HEADACHE SURGERY

Understanding a Path Forward

By Adam Lowenstein, MD, FACS

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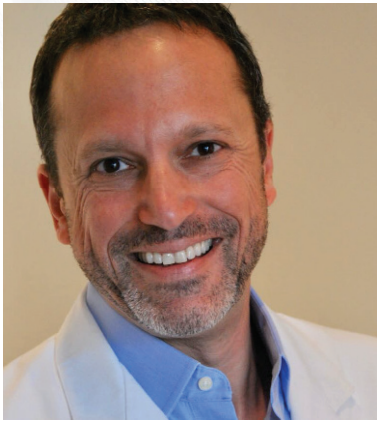
Dedication

To all my past, present, and future headache patients; you are among the strongest, most resilient individuals I've had the privilege to know. Your courage in facing daily challenges and your unwavering hope inspire me every day. This book is for you, with gratitude for the trust you place in me and the lessons you continue to teach me. May it bring you comfort, relief, and the reassurance that you are never alone in your journey.

About Dr. Lowenstein



Dr. Adam Lowenstein's journey into medicine was sparked by his early hands-on experience in healthcare, beginning with his work in pediatric trauma at Children's National Medical Center in Washington, D.C. He went on to study molecular biology and genetics at the University of Wisconsin-Madison, laying a strong foundation for his medical studies at the University of North Carolina at Chapel Hill.

Dr. Lowenstein then trained extensively, first with five years of general surgery at Thomas Jefferson University, followed by two years in plastic and reconstructive surgery at the University of Massachusetts.

Throughout his career, Dr. Lowenstein has prioritized patient care driven by personal commitment shaped by his own history with migraines. His practice reflects a unique blend of skill, compassion, and a dedication to innovation, making him a trusted figure in his field.

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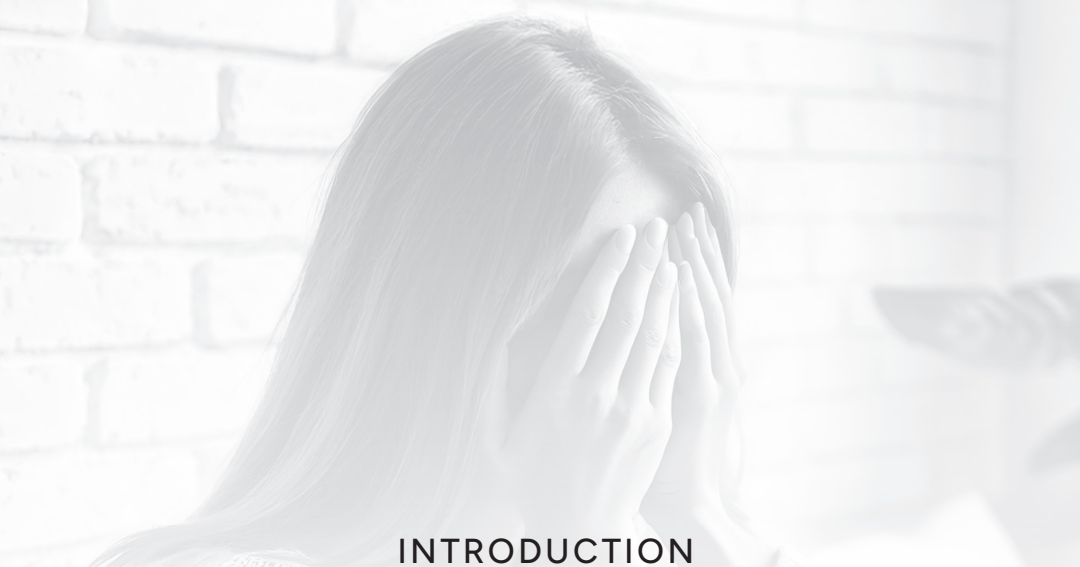


INTRODUCTION

Why Me?

The question on the minds of many who suffer from severe, debilitating headaches is, "Why me?" Patients often attribute their pain to past events—traumatic or otherwise—such as Lyme disease, car accidents, or sports injuries.

There are many factors that contribute, but the biggest is simply you being you. As you'll see in the following pages, your anatomy plays a significant role in headache pain, though triggers like illness or injury can exacerbate inflammation in your unique structure.

Migraines often run in families because nerve entrapment or irritation can be inherited, just like your height or the shape of your nose. My own experience with chronic headaches stems from a predisposition

in my anatomy, where stress amplified my susceptibility to nerve irritation, leading to chronic migraines.

While this might seem like bad luck, there's hope: your anatomy can be addressed. Just as a bad appendix can be removed, an inflamed nerve can be decompressed, relieving chronic headache pain.

A Life in Pain: My Earliest Memories of Headaches

When I think back, I cannot pinpoint the exact moment my headaches began. I just remember they were always there, lurking in the background, even in elementary school. No one else in my family had them. I was on my own in figuring out what was happening to me.

Back then, my go-to solution was Anacin—basically aspirin with caffeine, like Excedrin. Not the best choice for a kid, but I didn't know any better. Eventually, the headaches got so bad that I ended up in the emergency room, and that was my first warning sign.

Navigating Adolescence with Migraines: Coping Without Answers

By high school, headaches became very frequent. There I am in my junior prom photo, sleeves rolled

up, trying to look cool while secretly battling another throbbing headache. Life was full of these moments for me. On a beach trip to Bethany, Delaware, I had a severe allergic reaction to the Anacin I had been taking too often. My throat swelled shut, and I found myself rushed to the emergency room, barely able to breathe. That was the end of aspirin for me as I had developed a severe allergy to salicylates.

Junior prom throwback: sleeves rolled up, striking a cool pose, all while quietly enduring yet another pounding headache.

I switched to Tylenol and Advil, but they never provided much relief. Looking back, it's almost absurd how long I endured the pain without seeking proper help. Neither my mom, a brilliant single parent with a PhD, nor I ever thought to consult a neurologist or even mention the headaches to the pediatrician. We just accepted them as part of my life.

Now, as a surgeon treating headache patients, I see how much I could have spared myself with a simple consultation. I realize now that many of my headaches were stress-related, triggered by tense neck muscles and strained shoulders. I assumed it was just life, something to endure.

I know better now. And I want to help others avoid the years of unnecessary pain I went through.

A Glimpse of Hope: A Path Toward Pain-Free Living

If you suffer from chronic headaches, there is hope for a brighter, pain-free future. A safe and straightforward procedure, commonly called migraine surgery or headache surgery, is more specifically outpatient peripheral nerve decompression and could be the solution that transforms your life. This procedure has shown remarkable success for many individuals,

significantly reducing or even eliminating their headache pain. For those who are good candidates, the results can be truly life changing.

Why This Book: Demystifying Peripheral Nerve Decompression

The purpose of this book is to demystify this type of headache surgery and explain why it works so effectively. I want you to understand what is causing your pain, and how and why this procedure works.

By understanding this procedure, you can make an empowered and informed decision about whether it might be the right path for you. While peripheral nerve decompression surgery may not be suitable for everyone, it has brought substantial relief to countless people suffering from migraines, tension headaches, occipital neuralgia, and more. If your life is disrupted by chronic headaches, it is important to explore every potential avenue for relief—and this surgery might just be one of the best options available to you.

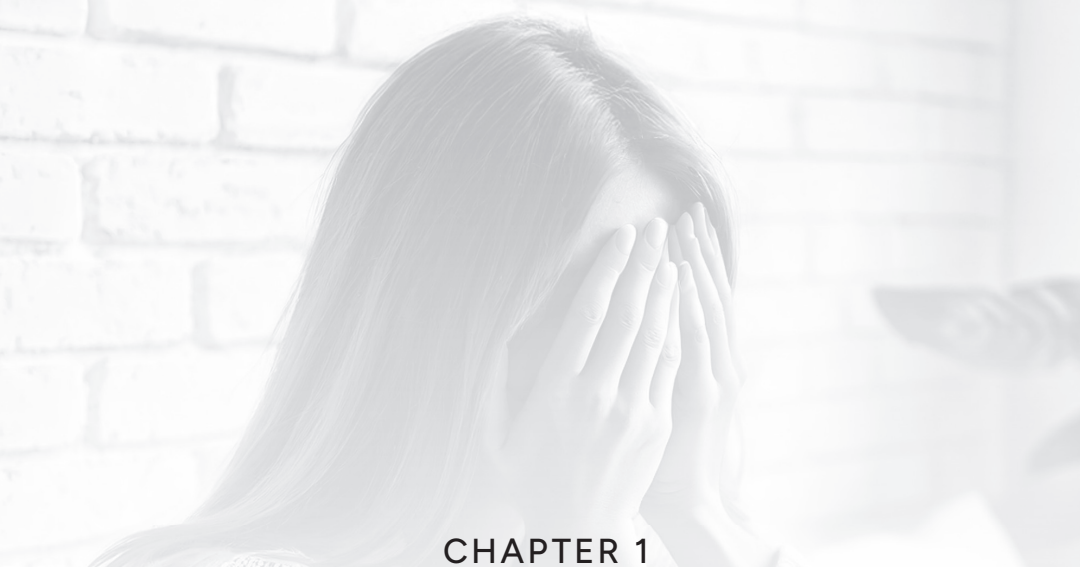
For Those in Pain: A Supportive and Practical Guide

As someone who has lived with the daily challenges of chronic headaches, I have designed this book to be a supportive and educational resource. Knowing

that reading can be difficult when you are in pain, I have used a larger font to minimize eye strain. In each chapter, I share both my personal story of living with headaches and provide practical, easy-to-understand information about the surgery.

A Revolutionary Procedure: Transforming Lives with Peripheral Nerve Decompression

Outpatient peripheral nerve decompression is a proven, safe, and relatively simple procedure that has an extraordinary success rate. An impressive 90% of patients who undergo this surgery experience a significant improvement in their pain, and nearly half of them achieve complete relief. Despite these outstanding results, many doctors and patients still do not fully understand the benefits of peripheral nerve decompression. My hope is that this book will help bridge that gap, providing you with the knowledge and confidence to explore a procedure that could offer you a new lease on life.



CHAPTER 1

The Long Road to Understanding

> *"That no one dies of migraine seems, to someone deep into an attack, an ambiguous blessing."* —Marianne Didion, acclaimed writer, suffered from migraines and wrote about their impact on her life in her essay "In Bed."

For years, I did not realize my headaches were migraines. I just thought they were "bad headaches" and something I had to live with. How different things might have been if I had consulted a neurologist sooner and received a proper diagnosis.

Like many sufferers, I convinced myself the pain was just simply part of life and tried to push through it.

However, recognizing and understanding the source of the pain is the first step toward finding relief.

Understanding How a Diagnosis is Made

In medicine, many factors contribute to finding a diagnosis. Through a process called the "diagnostic ladder," general to more specific signs and symptoms help narrow down a patient's condition to a particular diagnosis.

For example, take the diagnosis of pneumococcal pneumonia. A patient goes to the doctor complaining of a cough. They may have a fever as well. The doctor starts with the most common and simple conditions like a cold and moves up 'the ladder' step by step ruling out the things the patient does not have, until they find the exact cause of the problem. This process helps ensure the patient gets the right treatment for their specific condition.

The doctor will ask specific questions to gather more information. For example, they might ask if the patient smokes or has been traveling recently. Are they coughing up sputum? These are symptoms—the feelings or problems a patient experiences that indicate something might be wrong with their health. These can include things like pain, fatigue, dizziness,

or a cough—basically, any change in the body that the patient notices and reports to the doctor. At this point, the doctor will run some tests and order blood work to look at the white blood cell count—a crucial part of your immune system; they help fight infections and other diseases. Next a chest x-ray will be obtained. A sputum sample will be sent to the lab and depending on test results, the diagnosis will be narrowed down.

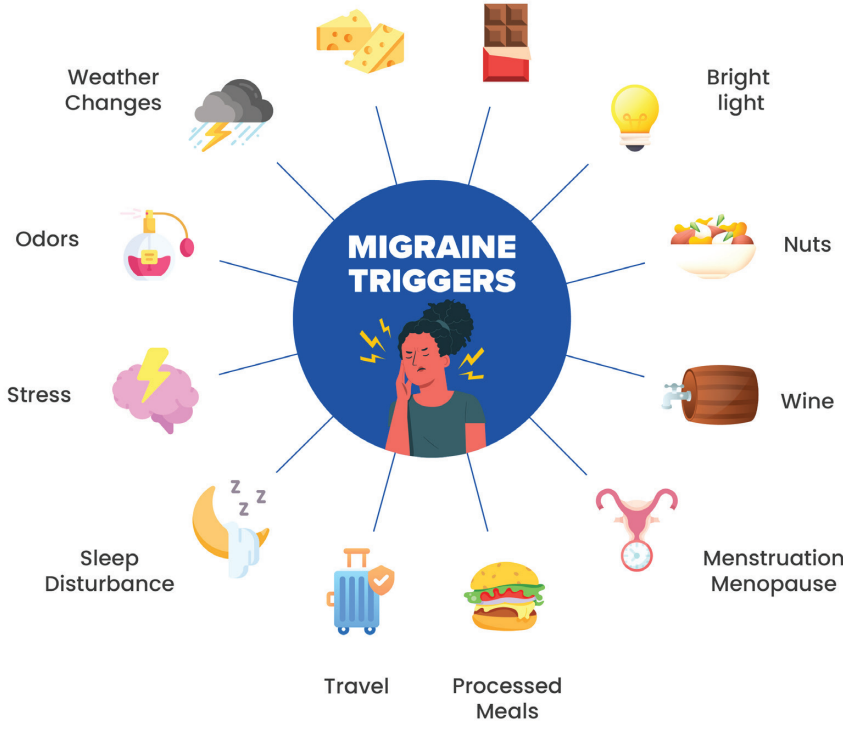
Subjective reporting from the patient relates to symptoms, their personal experience of the condition. In contrast, facts returned from clinical tests are called signs. The x-ray is going to show cloudy inflammation and an infiltration of disease throughout the lung tissue. Blood tests are going to show an elevation in a white count, consistent with infection. The sputum sample is going to be cultured and a bacteria called pneumococcus is going to be isolated from that growth. These signs allow the doctor to be certain that the patient has an infection of their lungs, causing pneumonia. Antibiotics will then be appropriately prescribed, and we would expect this patient to get better.

If only working with headaches were this straightforward.

Unfortunately, headaches have lots of symptoms but very few signs. Most doctors are not even oriented to looking for signs. The headache patient experiences pain in various regions of the head, and might also have accompanying issues of light sensitivity, nausea, tinnitus, or other experiences that are related to their pain. But there are very few tests that most doctors run to confirm a particular headache diagnosis. To make the issue even more difficult, many headache patients are not seen by specialists who deeply understand their disease.

Who Should You See?

Most patients treated for headaches are treated by their general practitioner or internist, a doctor who has a moderate amount of expertise in a very large number of things. They have to know a good deal about many more things than I do as a surgeon. These doctors will often recommend some generalized baseline approaches that help in cases of simple chronic headaches. Some patients do not respond to these straightforward medications and management, and we would hope that those patients would be referred to an "expert." Those headache sufferers should be referred to a neurologist, a doctor specializing in



diagnosing and treating disorders of the nervous system. These doctors are experts in caring for abnormalities of the brain, spinal cord, and nerves. Neurologists are well-versed in caring for headaches and are often the principle caregivers of patients with chronic headaches.

General neurologists have a broad knowledge base, covering areas like neurodegenerative disorders,

autoimmune neurological conditions, Parkinson's disease, and dementia. However, they may not be as specialized in headache treatment as a headache specialist. In medicine, this structure is also like a ladder, or more specifically a pyramid: the more specialized a doctor becomes, the deeper their knowledge in a narrower area, while those with broader knowledge cover a wider range of issues but in less depth.

Sometimes a patient may have the opportunity to see a neurologist who specializes in headache care. These headache specialists are usually neurologists who focus specifically on headaches, as opposed to other areas of neurology. While they may know more about various neurological diseases than a general physician, their expertise in headache medicine surpasses even that of a general neurologist.

What is My Doctor Thinking?

When a medical specialist sees a headache patient, they begin by asking about the patient's symptoms. It is primarily the patient's symptoms that contribute to the diagnosis of a specific type of headache. The severity, location, timing, and associated symptoms such as aura, nausea, and photophobia (light sensitivity) are key factors in providing a specific headache diagnosis.

As an example, a migraine patient often reports a specific sequence of events associated with their headache. Migraines typically progress through four stages:

1. **Prodrome:** Hours or days before a migraine, you might notice symptoms like mood changes, food cravings, or neck stiffness.
2. **Aura:** Some people experience visual or sensory disturbances, such as seeing flashes of light or having tingling sensations. This stage often lasts 20-60 minutes but not everyone has an aura.
3. **Attack:** The headache phase, often characterized by severe, throbbing pain, can be accompanied by nausea, vomiting, and sensitivity to light and sound. This can last 4-72 hours.
4. **Postdrome:** After the headache subsides, you may feel drained, fatigued, or have lingering sensitivity. Your head may feel like a big sore muscle after a strain. This phase can last a day or more.

Not everyone experiences all migraine stages, and the intensity can vary. However, migraines can

have individual sub-diagnoses as well. For example, a migraine becomes classified as status migrainosus when the following are met:

5. **Duration:** The migraine attack lasts for more than 72 hours, either continuously or intermittently.
6. **Severity:** The headache is severe, often unresponsive to standard treatments, and significantly disrupts daily functioning.
7. **Recurrent Attacks:** status migrainosus can result from recurrent migraines that overlap without complete resolution between episodes.

There are many different types of migraine diagnosis depending on the variation of symptoms reported by the patient:

- migraine without aura (common migraine)
- migraine with aura (classic migraine)
- chronic migraine
- hemiplegic migraine
- retinal migraine
- vestibular migraine
- menstrual migraine

- migraine with brainstem aura
  - (basilar-type migraine)
- abdominal migraine
- status migrainous
- ocular (ophthalmoplegic) migraine

The Spectrum of Headache Diagnoses

Migraine is only one general type of headache. Headaches can be classified into a wide range of diagnoses, with over 200 different types recognized by the International Classification of Headache Disorders (ICHD), maintained by the International Headache Society (IHS). These are broadly categorized into two main groups:

1. **Primary Headaches:** These are headaches not caused by another medical condition and include:
   - migraine
   - tension-type headache (TTH)
   - cluster headache
   - trigeminal autonomic cephalalgias (TACs)
2. **Secondary Headaches:** These headaches are caused by an underlying condition, such as infection, injury, or vascular disorders.

Other notable headache diagnoses include new daily persistent headache (NDPH), hypnic headache, and occipital neuralgia. Each of these categories contains multiple specific diagnoses, contributing to the total of over 200 different headache types recognized by medical professionals.

Symptoms Over Signs: The Basis of Headache Diagnosis

For the most part, headache diagnoses are related to the symptoms that the patient experiences. Because of this, as a patient's symptoms change over time, their diagnosis might change as well. I have had a patient with four different diagnoses from the same neurologist. This is quite different from other areas of medicine where, for example, a patient with diabetes does not receive multiple diabetes diagnoses as their condition evolves.

Headache diagnoses are generally based on the subjective experience of the patient, with very few tests helping to narrow down the diagnosis. Neurologists primarily rely on symptoms rather than signs when making a headache diagnosis. In fact, most of the tests run for headache diagnosis are "tests of exclusion."

When neurologists order an MRI for a patient with severe headaches, it is often to rule out serious conditions rather than to make a specific diagnosis. The first concern is to ensure there is no brain tumor, which can cause headaches due to the mass effect. The skull is a rigid structure, so if a tumor is growing inside the brain, it increases pressure and stretches the brain's lining (the meninges), leading to pain. While brain tumors are a rare cause of headaches, it is crucial to rule them out. An MRI helps exclude the possibility of a brain tumor but does not necessarily provide a definitive diagnosis of what is causing the headache. This is an example of a "test of exclusion."

My Diagnostic Approach: Reading the Signs

As a super-specialized physician, I focus exclusively on headache surgery (and other aspects of plastic surgery in my case). I do not treat headaches outside of surgery, referring non-surgical care to neurologists and headache specialists. While they know more about various treatments like medications, my expertise in headache surgery is likely deeper than theirs.

Most of my patients come to me with a history of a negative MRI, so we know a tumor does not cause

their headaches. I focus on checking the signs associated with their headaches to determine how I can help. Surprisingly for many patients, the tests I run and the information I need are straightforward. After years of seeing numerous neurologists and headache specialists with unclear results, they are often shocked to discover that my workup is so simple.

CHAPTER 2

Anatomy vs. Physiology

> *"Migraines take over your body. You have to fight through it, but sometimes you have to surrender and rest."* —Janet Jackson has spoken openly about her struggles with migraines. She advocates for greater awareness about migraines and how they can severely affect one's daily life, particularly highlighting the need for understanding and support for those dealing with this condition.

I might be considered one of the "lucky" ones, having escaped the more debilitating symptoms associated with chronic headaches, such as nausea or even paralysis. I have noticed a clear link between my

headaches and periods of high stress. In high school, I was generally relaxed as the academic challenges were not overwhelming, but I struggled in less-than-ideal situations, like long car trips with my stepbrothers. My headaches were an issue during my teens, but they improved significantly in college. My time at the University of Wisconsin-Madison was marked by a profound sense of joy. I woke up almost every day for four years feeling thrilled with my life, which was a true gift.

Certain courses, however, such as physical chemistry with a particularly challenging professor, caused me considerable stress. Studying with my premed friends, some complex proofs of thermodynamics required significant concentration through tension induced headaches. Thankfully, these challenging courses were limited, and my headaches were not as frequent during that time. That said, other aspects of college life contributed to my headache pain. I made many great friends, and we lived together, often having quite a good time in Madison, Wisconsin. While most people experience headaches after drinking, mine were excruciating. I relied on water, Advil, and coping mechanisms to push through the pain, so they did not totally debilitate me. Unfortunately,

as I transitioned to the next phase of my education, the frequency and severity of my headaches began to worsen.

Unraveling the Complexities of Headaches

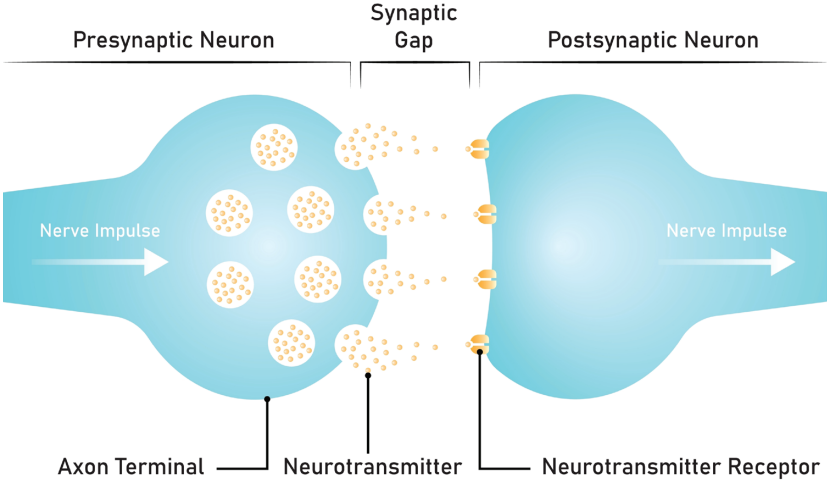
Neurologists have dedicated substantial effort to unraveling the complexities of headaches and their associated symptoms, often approaching the issue quite differently from headache surgeons. Neurologists, like many other non-surgical physicians, concern themselves largely with physiology. Surgeons, on the other hand, are physicians of anatomy. While both types of physicians manipulate the body, they do so in very different ways using very different approaches. This distinction is significant and warrants further discussion.

The Physiology . . .

Physiology is the study of how our body's chemistry keeps us alive. Every second, billions of chemical reactions are happening inside each of the trillions of cells in our body. These reactions not only occur within each cell but also between cells, allowing them to communicate with one another. For example, cells can send signals to their neighbors or even to distant cells through the bloodstream by releasing chemicals

like hormones. These hormones, produced in areas like the brain or glands, travel through the blood to affect cells in different parts of the body. Some hormones have widespread effects, while others target specific cells.

When it comes to migraines, understanding nerve cells and how they communicate is important. Nerve cells or neurons communicate at special junctions called synapses. When one nerve cell is activated, it triggers a chemical reaction at the synapse, passing the signal to the next nerve cell. This chain reaction can carry messages to or within the brain, resulting in thoughts, sensations, or muscle movements.



In migraines, these nerve signals can become overactive, leading to intense pain and other symptoms associated with the condition. Understanding these chemical processes helps us grasp what's happening in the brain during a migraine and why certain treatments such as medications that alter these chemical signals can be effective in managing pain.

. . . and Anatomy of Headaches

A nerve itself is a feature of anatomy. Anatomy can be thought of as the study of the structure of the body, rather than the chemistry of the body. Muscles, bones, intestines, and organs are all anatomic features of the human body. It takes physiology to make all these aspects of anatomy function. For example, a muscle such as the biceps is composed of many individual muscle bundles that are in turn made up of many individual muscle cells. Inside each muscle cell is a chain of proteins, which are made up of individual chemicals linked together in specific ways. The activation of a muscle cell creates chemical reactions between chains of proteins in that cell which cause that tiny protein strand to travel against the adjacent protein in a different direction.

The two protein strands moving in opposite directions cause a shortening of the overall distance from one end of one protein to the other, and that creates a contraction of the cell where those protein chains reside. The combination of contraction of many protein chains in many adjacent cells creates a contraction of the muscle bundle. The contraction of many muscle bundles creates a contraction of the biceps muscle, and the contraction of the biceps muscle creates a bend at the elbow of the arm.

As we can see from the relationships of nerve cells to nerves themselves, and protein strands to muscles, there is a significant relationship between physiology and anatomy. However, the differences between the two are very significant in the thought processes of a neurologist vs. a headache surgeon. Physiology is the world of the neurologist or other types of doctors, such as an endocrinologist or medical oncologist. Anatomy is the world of the surgeon. Doctors such as neurologists work to influence the body by prescribing medications that alter chemical reactions in the body, while surgeons cut things out or move things around in the body to influence a healthy outcome.

Physiological and Anatomical Differences

The differences in approach to headaches from the physiological vs. the anatomical aspects are incredibly evident when we look at things from the standpoint of diagnosis. In the last chapter, we saw that there are over 200 headache diagnoses according to the IHS, and we reviewed how those diagnoses correspond to the symptoms experienced by the patient. In the physiologic model, the chemical reactions occurring in the brain can cause a wide variety of symptoms and, in fact, the mechanism for these variable symptoms is not clearly understood. What we know is that something causes a cascade of chemical reactions in the brain that are experienced in different ways in different patients.

The neurologist's approach is to try to affect these chemical reactions by providing different medications that hope to interrupt the chemical cascade that is causing pain and other discomfort. By blocking some of the chemical signals or providing medications that affect the blood vessels of the brain, for example, neurologists hope to provide relief from migraine misery. The incredible number of different medications and their mechanisms and side effects are covered elsewhere by doctors with a much better

understanding of their development and utilization, so we are going to skip over that and stick to the surgical approaches.

That said, when there are so many different drugs to try to affect something in so many ways, it is an indication of an incomplete understanding of the disease process. Consider type 1 diabetes vs. cancer, for example. We generally understand that diabetes is due to an insufficiency of insulin to be excreted by the pancreas, and diabetes is treated by supplying insulin to these patients. With cancer, oncologists try one form of chemotherapy to see if it works and then try another type with a different chemical mechanism. If that doesn't work, the physician may move on to another version. A similar approach is used with headaches. How many headache patients have progressed through beta-blockers, amitriptyline, triptans, CGRP inhibitors, and more? Each of these medications works in completely different ways.

We hope to one day truly understand and treat cancer consistently well with drugs, but both cancer and migraines are incompletely understood when it comes to physiology.

Dr. Bahman Guyuron is an internationally recognized plastic surgeon and a pioneer in headache surgery.

The Surgeon's Approach

The surgeon thinks about migraines very differently. We agree that the chemical cascades in the brain are highly complex and create an incredible amount of pain and other symptoms in so many patients. But the surgeon wants to address the root cause of these issues and prevent the original signals that begin these chemical cascades in the first place. And it turns out that we can do exactly that for many patients.

In the early part of the century, Dr. Bahman Guyuron, an internationally recognized authority in the plastic surgery field, was working at his clinic in Cleveland, Ohio. Dr. Guyuron noticed that some of his patients who received brow lifts reported relief of their migraines in addition to an appreciation of his great aesthetic work. As exceptional surgeons do, Dr. Guyuron questioned why this surgery might have relieved his patients' headaches.

The purpose of a brow lift is to elevate the eyebrows. One of the problems with drooping brows is that the muscles under the eyebrows tend to pull them down and toward the center of the forehead. These muscles, called the corrugator muscles, cause the frown lines or "elevens" that appear between the forehead. These are the muscles that are commonly treated with Botox® for aesthetics. (Yes, we will get to the reason why Botox® is sometimes effective in the treatment of migraines).

As part of the brow lift procedure, the corrugator muscles are removed to prevent the brows from being pulled down. The challenge in this procedure lies in the two sensory nerves, the supraorbital and supratrochlear nerves, that provide feeling to the forehead and front of the scalp. These nerves emerge from the

eye socket (orbit) and pass through the corrugator muscles on their way to the skin of the scalp. During a brow lift, the muscles are removed while carefully preserving the nerves, teasing the muscle fibers away without damaging the nerves.

Dr. Guyuron thought maybe his patients' migraines were being caused by the corrugator muscles squeezing on these sensory nerves, and the nerve irritation signals then caused the brain to react in a way that created the chemical cascade causing migraine symptoms. Several studies were then performed, with a significant amount of research into the nerves that might be involved in causing headache symptoms. By the time Dr. Guyuron published his landmark paper in 2005, he had identified several sensory nerves that contributed to severe headache syndromes. The remarkable results of the study showed that over 90% of his surgical patients had significant improvement in their pain. The age of anatomic considerations in the treatment of severe headaches had been born.

HAS MIGRAINE SURGERY BEEN WELL STUDIED?

A frequent misconception is that nerve decompression for headache relief is an experimental procedure that has not been well studied or researched. This claim is too often made by neurologists who have not investigated the procedure thoroughly.

A major part of this problem is that the extensive research that has been performed on headache surgery is published in surgical journals rather than neurology journals. Because medical doctors such as neurologists do not subscribe to journals about surgery, general practitioners and neurologists are not being exposed to adequate information about the procedure.

Rest assured that nerve decompression is not new, as we have seen it performed for carpal tunnel patients for many, many years. The application of nerve decompression to relieve headaches has been performed for over 20 years. These procedures are proven, safe, and, most importantly, incredibly effective.

CHAPTER 3

Understanding the Anatomy of the Head and Neck

> *"A migraine isn't just a headache; it's like someone has taken your head and put it in a vice."* —Whoopi Goldberg endured debilitating attacks that often interfered with her professional commitments, including hosting major events like the Oscars. She emphasizes the importance of consulting healthcare professionals to explore available options and regain control over one's life.

I always knew I wanted to go to medical school. Finishing many of my high school requirements early, I had the opportunity to spend much of my senior year

outside of the classroom in a professional setting. I interned with Dr. Martin Eichelberger, Director of Trauma at Children's National Medical Center, working on pediatric trauma studies. This experience solidified my desire to become a pediatric surgeon, and I continued working with Dr. Eichelberger throughout college, contributing to several published papers. That foundation likely helped me secure acceptance to the University of North Carolina at Chapel Hill for medical school.

Medical school was more demanding than college, with intense competition and a heavy workload. In my first two years, I began experiencing frequent headaches, probably due to stress. These headaches often interfered with my studies but also deepened my empathy for those dealing with chronic pain. Ironically, when my anatomy course shifted to the head and neck, my headaches became a motivator, fueling my drive to master this area. By the end of the semester, I earned an "Honors" grade, recognizing that my own pain had sparked a new fascination with understanding and treating headache disorders.

In hindsight, my journey from trauma surgery to focusing on the invisible pain of headaches was

shaped not just by academics but also by personal experience. The same meticulous care I once admired in trauma surgery has become vital in diagnosing and treating headaches. Now, helping others manage their pain feels like a mission rooted in empathy, and I dedicate my career to making a meaningful difference for patients who share these struggles.

Understanding the Anatomy of the Head and Neck

Understanding the anatomy of the head and neck is critical to curing headaches. This seems like an obvious statement, but until the early part of this century most doctors would have challenged that statement by saying that only the chemistry in the brain was responsible for headaches. We now know that many, if not most, headaches are caused by irritation of one or more of several nerves on either side of the head and neck.

Nerves can be divided into different categories, and for the purposes of this book, we are going to discuss two of these classifications: central vs. peripheral nerves and motor vs. sensory nerves.

A central nerve is a nerve found in the brain or spinal cord. These nerves require very involved surgery

to manipulate, and these surgeries are nearly always done in a hospital setting with the patient staying in the hospital for some time after the operation. Surgery on central nerves is performed by a neurosurgeon.

A peripheral nerve is a nerve found outside of the brain or spinal cord, in the periphery and often near the outside of the body. Nerves in the fingers, arms, legs, face, neck and skin are peripheral nerves. These nerves are easy to access and surgery, when required, is often brief and done as an outpatient. Carpal tunnel surgery is an example of peripheral nerve surgery, and we will revisit that later. Surgery on peripheral nerves is performed most frequently by a plastic surgeon. While this may sound strange because of the common associations of plastic surgeons and aesthetic surgery, plastic surgeons are routinely trained in hand surgery and microsurgery—surgery requiring high magnification to deal with things like very small blood vessels and nerves.

Nerves are also divided into sensory nerves vs. motor nerves, and these descriptions are somewhat self-explanatory. A sensory nerve carries touch, pressure, heat, and cold feelings back to the brain which interprets these signals into the various sensations. A motor nerve carries signals from the brain to muscles

that contract and create movement. Some nerves are purely sensory, some are purely motor, and some nerves carry both sensory and motor fibers within them. All of the nerves that we will be discussing with respect to headaches are peripheral sensory nerves. This means that they are outside of the brain and only carry sensory information. As a result, they are relatively easy to access and surgery on them, when required, does not involve hospitalization. Damage to any of these nerves cannot cause paralysis.

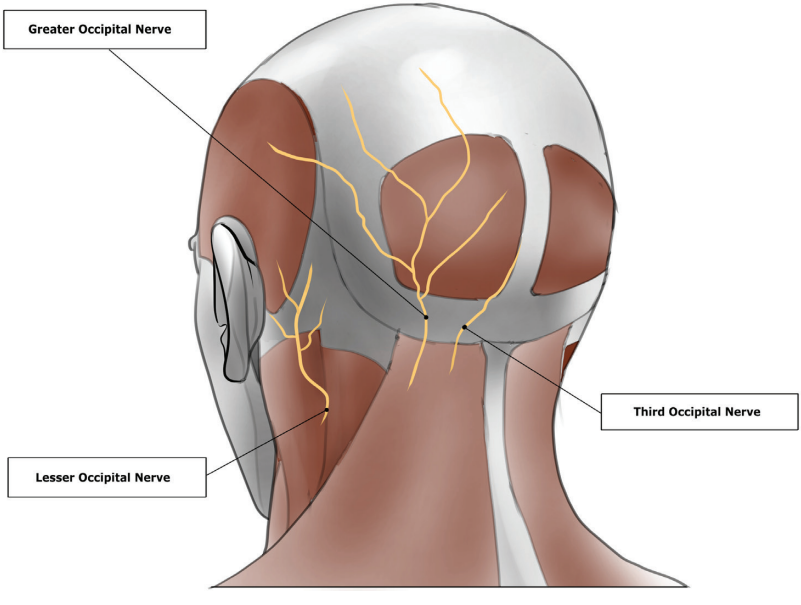
The Greater Occipital Nerve: A Key Player in Headache Pain

One of the major sensory nerves in the back of the head, and the one that is responsible for so many headaches and so many different headache diagnoses, is called the greater occipital nerve (GON). The GON originates from the spinal cord at the level of the second and third cervical vertebrae in the neck. It is primarily responsible for innervating or supplying nerves to the skin of the posterior scalp, providing sensation from the back of the head to the top of the head. Like other nerves involved in causing headaches, it does not contain motor fibers and only carries sensory information from the scalp to the brain.

Nerves such as the GON can be visualized in a similar manner as a tree, with roots that originate in the brain or spinal cord, a trunk that is usually a single structure that travels from the root to the area where the nerve does its work and then branches out. The branches usually occur close to the region of the body where the nerve is working, particularly in the case of sensory nerves that provide feeling to a specific area.

After its origin in the spinal cord, the GON roots pass between the first, second, and sometimes third cervical vertebrae (C1, C2, and C3) and at this point the roots that make up the nerve come together to form its trunk. The GON then travels beneath the obliquus capitis inferior muscle, and pierces through the semispinalis capitis muscle. These muscles are responsible for the stability of the neck and help the

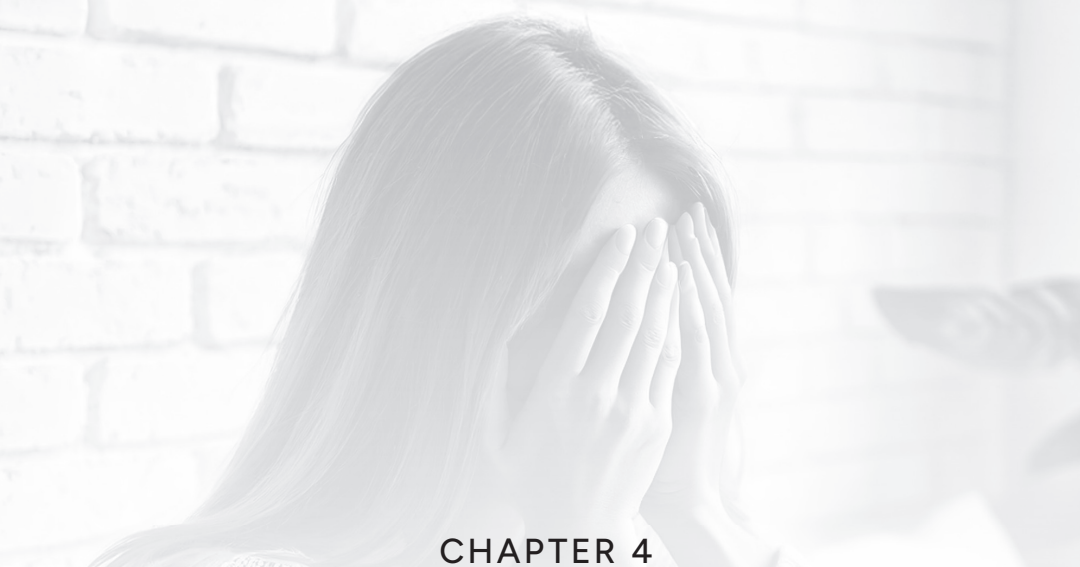
neck to support the weight of the head. The nerve then continues upwards toward the back of the scalp, running through the trapezius muscle. After piercing the trapezius near the base of the skull, the GON ascends through the scalp where it provides sensory innervation to a large portion of the posterior and superior parts of the head. The GON branches in this area, and multiple branches then terminate in the skin of the back of the scalp to provide feeling to this region.



The anatomy of the occipital nerves: Irritation of these nerves leads to the pain of occipital neuralgia, tension headaches, and many other migraine and headache disorders.

The GON, when it is irritated, is a major contributor to headache pain. Irritation of a nerve is called neuralgia, and irritation of the occipital nerve is called occipital neuralgia. Now that we understand the anatomy of the GON, we can better discuss what happens when it gets irritated, how that can cause different types of headaches, how we can tell that the GON is the issue, and later in the book … how we can fix it.

Dr. Lowenstein reviews the position of the greater occipital nerve.



CHAPTER 4

Understanding Neuralgia and Nerve Blocks

"The very painful state which I call 'The Migraine,' which is accompanied by a grinding noise and dancing figures before my eyes." —Lewis Carroll, author of Alice's Adventures in Wonderland, is widely believed to have experienced migraines with visual disturbances which could explain some of the surreal and fantastical imagery in his work.

The Realities of Medical Training

The transition from the classroom to the hospital during the third and fourth years of medical school was exhilarating. It marked the beginning of hands-on

learning, where we stepped out of lecture halls and into the high-stakes world of patient care. These years were not just about observing; we were taking on the roles of junior doctors, experiencing the realities of medicine with real patients, under the supervision of seasoned physicians. It was a thrilling step forward, but it also came with a steep price—long hours, sleep deprivation, and mounting pressure.

The excitement of donning my first white coat and stepping onto the hospital floor was tempered by the physical toll that accompanied it. As the demands increased, so did the tension in my body. Stress settled like a weight in my neck and shoulders, and I began experiencing headaches with greater frequency and intensity. I simply assumed this was part of the medical lifestyle. After all, who didn't suffer from headaches when under constant stress? I persevered, dismissing the pain as a normal side effect of the life I had chosen.

Looking back, I can now see that my headaches weren't just a consequence of stress. If I had seen a neurologist at that time, I might have been diagnosed with tension-type headaches, or even more specifically, occipital neuralgia.

My mother and I at my graduation from medical school. A day of both relief and anticipation of what was to come.

Understanding Neuralgia: From Carpal Tunnel to Occipital Nerve Pain

Neuralgia means irritation of a nerve, and this can be caused by many different things. In the head and neck, neuralgia is usually caused by a compression of the nerve by adjacent structures. Another neuralgia that is very well known is carpal tunnel syndrome. This irritation of the median nerve of the hand occurs when the nerve is compressed within the tunnel in

which it travels within the wrist, causing symptoms in the hand that can include numbness, tingling, and most importantly chronic pain. I'm sure that nearly everyone reading this book knows someone who has suffered from carpal tunnel syndrome. It is likely these people had surgery for carpal tunnel syndrome as it is well known, well documented, and is very well accepted as the gold standard for treating this problem.

In carpal tunnel syndrome, an event, or chronic repeated use, or localized inflammation, causes compression of the median nerve in a relatively narrow space. This irritates the nerve, which then sends "distress signals" to the brain. The brain interprets these signals as pain or numbness or sometimes paresthesias another medical term that refers to variable sensations such as tingling or burning pain. If your leg has ever "fallen asleep" or you have ever been hit at your funny bone, the feelings that you experience are paresthesias). The way the brain interprets the distress signals sent by the median nerve creates the symptoms that the person with carpal tunnel syndrome experiences. Because the median nerve also carries some motor fibers, weakness is sometimes associated with this neuralgia.

Carpal tunnel syndrome is most often significantly improved or cured by surgery, which involves releasing the tight tunnel in the wrist where the median nerve is most compressed. This decompression surgery alleviates the median nerve from its irritation, resulting in the resolution of the median nerve neuralgia. The distress signals are no longer sent by the irritated nerve, and the patient no longer experiences pain or paresthesias and they get better.

Neuralgia of the occipital nerve is another recognized problem, though until recently the surgical decompression of the nerve was not recognized as a treatment. This is kind of crazy if you think about it, considering the frequency that carpal tunnel decompression is performed every day in operating rooms all over the world. The association of median sensory nerve decompression with the relief of carpal tunnel syndrome seems straightforward, but until recently nobody seemed to consider that headaches arose from similar situations with sensory nerves to the head that could be similarly treated.

Breaking Down Key Characteristics for Occipital Neuralgia

While occipital neuralgia is a recognized diagnosis, neuralgia of the occipital nerve can cause headaches in many different diagnoses. Patients with a specific diagnosis of occipital neuralgia have the following characteristics:

1. **Pain Location:** The pain is typically located in the distribution of the occipital nerves, primarily affecting the back of the head, the scalp, and sometimes radiating toward the eye or forehead on the affected side.
2. **Pain Nature:** The pain is usually described as stabbing or shooting, and intermittent but can have aching or burning sensations between sharp pain episodes.
3. **Associated Symptoms:** include sensitivity or tenderness in the area where the occipital nerves are found, and diminished sensation or tingling in the scalp.
4. **Exacerbation by Pressure:** Symptoms may worsen when pressure is applied over the

greater or lesser occipital nerve, such as pressing the base of the skull.

5. **Diagnosis:** A key diagnostic feature is the relief of pain after an occipital nerve block, which supports the diagnosis of occipital neuralgia.

So according to the IHS, occipital neuralgia is characterized by sharp, stabbing, burning, aching or shooting pain in the head and scalp. These pains can be intermittent or episodic but can persist between severe episodes. If we harken back to the variability of symptoms that occur in carpal tunnel syndrome, we see that the neuralgia of the nerve sends distress signals to the brain, and the way the brain interprets these signals affects the symptoms they experience.

We now know that the brain can take those distress signals from the occipital nerve (or the other six nerves on each side of the head and neck that we currently recognize as contributing to headaches) and turn them into all types of pain sensations and other symptoms. Some people experience shooting pains and some burning pains. Some people experience dull aching pains, some sharp stabbing pains. Others experience auras with nausea and photophobia. Some

patients experience severe globalizing pain. Some patients experience migraines. Those patients who get worsening compression of the occipital nerve with stress may get a diagnosis of tension headaches. While the experiences and diagnosis may be different, the cause of the pain can all be the same—irritation of the occipital nerves.

Tension Headaches

Let's clarify another IHS diagnosis, the tension-type headache. If you have ever had a stressful day or experienced an episode of severe tension, you have likely "held it in your neck" or shoulder area. Tension often creates tightness in the neck and shoulder region, which is the reason that there are now so many little massage vendors throughout airports. Everyone who is stressed (and who is relaxed in an airport?) wants a neck and shoulder massage. We know that the occipital nerve runs right through the stabilizing muscles of the neck, as well as the trapezius, all the muscles that get tight in times of stress. Now who wants to guess what will happen next?

Stress and tension cause tightness in the muscles of the neck, which squeeze on the GON. This compression of the GON sends distress signals to the brain,

which provides pain sensations in the head causing a headache. The pain in the head, manifested by a headache, provides more stress and tension causing more muscle compression on the nerve, which causes more pain. In fact, since the tension is causing compression on the nerve that is causing irritation of the nerve, and we know that irritation of the occipital nerve is called occipital neuralgia, why is tension-type headache a different diagnosis?

What I'm getting at again here is that we now know that irritation or neuralgia of various nerves, the GON being a major player here, causes various headache symptoms that can be called many different diagnoses depending on how the pain is experienced by the patient. Because the diagnosis a patient receives is most often related to the symptoms that they experience instead of the signs that the physician can detect, the variability in diagnosis does not often relate to the root cause of the headache experienced. The root cause of so many of these headaches is actually very similar in nature to carpal tunnel syndrome—an irritation of a peripheral nerve outside of the brain, and one we can easily get to and often fix.

You don't have to just take my word for this, as it is very easy to prove. Going back several paragraphs

we saw that a characteristic of occipital neuralgia is that "A key diagnostic feature is the relief of pain after an occipital nerve block." What this means is that a patient with occipital neuralgia pain has their pain resolved when a nerve block is properly applied. A positive response to a nerve block is a sign, not a symptom, but one that very few neurologists bother to look for. Let's discuss nerve blocks and why this works.

Nerve Blocks

A nerve block is an injection of a drug to the nerve that effectively "blocks" its function. In the case of the GON, because this nerve only carries sensation and does not have any motor function, a block prevents the nerve from providing feeling to the back of the scalp. A successful GON block creates a rather large region of numbness at the back of the scalp, because the injection is blocking the function of this nerve from providing feeling here. When a patient is suffering from a headache that is caused by irritation of the GON, the numbness is accompanied by a significant improvement of the headache pain as well.

A simple nerve block can determine if a patient is a candidate for headache surgery.

Nerve Block Types

There are two general types of nerve blocks, called diagnostic or therapeutic. The diagnostic nerve blocks are meant to create short lived numbness and pain relief and are most often performed by injecting only a local anesthesia such as lidocaine or bupivacaine to the nerve. These drugs shut the nerve down and block it for a relatively short period of time, usually about 45 minutes to a few hours depending on the concentration of each of these drugs. These are the types of nerve blocks performed by headache surgeons such as myself, in order to confirm that a neuralgia of the nerve is indeed causing the headache. Again,

the positive response to a diagnostic nerve block is a sign that helps us see if a nerve compression is the cause of a patient's symptoms.

Diagnostic nerve blocks utilize local anesthesia without steroids.

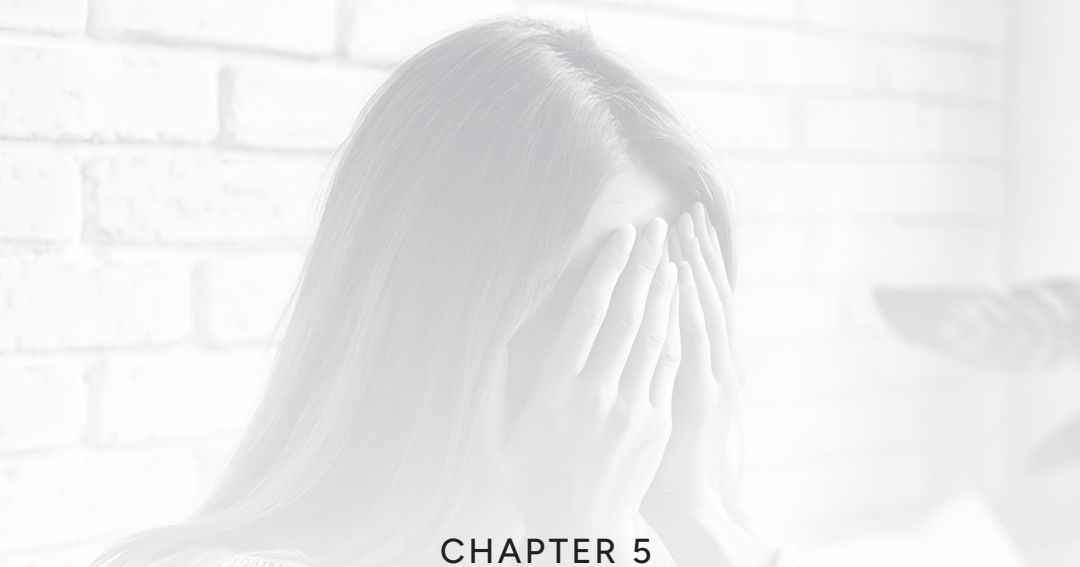
Therapeutic nerve blocks add steroids to the lidocaine and bupivacaine, which is supposed to help with inflammation in the region for a few months. Unfortunately, steroids are very irritating in the short term, and sometimes neurologists and pain doctors miss the nerve and inject steroids into adjacent tissue. This often causes more pain, and unfortunately such patients are falsely led to believe that nerve blocks are

harmful rather than helpful. Most headache surgeons don't perform therapeutic nerve blocks because of the variable effectiveness of steroids, and the purpose of our blocks is usually just to confirm that a patient is a good candidate for surgery.

Now we understand what neuralgia is, and we understand that there are many different symptoms associated with nerve compression. We understand that variability in symptoms may lead to many different types of headache diagnoses. We also understand that a properly applied diagnostic nerve block provides numbness and pain relief to the area where a compressed nerve usually provides sensation. Lastly, we understand that the IHS tells us that a successful nerve block relieves pain in cases of occipital neuralgia. Taken together, these concepts prove that neuralgias of sensory nerves such as the GON can cause many different symptoms and therefore can be the root cause of many different headache diagnoses.

We see in everyday practice that a properly applied diagnostic nerve block provides pain relief for patients with all different diagnoses. This is the most important concept of the book so far. Patients with diagnoses from migraine to tension-type headache to cluster headache to new persistent daily headache whose

pain is in the back of the head often respond to nerve blocks, which means that the same thing often causes all these different diagnoses—irritation of the occipital nerve. And we can fix that … just keep reading.



CHAPTER 5

The Pressure Within: Understanding Headaches and Nerve Pain

> *"I am once more overcome by the feeling of my head being split apart."* —Sigmund Freud experienced chronic migraines throughout his life. His migraines were intense and debilitating, with symptoms of severe pain, nausea, and sensitivity to light.

Before I could specialize in pediatric or plastic surgery, I had to establish a foundation in general surgery—a highly competitive field with limited residency spots. Success in this journey required more than academic excellence; it demanded critical thinking

and the ability to build meaningful patient relationships. The path to securing a top residency position meant proving my capabilities both in the classroom and through real-life decision-making.

During a cardiology rotation, critical thinking was once demonstrated to me through humor. A top-ranked student fell for a cardiologist's joke about inserting an IV into the optic vein behind the eye, an absurd approach that would never actually be performed. After failing to place an IV in a patient's arm, she prepared to try this "technique," but I intervened in time to prevent a serious mistake. The incident highlighted how essential sound judgment is in medicine—beyond what can be taught in textbooks or classrooms.

Throughout medical school, I dealt with significant headaches at least twice a week but pushed through, driven by my passion for becoming a doctor. I eventually secured residency in the rigorous five-year general surgery program at Jefferson University in Philadelphia. Those years were marked by relentless stress, intense training, and unyielding pain. Reflecting on that time, I'm amazed I endured it, often finding myself rubbing my neck or temples, seeking a

small measure of relief from the severe pain that had become a constant companion.

Why We Rub Our Temples, Our Foreheads and Our Neck . . . Nerves and Headache Pain

Rubbing areas where sensory nerves run is common during headaches because many headaches are linked to irritation of these nerves. Applying pressure can reduce distress signals sent to the brain by temporarily limiting nerve function.

Typical spots people rub, such as the temples, above the eyes, or the back of the neck, align with the locations of peripheral sensory nerves involved in headache pain. These nerves lie close to the skin and aren't part of the brain or spinal cord, making them accessible for relief through pressure, and relatively easy access during outpatient nerve surgery.

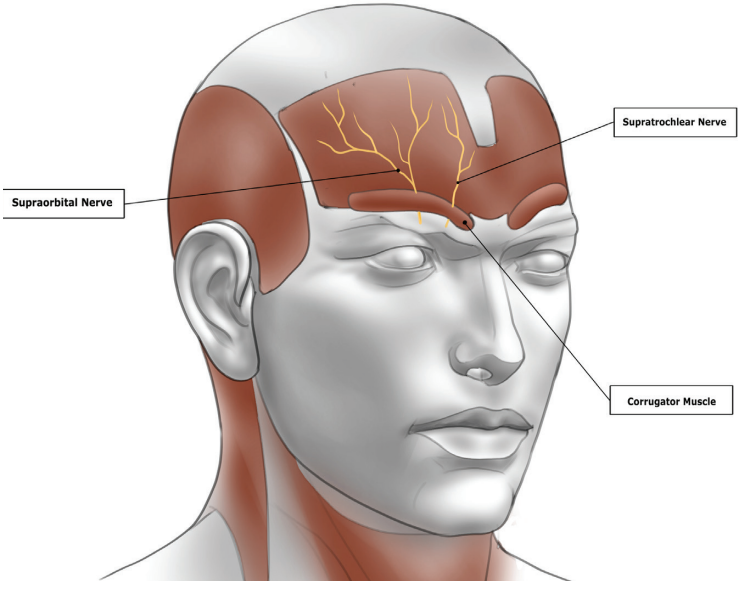
At the front of the head, four key nerves, the supraorbital, supratrochlear, zygomaticotemporal, and auriculotemporal nerves, are commonly associated with headaches. The supraorbital (SON) and supratrochlear nerves (STN), branches of the frontal division of the trigeminal nerve, provide sensation to the forehead and front of the scalp. These nerves often

contribute to headaches, including migraines, with pain concentrated in the forehead or behind the eyes.

Dr. Lowenstein points out the anatomy of the Supraorbital (SON).

The trigeminal nerve is a large sensory nerve that emerges from the trigeminal ganglion at the base of the skull, dividing into three branches (frontal, maxillary, mandibular), each further subdividing to serve the upper, middle, and lower face. Trigeminal neuralgia, a painful condition, arises from irritation at the ganglion, while neuralgia of the branches can result in headaches.

Compression or irritation of the supraorbital and supratrochlear nerves can occur in various ways. These nerves pass through a notch or tunnel in the upper orbital bone (the top of the eye socket) at the orbital rim which you can feel between your eye and your eyebrow. At the orbital rim, tight connective tissue or narrow bone structures may cause compression of the nerves. Each nerve is accompanied by an artery and a vein, which can push against the nerve and cause irritation.



Understanding nerve compression: The supraorbital (SON) and supratrochlear (STN) nerves, which provide sensation to the forehead, can be compressed or irritated at the orbital rim or by the corrugator muscle behind the eyebrow.

Another spot for these nerves to be compressed and irritated is the band of muscle that lies above the orbital rim, behind the eyebrow. These nerves travel through this muscle on their way to provide sensation to the forehead, though they don't influence the muscle directly. This muscle is called the corrugator muscle and is responsible for frown lines on the forehead. This is the muscle that is targeted by Botox® in cosmetic patients who are seeking to prevent the "elevens" that form when these muscles contract.

Botox® and Migraines: How Muscle Relaxation Eases Nerve Compression

Botox® is paralytic, meaning muscles where it is injected tend to relax and stop contracting. By paralyzing the corrugator muscle, the patient is unable to create the frown lines associated with the contraction of this muscle. Some patients are treated with Botox® for their headaches, and with an understanding of anatomy, we can see how this works. In some patients, the corrugator muscle compresses the supraorbital and/or supratrochlear nerves as it passes through, and this compression irritates these nerves. By applying Botox® to the corrugator muscle in these patients, the muscle is made to relax, and the compression does

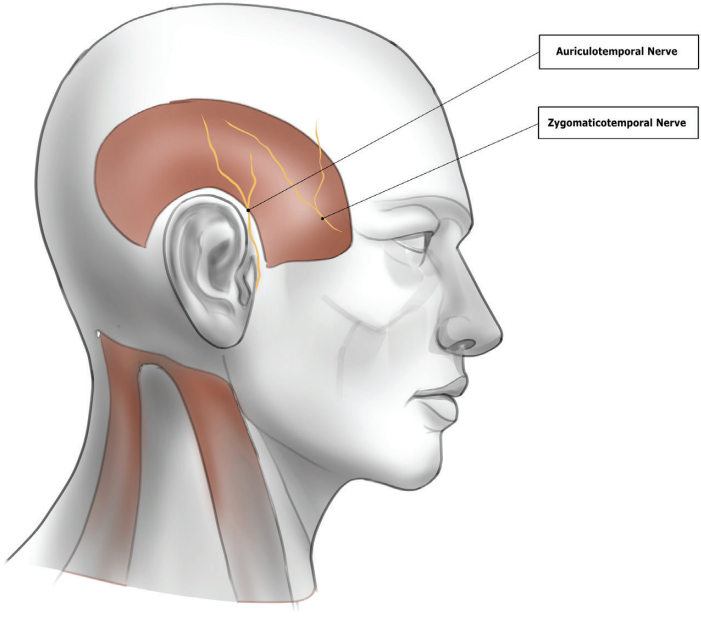
not happen. Without compression, the nerves are not transmitting distress signals to the brain and the cascade of events associated with migraine pain does not happen … and the migraine is relieved.

Botox® paralyzes muscles that can squeeze and irritate nerves in the face and neck that cause headache pain.

As we said, irritation of these nerves is known as supraorbital neuralgia, supratrochlear neuralgia, and sometimes supraorbital syndrome. This irritation is associated with many different headache diagnoses, and again, we know this because many patients with pain from migraine, new daily persistent headaches, cluster headaches, and other diagnoses who come with their headache pain in the front respond to a nerve block of the supraorbital and supratrochlear

nerves. Botox® often helps these people, but in cases where the nerve compression is due to fascia, bone, or blood vessels and not muscle, Botox® will not have any effect. In these patients, the muscle is not the culprit in compressing the nerve. Regardless of what structure is causing the nerve irritation, a nerve block shuts down the nerve, providing numbness in the forehead, and often complete relief of the headache pain. If this happens, the patient is a good candidate for headache surgery, even if Botox® has not been effective.

The zygomaticotemporal (ZTN) and auriculotemporal (ATN) nerves in the temple region can also contribute to headache pain, though they provide feeling to only small areas of the scalp. It can be hard to localize the small area of numbness that the nerve block creates, but a significant relief of headache pain can be seen when these nerves are blocked in corresponding patients. These nerves can be irritated by muscle compression or accompanying blood vessels or muscles. When you are rubbing your temples, it may be these nerves that are getting your attention.



Nerve anatomy at the temple: The zygomaticotemporal and auriculotemporal nerves in the temples can be key contributors to headache pain due to compression by muscles or blood vessels.

We have already discussed the anatomy of the greater occipital nerve (GON), which originates in the nerve roots of the upper spinal cord and travels through significant amounts of muscle, the semispinalis and trapezius, before ascending into the scalp to provide sensation to the skin of the back of the head. This nerve has many areas where compression commonly irritates.

How Muscle Tension and Scar Tissue Cause Head Pain

Tight muscles are often the culprit in occipital nerve irritation as we have seen in tension-type headaches or other headache diagnoses associated with stress. Bands of scar tissue or fascia can also be present and compress the GON within or around the muscles where the nerve travels. This is particularly common in patients with previous injuries such as whiplash. These muscles fight to stabilize the head in a whiplash injury, and small tears in these muscles at the time of the injury can heal as scar tissue, creating nerve compression and irritation.

Blood Vessel Compression: the Pounding Headache

As the GON emerges from the muscle, the occipital artery crosses the nerve toward the base of the skull. This artery can lie on top of the nerve or even split around the nerve creating a lasso of artery around the GON. In patients where this artery is compressing the nerve, we often find symptoms of a pounding headache. In these patients, each heartbeat provides a pressure wave, which causes a momentary expansion of the artery, pushing directly on the nerve. This

situation can also be found in patients where the artery is compressing the supraorbital, supratrochlear, or auriculotemporal nerves, and so pounding pain in the forehead, behind the eyes, or at the temple is often explained by this phenomenon.

Hidden Triggers of Head Pain in the Back of the Head

Another culprit that we find compressing the GON is sometimes the lymph node. Lymph nodes are tiny glands throughout the body that are home to important immune cells. With inflammation or infection, these lymph nodes can enlarge, and when the nodes that are found in the neck and base of the scalp are inflamed, they can push on a nearby nerve. Patients with a history of illness, either acute or chronic, can have long-term enlargement of these lymph nodes creating chronic headache conditions.

The Smaller Occipital Nerves Can Also Be Culprits

Other nerves that innervate the back of the neck and scalp include the lesser occipital and third occipital nerves. Similar to other nerves, pain occurs when they are compressed, often by muscle tightness or scar tissue. The third occipital nerve provides sensation to

the small area at the center of the back of the head. This nerve arises from the upper spinal cord just below the GON, and travels through often tight muscles where compression can cause central posterior headache pain.

The lesser occipital nerve (LON) runs along the side of the neck after it emerges from behind the sternocleidomastoid muscle. This muscle connects the mastoid process, the hard bone found behind the ear at the base of the skull, to the collar bone and can be seen when turning your head as a long thin muscle band in the neck. The LON travels up with this muscle to the mastoid area to provide sensation here and can be compressed by the tight tissue near the mastoid process, or by the muscle itself. This nerve is a particular problem of mine, and I am often rubbing the side of my neck below the back of my ear to try to relieve pain here.

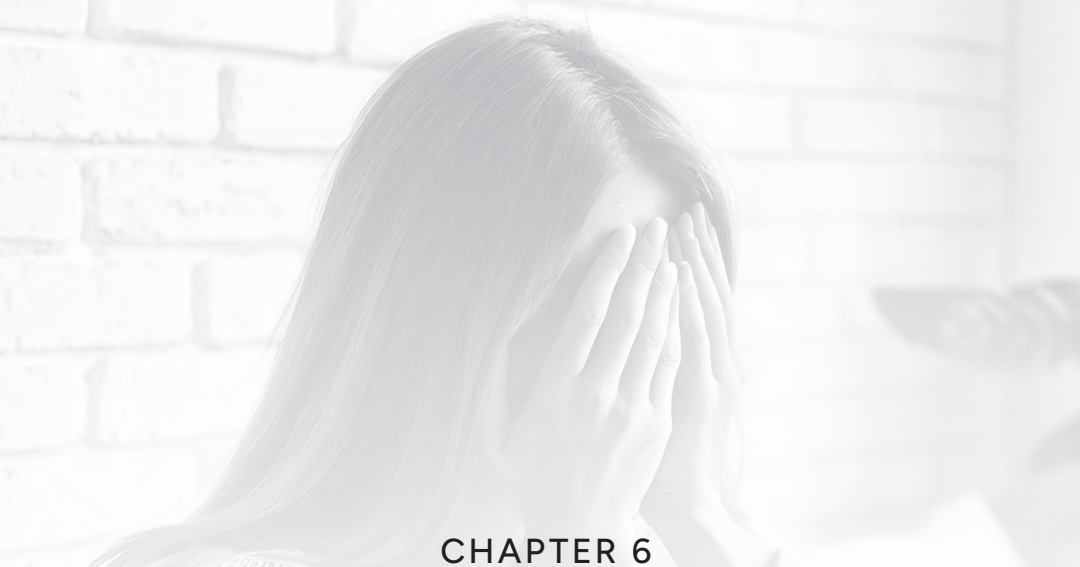
A Word About Rhinogenic Headaches

Rhinogenic headaches are related to other types of nerve compression syndromes. Nerves in the lining of the nose, when compressed, can cause headaches much like those discussed above. Particularly with a severely deviated nasal septum, when one part of

the nasal lining is pushed up against another part of the nose, the compression here can cause localized neuralgia that can cause headaches. Rhinogenic headaches are usually felt in the sinus area, though they can radiate elsewhere in the head. Patients with these types of headaches should consult with a plastic surgeon or ear, nose and throat (ENT) specialist who performs rhinoplasty, and corrective surgery on the nasal structure can release the pressure on the problematic nerves and therefore relieve the pain of these types of headaches.

Irritation of any of these nerves discussed above causes the corresponding distress signals to be transmitted to the brain. Depending on how the brain processes these signals, the chemical cascades are interpreted as headaches, nausea, dizziness, and even paralysis and other symptoms that can be associated with various headache syndromes. It is the way that everyone's brain interprets these distress signals that create the specific symptoms that each patient experiences.

As a headache surgeon, my goal is to address these nerves and eliminate the triggers of these headaches, preventing symptoms before they start.



CHAPTER 6

Inside the Pain: A Surgical View of Nerve Compression

Full disclosure: The next chapter may not be for everyone, as it includes graphic images from surgery showing nerves under compression, just as we've discussed. These photos are intended for readers who are curious and comfortable with such detailed visuals. If you're unsure or prefer not to view them, rest assured that these images aren't essential for understanding nerve decompression surgery, and you'll still gain valuable insights from the rest of the book. For the sake of thoroughness, I'm including examples from real cases at our facility, showing nerves in both the front and back of the head during surgery.

"When a migraine hits, everything else stops. It's like being hit with a wall of pain you just have to survive." —Cher is an advocate for greater awareness about migraines, especially in how they are often misunderstood or minimized. Her openness has helped bring attention to migraines as a serious health issue, encouraging others to seek treatment and support.

The following photos are of the back of the head indicated by the red circle. The photos are enlarged

significantly for clarity purposes, as surgery is performed with special magnification glasses to help in performing precise maneuvers. A small structure such as a bit of tissue banding or a small blood vessel or lymph node can have significant impacts on the nerve. For perspective, the GON seen below are about the size of a narrow shoelace, and the supraorbital and supratrochlear nerves are the size of a piece of spaghetti. The blood vessels that are within the nerves are smaller than hairs and bring nutrients to the nerve just like any tissue in the body requires. The blood vessels next to the nerves are about the size of a capellini noodle, and the lymph node is the size of a pea.

CASE 1—A band of fascia compresses the greater occipital nerve in surgery

This patient is a 40-year-old woman who suffered 5 1/2 years of severe headaches. With three children and a husband in graduate school, she had difficulty managing her day-to-day activities. She had seen a neurologist, headache specialist, and pain specialist.

During surgery, her GON was compressed by a band of fascia (connective tissue) crossing it (Photo 10). The area of the compression can be seen to be

white and blanched where the blood vessels that travel with the nerve and supply the nerve with nutrients are compressed. Following the division of the band of fascia, the nerve appears much healthier (Photo 11).

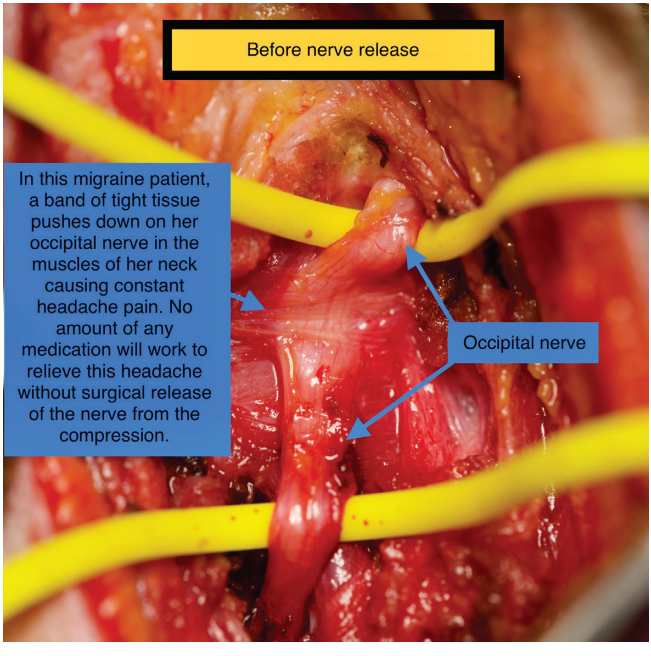


Photo #10: This greater occipital nerve (GON) is compressed by a band of connective tissue.

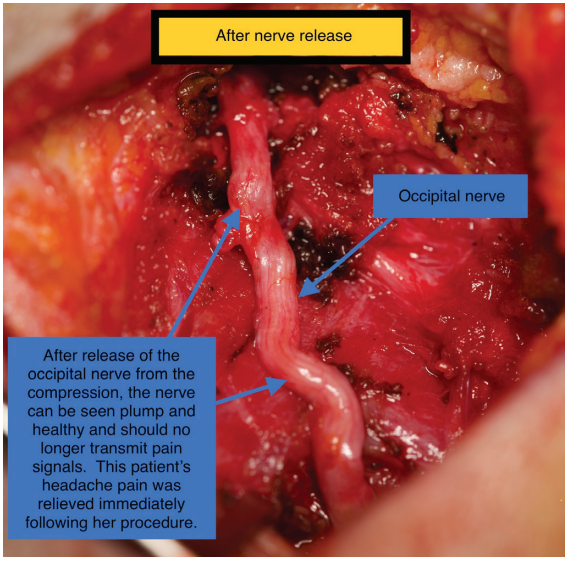


Photo #11: Following the release of the band of fascia, the nerve looks plump and healthy. The small blood vessels within the nerve can be seen to be healthy and able to deliver blood to the nerve without compression.

CASE 2—Addressing nerve compression by blood vessel and lymph node

This 39-year-old nurse had migraine headaches since childhood, and she had associated blurry vision and nausea. During surgery, we found both a blood vessel and a lymph node pushing on the GON (see Photos #12 and Photo #13). Both issues were resolved during surgery by removing the compressive problems (Photos #14 and Photo #15).

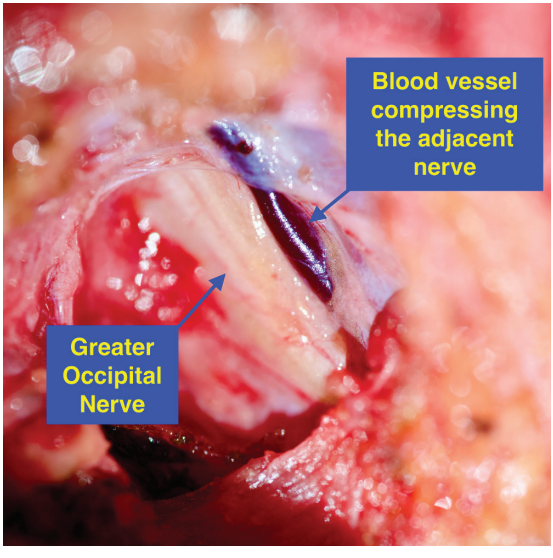


Photo #12: This GON is being compressed by an adjacent blood vessel.

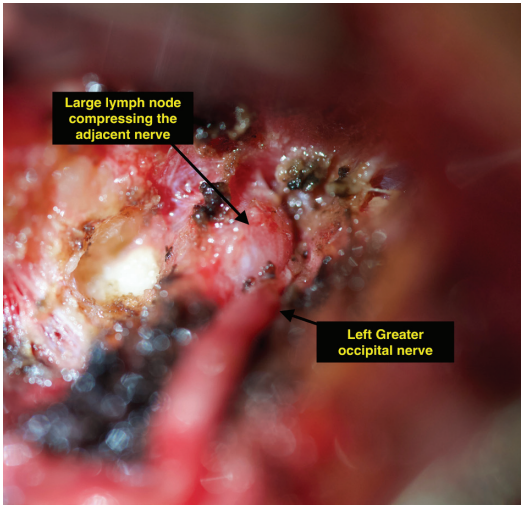


Photo #13: A lymph node compresses the GON.

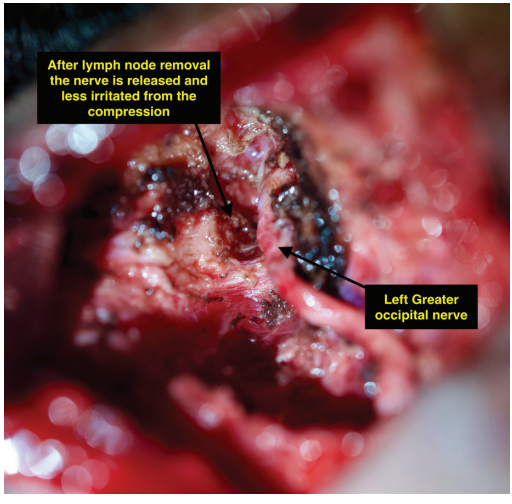


Photo #14: Following removal of the lymph node and blood vessel compression, there is more space for the nerve which is no longer pushed on by the adjacent structures.

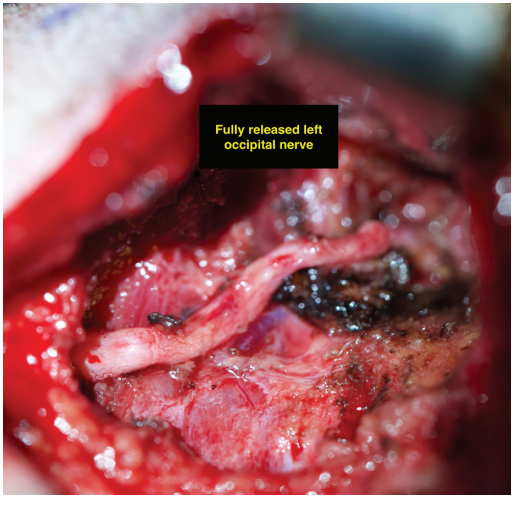
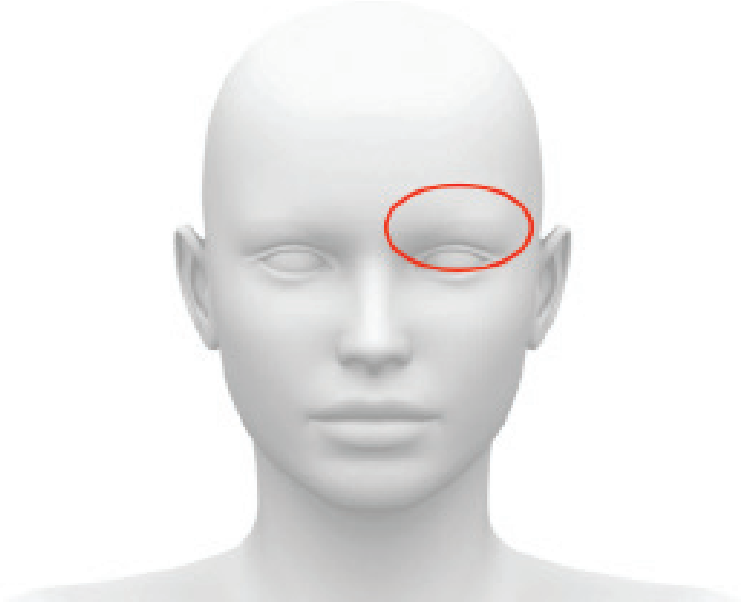


Photo #15: After completing the dissection and release, the nerve can be seen to be plump and healthier looking. This photo is taken from a different angle to allow better visualization of the nerve segment.



The following photos are from the front of the head as indicated by the red circle.

CASE 3—Bony compression of the supraorbital nerve explains migraine persistence

This patient complained of chronic migraines behind her eyes and in her forehead. Interestingly this patient had a great response to nerve blocks but not to Botox®, and in surgery, we can see why. Her SON went through a foramen, a hole in the bone and was constricted in the bony tunnel, creating neuralgia (Photo #16). As Botox® paralyzes the muscle and has no effect on the bone, relaxation of the corrugator

muscle did not affect her pain because it was the bone causing the problem. Because the nerve block turned the whole nerve off, her pain went away with the nerve block, and we knew she would be a great candidate for surgery. Following the removal of the compressive part of the bone, the nerve was no longer irritated (Photo #17).

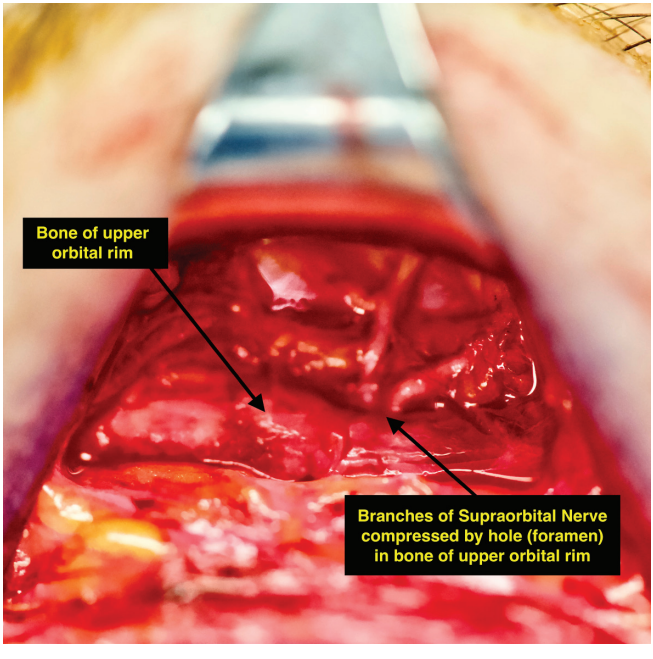


Photo #16: The supraorbital nerve (SON) in this patient is traveling through a tunnel in the bone of the upper orbit above the eye. The nerve can be seen emerging from the bone.

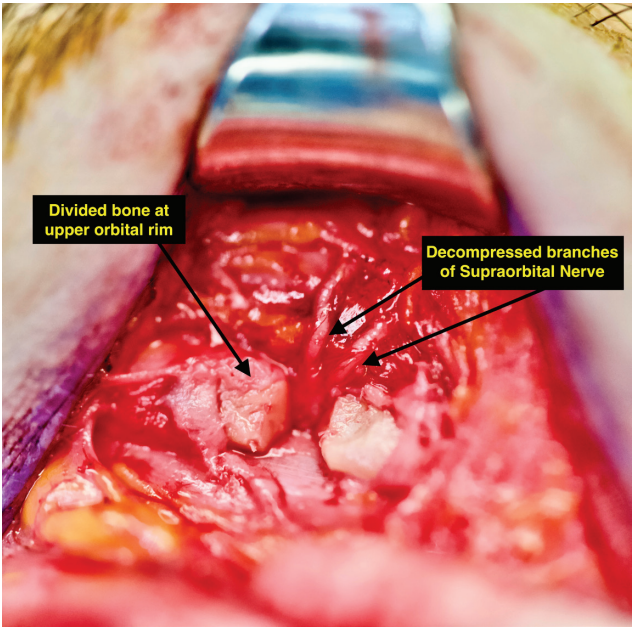


Photo #17: Following removal of the outer part of the bone, we turned the tight tunnel into a larger channel, where the nerve is no longer compressed and irritated.

Case 4—Muscle relief for headache reduction in supratrochlear and supraorbital nerve compression

As opposed to the previous patient, this patient had a great response to Botox®, and during the times when she had aesthetic Botox® to prevent her frown lines, she found that her headaches were relieved. This photo shows both the supratrochlear nerve (STN) and the supraorbital nerve (SON) after the removal

of the muscles that surrounded them. Dissection of the branches allows for the nerves to lie in a relaxed fashion, without the muscle there to irritate them (Photo 18).

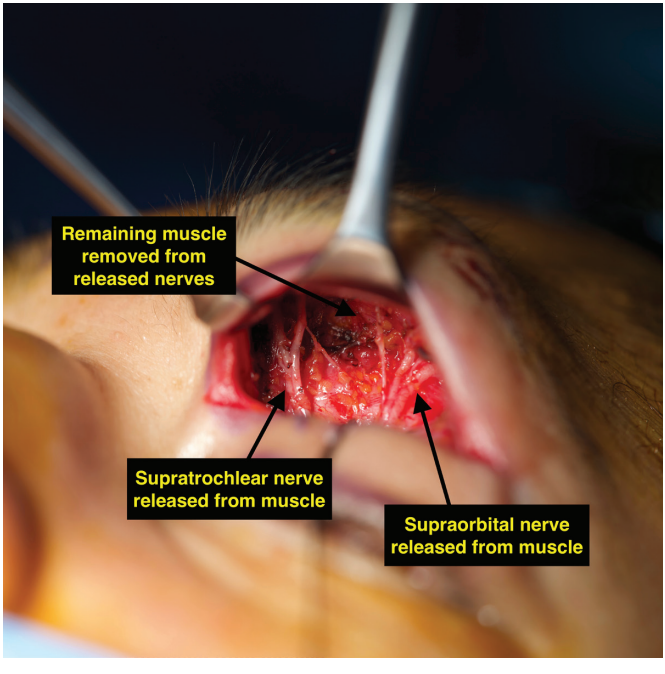
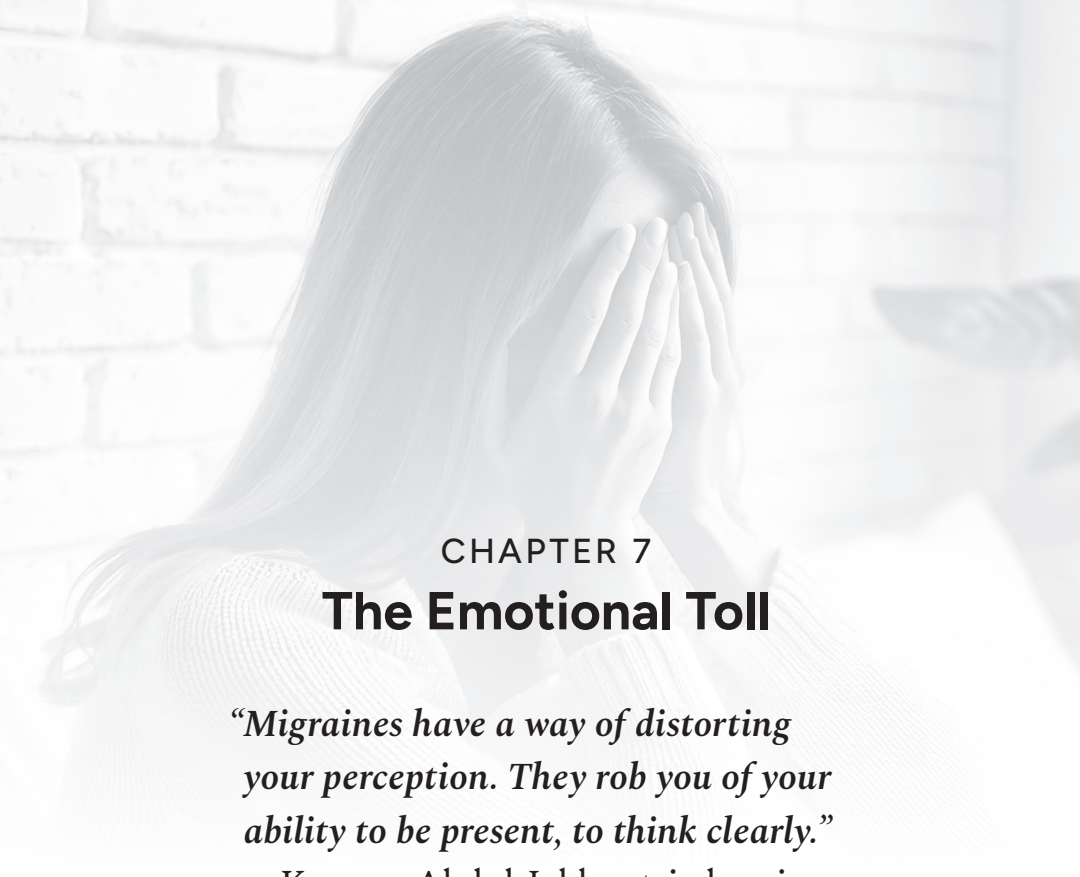


Photo #18: The supraorbital and supratrochlear nerve branches can be seen once the corrugator muscle is removed.



CHAPTER 7

The Emotional Toll

"Migraines have a way of distorting your perception. They rob you of your ability to be present, to think clearly."
—Kareem Abdul-Jabbar tried various treatments over the years, including medications and lifestyle adjustments. His willingness to discuss his condition publicly has helped shed light on the impact of migraines on athletes, underscoring that even those at the peak of physical fitness are not immune to this debilitating condition.

STRESS AND SLEEP DEPRIVATION: The Impact of an Exhausting Schedule

During and after residency, my severe daily headaches—often an eight out of 10 on the pain scale—made it difficult to be pleasant around others. Despite the pain, I had to perform at a high level without complaint, especially in front of patients and senior surgeons. The stress hit an entirely new level with sleep deprivation, particularly during trauma and transplant rotations where shifts stretched for two or three days at a time. Sleep came in brief intervals, with only minutes to rest before another call to the ER. Being jolted awake just after dozing off felt like poking a migraine bear with a sharp stick.

After these intense 48—to 72-hour shifts, I'd finish late at night, only to return to the hospital by 6 a.m. for patient rounds. A solid five hours of sleep was a rare luxury. Living in a fourth-floor walk-up near Benjamin Franklin's house in Philadelphia, I was occasionally found asleep at the base of the stairs, too exhausted to make it to my apartment. The physical toll of residency compounded the relentless cycle of pain and exhaustion.

Anyone who has experienced sleep deprivation knows it can induce headaches. The constant tension in the head and neck muscles, paired with straining eye muscles, creates a cycle of stress, nerve compression and pain that makes falling asleep even harder. Research confirms that sleep deprivation impacts mental health, memory, mood, and overall well-being. [1] The relationship between sleep and headaches is a two-way street; while lack of sleep triggers headaches, severe headache pain can also disrupt sleep patterns, further perpetuating the cycle.

RELATIONSHIPS: The Strain of Chronic Pain on Personal Connections

Chronic pain affects more than just the sufferer—it impacts relationships of all kinds, including marriages, friendships, work dynamics, and, most heartbreakingly, parenting. During my residency, I often came home to find my girlfriend sitting on the couch. I'd sometimes arrive home and lie down with my head on her lap and just cry without saying a word. It's remarkable how partners can stay supportive despite the toll that chronic pain takes. The need for care and support can feel overwhelming.

Living with a headache is very hard, and living with a person living with a chronic headache can devastate a relationship. I have heard so many stories of spouses who just can't or won't understand how much pain a patient is having, nor why their partner cannot fulfill their needs because of chronic pain. While a headache sufferer may come into a relationship with a headache history, sometimes headaches develop later in life presenting new difficulties to an established relationship. Worrying about your pain, and at the same time worrying about your relationship adds insult to injury.

I have, however, also been privileged to witness so many incredibly supportive families involved in caring for patients with chronic headache pain. Changing schedules, the inability to rely on a patient suffering with pain or deprivation of reciprocal emotional support do not seem to deter some partners from remaining all-in and nurturing even in the most difficult of circumstances.

It's heartbreaking when I see parents struggling with migraines. One of my most rewarding experiences was receiving a video from a young girl thanking me for "bringing her mom back" after years of pain had caused unintentional neglect. Another patient, a remarkable woman from Canada who you will hear from in a later chapter, has a devoted family. Her husband supported her through nearly 20 years of severe pain that often confined her to bed. Their three boys had to adapt to life without many typical social interactions because of her condition. Each summer, I look forward to their annual video update on their life following her pain relief.

DEPRESSION:
The Mental Toll of Living with Chronic Pain

Depression is a frequent companion of chronic pain, and I wasn't immune to it. The hopelessness of feeling like nothing will ever improve can be overwhelming. Even though I knew my residency would end after five years, I lost sight of that fact, believing that my life would always be this way—dominated by stress and unrelenting pain. I recall crossing Chestnut Street in Philadelphia with my eyes closed, thinking that if I got hit by a car, at least I wouldn't have to endure another day of pain. Thankfully, though I suffered from emotional scars, I avoided physical trauma.

During those years, I neither had the time nor the inclination to seek help. As I've previously stated, I wonder how things might have been different had I seen a neurologist or therapist. I've since been

diagnosed with PTSD due to my residency experiences. Addressing the issues at the time would have helped immensely, and I encourage anyone dealing with depression or chronic pain to seek therapy.

Depression is complex. It can be situational, as mine was, triggered by external circumstances, or it can stem from genetic factors, medical conditions, or medications. Chronic pain can lead to depression, just as depression can worsen headaches, creating a cycle that feels impossible to break. Therapy is incredibly important for chronic pain patients.

In patients with chronic pain and depression, it is important to delineate which condition is causing the other. While patients whose chronic pain is causing their depression can be great candidates for nerve decompression, patients with baseline depression and anxiety causing headaches can be some of the most challenging to manage. Unfortunately, this latter population does not respond well to headache surgery. When emotional or psychological illness is the root cause of a patient's pain, that underlying issue must be addressed, and nerve compression is unlikely to be the cause of such problems.

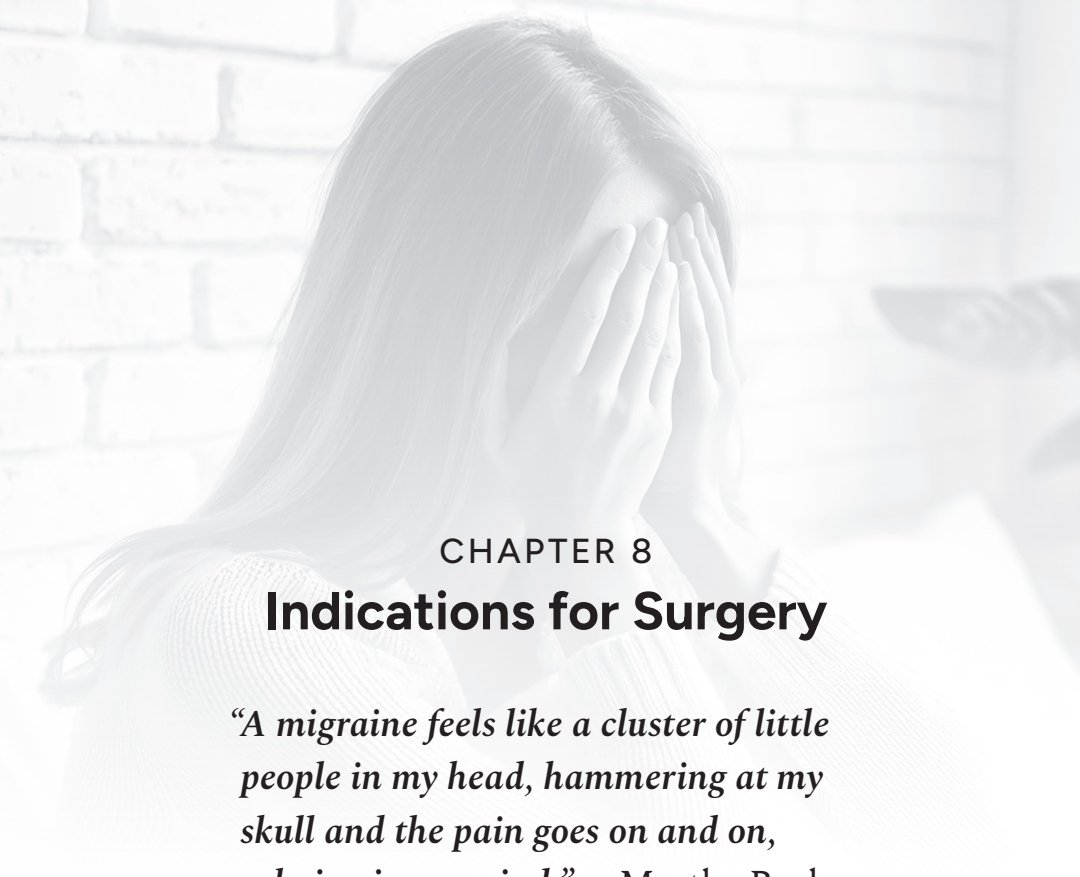
Patients who are depressed and/or anxious due to their chronic severe headache pain, which is causing emotional and psychological issues are the norm. These patients are often excellent candidates for headache surgery. Watching the reversal of emotional heaviness following successful nerve decompression is moving, and the return of normal personal, emotional, and professional dynamics in these patients is incredibly rewarding.

HOPE: The Struggle to Stay Positive Amidst Chronic Headaches

It's difficult to maintain hope when chronic headaches persist, especially for patients who have tried

numerous treatments without success. Because nerve decompression for severe headaches isn't often suggested by primary care doctors or neurologists, many patients find me as a last resort. They usually arrive cautiously hopeful, afraid of being disappointed yet again. However, when surgery brings significant relief, the joy is even greater.

As challenging as it can be, I urge headache sufferers to hold on to hope.



CHAPTER 8

Indications for Surgery

"A migraine feels like a cluster of little people in my head, hammering at my skull and the pain goes on and on, echoing in my mind." —Martha Beck, a well-known life coach, author, and speaker, has shared her personal experiences with migraines in her writings and interviews. Beck has described how migraines affected her as the intense pain and accompanying symptoms could be overwhelming and isolating.

Shifting Aspirations: From Pediatric Surgery to Plastic Surgery Amidst the Crack Epidemic

When I started at Jefferson, I was intent on becoming a pediatric surgeon, inspired by my earlier research experiences. However, the crack cocaine epidemic transformed our pediatric cases, and much of my time went into performing extracorporeal membrane oxygenation, or ECMO for short, procedures for premature babies born to mothers facing addiction. The emotional weight of these cases, often with uncertain outcomes, made me question whether this would be the future I wanted in medicine.

During this time, I began observing the work of the plastic surgeons, who seemed to find a rewarding balance in their practice. My interest in plastic surgery grew, not only because I appreciated the art of it, but also through reconstructive procedures. Particularly, the TRAM flap breast reconstruction, which uses abdominal tissue to restore a breast mound for cancer patients, was a personal favorite procedure. A pivotal moment came when I performed this surgery alone for my mentor's office manager. Dr. Moore, an incredible plastic surgeon, pretended to not show up for the surgery and watched through the blinds of the operating room window while I anxiously performed

the entire surgery by myself. That successful experience solidified my decision to shift from pediatric to plastic surgery.

Eventually, I joined Dr. Thomas Lawrence at the University of Massachusetts, where the supportive environment significantly eased the physical and emotional toll, I'd previously experienced. Although my headaches were still a challenge, they were less debilitating, especially as I found more balance and rest in my life.

A breakthrough came when I met my wife, Elizabeth, and my mother-in-law introduced me to a migraine medication that provided me relief I'd never thought possible. This experience left me contemplating how different my journey might have been had I sought this treatment earlier. I would have been a candidate for a medication treatment years earlier if I had just sought and found the right doctor. Patients often relay similar stories to me, astonished that they could have found relief if they had just known about nerve decompression earlier.

Criteria for Considering Surgical Nerve Decompression for Chronic Headaches

Patients frequently ask why I have not undergone headache surgery myself given my history. The decision to undergo a procedure is based on "indications," or reasons that justify surgery, and "contraindications," which are reasons to avoid it. Headache surgery is no exception.

Ideal candidates for outpatient surgical nerve decompression for chronic headaches typically have the following:

- Chronic headaches that have persisted even if episodic
- Headaches severe enough to impact daily life
- A history of medical evaluation by a neurologist
- A negative MRI of the head
- A positive response to nerve blocks or Botox®
- Failed conservative treatments, such as physical therapy and medications, or
- Difficulty tolerating headache medication side effects, or
- A desire to avoid long-term medication use.


ARE YOU A CANDIDATE FOR
MIGRAINE SURGERY?
JANUARY
Chronic and Persistent Pain
Have your headaches been ongoing for months or years?
Impact on Daily Life
Are your headaches severe enough to disrupt work, relationships, or hobbies?
Neurological Evaluation
Have you been thoroughly examined by a neurologist?
Diagnostic Imaging
Do you have a negative MRI of the head, ruling out other conditions?
Response to Nerve Blocks
Have you experienced significant relief from nerve blocks or Botox®?
Limited Success with Other Treatments
Have medications or physical therapy failed to bring relief?
Medication Challenges
Do you struggle with medication side effects or want to avoid long-term use?

Common Misconceptions: Why Surgery Isn't Always the FIRST Option

We often receive calls from people looking for a quick fix who have not seen a neurologist or explored appropriate medications. For patients in these situations, we advise consulting a neurologist as a first step, as they may find relief without needing surgery.

Although headache surgery is a low-risk outpatient procedure, it should still be considered carefully. If a patient can manage their pain through other means, such as medication or physical therapy, surgery may not be necessary. In my case, using Zomig has controlled my headaches well enough that I don't feel I need to have surgery at this time.

Exceptions to the Rules: Not Every Decision is Black and White

In some cases, I'm willing to bend the rules for patients who understand the risks and benefits. For example, a trumpet player experiencing pain while performing chose surgery without a full neurological workup due to time constraints and the impact on his career. He did not want to try different medications and wait to see if they worked—he just wanted to move on with

his life. While exceptions are possible, the general criteria serve as good guidelines.

The Role of Nerve Blocks

Nerve blocks are often seen as a clear indicator for nerve decompression surgery—if blocking a nerve relieves pain, it logically points to the nerve as the source. For patients with strong responses to nerve blocks, surgery is a straightforward decision.

My own experience has broadened this perspective. I'm a good candidate for surgery, as nerve blocks usually work for me, but I've avoided surgery because medication usually controls my headaches, minimizing downtime. Recently, however, I had a severe migraine and gave myself occipital nerve blocks. Although my scalp went numb, the headache persisted.

This incident has led me to reconsider surgery for patients who don't respond to nerve blocks. I explain that I'm open to operating on these patients but caution that I can't offer the same 90% success expectation. Surgery remains a reasonable option, but with tempered expectations, as I never want to promise more than I can reliably deliver.

Contraindications for Surgery: When Headache Surgery Is Not an Option

Certain situations make surgery unsuitable, such as medical conditions that prevent safe anesthesia. We require medical clearance from the patient's doctor, and conditions like bleeding disorders or significant heart issues can be reasons surgery may not be the best option.

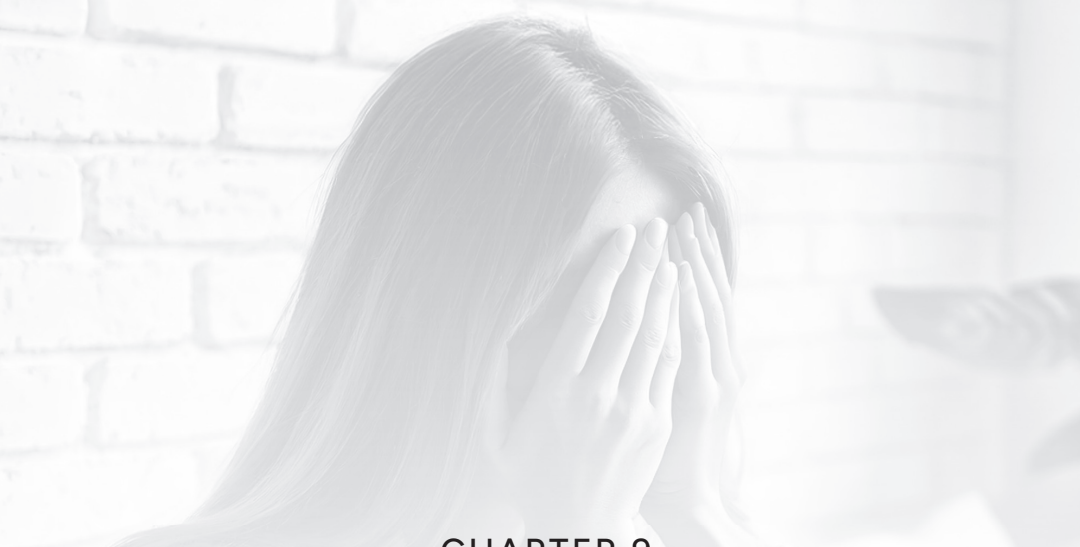
Patients with severe psychological disorders may still be candidates, but they present unique challenges. Of the few patients in my practice who have not improved after surgery, several have had significant psychological issues, requiring mood and psychological medications. Expectations must be realistic for these patients, as they are at higher risk for failure.

Radio-Frequency Ablation (RFA) uses energy to temporarily block nerve signals but can damage nerves over time. This procedure is commonly performed by pain management doctors, and many headache patients have tried this therapy prior to finding me. Patients with limited RFA history may still be good candidates for nerve decompression. Patients who have had many RFA treatments are less likely to benefit from nerve decompression surgery, but relief is often found following the division of the damaged nerve. More to come about that…

MY NEUROLOGIST SAYS THIS SURGERY DOESN'T WORK!

Some patients explore nerve decompression surgery and consult their neurologists about it. While many neurologists are unaware of the procedure, some may claim it doesn't work, often due to *selection bias or failure bias*. Headache surgery has a success rate of just over 90%, meaning a small percentage of patients may not experience relief. These individuals are more likely to return to their neurologist, reporting persistent pain.

In contrast, the majority who find relief rarely return to their neurologist, as they no longer need care. This creates a skewed perspective—neurologists see only the failures, not the successes, leading to misinformation about the effectiveness of nerve decompression surgery. I urge my patients to share their positive outcomes with their neurologists to help counter this bias. If you choose to have the surgery and it helps, please let your doctor know. Together, we can improve understanding and correct false assumptions about this life-changing procedure.



CHAPTER 9

The Surgery

"I wouldn't wish a migraine on my worst enemy. That feeling when your vision goes, the nausea sets in, and your head feels like it's splitting in half." — Frederick Banting, the co-discoverer of insulin and Nobel laureate, suffered from severe migraines that were often incapacitating, interfering with his groundbreaking medical research.

From Denver to Santa Barbara: Finding My Path in Plastic Surgery and Migraine Relief

Following my training in Massachusetts, my career in plastic surgery began in Denver, a city I cherished, where I thrived as part of an exceptional team

at Kaiser Permanente. It was an ideal environment for a young surgeon, offering a diverse caseload and mentorship from brilliant colleagues like Dr. Berry Morton, Dr. Royal Gerow, and Dr. Brad McDowell. Among them, Dr. Gerow stood out for his technical mastery, and we often collaborated on microsurgeries, intricate procedures requiring delicate work on small vessels and nerves under a microscope. I was privileged to perform complex procedures ranging from bilateral cleft lip repair to separating conjoined twins alongside 20 other specialists. Yet, as fulfilling as the work was, Kaiser Permanente's structured environment eventually clashed with my desire for autonomy, and a shift to the Chief of Plastic Surgery at Good Samaritan Hospital did not fully reignite my passion. The stress of routine cases and a lengthy commute led me to seek a new challenge.

From National Engagement to Private Practice

While navigating my early career, I gained invaluable exposure through national involvement with the American Society of Plastic Surgeons (ASPS), even earning a spot on the ASPS Board of Directors. This role allowed me to shape educational programs and connect with icons like Dr. Bahman Guyuron.

When I decided to leave Kaiser Permanente, enticing opportunities arose, including one at the University of Pittsburgh's prestigious program. However, the west coast beckoned, and I ultimately chose a private practice in sunny Santa Barbara. There, I shifted my focus to aesthetics, enjoying the precision and artistry of working with healthy patients. Still, I missed the profound sense of impact that reconstructive surgery offered. It was in this balance of technical mastery and a yearning for deeper purpose that I began to explore new avenues.

A Renewed Purpose in Migraine Surgery

It was 2007 when I first heard of nerve decompression surgery for migraines pioneered by Dr. Guyuron. I was drawn to the idea of helping others overcome chronic pain. As the data piled up showing how well this surgery worked, I decided to pursue training alongside Dr. Ziv Peled to master the techniques. Over three months, I repeatedly flew to his operating room, immersing myself in the specialty. By 2017, I began offering nerve decompression surgery in my practice, transforming the lives of patients from across the country and beyond. Their gratitude for pain relief has been unmatched, and this work has

brought my career full circle—combining technical skill with profound impact, reigniting my passion, and solidifying my expertise in a field where I can make a lasting difference.

Headache Surgery is NOT Brain Surgery—Let's Discuss the Details

In my practice, headache surgery is performed either on the front of the head or the back. If the patient's distribution of pain and the diagnostic nerve blocks indicate that the other side requires surgery, a second procedure is performed no earlier than three months after the first. While some surgeons will operate on the front and back of the head at the same time, I tend to be more conservative as positioning for surgery in the front creates pressure on the nerves of the back of the head, and vice versa. Placing pressure on nerves that have been freshly decompressed on the front when doing surgery on the back, or the opposite, puts unnecessary trauma to these freshly operated areas, and I do not feel this is helpful for recovery and relief. This is generally reflected in our excellent rate of success.

Nerve blocks tell us which nerves to operate on. When the patient presents to the office in pain, sequential nerve blocks are used to figure out which nerves are problematic. A nerve block on the GON may dampen the patient's pain from an eight out of 10 to a three out of 10, and then a block on the LON brings that pain down to a zero. If that happens on only the right side, and the pain is never present on the left side, then the patient would be a candidate for decompression of the right posterior nerves. Depending on the patient's headache location and the success of relief associated with nerve blocks, we may operate on the front right, the front left, or both. Alternatively, we might operate on the back right quadrant, the back left, or both at one time. Bilateral operations are often performed but as discussed above, are limited to the front or the back, not at once.

Minutes after a nerve block, most patients report scalp numbness and headache relief.

POSTERIOR SURGERY

Preparing for Occipital Nerve Surgery: Marking and Positioning

Surgery on the occipital nerves starts with shaving a strip of hair, about 2-3 inches wide, extending from the hairline in the back up to the occipital protuberance, the spot on the skull that sticks out the farthest in the back of the head. The midline is marked, and the nerve positions are marked based on known

landmarks. The GON is located 3 cm down from the occipital protuberance in the midline, and then over 1.5 cm toward the side of the pain. Patients can often localize their pain to that or a nearby spot, even on a simple exam. The third occipital nerve is located about 3 cm below the GON on each side.

Dr. Lowenstein's operating room is optimized for the care of headache patients.

The LON is marked similarly, by creating an imaginary line between the opening of each ear and measuring 5.3cm down the midline from that level, and then 6.5cm out on the side of the pain. This most

often brings us to a spot at the back side of the sternocleidomastoid muscle (SCM), as discussed in Chapter 5. A 2 cm incision is marked at this spot as well.

The patient is brought to the operating room and lays on a gurney where the anesthesia provider starts general anesthesia and the patient falls asleep. A breathing tube is inserted for safety, and the patient is rolled over to the prone position—face down on the operating room table. We then take about 30 minutes to properly pad and position the patient to make sure their face is encased in foam, and there are no problematic spots of pressure on the knees or hips or breasts. The area we are operating on is then cleaned and draped with sterile drapes.

Addressing the Lesser and Greater Occipital Nerves

After washing our hands and getting into a sterile gown and gloves, I inject all of the incisions with an anesthetic that contains epinephrine, a drug that helps squeeze down blood vessels to reduce bleeding during surgery. A scalpel is used to first make the incision over the lesser occipital nerve, and the SCM is identified. The LON is most often found coming out from behind this muscle and running up along

the muscle. Because all the small branches of this nerve are ensconced in tight tissue in the mastoid area, it is usually best to cut the trunk of this nerve near the incision. The area that the LON provides feeling to is quite small, and permanent numbness here is rarely noticed.

Cutting a nerve traumatically can cause a painful scar of the nerve, called a neuroma. When nerves are cut and then buried into nearby muscle, neuromas tend not to form. The LON is therefore cut here and buried into a small hole made in the SCM to prevent neuroma formation. The wound is then closed in a few skin layers, and a small bandage is applied. We then head over to the other side, if necessary, where the LON is addressed in the same manner as needed.

After these smaller nerves are taken care of, we move our attention to the GON. To find this nerve, a midline incision is made in the shaved area of the head, and then we bring that wound down to the level of the trapezius muscle. We then free up the tissue over the trapezius on the side of the pain, for about 2 cm and in the area under the mark we have made for the GON. By spreading the muscle layers, we can separate the fibers of these trapezius muscles and find the GON as it emerges through this muscle layer. Once

we find the nerve, it is encircled with a soft piece of rubber, so moving the nerve to the left and right does not require grabbing it directly with forceps.

Nerves are very delicate, and the less trauma they are subjected to the better. From here the nerve is followed up toward the scalp and freed from whatever appears to be impinging on it. Any blood vessels are cauterized and separated from the nerve, any lymph nodes are similarly removed, and any bands of muscle or fascia or scar that are pushing on the nerve are removed from the immediate area of the nerve. As the nerve branches, each branch is followed and freed from anything that is irritating them. As these branches are followed up, we eventually find their ends running in the soft fatty layer that everyone has under their skin. At this point there are no further worrisome structures, and the nerves are left to run in this superficial layer up to the skin where they provide feeling.

Final Steps: Decompression and Closure for Optimal Healing

Once the nerve is freed from where it is found up to the scalp, it is time to free things up in the opposite direction. The nerve is traced down to and then into the more substantial stabilizing muscles of the neck, and

a column of muscle is removed around the nerve as it descends down toward its roots. Once through these muscles, we can once again see a fatty layer where no further nerve impingement is likely. At this point the GON is completely decompressed. Because relatively little muscle is actually removed relative to the size of the whole muscle, no motion or strength deficits are noticed following surgery.

During the dissection of this nerve, we often come across the third occipital nerve (TON), which lies further down the neck from the GON. This nerve, if problematic, is found and cut, similar to the LON, and buried into nearby muscle to prevent neuroma. We try not to cut the GON, as this nerve provides feeling to a large area. Because the TON and the LON both provide feeling to very small regions, cutting them is hardly ever noticeable by the patient after surgery.

If the patient only has issues on the right or the left side, then only that side is decompressed. As headache pain is often bilateral, the other GON and TON are addressed in the same way if needed. In Chapter 6, a completed bilateral GON decompression can be seen.

At this point, it's almost time to close the wounds. A piece of fat can nearly always be found on the underside of the skin where the operation has been

performed. Some of this fat is isolated and put down into the muscle adjacent to the nerve, to provide padding there. This maneuver is performed on each side before closing the incision site within the hairline. I prefer to use staples, as they are the best method for closing these types of incisions. Staples gently turn the skin edges outward, allowing hair to grow very close to, and sometimes through, the scar, providing the best long-term aesthetic result.

Dr. Lowenstein operates using special glasses that magnify the delicate nerve surgery.

ANTERIOR SURGERY

Surgery on the nerves of the forehead and temple is performed in more aesthetic areas of the face, so the incisions here are meant to be hidden. This surgery begins similarly to posterior surgery, with marking. The incision for decompressing the supraorbital nerve (SON) and the supratrochlear nerve (STN) is marked in the eyelid crease, which is the same spot we make an incision when we perform aesthetic eyelid surgery, called blepharoplasty. The nerves are marked by feeling along the upper orbital rim, where small depressions are often felt in each spot where the nerve emerges from the eye socket. The zygomaticotemporal nerve (ZTN), is found just to the side of the orbit and is marked with a dot. The auriculotemporal nerve runs with the superficial temporal artery, which can be found by feeling a pulse right below where the upper ear meets the cheek near the temple. This pulsation is marked, and a small incision is marked to overlay it along the hairline.

Preparation and Initial Incisions

As with the other surgery, the patient is brought to the operating room, but because we do this surgery in the supine position, lying on the back, no rolling

is needed. General anesthesia is begun, and the patient's head and neck are cleaned and surrounded with sterile drapes. Local anesthetic with epinephrine is injected into all planned incisions. To protect the eyeball, called the globe, a protective contact lens is placed along with special gentle ointment.

Targeting and Decompressing Specific Nerves

The anterior procedure begins, like the posterior operation, with the easy nerve, and an incision is made over the ATN. Spreading in this area unveils the artery, vein, and nerve which all travel together. Each of these structures is divided in turn, and the nerve is allowed to retract into tissue below the incision. Similar to burying into muscle, allowing the nerve to retract to be ensconced in soft vascularized tissue prevents neuroma formation. This part of the procedure goes quickly, and the skin is closed with sutures. The opposite ATN is then taken care of if a bilateral procedure is necessary.

We then bring our attention to the eyelid, where an incision is made with a scalpel. The layers of the upper eyelid are distinct, and once we move down past the most superficial muscle layer, I move upward toward the rim of the orbit which is easily felt and then found.

As the layers of soft tissue over the bone are teased away, the SON nerve is found, usually accompanied by an artery and vein. The way that the nerve turns the corner around the bone is then examined. If this happens through a notch, the fascia at the base of the notch is removed to prevent compression there. If the nerve travels through the bone, a tool called a rongeur is used to remove the superficial bone and turn that tight tunnel into a channel where the nerve can lie relaxed. Before and after photos of this release can be found in Chapter 6. The accompanying artery and vein are divided so they can't bother the nerve either.

As the nerve travels up toward the forehead, it passes through the corrugator muscle which must be removed from the areas where the nerve is found. The nerve often branches here, and so like the GON, each branch is followed and freed from whatever muscle fibers compress it. Once the nerve branches pass through the muscle, they enter the fatty tissue below the forehead skin where no further impingement will be problematic. At this point the SON is fully decompressed.

The STN is found one to two centimeters toward the midline in the same planes and is treated in the same manner as the SON. Because the STN provides

feeling to such a small area, one option that has recently been adopted by several of us who do this operation is to divide this nerve rather than perform decompression. I make the decision of what to do here based on the severity of the patient's symptoms in this area and the appearance of the nerve.

At this point, all the nerves in this anterior quadrant have been addressed, except for the ZTN, which can be found near a vein in the anterior temple. Because I am comfortable in this region having done aesthetic work here for years, I approach this vein through the same upper eyelid incision. The vein and nerve here are divided; they are both very small and are allowed to retract into the temporalis muscle through which they emerge. The wound is then closed, and we move on to the opposite side if necessary. Wounds in the front of the head are closed using inert sutures that are removed five to seven days after surgery to prevent track marks, the same way that we treat the sutures of a facelift or aesthetic eyelid surgery.

MY NEUROLOGIST SAYS YOU SHOULD NEVER CUT A NERVE!

Neurologists and pain doctors often warn against cutting nerves due to the risk of neuroma—painful nerve scarring that can result from trauma. Neuromas frequently arise from incidents like car accidents or kitchen injuries, where nerves are damaged without proper treatment. These cases commonly end up in doctor's offices, reinforcing the belief that cutting a nerve is dangerous.

However, this is another example of selection bias. In headache surgery, nerves are carefully cut and treated to minimize the risk of neuroma. By embedding the cut ends into muscle or well-vascularized tissue, neuroma formation becomes exceedingly rare. This precise technique is far removed from the uncontrolled trauma that typically leads to neuromas.

If neurologists only see patients with problematic neuromas and not the many who have undergone successful nerve surgery without issues, their perspective becomes skewed. This bias can lead even well-meaning doctors to provide incomplete or inaccurate advice about headache surgery.

While neuroma formation is a possible risk, it is extremely rare in these surgeries. I thoroughly explain all risks to my patients, from common side effects like surgery failure—or even an earthquake during the procedure! Patients must weigh these rare risks against the overwhelmingly positive outcomes when considering whether headache surgery is right for them.

RECOVERY FROM Headache Surgery

THREE KEY ASPECTS

1. Activity Recovery

Immediate Post-Surgery

Patients can manage basic daily activities (ADLs) like bathing and dressing within a day or so after surgery. Showering is allowed the day following surgery.

First Week

While most can handle light tasks, it's advised to have caregivers available to assist with daily needs, especially in the first week.

Exertional Activities

To protect the newly decompressed nerves, avoid any strenuous activities, heavy lifting, or intense physical exertion for one month. This precaution allows deep tissues to heal fully and minimizes the risk of trauma.

2. Aesthetic Recovery

Posterior (Back of Head) Surgery

The main incision is placed within the hair-bearing area, allowing long-haired patients to cover it by wearing their hair down. Short-haired patients may need time for hair growth over the incision. Staples are removed after two weeks, and as the hair fills in, the scar generally becomes nearly invisible.

Frontal (Forehead and Eyelid) Surgery

The eyelid incisions heal much like those from aesthetic eyelid surgery. Sutures are removed after one week, but mild bruising and swelling around the eyes are common and may take two to three weeks to resolve. Patients are advised to avoid makeup for at least two weeks to allow for full healing. We often say, "two weeks for friends, three weeks for enemies" regarding public appearances.

3. Pain Recovery

Timeline Variability

Pain relief varies widely. Some patients are headache-free immediately after surgery, while others may have fluctuating pain for up to six months as the nerves settle. This variability is common, and patience is often required.

Typical Progression

Most patients experience noticeable relief within a few days, though residual discomfort can linger.

Follow-Up

Regular follow-up visits help monitor progress and address any concerns. Patients are informed about the potential for gradual improvement and the possibility of delayed relief, which can happen at the six-month mark or beyond.

RECOVERY FROM SURGERY

Recovery from headache surgery can be thought of in three different ways: activity recovery, aesthetic recovery, and pain recovery.

Activity recovery refers to the period of time required before a patient can resume exertional activities, and this is usually about a month. While most patients should be able to take care of themselves after about four days, I recommend patients refrain from strenuous activities for a month to allow the deep tissues to heal and prevent early trauma to the newly freed nerves. Patients are allowed to shower the day following surgery, and "activities of daily living," called ADLs in the medical world, are usually not a problem a day or so following the operation. That said, headache surgery patients should have active caregivers around for the first week or so after surgery and should certainly not plan on being caregivers for others for about two weeks after the operation.

Aesthetic recovery refers to when patients should expect to feel comfortable out in public. While this is very patient-dependent, there are several things to keep in mind. The incision in the back of the head lies largely, if not completely, in the hair bearing area of the scalp and if the patient has long hair, it is completely

covered by the hair above it when the hair is "down" as opposed to a ponytail or bun. If the patient has short hair, that region of the scalp is going to take some time to fill in. The staples used on this incision are removed at two weeks, and different patients have varying comfort levels when this area is seen in various settings. As the hair grows in and the scar matures, we expect it to be noticeable only when examined, as the hair hides this scar very well. The small scars on the neck where the LON is addressed are usually covered with surgical tape and tend to heal to fine white lines.

Aesthetic recovery following frontal surgery is very much like the recovery from aesthetic eyelid surgery. The sutures of each of the incisions are removed at one week, but swelling and bruising around the eyes is a frequent occurrence, and patients may or may not be timid about their presentation while these resolve. We commonly tell patients, "Two weeks for your friends, three weeks for your enemies," when discussing the timing of aesthetic recovery. We want patients to wait at least two weeks to apply makeup to the area but after that any residual swelling and bruising is usually nearly resolved. The small incisions at the ATN usually heal very quickly and very well and are rarely an issue for patients.

A Mature Scar Following GON Surgery

Eyes open and closed showing a mature scar following frontal headache surgery.

Pain recovery has two factors—the resolution of surgical pain and the resolution of headache pain. Surgical discomfort is usually short-lived and well-controlled in the day or two following surgery using Percocet or similar medication. Following this, residual surgical pain is usually treated easily with Tylenol. It can take up to six months for patients to experience the level of headache pain relief we expect to be their long-term outcome. Many patients are headache free in the recovery room immediately following their surgery. Other patients experience waxing and waning of their pain over the months following their surgery.

Nearly all patients are somewhat better in the days after their surgery, but the course of postoperative headache pain can be quite unpredictable for the first six months following nerve decompression. I have seen patients with significant headache pain for the five months after surgery who rather suddenly have their pain resolved at the six-month mark. Because I never want to promise more than I deliver, I always discuss this variability of pain recovery with each patient and ask them to plan for good days and bad days during the first six months after surgery.

Results of Headache Surgery

A successful result following headache surgery is measured as the patient experiencing at least a 50% reduction in headache pain, though the hope is always, of course, that we achieve 100% pain improvement. Dr. Guyuron's initial study of 89 patients revealed a success rate of 92%, with 31% of those patients achieving complete pain resolution.[2] Dr. Guyuron published a 5-year outcome paper as well, showing at least 50% pain improvement in 88% of these 89 patients in the study, and at that 5-year mark, 29% of these patients were still completely headache pain free.[3]. A recent review of my own of the last 95 patients showed a 91.5% success rate and that 48.4% of those 95 patients reported being completely pain free following their headache surgery.

Complications of headache surgery are rare (about 1%) but should be considered. Any surgery incurs the risk of postoperative bleeding, or poor scarring. When dealing with headache surgery, we must add the risks of problematic numbness or paresthesias (these are the bizarre feelings that you get when your leg falls asleep or someone hits your funny bone), and the extraordinarily rare risk of worsening pain.

Most headache surgery patients (over 90%) are pleased to have had the surgery and would recommend it to others.

PRIMARY vs SECONDARY SURGERY

Primary surgery means the first time something is operated on, while secondary surgery refers to further operations such as revisions. Because primary surgery is most often successful in relieving migraines, revision is rarely necessary. However, when nerve decompression of the GON does not work, even this nerve can be safely divided in secondary surgery. This often provides relief in these refractory cases.

This is particularly evident in patients who have had multiple radiofrequency ablation (RFA) treatments at the GON, as the RFA repeatedly injures the nerve. Recent research has shown these patients also have an excellent prognosis, though they may require nerve division vs decompression.

CHAPTER 10

Patients Tell Their Story

Dr. Lowenstein's patients share their own experience of headache surgery.

Christine's Story—
Occipital Neuralgia by the Numbers

Not only are the headache pain and dizziness gone, but I'm hiking and biking and active again!

Navigating the complex journey of pain and persistence, the following list highlights the diagnostic hurdles, tests, treatments, and support that shaped my path to finally understanding and finding relief from a persistent, life-altering headache condition. Spanning numerous diagnoses, symptoms, and interventions,

these numbers tell the story of years spent seeking answers and enduring extensive evaluations, all while supported by a resilient family and guided by a medical team. From blood tests and spinal taps to imaging scans and targeted nerve treatments, each step represents a chapter in the pursuit of relief. Here's a look at the milestones of this medical journey, culminating in the hope of finding a solution with one surgeon's expertise.

30 Doctors, Nurse Practitioners, and Physician Assistants

- 22 diagnoses (hyperreflexia, weakness, paresthesia, muscle weakness, fatigue, idiopathic intracranial hypertension, headache, occipital neuralgia, cervicogenic headache, peripheral neuropathy, mixed headache, numbness and tingling of skin, disequilibrium, back pain, spastic gait, cervical spondylosis, facet syndrome of cervical spine, gait abnormality, cervical radiculopathy, postural instability of gait, central pain syndrome)
- 14 blood tests (west nile virus antibody (igg, igm), borrelia antibody, vit e, vit b 1, copper,

zinc, thyroid stimulating hormone, c-reactive protein, ana, cortisol, ccp, rf, b12)
- 10 symptoms (constant headache, neck pain with radiation, disequilibrium, paresthesia, increased reflexes, gait issues, balance issues, tinnitus, nausea, sensitivity to light)
- 9 lumbar punctures, aka spinal taps (cerebrospinal fluid: vdrl, protein, glucose, enterovirus, hsv)
- 8 different prescription drugs (diamox, zonisamide, indomethacin, gabapentin, amitriptyline, prednisone, venlafaxine, zofran)
- 7 mris (t-spine, l-spine, c-spine (w/ & w/o contrast)
- 4 years of symptoms
- 3 sets of bilateral nerve blocks (occipital and auricular nerves)
- 2 sets of bilateral facet injections (c2-c3-c4)
- 2 cerebral spinal fluid leaks after a lumbar puncture and ct myelogram
- 1 hospitalization for "further evaluation for persistent headache"
- 1 x-ray (c-spine)
- 1 mr venogram of the brain without contrast
- 1 ct myelogram

- 1 incredibly supportive family
- 1 surgeon who said he could help me!

It Started with the Worst Headache of My Life.
On August 24, 2015, after undergoing MRIs and a thorough exam, I was released from the emergency department (ED) with instructions to follow up with my primary care physician (PCP). My symptoms included a dull headache, an unsteady balance that required me to hold onto walls to walk, and hyperactive reflexes. My PCP suggested I follow up with a neurologist, though I sensed he thought I was "hysterical" and responsible for my own symptoms. Two weeks later, I finally saw neurology, but they offered no better answers. After several visits, blood tests, and a lumbar puncture, there were still no clear diagnoses. As the months passed, my headache worsened, confining me to bed and forcing me to stop working.

Navigating a Maze of Misdiagnoses and Setbacks
The Friday before Thanksgiving, I received a call from neurology: a test had come back positive. The doctor regretfully informed me that I had tuberculosis meningitis (TB). Oddly, I felt a sense of relief—something concrete had finally shown up. Yet, as the weekend progressed, my condition deteriorated,

prompting another trip to the ED. There, the doctors reviewed my positive result and dismissed it, saying that if I had TB meningitis, I would likely be dead. I was stunned—these were the same doctors who had ordered the test and delivered the results.

The doctors admitted me to the hospital to investigate further. After all, if I did have a highly contagious and deadly disease, containment was essential. More MRIs, blood work, and discussions with specialists followed, only to reveal that the TB meningitis result had been a mistake due to a sample mix-up. After another lumbar puncture, surprisingly, I felt much better. The neurologist informed me I had Idiopathic Intracranial Hypertension (IIH). The hospitalist also apologized, admitting she had labeled me a malingerer in my records—a person who feigns illness to avoid responsibilities. They explained that, had this lumbar puncture not brought clarity, I would have been referred to psychiatry. I was prescribed Diamox to reduce my cerebrospinal fluid (CSF) and discharged with instructions to follow up with my neurologist.

With treatment, I began to improve and returned to work as an engineering project manager. Over the next 18 months, as my symptoms periodically returned and impaired my functioning, lumbar

punctures helped by draining excess CSF. I was able to manage Diamox and Zonisamide and continued working full-time.

A Turning Point: Seeking Relief Amid Worsening Symptoms

On June 29, 2017, however, I experienced a spinal leak after a lumbar puncture and required a blood patch to seal it. Unfortunately, from that point on, lumbar punctures no longer relieved my symptoms. My headache intensified, reaching an 8 out of 10 on the pain scale, limiting me to just 2-3 hours of work a day before heading home to rest. I was unable to fully participate as a mother, wife, or family member, and I began losing faith in my doctors' ability to find the root of my condition.

In August, I consulted a PA in Neurology. During his exam, he mentioned occipital neuralgia. I laughed because I had come to the same conclusion myself. He referred me to specialists who confirmed the diagnosis, and I began treatment. This involved occipital nerve Blocks and Facet Injections at various cervical spine levels, which provided only minor, temporary relief. As treatments failed to bring lasting improvement, the doctors began to lose interest. My

engineering mindset took over: I researched tirelessly, joined Facebook groups for ON and IIH, identified additional tests to explore, and pushed for them. Though the results were disappointing, I refused to give up.

Eventually, I discovered occipital nerve Decompression Surgery. After gathering information in my online support groups, I compiled a shortlist of potential surgeons, emailing each of my symptoms, test results, and relevant history. I decided to pursue a consultation with Dr. Lowenstein, who treated patients in Denver, where I live. After a nerve block mapping consultation with him on February 19, 2019, he confirmed he could help. I was flooded with relief and hope.

On March 19, 2019, I underwent surgery in Dr. Lowenstein's Santa Barbara facility. When I awoke, he asked if I could walk without dizziness. I laughed and told him I wasn't sure since I'd just woken up. Back at my hotel, as I got up to get dinner, I noticed something remarkable: I no longer needed to hold onto walls. My headache was gone, my balance was restored, and I felt incredible. Though I had to remind myself to take it easy during recovery, I was tempted

to go for a run. I resisted—but the desire to move freely was exhilarating.

I Had Won This Battle.

Reflecting on this four-year journey, I endured skepticism, misdiagnoses, and dismissal. A doctor once suggested that learning to breathe would cure me, my PCP recommended getting an attorney and applying for disability, and a neurologist labeled me a malingerer. At work, colleagues questioned if I was intoxicated, and a senior executive accused me of seeking attention by using a walker. But in the end, I got my life back, and that's what mattered.

Now, after more than five years post-surgery, I'm able to bike, run, hike, and enjoy life with my family. My advice to anyone dealing with complex medical challenges: never give up. Pursue answers relentlessly, even when experts doubt you. This is your life, and no one will fight for it like you will.

Courtney's Story—What Life? A Painful Existence Defined by Migraines

This photo is from my trip to New York City in September. It was five days of walking and exploring, and I felt so much better than I would have before the surgery. We covered 6-7 miles each day, and I was feeling great!

Chronic migraines left me merely surviving, stripped of joy, connection, and purpose. Before my

migraine surgery, when people asked what my life was like, I could only respond with, "What life?" It may sound dramatic, but it was my reality. How do you call it living when you can't maintain meaningful relationships, when every activity you once loved becomes impossible? What's left when each day is just about surviving the pain? Eventually, I woke up to the harsh realization that years had slipped by, and I'd been stuck—barely staying afloat—missing out on what life could have been.

Survival Over Living: The Pain of Constant Disappointment

Relief was always temporary, leaving me stuck in a relentless cycle of false hope and deeper despair. Life with chronic migraines wasn't living—it was a daily battle to survive. I spent years chasing treatments, always met with fleeting relief that disappeared as fast as it came. Each new attempt brought hope, but the pain always returned, dragging me back into the darkness. My potential, my ambitions, and my future were swallowed whole by this relentless illness. As the migraines destroyed my physical and emotional well-being, I watched my teenage years and early

20s slip away, lost to the rollercoaster of hope and disappointment.

The End of Hope: Surrendering to a Life of Compromise

Exhausted by the fight, I accepted that my life would never be what I'd imagined, clinging to small fragments of happiness. At some point, I was too tired to keep hoping. I had moved through every stage of grief and arrived at acceptance. I no longer dreamed of living a fulfilling life; instead, I settled for surviving and finding pride in the small moments of happiness I could grasp. My life became a constant compromise, and while I refused to let it destroy me, I had resigned myself to mediocrity. I thought this was the best I could expect from life.

A Glimmer of Hope: The Google Search That Saved Me

Then, one late night, everything changed. During yet another insomnia-driven Google search, I stumbled across something called *migraine nerve surgery*. I'd seen countless treatments over the years, but this one felt different. Something about it sparked excitement—the kind I hadn't felt in years. I couldn't explain it, but I just knew that if I could see this surgeon, my

life would change. That search reignited a tiny spark of hope, something I had buried long ago.

Finally Seen: Finding a Doctor Who Understood My Invisible Pain

Dr. Lowenstein didn't just treat me—he saw me and gave me the belief that healing was possible. When I met Dr. Lowenstein, I knew immediately I was in the right hands. Despite looking like a healthy 28-year-old on the outside, he saw the years of pain and emotional exhaustion I carried with me. When he said, "We're going to get you fixed up and feeling better," I believed him. For the first time, I felt truly seen by a doctor who understood the invisible weight of my suffering. From that moment on, my trust in him never wavered.

Post-Surgery: Rediscovering Life, Joy, and Connection

The transformation was immediate—color, energy, and joy returned bringing a whole new world of possibilities. The changes after surgery were nothing short of miraculous. My friends and family noticed first and said I had color in my face again, something they hadn't seen in years. I was laughing, energetic, and finally enjoying life in a way I hadn't since I was

14. No more canceled plans or days spent recovering from simple activities. I could engage with my loved ones, experience joy, and even look forward to the future. My life was no longer limited to mere survival; it was bursting with possibility.

The Power of Healing:
From Lost Hope to Unstoppable Confidence

With the pain gone, my mental clarity returned, and I realized that nothing could hold me back anymore. The physical relief from the surgery was incredible, but the change in my mental health was equally profound. The cloud of despair that had followed me for years lifted, and my optimism and drive returned. It felt like waking up from a long nightmare. Suddenly, I wasn't just surviving; I was thriving. My life transformed from "What life?" to "Oh, this beautiful thing!" The future no longer felt like a burden; it felt like an adventure waiting to be embraced.

Unending Gratitude: A Second Chance at Life, Thanks to Dr. Lowenstein

Dr. Lowenstein gave me back not just my health, but the ability to live fully and chase my dreams. When life turns around as dramatically as mine did, there aren't enough words to express the gratitude you feel. I would drive 100 miles every week, or have the surgery 100 times over, if it meant I could keep feeling this way. No amount of thanks could ever capture how deeply grateful I am to Dr. Lowenstein for giving me back not just my health, but my life. He will always be a part of every step I take and every dream I pursue.

Vera's Story—Life Stopped at 38: The Onset of Chronic Migraines

I am back to living an active, joy-filled life with my family, forever thankful for Dr. Lowenstein's care. Here I am camping on the big island of Hawaii where we live.

An active and healthy lifestyle came crashing down when migraines took over my life. My life came to a screeching halt when I started suffering from chronic migraines at age thirty-eight. Before the migraines, I was healthy and active. My husband, our daughter, and I loved camping, hiking, swimming, and exploring the outdoors. But in 2022, after contracting COVID

for the first time, everything changed. Although the initial infection felt like a mild cold, it left me with severe headaches unlike anything I had ever experienced before.

When Headaches Became Unbearable

As the headaches worsened, I found myself trapped in pain, bed-bound, and unable to work. As time went on, the headaches grew more intense and unrelenting. I became hypersensitive to light and sound, constantly nauseous, and overwhelmed by debilitating pain. Nothing I tried eased the pain, and my life became severely limited. I was confined to bed most days, unable to work or live my life. After seeing multiple general practitioners, I was finally diagnosed with chronic migraines and referred to a neurologist, but the road to relief was far from over.

Searching for Solutions:
Every Treatment Came Up Short

From medications to injections, nothing worked, and I was told there was no solution. Working with a neurologist, I tried every possible treatment—abortive and preventative medications, Botox® injections, nerve blocks, and even dietary changes. Nothing made a difference. The migraines were relentless, and the

symptoms made it impossible to function. Desperate for answers, I sought a second opinion from another neurologist, only to be told there was nothing more they could do for me. I was devastated, left in constant pain and without hope.

Finding Hope in Migraine Surgery: A Lifeline in Dr. Lowenstein

Through my husband's research, I discovered Dr. Lowenstein, and for the first time, I believed there was a way out of the pain. In my husband's relentless search for answers, he came across migraine surgery. That's when I discovered Dr. Lowenstein. After listening to his podcast and exploring his website, I understood my migraines in a way I never had before. It became clear that surgery was my way out of this pain. For the first time in years, I had hope. I was confident that this surgery would restore my life, and I was ready to take the leap.

A Miraculous Switch: Pain-Free After Surgery

The day after surgery, so much of my pain was gone, and I felt like I had been given my life back. My surgery on the greater and lesser occipital nerves went smoothly, and the recovery process was a breeze. The very next day, it felt like a switch had been flipped—most of my

pain was completely gone. All of the pain in the back of my head had disappeared. I was overwhelmed with disbelief and joy, tears flooding my eyes. The relief was so profound that I quickly scheduled another surgery to decompress the supraorbital and temporal nerves, to take care of the remaining discomfort in my forehead. Once again, the surgery and recovery were smooth sailing, and just like before, it felt as if the migraines had simply vanished.

Living Again: 100% Migraine-Free and Grateful

I am back to living an active, joy-filled life with my family, forever thankful for Dr. Lowenstein's care. Since the surgeries, I have been 100% migraine-free. I'm doing the things I love. It's hard to put into words how grateful I am to Dr. Lowenstein—not just for his expertise but for his kindness and the way he changed my life. I will forever be thankful to him for giving me the chance to live fully again.

Christa's Story—Before and After: A Life Defined by Pain and Healing

Near our Home in British Columbia, the surgeries have given me a new lease on life, one filled with joy, purpose, and endless possibilities.

Two nerve decompression surgeries became the turning points that changed absolutely everything. There are moments in life that mark everything as either "before" or "after." The nerve decompression surgeries Dr. Lowenstein performed on my head are two such defining events. At 18, my life took an unexpected turn as chronic illness and head injuries reshaped my reality. From being an active, healthy, and busy

teenager, I became a fragile version of myself battling excruciating pain. What began as a severe flu with multiple other debilitating symptoms head-to-toe, quickly turned to gut-wrenching physical agony that included crushing head pain that consumed my existence for five years. I was in and out of hospitals, seeing over 30 specialists, and was diagnosed with a few chronic illnesses, each accompanied by relentless migraines. Head injuries from two different car accidents only added to the toll, and my head endured beating after beating as I fainted from seizures, suffering concussion after concussion.

Finding Love Amid the Pain

During the darkest time, and as illness began to dictate my existence, day and night, something miraculous happened: I met Justin, the man who would become my husband. He has been a steady and unwavering source of strength. We met just before my 19th birthday and were married exactly one year later. Through the worst of my suffering, Justin was my rock, a real-life hero who never left my side. Despite my chronic health struggles and head pain, God forged a love between us that has only grown stronger—especially as we welcomed our three sons into our family.

Although I eventually recovered from my chronic illnesses before having our sons, the violent head pain never relented. aura migraines, worsened by each pregnancy, gripped me with searing, knife-like pain in my head and face, accompanied by nausea, profuse vomiting, and blinding vision issues. The pressure was like a vice tightening around my skull, making even the lightest touch to the back of my head unbearable. No treatment, no doctor, no diet, no adjustment could alleviate the torment that consumed me daily for the next 10 years.

Desperation and Hopelessness: Living in Constant Pain

Endless failed treatments left me exhausted, searching for answers that never seemed to come. By 2021, I had run out of options. Specialists reviewed my history and confirmed what I already feared: every possible treatment had been exhausted, and nothing worked. Medications brought temporary relief, but the migraines and head pain always returned, often more disabling than before. Life was dictated by the unyielding pain, and as a family of five, we adjusted our lives around it, hoping for some kind of breakthrough that never came. Without the consistent care

and support of family and friends, especially both sets of our parents, I'm not sure how we would've made it.

The relentless pain brought me to a breaking point, but even in my lowest moments, strength and hope never completely disappeared. Despite having so much to be thankful for—my loving husband, my precious children, a wonderful community, and a strong loving God worth trusting—the unrelenting pain pushed me to the edge many times. There were moments so dark that I believed my family would be better off without me. I considered ending my life, convinced that it would set them free from the constant burden of my suffering. But even in those darkest times, God carried me, reminding me that my life had value, even as I struggled to see it.

A Glimmer of Hope: A Miraculous Discovery

Just when I thought I had no options left, God led me to Dr. Lowenstein who gave me a new chance at life. One night in March, after a particularly vicious migraine left me bedridden for days, something inside me snapped. I couldn't take it anymore. In desperation, I prayed for God to intervene, to show me something I hadn't yet tried. That's when I felt an inexplicable

urge to go on YouTube—a strange thought at that moment. The first video I saw was Dr. Lowenstein explaining his migraine surgery. Something shifted in my heart. My husband and I watched his videos, and the hope I had lost began to flicker back to life.

Taking Action: The Path to Surgery

The next morning, I called Dr. Lowenstein's office, and within a week, we had a video consultation. Everything moved quickly from there. After bloodwork, exams, and nerve injections, I was scheduled for occipital nerve decompression surgery in California. The process was seamless, and Dr. Lowenstein and his team were thoughtful, compassionate, and thorough, putting us at ease every step of the way.

Relief at Last: The Turning Point After Surgery

Although recovery wasn't easy, the profound relief I eventually experienced after surgery was completely life changing. Both surgeries—on the nerves at the back and front of my head—went smoothly. Although recovery came with its own new challenges, including strange sensations and lingering pains, I held onto hope. Then, five months after the second surgery, the pain began to lift. For the first time in 15 years, I had hours—sometimes entire days—without pain.

Migraines became less frequent and less intense. Medications that had never worked before started to help whenever a migraine surfaced, and I knew that I was finally on the road to healing.

A New Reality: 80% Pain-Free and Thriving

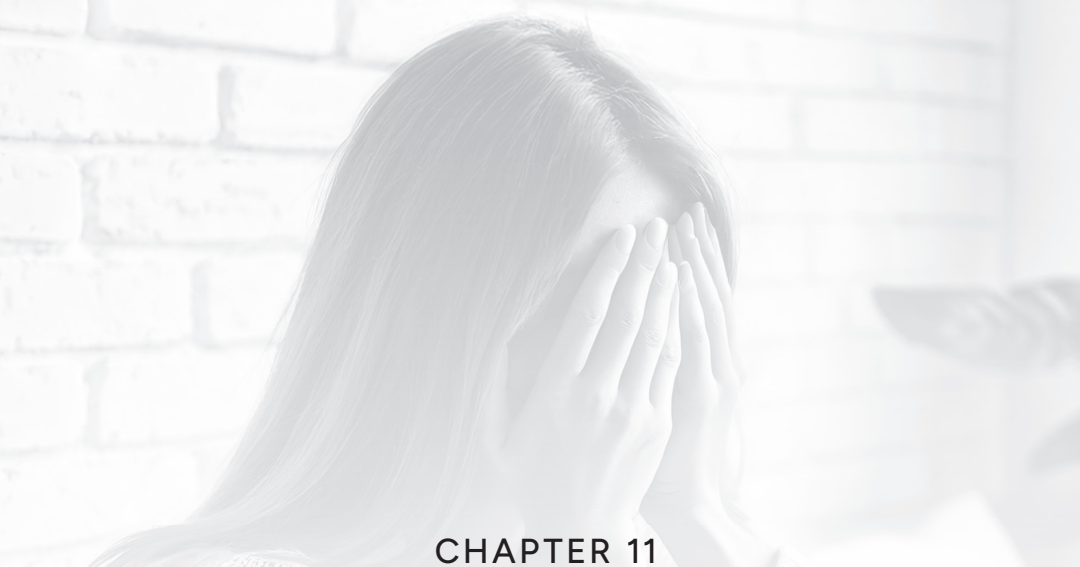
Today, life is no longer dictated by pain. I am 80-85% improved, and my days are full and vibrant. I went into surgery hoping for even a 50% improvement, but now, three years later, I can confidently say I am 80-85% better. While I still experience occasional migraines and cranial pressure, most days I am completely pain-free. Life has opened up in ways I never thought possible. I can participate fully in family life, travel, garden, keep bees, host gatherings, be a part of our church family, and even homeschool our boys without the weight of chronic pain holding me back. The surgery not only gave me my life back, but it also gave my family the mother and wife they hoped and prayed for.

The change in my life is indescribable. I can make plans, sleep through the night, drive, sing, and laugh without fear. I can engage fully with my incredible sons and be by my husband's side in this beautiful adventure of life. Dr. Lowenstein didn't just give me

relief from migraines; he gave me back the ability to thrive. Words can't express the depth of my gratitude for his skill, compassion, and dedication. Thanks to him, my life—and the lives of my family—have been forever changed.

Life After Surgery: A Future Full of Promise

The surgeries have given me a new lease on life, one filled with fresh joy, unhindered purpose, and endless possibilities. Looking back, there is a clear line marking life before and after my surgeries in Santa Barbara. Before, life was consumed by pain and survival. After, life is full of vibrant moments, shared memories, and unrestrained joy. Even with the occasional migraine, I am thriving. I wish more people knew about this life-changing surgery—so many could find the relief that I never thought was possible. Thriving is no longer just a word; it's the reality of my life today, sweeter than I ever imagined.



CHAPTER 11

Choosing Your Headache Surgeon

Nerve decompression for the treatment of headaches is a highly specialized practice. Because there are still so few centers of excellence for this type of surgery, even new graduates from training programs often get limited exposure to headache surgery in their training. When searching for a headache surgeon, important factors to consider include experience, expertise, environment, and comfort.

Expertise

To some degree, experience and expertise go hand in hand. Those of us who do more surgery are going to likely have more expertise. Because of the relatively few prolific headache surgeons, many patients tend

to travel for their care in order to find this expertise. In my practice, I see patients from the East Coast of the US to Alaska and Hawaii. Because there are so few headache surgeons outside of the United States, patients travel to have surgery with me from Canada, Europe, Asia and Australia.

Environment

At the time of this writing, there are about twelve to fifteen headache surgeons who specialize in this kind of nerve decompression surgery. Several surgeons are in private practice, while some are in academic centers. The experience that each of these surgeons offers is going to be significantly different.

An academic center is going to provide the experience of a large hospital and a multidisciplinary referral center, and this can be very comforting to many patients. Surgeons in academic centers are more likely to be involved in research, with more resources to help with these efforts. Dr. Janis, Dr. Afifi, Dr. Austen and Dr. Amirlak are all well-respected surgeons and friends who practice in academic settings. Dr. Gfrerer is another accomplished academic surgeon who contributes significantly to headache surgery research.

A private practice environment is going to be more personalized, and your surgery is likely to be in a smaller surgery center rather than a larger facility. In my practice, for example, I operate in my own surgery center where all the staff are very familiar with the surgery that we perform. Dr. Peled, Dr. Hagan, and Dr. Guyuron are excellent surgeons and friends who, like me, are in a private practice setting.

Comfort

The last factor that patients should consider is their comfort with the surgeon. Personality varies between patients and doctors, and finding the right match is very important in your surgery and your recovery. Does your surgeon's office call you back? Does your surgeon answer your questions and explain the procedure and expectations? These are very important factors in patient care and patient comfort.

In my practice, most patients seek me out not only because of my expertise but also because of my passion for migraine surgery and my ability to understand their experience. Having suffered from migraines myself, I have a unique perspective that many patients appreciate. I consider education a keystone of my practice, and so I strive to make sure my

patients understand the surgery and expectations. I am very conservative, and I run a very "tight ship," making sure my surgery center and staff are optimized for patient care. That said, I don't match perfectly with all patients and if I don't think I am the best resource for a certain patient, I let them know and refer them elsewhere.

It is the hope of all migraine surgeons who specialize in these operations that nerve decompression procedures grow and become more common and more accessible. The Migraine Surgery Society (MSS) was formed to facilitate this process and can be another resource when searching for doctors with a special interest in headache surgery. I do recommend that you make sure your surgeon is a member of the MSS. In twenty years, I sincerely hope that nerve decompression for headaches will be the standard of care where all the patients who can benefit from this life-changing operation can find hope and relief.

CONCLUSION

A Journey from Pain to Purpose

As I reflect on the stories shared in this book, both mine and my patients, I'm reminded of how personal and unique each individual's path to healing truly is. For so many of us, the experience of living with chronic pain feels like an endless journey with too few answers and far too little hope. Yet, these stories are a testament to the fact that relief is not only possible—it is achievable.

Through my own struggles with migraines, I came to realize that the pain itself was shaping me, guiding me toward a purpose I had not initially recognized. That purpose became clear the day I decided to specialize in treating headache patients. I knew firsthand the toll chronic pain could take on someone's life, and I wanted to help others avoid the years of unnecessary suffering I endured.

This journey has not been easy for me nor for my patients. But each story in these pages represents a victory—a moment when someone who had lost hope found it again. I've witnessed the transformative power of peripheral nerve decompression surgery in ways I could have only dreamed of when I was a teenager suffering in silence. For so many people, this procedure has been a turning point, a lifeline back to the lives they had almost given up on.

My hope is that this book not only demystifies the surgery but also instills a sense of resilience and empowerment. If you or someone you know suffers from debilitating headaches, know that there is a path forward. Healing may take time, perseverance, and

self-advocacy, but it's worth the journey. The patients you've read about here serve as living proof that pain is not the final word.

Thank you for sharing this journey with me. Whether you're a patient, a caregiver, or simply someone seeking knowledge, I hope you walk away from these pages with a renewed sense of hope and understanding, as education is half the battle. Pain may be a part of your story, but it doesn't have to define your future. Relief, recovery, and a life of possibility await you.

To make things easy, I've included a QRCode here that takes you to my website's FAQs section. Simply scan the code with your smartphone to access this resource.

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