

Don't be a pain in the neck - a short guide to neck and back pain for ophthalmologists

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Musculoskeletal pain is a common occupational health risk among healthcare professionals. Ophthalmologists are vulnerable to such risk as they are frequently exposed to adverse ergonomic conditions. Various studies (Dimitri et al 2005; Hyer et al 2015) have shown that the incidence of back and neck pain among ophthalmologists was significantly higher than that of the general population. Around one-third of ophthalmologists reported neck and/or back pain when operating, and in particular, one-third complained about exacerbation of pain during slit lamp use. This is a growing concern as there is continuing lack of attention given to ergonomics among surgeons and hospital managers. There seems also little attention paid to such aspects during the formative years of surgical training. Neck and back pain represent significant negative impacts on ophthalmologists' quality of life, surgical performance, career, and professional longevity.

Clinical Picture

Most neck and back pain is non-specific and not attributable to any known cause (Bardin et al 2017; Corp et al 2021). However, discogenic back pain, that is, pain caused by pathological changes of the intervertebral disc, with or without nerve root irritation and segmental instability, is common. This may also be associated with pathological changes in the zygapophyseal (facet) joints. Most patients nearly or completely recover from their spinal pain within the first six weeks, but the numbers of patients with recurrent and chronic symptoms reported after 1 year are substantial. "Red flags" are present in a small number of spine patients which have neurologic impairments or serious underlying diseases (e.g., malignancies, cauda equina syndrome, fractures), requiring prompt and accurate diagnosis (Verhagen et al 2016).

Management

In the UK, the National Institute for Health and Care Excellence (NICE) has provided guidelines in the management of neck and back pain (<https://www.nice.org.uk/guidance/ng59>). Clinical practice guidelines are also available in Europe, the US, and many other parts of the world (Foster et al 2018; Corp et al 2020). There have been changes in these guidelines over the years. Greater focus is now placed on self-management, physical and psychological interventions with less emphasis on pharmacological and surgical treatments. Recommended physical treatments include a graded exercise programme that focuses on improvements in functional capabilities. There is general consensus that exercise and an active lifestyle play a key role in the management of spinal pain. However, there is no evidence showing that any one form of exercise is better than another. Individual needs, preferences, and capabilities should be considered in deciding

about the type of exercise. Some studies have revealed positive associations between back pain and awkward posture, bending and twisting, prolonged sitting and standing, whole body vibration, and heavy physical work but such observations are not consistent (Swain et al 2020). It is suggested that clinical management may include ergonomic interventions that address these potential causes of spinal pain. Passive therapies, such as spinal manipulation or mobilisation, massage, and acupuncture are generally not recommended. Wearable sensors (e.g. accelerometers) have also been used to monitor spine posture and movements (Wong et al 2009, Papi et al 2017; Tsang 2020), providing a promising ergonomic intervention in the workplace. Moreover, fear avoidance (the avoidance of spine motions due to fear of pain), low self-efficacy (loss of confidence in the ability to deal with symptoms or limitations associated with pain) and mental stress are common in spinal pain sufferers. Most guidelines recommend psychological therapies such as cognitive behavioural therapy, progressive relaxation, and mindfulness-based stress reduction, and a combined programme of physical and psychological treatments.

Ergonomics

Previous authors have suggested a number of ergonomic factors which may contribute to spinal pain in ophthalmology practice (Chatterjee et al 1994; Alrashed 2016; Betsch et al 2020), including awkward and sustained postures, dynamic repetitive motions, and motions involving heavy loads. Unfortunately, there are very little well-conducted research studies which have investigated these ergonomic factors. Most of the information available in the literature represents clinical opinions rather than scientific evidence.

However, we have put together some suggestions of what ophthalmologists and allied healthcare workers should consider in their everyday clinical practice.

Computers

Attention should be paid to the spatial relationship (e.g. height and distance) between the screen, keyboard, and mouse to ensure a good posture. Shoulders should be dropped and rested, and arms should not have to stretch to reach the keyboard and mouse. The chair should be adjustable and have arm rests. A large screen is desirable. We are on the screen much longer nowadays with remote or virtual consultations, Zoom meetings, and increasing reliance on multiple and clunky NHS IT for communication, referrals, electronic health records, imaging and so on.

Slit lamp examination

Here, relative height and distance are of importance. The patient's comfort is assured when their chair is central to and at the correct distance from the slit lamp. Their chair may be fixed in position and if so must be correctly sited. Just like the slit lamp and the examiner's chair, the patient's chair should be able to go up and down for a comfortable position. The patient may also adjust their forward-backward position on the chair to allow comfortable placement of their chin on the chin rest and their forehead against the bar. A comfortable patient in a steady position allows swifter examination which benefits both the patient and the examiner.

Both sides of the viewing eyepiece should be at the same height, so the examiner does not need to tilt their head, except in rare cases of facial asymmetry on the part of the examiner. The depth of the slit lamp table should not be excessive to avoid jutting forward of the examiner's head to reach the eyepiece. The slit lamp should ideally be mounted so it can swing or advance to position easily, without

having to physically push the slit lamp around. If the latter, the castors should work well, and the floor should be level, smooth and firm. The floor should not be carpeted. The examiner's chair should be on smooth castors with its height easily and fully adjustable. The examiner should not have to stoop or stretch to reach small and tall patients. Wheelchair bound patients and bariatric or other patients with exuberant anatomy can prove challenging. Ideally, wheelchair bound patients can be examined in clinic rooms with wheelchair compatible slit lamp assemblies.

Laser treatment and the Indirect ophthalmoscope

Surgeons should pay particular attention to correct positioning, posture and arm support when carrying out laser treatment. This is particularly the case for prolonged treatment such as pan-retinal photocoagulation and when a contact lens needs to be held with one hand.

Indirect ophthalmoscopy necessitates awkward posture particularly when examining premature babies for retinopathy of prematurity. Correct table height is important. The same applies for laser treatment delivered through an indirect ophthalmoscope.

The ophthalmic operating theatre

Although much more time is usually spent in clinic compared with operating, there is more tension and static posture in theatres.

Operating microscope

This should ideally be ceiling mounted to save floor space and having to wheel a heavy operating microscope around. The ceiling needs to be tall enough though otherwise the assembly can get in the way when not in actual use. Operating microscopes come with different working distances. If the distance is too short, there may not be enough working space for full length instruments especially if a vitreo-retinal viewing appendix is in place. Ideally, there should be separate VR and anterior segment operating theatres. Too long a working distance and surgeons of shorter stature cannot reach. Surgeons may not have space to put their legs either.

Space

Attention should be paid to arranging positions of the operating table, the instrument trolley, the phaco and other machines, pedals and chairs for surgeon, assistant, and scrub nurse. There will be crowding so careful and consistent positioning is important, as is having the smallest, safe, and stable footprint for each item all competing for the same crowded space. We must not forget there needs to be space for the legs and feet of the surgeon, assistant(s), and scrub nurse too! If parties, machines, and tables are too far apart, then arms will need to be stretched adding to poor ergonomics and decreased safety.

Operating table

The adjustability of the operating table is of utmost importance not just in height but also tilt, incline of the back rest and height and incline of the head rest. Patients with kyphoscoliosis or fixed neck deformities present particular challenge, often requiring spacing gel or even pillows. These necessitate surgeons stretching their back and neck and leave insufficient space for their legs. Aside from adjustability, the headrest and the upper part of the operating table supporting the shoulders should be slim both sideways and in thickness. This together with a heavy base positioned further down the table (cantilever) allows the surgeon to move their chair very close to the operative field, reducing having to jut their head forwards for a sustained period of time.

Operating chair

The operating chair should be comfortable to sit on and give some back support. Although it needs to be stable, its footprint should not be overly large, taking up valuable leg space. A heavy base will lower its centre of gravity and improve stability. Some like to have arm rests for some or all types of procedures but they do take up space and need draping. Needless to say, the height needs to be fully adjustable. With a hydraulic mechanism, a ring lever as opposed

to a sector lever will mean the surgeon does not need to twist the chair round to locate the lever. Electric motors for adjusting height are useful but there may be less speed and there will be problems of having to recharge and replace batteries. Castors need to be smooth and should be maintained through regular cleaning and lubrication, and if necessary, by sending the chair for servicing.

Posture

The surgeon should sit on both buttocks with equal weight distribution on the chair. They need to have freedom of movement of all four limbs, independently, akin to a church organist. Their back should be straight (with normal lumbar lordosis and not leaning to either side) and the neck neither overextended nor flexed. The gaze should be looking forward or slightly downward and never upwards. The incline of the microscope eyepiece should reflect this. When there is no need for the feet to be used, they should both be flatly rested on the floor or pedals, on toes, balls and heels. The shoulders should be rested and dropped and not under any tension. Breathing should be of sufficient depth and regular, holding breath only for the shortest period of time for particularly intricate surgical manoeuvres. Avoid a static position for long operations, standing up and stretching at least once an hour.

Revolution

At some point soon, viewing systems using 3-D displays will be commonplace. The illuminating light could also be outside the visible spectrum so patients will no longer be dazzled by the operating microscope or slit lamp.

Future Research

Future research should build on our current understanding of neck and back pain and investigate ergonomic interventions which may minimise the risks in ophthalmology practice. Interdisciplinary studies would be particularly helpful in not only studying ergonomic interventions but also their feasibility and acceptance, and their relation to the engineering designs of surgical instruments. Health technology may also have a role in the use of smart sensors in monitoring posture and movements of the ophthalmologists.

Summary

This article has highlighted the risks of neck and back pain in ophthalmologists, and some of the current clinical guidelines for managing these clinical disorders. There is very little research related to ergonomics in ophthalmology practice, although some suggestions have been made which may help minimise the risk of spinal pain. We believe ergonomics should be included in the early days of surgical training. Maintaining an active lifestyle and following some simple ergonomic advice may help prevent and manage potentially career-threatening spinal conditions and prolong the working life of ophthalmologists.

Advice to ophthalmologists for keeping the spine healthy

- Pursue an active lifestyle; exercise regularly, and engage in any form of exercise that you really enjoy
- Understand and apply manual handling guidelines, and perform a risk assessment if required
- Avoid awkward and prolonged static posture
- Good ergonomics whilst at the desk, working on the computer, using the slit lamp, performing indirect ophthalmoscopy, doing laser treatment, and operating
- Invest in and use ergonomically friendly chairs and operating tables, and consider a ceiling mounted operating microscope
- Generally adopt a positive frame of mind and stay positive if suffering from neck or back pain; they are usually self-limiting

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