


Applied Ergonomics and Microscope Dentistry, A Need for Quality Dentistry, and Prolonged Performance. Systematic Approach Concept: Applied Ergonomics and Microscope Dentistry

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Abstract

Stress, pain, injuries, and errors in dental procedures are situations highly linked to dentistry derived from multiple factors making this profession a profession with high physical and mental demand to achieve quality treatment without deteriorating the health of those who perform it, in this case, the dentist, the assistant, and hygienist. The effects of wrong postures, but above all, the lack of knowledge of the proper postures, the modeling of bad habits acquired during the training stage in dental school, and the lack of work guidelines that not only take into account the dentist but also to all the work staff and the methodological organization of dental tasks can be found in the scientific literature. However, it is necessary to see the big picture and change the perspective and work paradigms, in which the use of technology and humans work synergistically within a framework of a systematic approach that simplifies the processes and ways of working to optimize the operator and staff health, maximizing the overall performance while achieving much better clinical outcomes for patients. One of the relevant technologies available is the dental microscope, which has multiple benefits, including the multiple magnification steps, shadow-free coaxial light, the possibility of documenting treatments in real-time through the cameras attached to the microscope, and the operator's health by promoting a neutral working posture. Many myths surrounding the use of the dental microscope through this reading will be updated, the benefits have a highly positive impact on dental work, and its training and use must be a requirement in education from the introductory stage.

Keywords: Ergonomics; Dental Microscope; Microscope dentistry; Posture

Introduction

Dental work is a job with risks for the development of musculoskeletal disorders; according to the literature, between 60%-95% of dentists and hygienists, with the neck, shoulders, and lower back areas being the most injured areas due to the characteristics of dental work, generally, this type of musculoskeletal disorder begins around the third year of dental school. Awkward work postures, the need for lighting, repetitive movements, a prolonged static sitting posture, time pressure in patient care, the high demand for precision and detail, the administrative burden, and the need for teamwork are factors with a high psycho-physical component that affect the health of the dentist.

The lack of accurate information and especially on the application of ergonomics, which is nothing more than the science that adjusts the work to the worker, can be the cornerstone to change the actual narrative in dentistry. Ergonomics is not just posture; it is the adoption of a systematic work method; it is a guide; it is a framework for organized and efficient work that respects the biomechanical laws of the human body. Understanding these laws related to seated working dental tasks is necessary to protect the body structures involved tasks since physiologically static postures deplete the arrival of oxygen to the muscles and the waste of its design products decrease, in turn generating overwork in different

muscle groups that maladapt to inappropriate postures, creating an environment in the postural muscles that are negative for their functioning and ideal for fatigue, decreasing performance and the treatment quality for the patient.

The recommended neutral working posture looking from the side is:

- a. Ear aligned to the shoulder.
- b. Shoulder aligned to the back.
- c. Hips higher than the position of the knees.
- d. Feet aligned to the thighs.

Basic training with this sitting posture, creating postural awareness during working time, and incorporating programmed stretching during the workday are vital to maintaining the physiology and minimizing muscle fatigue. Neck pain has been shown to be associated with any job where forward head posture is 20 ° or more for 70% of the working time. From there, it is that, on average, dentists and hygienists work with a forward head posture of at least 30° for 85% of their time in the operatory, especially when working naked eye dentistry or using conventional magnifying loupes. The major biomechanical problem is the human eye's limited visual capacity and resolution and the working distance operator's eye-patient mouth, which exceeds the limits to focus appropriately on the patient's mouth. With a dental microscope and an ergonomic operator stool, a neutral posture can be executed 100 percent of the working time, but there are some myths related to its use in dentistry; these are generated from the fear of leaving the comfort zone and facing the growth zone, given the learning curve of this technology.

Creating a positioning and use guide system within the framework of the operator's neutral posture flattens this curve and will make its use more fluid as long as training and daily use always automate its proper use.

The first of these myths is that the microscope is only for endodontics; the need to see more and do better is for all dental disciplines in general; the oral cavity is dark, and the precision requirements expressed in microns, whether in prosthetic carving, margin verification, carious cavities, cuts in periodontal soft tissues among others, makes multiple magnification steps necessary with a light that does not generate shadows like that of the dental microscope, precision requirements is a fundamental matter of dentistry not only for one specialty. Together with the benefits mentioned above, the main contribution of the microscope is the health of the operator while working, since by regulating the working distance through the internal optics of the microscope, it regulates the posture of the head and back immediately if the adjustments in the elements of the microscope are adequate. The dental microscope protects your body by promoting neutral posture and motion economics of the body.

The dental microscope also promotes efficient work with four-handed dentistry with the dental assistant, generating

control movements for the operator, who will be focused on the binoculars observing the working field while the assistant masters the transfer of the instruments to the hands of the dental operator; this through horizontal working distance guidelines for efficient and fluid teamwork. The dental microscopy work design promotes appropriate mobiliary and furniture selection and the operator's working position at 12 o'clock behind the patient's head, which places the best postural symmetry conditions with fewer compression loads on the neck, back, shoulder, and wrist joints. The systematized positioning in sequence, first of the operator, positioning techniques of the patient and the microscope at last, as well as the use of the dental mirror, together with the verbal indications to the patient according to the arch and quadrant, guarantee the workflow, posture, flattening of the learning curve and above all use of the microscope without physical-mental fatigue for the operator.

Conclusion

The importance of application of ergonomics in dental practice, but especially in basic teaching in dental school, is essential to minimize the high rate of musculoskeletal disorders within the profession. Working seated in a neutral posture and adjusting the patient's and the microscope's position sequentially will generate efficient and pain-free work for the operator. In contrast, better clinical results are obtained in the dental task through the multiple magnification steps and coaxial illumination of the microscope. Incorporating the microscope promotes efficiency, teamwork with the assistant, and changes in the way of working with the objectives of improving performance, optimization of movements, and prolonging the correct working posture in the operator. Efficiency work requires good systems; that is the philosophy of ergonomic dental work, creating a system of synergy between humans and technology of excellence in the profession, and should also be a requirement in dental schools; the dental microscope is not only for endodontics.

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Conflict of Interest

There is no conflict of interest in the article.

Authors Note

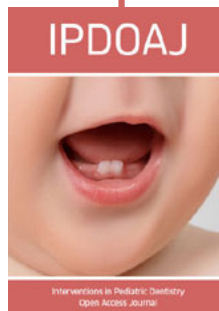
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