Novel Physiotherapies

Öhman et al., J Nov Physiother 2013, 3:4
http://dx.doi.org/10.4172/2165-7025.1000165

Research Article Open Access

The Physical Therapy Assessment and Management of Infants with Congenital Muscular Torticollis. A Survey and a Suggested Assessment Protocol for CMT

Anna M Öhman[1]*, Eva-Lott Mårdbrink[2], Christina Orefelt[3], Anthea Seager[4], Lisen Tell[5] and Eva Arrenhius Klackenberg[6]

[1,2]*Department of Paediatrics, University of Gothenburg, Queen Silvia Children's Hospital, Gothenburg, Sweden*
[3,5]*Sollevi Physiotherapy, Stockholm, Sweden*
[4]*Senior Physiotherapist,Temple Street Children's University Hospital, Dublin 1, Ireland*
[6]*Department of physiotherapy, The Astrid Lindgren Children´s Hospital, Stockholm, Sweden*

Abstract

Background: Infants with congenital muscular torticollis (CMT) are treated with physical therapy, however the knowledge about type of assessment and treatment in current clinical practice is not clear.

Aim: This study aimed to investigate the management of infants with CMT within a network of physical therapists.

Settings/population: Physical therapists from a network for CMT participated in the study. Method: With permission a questionnaire from New Zealand was used. Subsequently an expert group of physical therapists developed a draft assessment protocol.

Result: In general there was a high degree of consensus between the respondents in the current survey. For the assessment visual estimates were most commonly used and an evaluation of cervical muscle strength of the neck was always/often conducted. The most effective form of intervention as perceived by the respondents in the management of CMT was passive stretching, handling advice, facilitation with strengthening exercises of the neck muscle and facilitation of active cervical range of motion. There were big discrepancies in assessment of hand- and hip asymmetry.

Conclusion: There seems to be a need to develop international guidelines for CMT to improve the evidence practice of assessment and treatment.

Keywords: Congenital Muscular Torticollis, Physical Therapy, Assessment, Treatment

Introduction

Congenital muscular torticollis (CMT) is the third most common musculoskeletal abnormality in infants next to hip dysplasia and clubfoot. The reported incidence is 0.4-2.0% [1,2] however a recent study indicates that it might be higher [3]. CMT is a result of shortening or excessive contraction of the sternocleidomastoid (SCM) muscle with limited range of motion (ROM) in both rotation and lateral flexion of the neck and an imbalance of muscle function around the neck [4-6]. Due to the positional preference there is a high risk that infants with CMT develop deformational plagiocephaly [7-9]. The birth history demonstrates an unusually high incidence of difficulties during labour e.g. breech presentation is commonly found [10-14]. There is also a coexistence with hip dysplasia [10,11,14]. Infants with CMT are found to be at risk of delay in achieving motor milestones [15,16].

Evidence-based Physical therapy is important for patients because it implies that they will be offered the safest and most effective interventions within the limitations of current knowledge. The expectation is that this will produce the best possible clinical outcome [17]. Physical therapists in general have positive attitudes and beliefs regarding evidence-based practice (EBP) [18,19]. However, the majority of physical therapists indicated that they need to increase the use of evidence in their daily practice [18]. The process of implementing any research outcome begins with awareness [20]. In order to understand to what extent there is a need to improve and implement "new" methods and strategies for assessment and treatment of CMT among physical therapists we need to know more about the current practice. Luxford et al. investigated current physical therapy management and issues in management of infants with CMT in New Zealand (NZ) [21]. They constructed a questionnaire for this purpose. In their survey they found that most physical therapists in NZ used a visual estimate [21], this may reflect a lack of knowledge about measurement tools or a possible reluctance to change. Luxford et al. [21] identified key points such as consideration of the use of international protocols, routine assessments of infants hips and the use of information handouts to parents. The aims of physical therapy treatment for infants with CMT are to prevent/reduce plagiocephaly and to achieve symmetrical head position, ROM and muscle function of the neck. It is also important to be observant on the infant's motor development. Assessments and treatments are described in several studies [1,5,22,23].

The aim of the current study is to obtain knowledge about the existing practice in the physical therapy management of infants with CMT among members of a network for torticollis and also to develop a draft assessment protocol that could be used when examining an infant with CMT. The first author is responsible for the survey.

Method

Eighty-nine members of the network for physical therapists working with torticollis were invited to participate in this survey by

***Corresponding author:** Anna Öhman, Department of Physiotherapy, The Queen Silvia Children's Hospital, Sahlgrenska University Hospital/Östra, SE-416 85 Göteborg, Sweden, Tel: +46-313434732; E-mail: anna.ohman@friskispraktiken.com

Received May 09, 2013; **Accepted** June 28, 2013; **Published** June 30, 2013

Citation: Öhman AM, Mårdbrink EL, Orefelt C, Seager A, Tell L, et al. (2013) The Physical Therapy Assessment and Management of Infants with Congenital Muscular Torticollis. A survey and a Suggested Assessment Protocol for CMT. J Nov Physiother 3: 165. doi:10.4172/2165-7025.1000165

Copyright: © 2013 Öhman AM, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

e-mail contact. Most of the members are from Sweden but a few are from Denmark. Forty physical therapists (45%) chose to participate. With permission from Bernadette Luxford, the NZ questionnaire was used. It was translated to Swedish, however the participants had access to both the English and the Swedish version if they wanted.

The questionnaire is anonymous, 10-pages long and comprises 28 questions divided into five sections collecting general and demographic information, information specific to subjective assessment, objective assessment techniques, differential diagnosis and treatment techniques used in the management of CMT [21]. The only difference in the Swedish version is that one assessment tool is added in one of the questions. In addition to the arthrodial protractor another large protractor is some-times used in Sweden [22,24].

At the beginning of the questionnaire there is a screening question to ensure that the information is sought from physical therapists that had assessed and/or treated an infant (under two years of age) with CMT within the last year. Descriptive statistic is used for the result.

After the survey, a panel of experts developed a draft assessment protocol. The panel consisted of six pediatric physical therapists experienced in the assessment of infants with CMT. The panel members had professional experience of assessment of infants with CMT ranging from 10 to 40 years, with a mean of 18 years.

Result

Of the 40 physical therapists who replied three had not treated any infant during the last year, therefore the analysis is done on the data from the remaining 37 respondents. Thirty-four physical therapists from twelve districts in Sweden and three physical therapists in Denmark were included; one participant did not indicate which region she was from. All participants were female, and 21 were aged between 30-49 years old. The 37 respondents had worked as physical therapists for median of 20 years (range 5-40 years), in pediatric settings for median of 14 years (range 1-40 years). They assessed/treated in median 13 infants with CMT during a year, range 1-300 infants.

	Never	Rarely	Some-times	Often	Always	Missing data
Information obtained	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Current age	0 (0)	1 (3)	0 (0)	0 (0)	**34 (97)**	2
Age at onset of CMT	0 (0)	1 (3)	0 (0)	2 (6)	**31 (91)**	3
Age at diagnosis of CMT	3 (9)	4 (12)	2 (6)	4 (12)	**20 (54)**	4
Pregnancy/labour/ delivery	1 (3)	1 (3)	3 (9)	6 (17)	**24 (71)**	2
APGAR score	**13 (37)**	11 (31)	6 (17)	1 (3)	4 (11)	2
Birth weight	8 (23)	**10 (29)**	5 (14)	2 (6)	**10 (29)**	2
Birth order (e.g. 1st, 2nd)	2 (6)	1 (3)	7 (22)	5 (16)	**17 (53)**	5
Social/family history	4 (11)	5 (14)	9 (26)	7 (20)	**10 (29)**	2
Head posture/preference	0 (0)	0 (0)	0 (0)	0 (0)	**35 (100)**	2
Presence of pseudotumor	0 (0)	0 (0)	5 (14)	4 (11)	**26 (74)**	2
Typical sleeping posture	0 (0)	0 (0)	0 (0)	4 (11)	**31 (89)**	2
Head/face changes	0 (0)	0 (0)	0 (0)	3 (9)	**32 (91)**	2
Feeding status/difficulties	4 (11)	4 (11)	4 (11)	10 (29)	**13 (37)**	2
Time in prone/supine	0 (0)	0 (0)	0 (0)	6 (17)	**29 (83)**	2
Time in car seat/pushchair	0 (0)	2 (6)	9 (26)	**18 (51)**	6 (17)	2
Ability to focus/follow objects	2 (6)	2 (6)	6 (17)	9 (26)	16 (46)	2
Other congenital anomalies	1 (3)	1 (3)	6 (17)	9 (26)	18 (51)	2
Current medication	5 (15)	**10 (29)**	9 (26)	4 (12)	6 (18)	3
X-rays/diagnostic tests	9 (26)	**10 (29)**	8 (24)	3 (9)	4 (12)	3
Use of alternate therapy	**17 (49)**	10 (29)	3 (9)	1 (3)	4 (11)	2

Two respondents had not completed all the data on this form

Table 1: Frequency of information taken at first assessment of the infant with CMT. Modal value is bolded.

	Never	Rarely	Some-times	Often	Always	Missing data
Assessment tool	n (%)	n (%)	n (%)	n (%)	n (%)	n
Visual estimate	0 (0)	0 (0)	2 (6)	0 (0)	**33 (94)**	2
Goniometer	**10 (37)**	8 (30)	5 (19)	2 (7)	2 (7)	10
Arthrodial protractor	**20 (74)**	1 (4)	0 (0)	2 (7)	4 (15)	10
Large* protractor	9 (29)	3 (10)	5 (16)	4 (13)	**10 (32)**	6
Photography	13 (41)	1 (3)	**14 (44)**	4 (13)	0 (0)	5
Video recording	**22 (76)**	7 (24)	0 (0)	0 (0)	0 (0)	8

Table 2: Frequency of selection of assessment components when conducting assessments in new infants with CMT.

	Never	Rarely	Some-times	Often	Always	Missing data
Assessment components	n (%)	n (%)	n (%)	n (%)	n (%)	n
Head tilt	0 (0)	0 (0)	0 (0)	0 (0)	**35 (100)**	2
Head shape	0 (0)	0 (0)	0 (0)	0 (0)	**35 (100)**	2
Craniofacial changes	0 (0)	0 (0)	3 (9)	3 (9)	**28 (80)**	3
Palpation of affected muscle	0 (0)	0 (0)	6 (18)	3 (9)	**24 (71)**	2
Passive lateral flexion of the neck	1 (3)	0 (0)	0(0)	4 (11)	**34 (97)**	2
Active lateral flexion of the neck	0 (0)	2 (6)	2 (6)	3 (9)	**28 (80)**	2
Passive neck rotation	0 (0)	1 (3)	0 (0)	3 (9)	**31 (89)**	2
Active neck rotation	0 (0)	1 (3)	0 (0)	3 (9)	**29 (88)**	4
Cervical flexion/extension	5 (14)	8 (23)	7 (20)	4 (11)	**11 (31)**	2
Cervical muscle strength	0 (0)	0 (0)	0 (0)	8 (23)	**27 (77)**	2
Trunk range of motion	**11 (31)**	**11 (31)**	4 (11)	8 (23)	1 (3)	2
Asymmetry of thigh creases	**17 (50)**	6 (18)	5 (15)	5 (15)	1 (3)	3
Hip range of motion	**13 (37)**	5 (14)	7 (20)	7 (20)	3 (9)	2
Postural asymmetry	4 (11)	1 (3)	5 (14)	5 (14)	**20 (57)**	2
Postural reactions	8 (24)	7 (21)	6 (18)	3 (9)	**9 (27)**	4
Asymmetry of hand function	**10 (29)**	2 (6)	5 (15)	7 (21)	**10 (29)**	3
Gross motor function	2 (6)	1 (3)	4 (11)	5 (14)	**23 (66)**	2

* Large protractor made for measurement of lateral flexion with the infant lying on it in supine. Not in Laxford et al. questionnaire

Table 3: Frequency of selection of assessment tools when assessing cervical ROM in infants with CMT.

Nine sources of referral to physical therapy were identified; the three most common were "child health care centers" (81%), commonly referred to as "well baby clinics", pediatricians (73%), and "special units for children" (46%). Eighty-four percent of the respondents had an information handout for parents. Sixty-two percent had best practice guidelines for CMT at their place of employment and 16% reported that a guideline was in the process of being developed.

When considering the subjective assessment there is a high level of agreement about the information sought (Table 1). With regard to the objective assessment techniques for infants with CMT there is also high agreement about most components (Table 2). For hand asymmetry and postural reactions most respondents answered always or never with remaining 40-50% of answers between the extremes. For assessment of ROM in the infant neck most respondents always used a visual estimate, followed by a large protractor and an arthrodial protractor (Table 3). Factors that limited the accuracy when assessing neck ROM, were the level of distress experienced by the infant and lack of suitable measuring tools at the clinic. The selection of treatment techniques is described in a table (Table 4), provision of handling advice being the most common.

	Never	Rarely	Some-times	Often	Always	Missing data
Treatment techniques	n (%)	n (%)	n (%)	n (%)	n (%)	n
Monitor: no active treatment*	1 (3)	5 (15)	1 (3)	1 (3)	**26 (76)**	3
Perform SCM PSE	5 (14)	0 (0)	8 (23)	10 (29)	**12 (34)**	2
Teach parents SCM PSE	5 (14)	0 (0)	6 (17)	7 (20)	**17 (49)**	2
Perform SCM massage	**19 (56)**	7 (21)	6 (18)	2 (6)	0 (0)	3
Teach parents SCM massage	**19 (54)**	6 (17)	8 (23)	2 (6)	0 (0)	2
Advise head position (sleep)	2 (6)	0 (0)	2 (6)	5 (14)	**26 (74)**	2
Handling advice	0 (0)	0 (0)	0 (0)	1 (3)	**34 (97)**	2
Provide information handout	2 (6)	0 (0)	4 (11)	5 (14)	**24 (69)**	2
Facilitate cervical strength exercises	0 (0)	0 (0)	0 (0)	11 (31)	**24 (69)**	2
Facilitate full trunk ROM	**9 (26)**	4 (11)	**9 (26)**	**9 (26)**	4 (11)	2
Facilitate postural reactions	7 (20)	2 (6)	7 (20)	**10 (29)**	9 (26)	2
Facilitate postural symmetry	5 (14)	3 (9)	3 (9)	7 (20)	**17 (49)**	2
Facilitate midline activities	4 (12)	4 (12)	5 (15)	4 (12)	**17 (50)**	3
Arrange orthotic device (cervical)	**27 (77)**	5 (14)	9 (26)	7 (20)	0 (0)	2
Arrange orthotic devices (car seat/bed/pushchair	**13 (38)**	5 (15)	9 (26)	7 (21)	0 (0)	3

* to observe the infant is probably understood by the respondents as a part of the treatment to observe the infant before e.g. stretching or strength exercise, not as the only treatm

Table 4: The treatment techniques use by the respondents for infants with CMT.

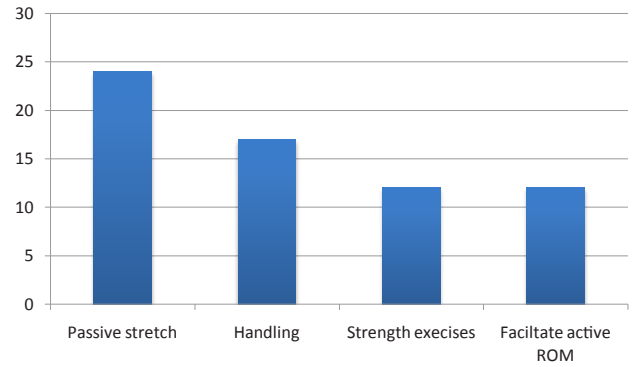

Figure 1: Perceived most effective form of intervention by the respondents in the management of CMT.

Most respondents indicated that they stretched the affected SCM muscle when appropriate (81%). Five respondents did never used passive stretching, three because they claimed that they had never seen infants with a contracted muscle, for one respondent the reason was that the infants was distressed and tense, and another respondent was of the opinion that CMT is the result of a fixation in the cervical spine.

The perceived most effective form of intervention by the respondents in the management of CMT was passive stretching, handling advice, facilitation of neck muscle strengthening exercises and facilitation of active cervical ROM (Figure 1). Most (93%) did not perform a passive stretch when the infant resisted the stretch or was upset. About half of the respondents performed stretches regardless of the infant's age (55%). The stretch was done using a movement direction of rotation toward the affected muscle and a movement direction of lateral flexion away from the affected muscle, 69% used a combination of the two movements. The stretch was held for mode 20 seconds, median 20 seconds, ranges 5-30 seconds. Nearly half of the respondents commented that the stretch was individually adjusted according to the compliance of the infant. Typically three repetitions were made during; median 1-2 sessions on each treatment occasion (range 1-5). The major issues faced by a physical therapist, when providing for the overall management of infants with CMT was a lack of parental compliance, infants age, lack of information from physicians/nurses to parents about handling (tummy time). The panel of experts designed a draft assessment protocol (Appendix).

Discussion

Forty-five percent chose to participate (42% fulfilled the criteria to continue to answer the questionnaire); this is according to Baruch an acceptable response rate [25]. Of those who spontaneously commented why they chose not to participate in the survey the most common was lack of time. Of the returned questionnaires 93% had treated an infant younger than two years during the last year. For some reason some respondents did not answer all the questions, (missing data). Whether they found the question irrelevant or if they just missed it is unknown. Compared with the survey in New Zealand (NZ) we have more missing data. The respondents seemed to be of a similar opinion based on the answers to most of the questions i.e. most had answered always/often or never/rarely. The results from these studies may be used as a baseline for discussion from which improvements can be achieved both in assessment and treatment.

Assessment

In general there was consensus with regard to the assessment of new infants with CMT. The majority of the respondents always determine typical head posture/preference, head shape, craniofacial changes, preferred sleeping posture, time in prone/supine, birth order, presence of SMT, palpation of affected muscle, passive and active ROM in neck rotation and lateral flexion, cervical muscle strength, postural asymmetry and gross motor function. This is similar to the Luxford et al. result [21], however it was more common to ask about family and social history in NZ (always 81% in NZ and in the current study 29%).

It was more common to evaluate cervical muscle strength in the current study; always/often 100% compared with NZ always/often 76%. Asymmetry in muscle function/strength in the lateral flexor of the neck is mostly observed in infants with CMT and is not observed in healthy infants [22]. It is easy to evaluate muscle imbalance with the muscle function scale (MFS), the MFS is valid and reliable and without any cost [18]. The MFS is developed in Sweden and maybe this is the reason that muscle function/strength are more often assessed in Sweden than in NZ.

The majority never or rarely assessed the infants' hips; also Luxford et al. found that hips were not often assessed. As there is a reported coexistence of CMT and hip dysplasia it is recommended to assess the hips as routine in new infants with CMT [21]. Clinically we know that hand asymmetry is not uncommon for infants with CMT, however this aspect had a broad variation in answers by the responders, with "always" being as common as "never". It can be important to be able to separate "normal" asymmetry due to CMT from a mild cerebral paresis.

Protractors were more commonly used in measurements' of passive rotation and lateral flexion in the current study than in NZ, however the majority never/rarely used a protractor. To use the correct instruments for measurements should be encouraged as it increases accuracy. The cost for the protractors used in the measurements of infants with CMT is minimal. Why protractors are not used more often is unclear there may be a lack of knowledge, these are not

convenient to use, there may be some reluctance to change. ROM in infants is not very easy to assess, as the infants dislike to be held during measurements.

Treatment

The most common treatments were passive stretch, handling advice, facilitation of neck muscle strength and facilitation of active cervical ROM. This is similar to the result in the survey in NZ. This is not unexpected; however there were five respondents who never used passive stretching, three claimed that they never saw infants with limited passive ROM (PROM). It is not known what values they considered as limited or normal PROM as the question about reference values used was not asked. One did not use passive stretching because the infants were distressed and tense. Another respondent considered it as a fixation in all infants that she had seen. For CMT to be attributable to a fixation is not supported by scientific evidence.

In both the current study and in the NZ survey it is clear that passive stretches were mostly adjusted to the compliance of the individual infants. More research about treatment options and effectiveness are needed to achieve best possible evidence-based practice. The respondents also considered handling advice, strength exercises and facilitation of active ROM as important factors for treatment.

It is unknown to what extent spontaneous recovery occurs. The only study found which investigated spontaneous recovery is not available for critical review as it is not available in English. However by reading the abstract it is obvious that there were an unusually high prevalence of infants in need of surgery in both the invention group and the control group [26]. This raises questions about the method, assessment, and reference values chosen. More studies are needed to find out more about the extent of spontaneous recovery.

In the current study as well as the survey in NZ, handling advices was considered a very important part. The majority of respondents (83%) always or often gave information handouts to parents, (90% had access to information folders), in NZ over a third had no access to information handouts for parents [21]. This difference may be due to that information folders and exercise folders developed at the two main Childrens Hospitals in Sweden being accessible to any professional who wishes to use them. There is no known network about CMT in NZ but information folders are shared in some districts (Luxford personal communication). Information handouts may be a very important in order to achieve the best possible parental compliance. The main concerns in the overall management of infants with CMT were lack of parental compliance and the age of the infant this is similar to the survey in NZ. Age at the start of treatment is shown to have influence on the result [1]. When trying to the panel of experts developed a draft assessment protocol for CMT. An international protocol when assessing infants with CMT would probably be of benefit achieves accuracy. International networking may be a good start.

Conclusion

In general there was a high degree of consensus between the respondents in the survey about assessment and treatment of newly diagnosed infants with CMT. Visual estimates were most common and the measurement tool most commonly used was the large protractor for measurements of lateral flexion of the neck. Evaluation of cervical muscle strength in the neck was always/often done. The perceived most effective form of intervention by the respondents in the management of CMT was passive stretching, handling advice, facilitation of neck muscle strengthening exercises and facilitation of active cervical ROM. The treatment was adjusted to the compliance of the individual infants. Assessment of hand- and hip asymmetry ought to be encouraged. An international protocol could help to increase accuracy of assessment. More studies are needed to investigate the benefit of different treatment strategies and to what extent spontaneous recovery occurs.

Appendix

Congenital muscular torticollis (CMT) anamnesis	
Name	
Birth date	
Age when CMT was discovered	
Pregnancy/delivery	
Birth weight	
Birth length	
Sibling number	
Heredity for CMT	
Sternomastoid tumor (SMT)	
Head position/postural control	
Sleeping position	
Difficulty with breastfeeding one side	
Tummy time when awake, approximate time	
Quantity of tummy time/day	
Pillow/other	

CMT status	Date	Date	Date
Spontaneus body position espec. head[A]			
Supine position			
When performing traction test			
Prone position			
Vertical position			
Palpation muscle			
Head shape, fontanelle			
Posterior flattening[B]			
Forehead asymmetry[B]			
Ear misalignment[B]			
Facial asymmetry[B]			
Neck Involvement[B]			
Craniometer[C] Right/Left			
Brachycephaly[B]			
Active rotation[D] in:			
Supine Right/Left			
Prone Right/Left			
Vertical Right/Left			
Musclefunction[E] Right/Left			
Passive rotation[F] Right/Left			
Passive lateral flexion[G] Right/Left			
Hip abduction/crease[H]			
Motor development[I]			

Conclusion	
Goal	
Intervention	

A.C-shaped. B. Cranial Tech scale. C. Craniometer diagonals. D Estimated. F.MFS 6-degree ordinal scale. F. arthrodial protractor, goniometer. G. Big protractor. H. Side difference/crease. I. E.g.with AIMS, asymmetry.

Acknowledgement

We thank all physical therapists that participated in this study.

References

1. Cheng JC, Tang SP, Chen TM, Wong MW, Wong EM (2000) The clinical presentation and outcome of treatment of congenital muscular torticollis in infants--a study of 1,086 cases. J Pediatr Surg 35: 1091-1096.

2. Chen MM, Chang HC, Hsieh CF, Yen MF, Chen TH (2005) Predictive model for congenital muscular torticollis: analysis of 1021 infants with sonography. Arch Phys Med Rehabil 86: 2199-2203.
3. Stellwagen L, Hubbard E, Chambers C, Jones KL (2008) Torticollis, facial asymmetry and plagiocephaly in normal newborns. Arch Dis Child 93: 827-831.
4. Cheng JC, Au AW (1994) Infantile torticollis: a review of 624 cases. J Pediatr Orthop 14: 802-808.
5. Emery C (1994) The determinants of treatment duration for congenital muscular torticollis. Phys Ther 74: 921-929.
6. Binder H, Eng GD, Gaiser JF, Koch B (1987) Congenital muscular torticollis: results of conservative management with long-term follow-up in 85 cases. Arch Phys Med Rehabil 68: 222-225.
7. Golden KA, Beals SP, Littlefield TR, Pomatto JK (1999) Sternocleidomastoid imbalance versus congenital muscular torticollis: their relationship to positional plagiocephaly. Cleft Palate Craniofac J 36: 256-261.
8. Rogers GF, Oh AK, Mulliken JB (2009) The role of congenital muscular torticollis in the development of deformational plagiocephaly. Plast Reconstr Surg123: 643-652.
9. Oh AK, Hoy EA, Rogers GF (2009) Predictors of severity in deformational plagiocephaly. J Craniofac Surg 20: 685-689.
10. Cheng JC, Wong MW, Tang SP, Chen TM, Shum SL, et al. (2001) Clinical determinants of the outcome of manual stretching in the treatment of congenital muscular torticollis in infants. A prospective study of eight hundred and twenty-one cases. J Bone Joint Surg Am 83-83A: 679-687.
11. Davids JR, Wenger DR, Mubarak SJ (1993) Congenital muscular torticollis: sequela of intrauterine or perinatal compartment syndrome. J Pediatr Orthop 13: 141-147.
12. Öhman A, Beckung E (2004) Mapping children born between 1990 and 1996 with an earlier treatment for congenital muscular torticollis. Nord Fysiother 8: 63-73.
13. Hsieh YY, Tsai FJ, Lin CC, Chang FC, Tsai CH (2000) Breech deformation complex in neonates. J Reprod Med 45: 933-935.
14. Tien YC, Su JY, Lin GT, Lin SY (2001) Ultrasonographic study of the coexistence of muscular torticollis and dysplasia of the hip. J Pediatr Orthop 21: 343-347.
15. Schertz M, Zuk L, Zin S, Nadam L, Schwartz D, et al. (2008) Motor and cognitive development at one-year follow-up in infants with torticollis. Early Hum Dev 84: 9-14.
16. Ohman A, Nilsson S, Lagerkvist AL, Beckung E (2009) Are infants with torticollis at risk of a delay in early motor milestones compared with a control group of healthy infants? Dev Med Child Neurol 51: 545-550.
17. Herbert R, Jamtvedt G, Mead J, Hagen KB (2005) Practical Evidence-Based Physiotherapy. Elsevier Philadelphia.
18. Jette DU, Bacon K, Batty C, Carlson M, Ferland A, et al. (2003) Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. Phys Ther 83: 786-805.
19. Schreiber J, Stern P, Marchetti G, Provident I (2009) Strategies to promote evidence-based practice in pediatric physical therapy: a formative evaluation pilot project. Phys Ther 89: 918-933.
20. Carpenter D, Nieva V, Albaghal T, Sorra J (2005) Development of a Planning Tool to Guide Research Dissemination. Advances in Patient Safety: From Research to Implementation (Volume 4: Programs, Tools, and Products). Rockville (MD): Agency for Healthcare Research and Quality (US).
21. Luxford B, Hale L, Piggot J (2009) The physiotherapy management of infants with congenital muscular torticollis: a survey of current practice in New Zealand. NZ Journal of Physiotherapy 37:127-135.
22. Ohman AM, Beckung ER (2008) Reference values for range of motion and muscle function of the neck in infants. Pediatr Phys Ther 20: 53-58.
23. Ohman AM, Nilsson S, Beckung ER (2009) Validity and reliability of the muscle function scale, aimed to assess the lateral flexors of the neck in infants. Physiother Theory Pract 25: 129-137.
24. Perbeck Klackenberg E, Elfving B, Haglund Y, Brogren Carlberg E (2005) Intra-rater reliability in measuring range of motion in infants with congenital muscular torticollis. Advances in Physiotherapy 7: 84-91.
25. Baruch Y (1999) Response rate in academic studies–A comparative analysis. Human Relations 52: 421-438.
26. Ozalevli SS, Bayir N, Cavusoglu YH, Cakmak O (2004) Is physical exercise necessary in the treatment of the congenital muscular torticollis? Pediatrik Cerrahi Dergisi, 18: 21-24.

Citation: Öhman AM, Mårdbrink EL, Orefelt C, Seager A, Tell L, et al. (2013) The Physical Therapy Assessment and Management of Infants with Congenital Muscular Torticollis. A survey and a Suggested Assessment Protocol for CMT. J Nov Physiother 3: 165. doi:10.4172/2165-7025.1000165

Submit your next manuscript and get advantages of OMICS Group submissions

Unique features:

- User friendly/feasible website-translation of your paper to 50 world's leading languages
- Audio Version of published paper
- Digital articles to share and explore

Special features:

- 250 Open Access Journals
- 20,000 editorial team
- 21 days rapid review process
- Quality and quick editorial, review and publication processing
- Indexing at PubMed (partial), Scopus, EBSCO, Index Copernicus and Google Scholar etc
- Sharing Option: Social Networking Enabled
- Authors, Reviewers and Editors rewarded with online Scientific Credits
- Better discount for your subsequent articles

Submit your manuscript at: http://www.omicsonline.org/submission/