



ACTIGRAPHY FOR MONITORING THE RESPONSE OF TEMPOROMANDIBULAR JOINT MYOFASCIAL PAIN THERAPY



G. D. Ko¹, B. Freund², I. Finkelstein³, A. Hum⁴,

¹Physical and Rehabilitation Med., Univ. of Toronto, Sunnybrook Hlth.Sci. Ctr., Toronto, ON, Canada, ²Crown Inst., Toronto, ON, Canada,

³Toronto Headache and Pain Clinic, ON, Canada, ⁴Canadian Ctr. for Integrative Med., Markham, ON, Canada

Background

Actigraphy is the measurement of movement. This is generally accomplished by wearing a device that records acceleration in 3 axis. Algorithms then convert this data into user-friendly information such as activity and quality of sleep. Recent advances in technology have made these devices (typically bracelets or watches) ideal for out of office monitoring. They are light, inexpensive, durable and endowed with long battery life. The stored data can be transferred to a computer wirelessly in the office or up-loaded to a cloud account by the patient from home using a phone or tablet as an interface. TMD like most chronic musculo-skeletal pain limits physical activity and disrupts sleep. Actigraphy is therefore an effective objective monitoring tool for the effectiveness of therapy.

Objective

The purpose of this pilot study was to evaluate the use of actigraphy in temporomandibular (TMD) myofascial pain patients and their response to Botulinum toxin-A injections.

Materials & Methods

Five healthy subjects between the ages of 19 and 45 with TMD symptoms involving the masticatory muscles and joint(s) of greater than 6 months duration were studied. Treatment consisted of Botulinum toxin A injections to the masticatory muscles. Subjects were monitored through clinical examination, subjective pain and sleep questionnaires as well as continuous actigraphy. The device used was the *Jawbone Up* (Jawbone Inc., CA) Data was collected 1 week pre-treatment, 1 week post-treatment and 4 weeks post treatment.

Results

Three of 5 subjects responded positively to the Botulinum toxin injections. Actigraphic data for both activity and sleep correlated well with changes in subjective pain and changes in objective measures such as range of jaw motion.



Jawbone Up
(Jawbone Inc., CA)



Screen shot of data collected from Jawbone Up

Pain (VAS 0-10) ROM (mm) Activity (steps) Awakening (#/night)

Subject	Pain (VAS 0-10)				ROM (mm)				Activity (steps)				Awakening (#/night)			
	t0	t1	t4	Δ Pain	t0	t1	t4	Δ ROM	t0	t1	t4	Δ Activity	t0	t1	t4	Δ Awakening
1	8	6	4	-4	33	36	43	+10	8450	8900	12500	+4050	4	2	1	-3
2	5	5	3	-2	39	40	42	+3	10700	9900	11900	+1200	2	2	0	-2
3	5	4	4	-1	28	30	30	+2	6830	6650	6770	-60	6	5	4	-2
4	7	8	3	-5	12	18	29	+18	4600	4670	10570	+5970	7	3	0	-7
5	9	9	8	-1	24	25	24	0	3600	3700	3590	-10	5	5	5	0

Discussion

Although actigraphy is not a specific measure of TMD severity, it indirectly measures quality of life parameters. When a patient becomes more physically active, sleeps more deeply and awakens less often it is reasonable to assume that they are feeling better. In this study botulinum toxin was used as a therapy because it does not directly influence sleep (such as sedative analgesic or muscle relaxant medications) and has no direct analgesic properties which could confound the results. A major advantage to actigraphic monitoring is that the data can be up-loaded and down-loaded to the cloud by the patient so that in-office follow-ups are not strictly necessary to monitor a patient's progress.

Conclusions

Actigraphy may be a useful monitoring tool for TMD myofascial pain treated with Botulinum toxin A injections. Further studies incorporating larger numbers, measures of sensitivity and specificity as in randomized controlled trials would be warranted.

References

- Pollak, C., et al. How Accurately Does Wrist Actigraphy Identify the States of Sleep and Wakefulness? *Sleep* 2001;24(8):957-965.
- Ahlberg, K., et al. Bruxism and sleep efficiency measured at home with wireless devices. *Journal of Oral Rehabilitation* 2008;35(8):567-571.
- Ancoli-Israel S, et al. The role of actigraphy in the study of sleep and circadian rhythms. *American Academy of Sleep Medicine Review Paper. Sleep* 2003;26(3):342-92.
- Morgensthaler, T. Practice Parameters for the Use of Actigraphy in the Assessment of Sleep and Sleep Disorders: An Update for 2007. *Sleep* 2007;30(4):519-529