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Ophthalmologists' Musculoskeletal Health: An Often Overlooked Concern

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Introduction

You may be familiar with the adage by Jim Rohn, "Take care of your body. It is the only place you have to live." This wise statement is of extreme relevance to clinicians as we do our best to manage growing waitlists and backlogs, diminishing healthcare resources, increasing patient demands, and the expectation to "do more with less."

Most of us were never prepared for the impact of these demands on our physical health, mental wellbeing and career longevity. Ophthalmologists, by virtue of the procedural nature of our specialty and the challenges created by the equipment and devices we use every day, are at high risk for work-related musculoskeletal disorders (WMSDs). According to the Canadian Center for Occupational Health and Safety, work activities that are frequent and repetitive or activities with awkward postures produce musculoskeletal disorders that may be painful during work activities or even at rest. These WMSDs are painful disorders of muscles, tendons, joints and nerves. Injuries can result from overuse and may develop over long periods of time.

How Common are WMSDs Among Ophthalmologists?

A 2018 systematic review and meta-analysis published in *JAMA* reported on WMSDs among surgeons and other clinicians. The review found that the prevalence of WMSDs among this group of at-risk physicians is *comparable to that reported among physical labourers* (**Table 1**)![1] In a 2005 survey of American ophthalmologists, 52% of the 697 respondents reported neck, upper body or lower back symptoms in the prior month; 15% of respondents reported having to limit their work as a result of their symptoms.[2] A survey published in the

Surgeons		Physical Labourers	
Neck	65%	Neck	32%
Shoulder	52%	Shoulder	28%
Back	59%	Back	54%
Upper Extremity	39%	Upper Extremity	42%

Table 1. 12-month prevalence estimates for work-related musculoskeletal pain; adapted from Epstein et al, 2018.[1]

Canadian Journal of Ophthalmology (CJO) in 2019 reported similar occupational musculoskeletal pain and injury in Canadian ophthalmologists.[3] Fifty percent of respondents reported musculoskeletal pain in the preceding 12 months associated with tasks performed in the clinic setting, while 48% reported occupational musculoskeletal pain in the preceding 12 months related to working in the operating room (OR). Neck pain was reported in 46%, lower back pain in 36% and shoulder pain in 28% of respondents.

Why are Ophthalmologists at High Risk?

Degenerative disease of the cervical or lumbar spine, rotator cuff pathology and carpal tunnel syndrome are the most common types of injuries reported by at-risk surgeons. This data might be puzzling as ophthalmologists don't lift heavy equipment or use hammers and power saws. One of the main reasons that ophthalmologists are at high risk is related to limited flexibility and adjustability of operating microscopes and slit lamps. This necessitates the user to adopt extreme or awkward postures in order to interface with equipment and patients. Excessive force or exertion and repetitive activities produce physical strain when working in the clinic and OR. According to the Canadian survey cited above, the most commonly reported challenges were related to performing repetitive tasks, working in cramped or awkward positions, and bending or twisting the neck.[3] The cumulative effect of these daily strains can take a serious toll over time. The following factors have been identified as leading to WMSDs in ophthalmologists:[4-6]

- Use of ophthalmic equipment and devices that have not been designed with surgeon comfort in mind
- Leaning forward at the slit lamp and craning one's neck to reach the oculars; referred to as the "slit lamp slump"
- Slit lamp controls are set relatively high up; therefore, exerting gripping forces on instruments or free lenses produces static forces on the shoulders as we try to keep our arms stable
- Excessive flexion of the elbows and wrists when using the slit lamp controls, causing us to sit in an awkward, uncomfortable position
- Extreme or awkward head and neck postures when examining patients with the indirect ophthalmoscope
- Pushing our head and neck forward in order to see through the oculars of the operating microscope
- Strain on the hips and ankles can develop when the phacoemulsification and microscope foot pedals are not level with one another

The static position of the head when looking through the microscope oculars can lead to spasm of contracted spinal musculature. Maintaining these positions can result in neck and back pain and related nerve problems including tingling in the hands. Over time, the awkward postures lead to the development of degenerative disc disease in the neck and/or lower back.

Slit Lamp Slump → Forward Head Position → Risk of Career-Ending Injury

Unfortunately, the examination equipment and devices we use repeatedly everyday promote a forward head position/posture (**Figure 1**). The forward head posture is characterized by neck extension which pushes the head forward beyond its natural position over the cervical spine. This posture places a strain on the muscles and bones of the neck and creates increasing amounts of weight pressure on the spine. It is not surprising that ophthalmologists experience cervical spine, shoulder and elbow pathology as we repeatedly look through oculars that don't tilt or telescope in or out and reach for knobs on the slit lamp that require us to lean forward and flex our unsupported arms.

Physician Heal Thyself?

When asked about pain management, the majority of Canadian ophthalmologists who participated in our 2019 survey reported relying on non-steroidal anti-inflammatory agents (NSAIDS), rest and massage therapy to manage pain secondary to work related activities.[3] The use of prescription opioids and need for surgical intervention were reported by a small minority of our colleagues (1.8% of respondents). Interestingly, ophthalmologists most commonly sought care from massage therapists (27% of respondents), followed by physiotherapists (15%); family physicians (14%); personal trainers (10%); sports medicine

- Damage from prolonged head forward position contributes to muscle spasms, disc herniation, osteoporosis and nerve impingement
- Posture impacts and modulates all body systems from breathing to hormonal production
- Spinal pain, headache, temporomandibular joint (TMJ) disorders, mood, blood pressure, pulse, and lung capacity are some of the symptoms and bodily functions most impacted by poor posture

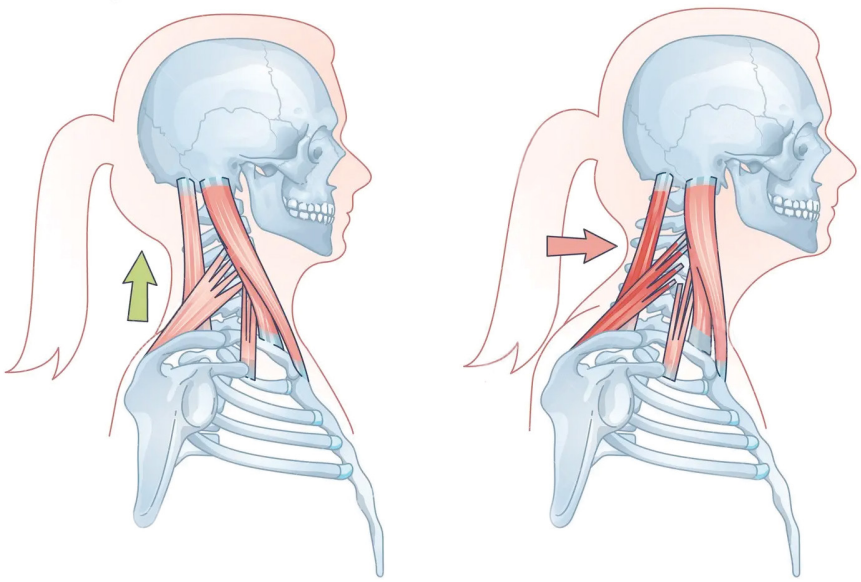

Figure 1. Forward head posture. Excerpted from Mayo Clinic Health Letter, March 2000.[7]

specialists (7%); neurosurgeons (3%); neurologists (2%); and physiatrists (3%).[3]

While massage therapy is a popular choice, consulting a physiotherapist, sports medicine specialist or physiatrist is a highly recommended first step. Neurological symptoms and deficits should not be ignored. These red flag symptoms require prompt assessment and investigation. Your family physician may need to refer you to a neurosurgeon, neurologist or orthopedic surgeon.

Regardless of the severity of pain or injury, ongoing physical conditioning is an essential part of self-care. A program that includes strength training, stretching and flexibility training is best undertaken with the guidance of a physiotherapist or registered kinesiologist. It is critical to consult with an *ergonomist* (either through the occupational health department at your hospital or a privately hired ergonomist) to assess your posture while you work, as well as the ergonomics of your workspace. The ergonomist can provide you with a customized ergonomic optimization plan for your specific needs.

It is clear that the solutions to the poorly addressed problem of WMSDs in ophthalmology do not lie in the realm of “physician heal thyself.” The solutions extend beyond our personal efforts to “sit up straight” or exercise five nights a week. Self-care is essential; however, even with the best self-care regimen, we return day after day to the same ergonomic challenges in our clinics and ORs. Without a doubt, physician-centric improvements in equipment and device design engineering will promote improved well-being and optimal career longevity for ophthalmologists.

The Impact of WMSDs

The impact of WMSD extends beyond physical pain, limited range of motion, weakness, reduced stamina, and other signs and symptoms. Numerous additional challenges exist:

- Cognitive: Musculoskeletal pain disrupts attention, sleep, and endurance
- Mental health: Anxiety and depression related to the negative impact of WMSD on career and personal life
- Burnout and moral distress: WMSD is associated with a high risk of burnout
- Patient care: Cancelled ORs and clinics, and even temporary changes in practice profile impact patient wait times and delivery of care
- Financial: Decrease in professional income, additional personal expenses related to rehabilitation and recovery
- Career-ending disability or early retirement
- Healthcare system: increase in wait times, lost productivity, cost of cancelled ORs and clinics, cost of replacing experienced and productive surgeons

Everybody is Susceptible to WMSDs

Less than a year ago, I experienced a work-related musculoskeletal injury. In my case, the perfect storm was in place for this to occur. I was the sole cornea specialist in the department, accepting additional referrals to compensate for three vacant full-time equivalent positions, while trying to manage my already full practice. My clinics were busy and when I was offered additional OR time, I took it to help manage my long surgical wait list. Unfortunately, one night while I was performing an emergency open globe repair, I felt significant pain in the back of my neck. I was able to finish the case; however, the following morning, the pain was much worse, and I was unable to turn my head. I had no choice but to take a brief medical leave. Fortunately, I did not require spinal surgery. I was advised to begin an intense rehabilitation program with a physiotherapist and registered kinesiologist. I also did some myofascial release therapy which was beneficial. It's important to remember that these injuries occur, not because we are reckless, but because we are so focused on delivering timely care, trying to make up for being short- staffed, and putting our patients and learners first. As a result, we often put ourselves last.

I returned to work determined not to re-injure myself despite returning to an even longer wait list and scores of appointments, minor procedures, laser surgeries, and surgeries to rebook. At the same time, I had to be committed to my own rehabilitation program. All of these challenges have given me a deeper perspective of the importance of advocating for and promoting physician wellness, both physical and mental.

My journey has also highlighted the critical role of individuals in leadership positions in their capacity to support physicians with WMSDs. Whether we work in a hospital setting, academic institution or private centre, it is critical for leaders to understand the importance of and facilitate the clinician's gradual return to work with the necessary ergonomic accommodations and improvements in the OR, clinic and office workspaces. Bear in mind that the process of ergonomic optimization is iterative and involves multiple trials and assessments. The reality is, prioritizing the procurement of ergonomically optimized ophthalmic equipment will benefit all stakeholders in the healthcare system.

I am fortunate to have resumed work and I'm well on the way to functioning at my pre-injury level. I am at the point in my recovery that I can share my personal experiences with my colleagues and our future ophthalmologists so that they can take proactive steps to avoid experiencing a work-related musculoskeletal injury.

Fulfilling the Needs of Ophthalmologists and Patients: Is it Really Possible to Achieve Both?

Consider these innovations:

Stereoscopic heads-up 3D imaging systems for cataract and posterior segment surgery

Rather than looking through the eyepieces of a microscope, heads-up surgery allows the surgeon to view the procedure on a large monitor. The surgical video and images are created by a 3D camera attached to the microscope. Heads-up surgery promotes a straight back posture for the surgeon which helps keep the spine in a more neutral position, avoiding the forward head posture.

Several systems have been developed, including the NGENUITY® 3D from Alcon, Zeiss Artevo 800, Beyeonics One from Beyeonics, and the SeeLuma™ from Bausch + Lomb. Some of these systems, however, require a head turn posture in order to visualize the 4K monitor. This is because the monitor cannot be positioned directly in front of the surgeon. Additionally, if the surgeon prefers to use the eyepieces for visualization, the conventional oculars create the all-too-familiar ergonomic challenge of the forward head posture. One notable exception is the SeeLuma visualization platform that is designed to allow surgeons to look straight ahead at a monitor without having to turn or twist the neck. Its innovative, ergonomically designed eyepieces can also be angled up and down as well as telescoped toward the surgeon. Based on its ergonomic design alone, I believe this platform has the potential to revolutionize ocular surgery.

The continuously adjustable inclined slit lamp microscope head

Interestingly, the slit lamp design has not changed in over 100 years. Although this "timeless design" seems to persist, Marco slit lamps (Takagi; by INNOVA) are available with a continuously adjustable eye piece

that can help reduce head and neck strain (**Figure 2**). The eyepieces extend further than those of the conventional non-adjustable slit lamp oculars and can be angled from zero to 90 degrees. This instrument will be available in Canada in the near future.

Figure 2. Image of Marco slit lamp; Takagi Europe.[8]

Conclusion

Physician-centric ergonomic innovations have the potential to improve our well-being and career longevity while enhancing patient outcomes. It is imperative that Canadian ophthalmologists are attentive to the potential for WMSDs and proactively seek to address concerns so as to minimize long-term impact on their health and patient care.

Financial Disclosures

None declared.

References

1. Epstein S, Sparer E, Tran B, et al. Prevalence of work-related musculoskeletal disorders among surgeons and interventionalists: a systematic review and meta-analysis. JAMA Surg. 2018;153(2):e174947.
2. Dhimitri KC, McGwin G, McNeal SF, et al. Symptoms of musculoskeletal disorders in ophthalmologists. Am J Ophthalmol. 2005;139(1):179-181.
3. Diaconita V, Uhlman K, Mao A, et al. Survey of occupational musculoskeletal pain and injury in Canadian ophthalmology. Can J Ophthalmol. 2019;54(3):314-322.
4. Betsch D, Gjerde H, Lewis D, et al. Ergonomics in the operating room: it doesn't hurt to think about it, but it may hurt not to! Can J Ophthalmol. 2020;55(3 Suppl 1):17-21.
5. Kent C. Will ophthalmology cripple you? Rev Ophthal. October 4, 2011. Available from: https://www.reviewofophthalmology.com/article/will-ophthalmology-cripple-you
6. Honavar S. Head up, heels down, posture perfect: Ergonomics for an ophthalmologist. Indian J Ophthalmol. 2017;65(8):647-650.
7. Mayo Clinic Health Letter. 2000 Mar;18(3).
8. Fully Adjustable Silt Lamp Eyepieces [image]. Manchester (UK): Takagi Europe. [accessed 2023 Sept 14. https://www.takagieurope.com/fully-adjustable-slit-lamp-eyepieces/