thank Dr Carol McMakin for her dedication to FSM education, Dr Ryan Suder for his counsel and encouragement, and especially to this patient's family for allowing him to illustrate the results of frequency-specific microcurrent and massage.

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