

Managing Migraines with Laser Therapy

Fred Kahn, MD, FRCS(C)



DEFINITION AND PATHOPHYSIOLOGY

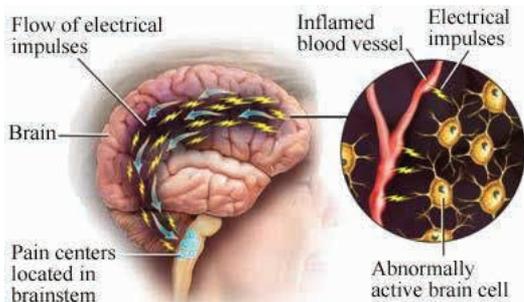
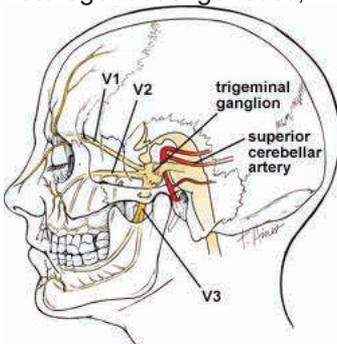
Migraine is a chronic, episodic, primary headache¹. It is thought to be a neurovascular pain syndrome with altered central neuronal processing (activation of brainstem nuclei, cortical hyperexcitability and spreading cortical depression) and involvement of the trigeminovascular system (triggering neuropeptide release, which produces painful inflammation in cranial vessels and the dura mater).²

Migraine can be viewed as an inherited disorder with episodic symptoms that arise in the brain.

Given the emerging evidence that migraine is based on complex, heterogeneous genetics, migraine attacks may be initiated in several ways. All humans have a trigeminocervical pain system that governs the head and upper neck, serving as a type of early warning system to protect the brain and upper cervical spinal cord from real or threatened injury. Any alteration in the stability of pathways either directly involved in or modulating the trigeminocervical pain system is a potential cause of migraine. Some people may inherit a low activation threshold for migraine; others, one that

is at the high end. The more often destabilizing triggering factors in the environment either separately or in combination meet this threshold, the more often the pain system is activated. This would explain why some people are headache prone and others are relatively resistant.

Aura is thought to be caused by a spreading wave of depolarization (cortical spreading depression). Aura is also associated with a localized reduction in blood flow followed by an increase in blood flow and characteristically affects the parieto-occipital cortex. Experimental evidence suggests that the cortical events underlying aura symptoms may be one of the ways that headaches are initiated in migraine patients. It is likely that the genes that make a person susceptible to aura are distinct from the ones that confer susceptibility to migraine headaches.



SYMPTOMS

Symptoms typically last from 4 to 72 hours and may be excruciating. Pain is often, but not always, unilateral, throbbing, worse with exertion, and accompanied by autonomic symptoms (e.g., nausea; sensitivity to light, sound, odors, etc.) Fortification spectra and other transient focal neurologic deficits, aura occur in a few patients, usually just prior to onset of the headache.² The diagnosis of migraine can usually be established on the basis of taking a thorough history.

CAUSES AND TRIGGERS

Many potential migraine triggers have been identified; these include the ingestion of red wine, hypoglycemia, excessive afferent stimuli (flashing lights, strong odors), weather changes, sleep deprivation, stress and hormonal factors. Cranial trauma, cervical pain and temporo-mandibular joint dysfunction may also trigger or exacerbate migraine headaches. Sensory input from the trigeminal nerve and cranial nerves IX and X have also been found to trigger migraines.

Fluctuating estrogen levels are a potent migraine factor. Many females experience the onset of migraine headaches at menarche, severe attacks during menstruation (menstrual migraine) and increased severity during menopause. For most women, migraines are less frequent and severe during pregnancy, although they may become more pronounced during the 1st and occasionally the 2nd trimester. Oral contraceptives and other forms of hormone therapy occasionally increase the severity of the headache and have been associated with CVA type episodes in women who have attacks associated with a variety of aura.

CURRENT MODES OF TREATMENT

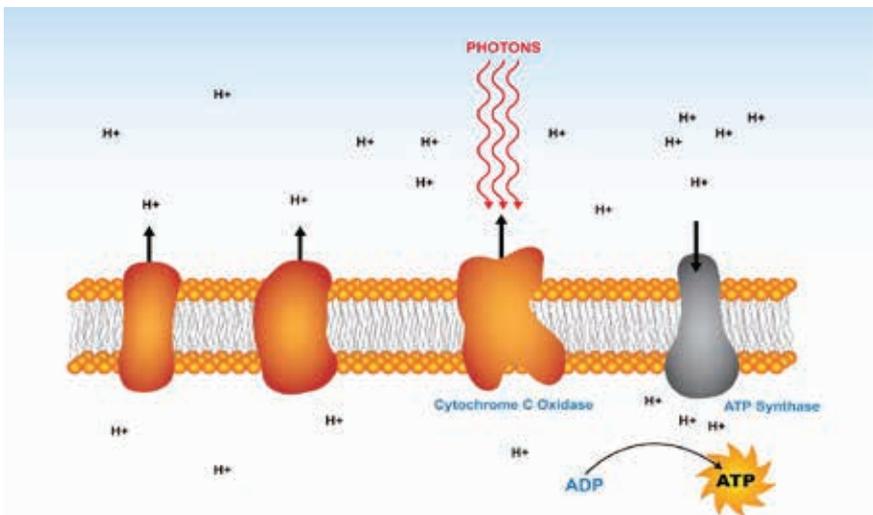
Many different medications have been specifically designed to treat migraines, with varying degrees of efficacy. In addition, some drugs commonly used to treat other conditions may also help to relieve or prevent migraines. Medications used to combat migraines include analgesics, triptans, antiemetics, and opioids, along with preventative medications such as beta-blockers, calcium channel blockers, serotonin receptor antagonists and OnabotulinumtoxinA. These medications all too frequently have many undesirable side-effects and limited efficacy.

Lifestyle changes (diet, exercise, sleeping habits) and some alternative therapies such as acupuncture, biofeedback therapy, massage therapy and manipulation, have been found to be helpful for some patients.

LASER THERAPY FOR MIGRAINES

A number of clinical trials have been performed in order to determine the efficacy of Laser Therapy for Migraines, both in children and adults. Gottschling et al.⁴ examined the effect of laser acupuncture on children with migraines or tension-type headaches. Over a four month clinical trial, they found that the laser treated group had a significant decrease in the number of headaches per month, a reduction in the severity of the pain and duration as compared to the placebo treated group. Ebneshahidi et al.⁵ also used laser acupuncture to show that adult patients suffering from tension-type headaches showed a significant decrease in headache intensity, the duration of attacks and number of days with headache per month, compared to the placebo treated group.

For more than 40 years, Laser Therapy has been effectively used in the treatment of acute and chronic conditions, including degenerative disc disease, repetitive stress injuries, muscle strains, sprains and arthritis.⁶ Laser Therapy is a non-invasive, pain-free, light-based therapy that uses a combination of red and infrared light in the form of superluminescent light-emitting diodes and laser diodes. The power output of these devices is below the level of surgical and other high-intensity lasers. Photon particles of light are absorbed by the mitochondria through cytochrome c oxidase and result in increased cellular ATP levels.⁶ Both Laser Therapy and acupuncture have been shown to increase endogenous opioid production and release, in addition to elevating the pain threshold levels.^{7, 8}



CASE PROFILE 1

ML

MEDICAL HISTORY:

The patient is a 30-year-old female who began to experience migraine headaches at 4 years of age. Headache patterns occurred from 1 to 3 times each month and generally lasted up to 3 days. They were triggered by environmental factors, emotional stress, etc. In addition to the headaches, which preclude all physical activities, she experienced visual symptoms such as periodic loss of vision in the left eye. Over the course of her life, she had been assessed by numerous specialists including ophthalmologists, neurologists, etc.; none of whom were able to offer any solutions. The patient had taken numerous analgesics and other medications which only occasionally provide temporary relief.

PHYSICAL EXAMINATION:

The patient demonstrated a normal range of motion of both shoulders and the thoracolumbar spine. The range of motion of the cervical spine was moderately restricted with regard to flexion, extension, lateral rotation and lateral flexion. Some spasm was noted over the left paracervical muscles. Neurological examination was grossly within normal limits.

DIAGNOSIS:

Chronic Migraine Headaches

DISCUSSION:

The patient received a total of 10 Laser Therapy sessions over the cervical spine. After only 2 sessions, subsequent attacks were less intense and of shorter duration. After 5 treatments, the headaches had disappeared completely. The range of motion of the cervical spine was found to be normal and physical examination failed to reveal any significant abnormalities.

Recommendations for Future Therapy:

To prevent recurrence, weekly treatments were continued for 4 weeks then reduced to several treatments on a bi-weekly basis and monthly up to 5 months. They were then discontinued to determine whether recurrence would result. This particular patient has not required the use of any pharmaceuticals since treatment session 5. Moreover, a three year follow-up revealed that headaches had not recurred after discontinuing treatment.

CASE PROFILE 2

CB

MEDICAL HISTORY:

This patient complains of recurring migraine headaches for 20 years. Her mother has also suffered from migraines all of her life. The headaches were less frequent earlier but during the past year had become problematic. They begin in the occipital area and extend to the right fronto-temporal region. They generally last 1-3 hours and she has had severe headaches for 13 of the last 15 days. These diminished the quality of her life from every perspective. She has used magnesium salts, many analgesics, etc. without any significant benefit.

PHYSICAL EXAMINATION:

The patient is right handed. The right grip is 60 and the left is 65 lbs. There is normal range of motion of both shoulders.

Range of motion of the cervical spine with regard to flexion, extension, lateral rotation and lateral flexion is 80% of normal.

There is no significant paracervical muscle spasm and only minimal tenderness C1-5.

There is no evidence of motor impairment, no sensory deficit and reflexes are within normal limits.

DIAGNOSIS:

1. Migraine Headaches
2. Myofascitis – Cervical Spine

DISCUSSION:

From the time of her last treatment, the patient has not experienced a single migraine event. She has now had 8 treatments and will be discharged after 10 treatment sessions. In our experience, relief is expected to be permanent.

CASE PROFILE 3

SL

CLINICAL HISTORY:

This patient is a 43 year old banker with a long history of headaches and pain in the cranium and cervical spine. The headaches are chronic and are present most of the time denoted by varying degrees of severity. Moreover, she has become habituated to their presence. She also has significant pain in the cervical and upper thoracic spine. She has had many sports injuries in the past playing competitive soccer. At this time she finds it difficult to sleep and because of the symptoms, has reduced all physical activities, including exercise. She has had many studies and therapies, none of which have provided any relief. She is currently utilizing copious amounts of Advil, Tylenol, etc. in the effort to resolve the symptoms.

PHYSICAL EXAMINATION:

The patient is right handed. The right grip is 35 and the left 45 lbs.

There is a normal range of motion of both shoulders.

Range of motion of the cervical spine with regard to flexion, extension, lateral rotation and lateral flexion is 50% of normal.

There is significant paracervical muscle spasm and tenderness from the occiput extending to T6.

Neurological examination is grossly within normal limits.

DIAGNOSIS:

1. Cervicogenic Headaches.
2. Myofascitis – Cervical and Thoracic Spine.

DISCUSSION:

This patient has sustained some concussions in the past and this may be responsible for the headaches, which have been present since age 18. She was placed on a course of Laser Therapy to the thoracic and cervical spine, including the cerebellum and brainstem. Following treatment #6, the headaches had disappeared completely and have not returned since. She underwent a total of 12 treatments to relieve symptoms and over the past 1.5 years, has been asymptomatic.

CASE PROFILE 4

DJ

CLINICAL HISTORY:

The patient has had migraine headaches since she was a teenager. They disappeared with her pregnancies but have returned over the past year. Currently, she is experiencing an episode which has lasted 6 days and has not been relieved by Tylenol, Codeine, Amitriptyline, etc. Her family doctor has ordered a CT scan in order to rule out other pathologies. Symptoms are most severe in the frontal area but radiate to the occipital region. They are somewhat incapacitating and more frequent over the last several months.

PHYSICAL EXAMINATION:

- The patient is right handed.
- The grip is 40 lbs bilaterally.
- There is a normal range of motion of both shoulders.
- Range of motion of the cervical spine with regard to flexion, extension, lateral rotation and lateral flexion is 70% of normal.
- There is significant paracervical muscle spasm and moderate tenderness C1-5.
- Neurological examination is normal.

DIAGNOSIS:

1. Migraine Headaches
2. Myofascitis Cervical Spine

DISCUSSION:

The patient was subjected to 9 laser treatment sessions over three weeks. This resulted in complete and to date, permanent relief of her symptoms.

CASE PROFILE 5

BM

CLINICAL HISTORY:

The patient is a 24 year old project manager who has pain in the right shoulder and neck. She recently sustained an injury lifting her nephew, which may be responsible for her present symptoms. She has had severe headaches since age 14 and the current attack has existed with unrelenting pain for 1 week. She does not have difficulty sleeping but is unable to take medications as they cause irritation of the gastrointestinal tract. She utilizes frequent massage, which provided only temporary benefit.

PHYSICAL EXAMINATION:

Range of motion of the cervical spine with regard to flexion, lateral rotation and lateral flexion is 80% of normal. Extension is less than 50% of normal. There is tenderness over the cervical spine from C1-6.

There is no evidence of motor damage, no sensory deficit and reflexes are within normal limits.

There is a normal range of motion of the left shoulder. On the right there is a 15-20° lack of lateral abduction.

There is moderate tenderness over the deltoid and the acromioclavicular area.

DIAGNOSIS:

1. 1. Migraine Headaches
2. 2. Right Rotator Cuff Injury.
3. 3. Myofascitis – Cervical Spine.

DISCUSSION:

This patient had complete relief of her headaches and all other symptoms following a four week course of therapy comprising 11 treatment sessions. There has not been any recurrence of symptoms over the past year.

CASE PROFILE 6

FC

MEDICAL HISTORY:

The patient is a 53 year-old medical secretary who had a chronic history of neck pain secondary to motor vehicle accidents sustained in 2000 and 2002. She fell in April 2012 and continued to have problems despite 20 physiotherapy treatments and the copious use of analgesics. She experiences headaches which are present most of the time and extend from the frontal area to the occiput. Symptoms restrict many of her physical activities and disturb her sleep. Periodically, she is unable to work. She sustained a head injury in 2007 while working out at the gym, in addition to the injury of April 2012, all of which aggravated her symptoms.

PHYSICAL EXAMINATION:

The patient is right-handed. The right grip is 35 lbs and the left is 45. There is a normal range of motion of both shoulders. Range of motion of the cervical spine with regard to flexion, extension, lateral rotation and lateral flexion is 60% of normal. There is significant tenderness from the occiput extending to C5. There is no evidence of motor impairment, no sensory deficit and reflexes are within normal limits.

DIAGNOSIS:

1. Cervicogenic Headaches
2. Cerebral Concussion
3. Myofascitis / Degenerative Osteoarthritis – C-T Spine.

DISCUSSION:

The patient received 14 Laser treatments over 6 months. After 8 treatments over 5 weeks, the patient noted an overall decrease in the severity and frequency of the headaches of 50%. Since the completion of her course of treatment, there have been no further episodes. Her grip strength and range of motion of the cervical spine have returned to normal levels.

CASE PROFILE 7

MD

CLINICAL HISTORY:

The patient is a 49 year old hotel employee who suffers from migraine-type headaches. These have become more severe in recent years, although they have been present for over 10 years. She may go for a week or two without an attack and then have a week or more of continuous, severe symptoms. These radiate from the occiput to the thoracic spine. They are frequently incapacitating and restrict all physical activities. She has had many different therapies and utilizes Advil, Tylenol, etc. to relieve symptoms.

PHYSICAL EXAMINATION:

- The patient is right handed. The right grip is 65 and the left 45 lbs.
- Range of motion of the cervical spine with regard to flexion, extension, lateral rotation and lateral flexion is 60% of normal.
- Tenderness is noted to be moderate from C1-T1.
- There is no significant muscle spasm.
- Neurological examination is within normal limits.

DIAGNOSIS:

1. Chronic/Acute Migraine-Type Headaches
2. Myofascitis – Cervical Spine

DISCUSSION:

This patient had a series of 6 laser treatments over three weeks. Three months post completion of therapy there has not been any recurrence of symptoms.

CASE PROFILE 8

CV

CLINICAL HISTORY:

The patient has been having migraine headaches every month or so since age 14. Over the past two months, they have been occurring every week or two and lasting for 3-4 days which is significantly longer than previously. Her condition at this time is acute and she also relates that she is sensitive to light and sound under these conditions. She takes Zomig 2.5 mg daily during attacks and sometimes when aura precedes the pain.

PHYSICAL EXAMINATION:

- The patient is right handed.
- The right grip is 35 and the left 60 lbs.
- Range of motion of the cervical spine with regard to flexion, extension, lateral rotation and lateral flexion is 75% of normal.
- There is tenderness from the occiput to C4.
- There is a moderate degree of paracervical muscle spasm.
- Neurological examination is within normal limits.

DIAGNOSIS:

Migraine Headaches

DISCUSSION:

This patient presents when symptoms become severe. After two to three treatment sessions she disappears for prolonged periods to return for additional treatment as required. Overall she is functioning normally and studying to become a dental hygienist. After 2-3 therapy sessions she generally is asymptomatic for 6 months or more. She no longer requires any medication.

CONCLUSIONS

At our clinics in Toronto, we treat an extensive number of headaches of various origins. Some of these are difficult to characterize, however all have one common denominator – frequent, prolonged and debilitating pain, which restricts physical activities and diminishes the quality of life. The majority occur in females which strongly suggests a hormonal factor and gender specificity. Many patients describe a complex aura prior to onset, however this factor is not consistent.

The utilization of Laser Therapy, whether to the cervical spine only or additionally to the cerebral hemispheres, almost invariably resolves the problem.

In all the case profiles included in this paper, aside from the complete relief of symptoms, grip strength values and range of motion of the cervical spine returned to relatively normal levels after the course of treatment had been completed.

In the most dramatic cases (20%), the occurrence of headaches was completely eliminated following the initial one to three treatments. In most instances after 5 therapy sessions, symptoms disappeared for prolonged periods of time. Additional therapy can be prescribed, if and when symptoms recur and also periodically as a preventative measure in a small number of patients as required (< 10%).

It should be noted that many headaches are associated with a previously sustained cerebral concussion, often undiagnosed, which may be of short or long duration. As you will infer from the case profiles included in this paper, myofascitis and/or degenerative osteoarthritis of the cervical spine are also concomitant pathologies in a large percentage of cases.

Laser Therapy applied to the cervical spine only, in over 60% of cases generally results in total relief. In the remainder of patients, therapy over the cerebral hemispheres is required in addition to treatment of the cervical spine. Clinical dictates will direct the application of therapy and utilization of the most effective protocols. Once the headaches are relieved patients are generally not required to return unless there is a recurrence.

The effects of Laser Therapy on the cerebro-spinal fluid, the vascular system and direct irradiation of the anatomical structures involved are the pathways leading to the induction of a potent anti-inflammatory and neuromodulation effect. Our extensive experience in managing these problems leads us to the following conclusion; Laser Therapy is highly effective in the treatment of headaches of all types and should be the treatment of choice by therapists managing these problems.

REFERENCES

1. International Headache Society. Classification of Headaches (ICHD-II). http://ihs-classification.org/en/02_klassifikation/
2. Beers MH, Porter RS, Jones TV, Kaplan JL, Berkwitz M. The Merck Manual of Diagnosis and Therapy 18th ed. Whitehouse Station: Merck Research Laboratories; 2006: 1847-1849
3. Goodman CC, Fuller KS. Pathology: Implications for the Physical Therapist 3rd ed. St. Louis: Saunders Elsevier; 2009: 1551-1559.
4. Gottschling S, Meyer S, Gribova I, Distler L, Berrang J, Gortner L, Graf N, Shamdeen GM. Laser Acupuncture in Children with Headache: A Double-Blind, Randomized, Bicenter, Placebo-controlled Trial. *Pain*, 2008; 405-412.
5. Ebneshahidi NS, Heshmatipour M, Moghaddami A, Eghtesadi-Araghi P. The Effects of Laser Acupuncture on Chronic Tension Headache – A Randomized Controlled Trial. *Acupuncture in Medicine*, 2005; 23(1): 13-18.
6. Chung H, Dai T, Sharma SK et al. (2012). “The Nuts and Bolts of Low-level Laser (Light) Therapy” *Annals of Biomedical Engineering* 2012; 40(2):516–533.
7. White A. Neurophysiology of acupuncture analgesia. Ernst E, White A, editors. *Acupuncture - A Scientific Appraisal*. Oxford: Butterworth Heinemann; 1999. p. 60-92.
8. King CE, Clelland JA, Knowles CJ, Jackson JR. Effect of Helium-Neon laser Auriculotherapy on Experimental Pain Threshold. *Phys Ther* 1990;70(1):24-30.



Contact Us

West Toronto Clinic

411 Horner avenue Unit 1
Toronto Ontario M8W 4W3

Tel: 416-251-1055

Downtown Clinic

181 University Avenue, Lobby Suite
Toronto Ontario M5H 3M7

Tel: 416-916-8125

Practice Consultants

sales@bioflexlaser.com
Tel: 1-888-557-4004



Join our group



Connect with us