

Adapted T'ai Chi Exercises for a patient with an upper cervical fracture: A case 'story'

Rosalind Smith

Contact Email:

taichiexercises@gmail.com

Case History

Ted was a fit male British Red Cross trainer in his sixties who contacted the physiotherapy department at the end of a month's open appointment. He had previously been given a course of physiotherapy by a colleague to mobilise and strengthen his neck following conservative treatment for a fracture of the upper cervical spine 4 ½ months ago.

Assessment

Ted reported that he was much improved and had been very pleased with the physiotherapy treatment that he had received. He was continuing to follow his neck care advice and was doing his exercises (active range of movement and isometric strengthening exercises) religiously 10 repetitions for each exercise, twice a day, but he still had some residual pain and stiffness when he moved his neck. He appeared anxious and wanted to have his neck rechecked because he was worried that it did not feel quite 'right' when he moved it and wondered whether there was anything more that could be done. If everything was alright and there was no further improvement possible he would be happy to continue with his home exercise programme and put up with the pain. Later at the end of the session when arranging his follow up appointment Ted explained that when he had the accident he was in a great deal of pain and being a first aider he was concerned that he had fractured his neck. However, at the minor injuries department his neck x-ray did not reveal any fracture and he was going to be sent home with analgesia and neck care advice. He was so concerned that his neck was fractured that he had insisted on further investigation and was then transferred to the main hospital where a CT scan subsequently revealed a fracture of the atlas. This incident may have accounted for his current anxiety that things still might not be quite right with his neck and his desire to have it rechecked.

On examination Ted had good sitting posture. Neurological tests – reflexes, myotomes, and dermatomes were normal. Isometric muscle testing of flexion, extension, rotation and side flexion were Grade 5 and pain free. His active neck range of movements in the sagittal plane, flexion, retraction and extension were full and pain free but both rotation and side flexion revealed a slight limitation and pain towards the end range. However, the most striking observation was the poor quality of his movement, especially noticeable on rotation, the principle movement of the atlanto-axial joint (Platzer, 1992). Ted appeared very apprehensive about moving his neck and he moved in a very stiff and jerky manner which worsened as he neared the end of his available range when his face tensed up and he complained of pain.

Intervention

On the first visit I reassured Ted that he had obviously worked very hard at his exercises and made an excellent recovery. However, I noticed that he was moving his neck in an abnormal manner. It looked as though he had forgotten how to move normally and that his neck muscles were co-contracting due to fear and anticipation of pain. I demonstrated to Ted his stiff and jerky movement on rotation and contrasted this with moving normally. I explained that this abnormal movement was entirely understandable after such a major injury followed by a period of immobilisation. Treatment would consist of re-educating his movement using a new approach based on modern pain theory and exercises adapted from T'ai Chi.

Using the 'Explain Pain' book (Moseley & Butler, 2003) it was shown how pain is a response to the brain's interpretation of a threatening situation (Moseley & Butler, 2003) and that Ted's fear could be triggering the pain that he was experiencing. With the aid of the model spine, cervical anatomy and the mechanics of movement were illustrated. In particular it was highlighted that most of the rotation occurs in the upper cervical spine at the atlanto-axial joint where the head and the atlas rotate on the axis as a unit.

In order to retrain normal, efficient, pain free movement it was explained that first Ted needed to learn how to relax his neck muscles. He was positioned comfortably in supine lying with the

weight of his head supported on one pillow and was asked to allow his neck muscles to 'relax' and 'let go' and then very slowly turn his neck about 1/2" – 1" to the right and then back to the middle and repeat to the left side. Additionally, the T'ai Chi words and phrases 'release', 'soften' and 'melt your muscles' were used to facilitate relaxation and reduce co-contraction.

To reproduce the atlanto-axial joint rotation where the head and atlas rotate about the axis, imagery was used and Ted was asked to think about the movement of an old fashioned barber shop pole which rotates about a central axis or to visualise his head turning like a 'ball on a stick'. Normal efficient movement was described as being effortless and he was asked to imagine his head 'floating' to each side like to a ball rotating in water. As Ted gained confidence he was able to increase his range of movement and he had no pain but most important of all his quality of movement improved. He was moving smoothly in a relaxed fashion without any jerkiness, which the Chinese call 'silk-like' movement (Khor, 2000). This term originates from China where in the past silk thread was drawn by hand from the silkworm's cocoon. The movement had to be very slow and smooth as any jerky action would break the thread (Khor, 2000)

The next challenge in the 45 minute session was to progress the exercise and teach Ted how to reproduce this relaxed 'silk-like' movement in the gravity loaded position of sitting. In order to do this the T'ai Chi movement principle of 'song' (pronounced sung) was explained. The closest translation into English of the word 'song' is 'relaxation' (Cohen, 1997) however, unlike the English word 'relax' which is often interpreted as meaning to eliminate all tension and become almost limp (Cohen, 1997) 'song' is an 'active relaxation' where the body is maintained in correct posture and alignment and the muscles are physically relaxed around the bones and joints. When a person is able to 'actively relax' while they move or perform a task they are making the most efficient use of their muscles (Cohen, 1997).

In order to achieve this 'song' or 'actively relaxed' state T'ai Chi involves developing a deep awareness of the internal body sensations – muscle state, joint proprioception, pressure etc (Kelly, 2007). As the appointment time concluded Ted was still unable to perform relaxed

movement in sitting. He was sent home with advice to concentrate on feeling the difference between contraction and relaxation in his neck muscles at rest and while moving and to practice 'actively relaxing' when performing his exercises in supine, sitting and standing. He was instructed to exercise 'little and often', 4 – 5 repetitions every couple of hours initially progressing to 10 repetitions while monitoring his pain and to gradually increase his available pain free range of movement. He was advised to avoid forcing into pain with tense muscles at the end range which appeared to be counterproductive as it was reinforcing his pain and resulted in a poor quality of movement. Routine warnings which he had received on his previous treatment were repeated and he was to use his common sense and stop exercising if he had extreme pain and reduced range of movement which would indicate that he had been over enthusiastic and had strained his neck. He would then need to reduce his repetitions and frequency of exercising and to progress more gradually.

Results

Two weeks later Ted returned for his follow-up appointment and said he was very grateful for my help but he no longer needed treatment as his pain had gone. He had thought about everything that had been discussed regarding pain theory and T'ai Chi and had devised the following exercise which he demonstrated.

'I was standing on the bridge of the coast to coast cycle route where I live and I thought... I will look towards the sea (Ted performed right rotation), then I decided to look toward the mountains (left rotation), then a little later some people cycled under the bridge (flexion) and finally some seagulls flew over head (extension)'

As Ted performed each movement there was no stiffness or jerkiness and his neck moved effortlessly with normal efficient movement through a full active range and he had no pain. He explained that he had continued to practice his exercise and he hoped that this was alright? Ted was congratulated for taking the initiative to create such an effective exercise and the therapist explained that she was happy for him to be discharged and to continue independently.

He was given a month's open appointment and could contact the department for help if he experienced any further problems.

Discussion

This case highlights the importance of knowing the patient's perception of their condition and facilitating changes towards more helpful beliefs, educating the patient about modern pain neurobiology, assessing the quality as well as quantity of movement and empowering the patient so that they are completely involved in their treatment and have a positive attitude to promote recovery (Smith 2008, 2009)

Using the principles and exercises adapted from T'ai Chi the patient was taught how to relax and move in a more efficient manner. Visualisations and concentration on the internal body sensations of movement (muscle state, joint proprioception and pressure etc) rather than pain were used to facilitate relaxation and re-educate rotation at the atlanto-axial joint. Initially this was performed in lying with the cervical joints and muscles in a gravity unloaded position slowly performing a small range of movement then gradually increasing the range of pain free movement. The exercises were progressed to the gravity loaded positions of sitting and standing.

In this patient as in the previous case studies of CRPS 1 patients (Smith 2008, 2009) forcing into pain with excessive effort and increased muscle tone in order to increase the quantity of movement appeared to be counterproductive. In theory cortical disruption of the necks representation in the somatosensory cortex of this patient may have occurred and may have played a role in the development and maintenance of this pain state. To some extent this would fit with the evidence of cortical disruption from other pain groups (Flor et al.2001; Pleger et al. 2006). Excessive painful effort may have been maintaining this cortical disruption, thus in cases such as this patient, it may be necessary to slow down and be less aggressive with the effort, applied to facilitate normalisation of cortical organisation to occur. Moving with minimal effort, normal muscle tone and concentrating on improving the quality of movement may have facilitated cortical re-organisation and helped subsidence of his pain.

The adapted T'ai Chi exercises were also performed slowly and repetitively and along with concentration on the internal body sensations of movement may produce a meditative state distracting the mind from the pain which may also in my opinion help to retrain the somato-sensory cortex though I can find no evidence to support this theory. Finally the patient was empowered and became so involved with the rehabilitation process that he created his own unique adapted T'ai Chi exercise which it is hoped may be beneficial for other patients.

Conclusions

This case report indicates that exercises adapted from T'ai Chi were beneficial in helping rehabilitate a patient with pain and a poor quality of movement following an upper cervical fracture.

While case reports are a very useful method of identifying new and potentially useful interventions, the author is aware that such a design cannot claim cause and effect. The improvement seen in this patient may have been due to the specific intervention delivered or it may have been due to natural improvement over time or non-specific therapeutic effects. Additionally, just because the intervention appeared beneficial for this patient the findings may not generalise to other patients. This case study along with the work of Smith in CRPS patients (Smith, 2008, 2009) make a reasonable argument that this form of intervention is worthy of more in-depth study using more robust methods.

Acknowledgements

The author would like to thank Dr Lorimer Moseley whose presentation on 'Pain and Motor control' in 2003 and book 'Explain Pain' (co-authored with David Butler) provided the inspiration for adapting T'ai Chi exercises for patients. Dr Nicholas Harland for his assistance and suggestions towards writing this case report. Also my T'ai Chi teachers, Dave and Jean Haines (students of Patrick Kelly) for generously sharing their knowledge and the T'ai Chi and Chi Kung Forum for Health tutors and players for their support.

References

, then a little later some people cycled under the bridge (flexion) and finally some seagulls flew over head (extension)'

As Ted performed each movement there was no stiffness or jerkiness and his neck moved effortlessly with normal efficient movement through a full active range and he had no pain. He explained that he had continued to practice his exercise and he hoped that this was alright? Ted was congratulated for taking the initiative to create such an effective exercise and the therapist explained that she was happy for him to be discharged and to continue independently. He was given a month's open appointment and could contact the department for help if he experienced any further problems.

Discussion

This case highlights the importance of knowing the patient's perception of their condition and facilitating changes towards more helpful beliefs, educating the patient about modern pain neurobiology, assessing the quality as well as quantity of movement and empowering the patient so that they are completely involved in their treatment and have a positive attitude to promote recovery (Smith 2008, 2009).

Using the principles and exercises adapted from T'ai Chi the patient was taught how to relax and move in a more efficient manner. Visualisations and concentration on the internal body sensations of movement (muscle state, joint proprioception and pressure etc) rather than pain were used to facilitate relaxation and re-educate rotation at the atlanto-axial joint. Initially this was performed in lying with the cervical joints and muscles in a gravity unloaded position slowly performing a small range of movement then gradually increasing the range of pain free movement. The exercises were progressed to the gravity loaded positions of sitting and standing.

In this patient as in the previous case studies of CRPS 1 patients (Smith 2008, 2009) forcing into pain with excessive effort and increased muscle tone in order to increase the quantity of movement appeared to be counterproductive and may have reinforced the pain by sending abnormal feedback to the somato-sensory cortex. In contrast, moving with minimal effort, normal muscle tone and concentrating on improving the quality of movement may have facilitated cortical re-organisation and helped abolish his pain.

The adapted T'ai Chi exercises were also performed slowly and repetitively and along with concentration on the internal body sensations of movement may produce a meditative state distracting the mind from the pain which may also retrain the somato-sensory cortex.

The exercises were also new and different from traditional physiotherapy and may have provided a challenge for the brain encouraging neurogenesis.

Finally the patient was empowered and became so involved with the rehabilitation process that he created his own unique adapted T'ai Chi exercise which it is hoped may be beneficial for other patients.

Conclusions

This case report indicates that exercises adapted from T'ai Chi were beneficial in helping rehabilitate a patient with pain and a poor quality of movement following an upper cervical fracture. While case

Acknowledgements

The author would like to thank Dr Lorimer Moseley whose presentation on 'Pain and Motor control' in 2003 and book 'Explain Pain' (co-authored with David Butler) provided the inspiration for adapting T'ai Chi exercises for patients. Dr Nicholas Harland for his assistance and suggestions towards writing this case report. Also my T'ai Chi teachers, Dave and Jean Haines (students of Patrick Kelly) for generously sharing their knowledge and the T'ai Chi and Chi Kung Forum for Health tutors and players for their support.

References

- Cohen, K. (1997) The Way of Qigong The Art and Science of Chinese Energy and Healing. The Random House Publishing Group, United States.*
- Flor H, Denke C, Schafer M, Grusser S. (2001) Effect of sensory discrimination training on cortical reorganisation and phantom limb pain. The Lancet, Vol. 357:1763-64.*
- Kelly, P. (2007) Infinite Dao. Kösel GmbH & Co, Altusried-Krugzell.*
- Khor, G. (2000) Tai Chi the Way to a Healthy Life. New Holland Publishers, Australia.*
- Moseley, GL, Butler, D. (2003) Explain Pai., Noigroup Publications, Adelaide.*

Platzer, W. (1992) Volume 1 Locomotor System, Georg Thieme Verlag, New York.

Pleger B, Ragert P, Schwenkreis P, Forster A, Wilimzig C, Dinse HR, Nicholas V, Maier C, Tegenthoff M. (2006) Patterns of cortical reorganisation parallel impaired tactile discrimination and pain intensity in complex regional pain syndrome. NeuroImage, Vol. 32:503 – 10.

Smith, R. (2008) Adapted T'ai Chi Exercises for Complex Regional Pain Syndrome 1. Journal of the Physiotherapy Pain Association 25, 11 – 13.

Smith, R. (2009) The Role of Adapted T'ai Chi Exercises in rehabilitating a patient with CRPS 1 & co-existing Chronic Neck and Shoulder pain. Journal of the Physiotherapy Pain Association 26, 6 – 9.