

Posture problems: risk or choice?

Professor Oene Hokwerda explains the options available to dentists when it comes to their musculoskeletal health.

About 65 % of dentists have musculoskeletal complaints which vary in severity, but involve one or more of the following: discomfort, pain, limitation of functioning and loss of working time. The risk of disability is considerable. But is it a high risk? Or are musculoskeletal problems a consequence of the dentist's decisions regarding his method of working?

Why are dentists not bothered by these problems, except when the signs and symptoms have become clear and practising dentistry becomes hampered? They often deny the physical consequences or think it won't happen

to them and if it does that it is a normal occurrence in the course of being a practising dentist.

Physical complaints, however, can largely be avoided or reduced substantially when adopting a healthy posture and a dynamic way of working. Humans are made for moving i.e. for a continuously varied load and relaxation of the muscles. While a static posture, certainly when maintained for the time that a dentist does, is unfavourable.

In the *Ergonomic requirements for dental equipment*, published in 2006 under the auspices of the European Society of Dental Ergonomics (ESDE) the current principles of the posture of the dentist together with the ergonomic requirements regarding dental equipment are described. It is of vital importance that dentists, lecturers in dentistry, manufacturers and dental depots are familiar with the basic principles of a healthy posture for preventive reasons.

Basic requirements

- Sitting in a steady posture, symmetrically upright, to reduce physical load as much as possible. This is also a condition for unhampered micromanipulation by the dentist.
- Making as many dynamic movements during patient treatment as possible.
- Training and strengthening the muscle-corset of the body through exercise or sport.

Achieve a steady upright posture

An illustration of an ergonomic way of working is available in *Adopting a healthy sitting working posture during patient treatment*. Sitting in a healthy posture (Figure 1) shows a trunk-knee angle (or angle between upper and lower legs) of 110° or more, so that a curvature of the spine is obtained comparable with standing; with the pelvis in a middle position.

The backward rounding and a hollow curvature of the spine tilting forward should be avoided to prevent overloading (Figure 2).

To obtain a balanced sitting posture the sitting bones should rest on a horizontal part of the seat and the thighs on an oblique part (Figure 3). The upper legs are spread horizontally between 30° and maximally 45°.

The upper body attains an upright posture when the breastbone is lifted so that the shoulders are directly above the hip joints and the centre of gravity is located in the spine above the area where the sitting bones at the underside of the pelvis rest on the seat. Forward bending of the head is maximally 25°, while the forward bending of the trunk, if necessary, is limited to 10°. Lateroflexion and rotation of the back must be avoided as well as prolonged or frequent elevation and protraction of the shoulders.

The upper arms are held against the upper body about 10° forward and the lower arms are lifted minimally 10–15°,

“The golden rule is: the eyes and skull should never follow the position of the hands”



Figure 1 (above): A stable posture symmetrically upright.

Figure 2 (right): The tilting of the pelvis: backward position with convex back, forward position with concave back and neutral position with back like standing. Courtesy of Dr Paul Engels

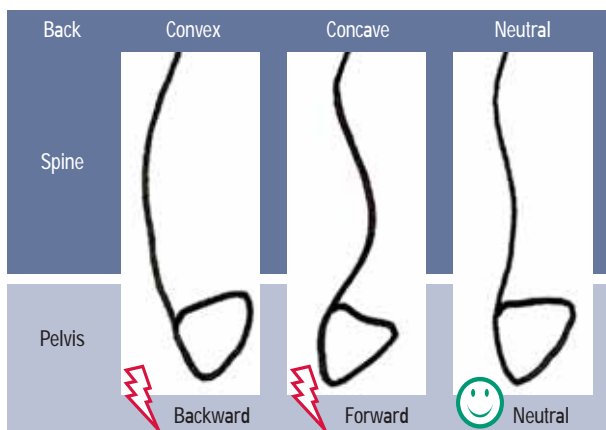


Figure 3 (left): Two working stools with a horizontal back part and oblique front part. Left: Model Groningen, Jörg, with fixed oblique part, 20°. Right: Ghopec, JPG Ergonomics, with fully adjustable oblique part, in relation with the height of sitting.



Figure 4 (left): Gripping instruments with reduced and more extensive sideward and forward moving with raised shoulders.

Figure 5 (right): Training preclinical students on a new, ergonomically designed unit (Academic Centre for Oral Health, Groningen, the Netherlands). Instruments in the field of vision.



maximally not more than 25°. The reason that the lower arms should not be lower than 10° is because it will cause the upper body and head to bend forward, making the positioning the working field too low.

Movements of the upper arms should be minimized as much as possible, sideways up to 15–20° and forward up to 25° to avoid raised shoulders, (Figure 4); and take place within the field of vision (Figure 5).

Finally, in order to sit symmetrically upright, the working field should always be positioned on working height in the symmetrical plane that divides the upper body into equal right and left halves. This is a natural way for carrying out all kinds of activities. The moment that the working field moves outside the symmetrical plane, an unfavourable asymmetrical posture arises which results in an unbalanced way of loading the body.

Moreover, a continuous unfavourable working posture suppresses proprioception, the neurophysiological feedback from muscles and joints about the load of the body. A loss of proprioception inevitably leads to unawareness of an unfavourable posture.

The natural focal distance between working field and eyes/spectacles, sitting in a correct posture, always requires a minimal lifting of the lower arms of 10° and is normally between 35–40 cm, but can be higher for tall dentists. This determines the working height.

How to position the patient?

Patients should be positioned horizontally, particularly when working from behind the patient (Figure 6). In addition, the head has to be turned in 3 directions to facilitate a straight viewing direction of the upright sitting dentist on the separate tooth surfaces. This will result in a working field that is parallel with the dentist's face when looking down perpendicularly or about perpendicularly, comparable with reading a book.

If not well positioned, the posture of



Figure 6 (above): Horizontal position of the patient for being able to sit upright.

the dentist will be adapted by the viewing direction, resulting in bending and rotating the head and upper body. The golden rule is: the eyes and skull should never follow the position of the hands; the working area has to be lifted and be positioned in the symmetrical plane so that the dentist can sit upright. This is often limited by the adjustability of the patient chair.

How to achieve good posture

Have pictures or a video taken of your own working postures from various

angles and check yourself against the principles outlined in this article. Set yourself some goals to make changes in the areas where you need improvement. An upright body position has to be trained before it can be maintained. The reproducibility of posture, sitting or standing, is only possible when a

distinctive reference is clearly visible: a true horizontal or vertical line. After adopting the desired posture you have to find out how the use of equipment fits in with what the posture requires. ■

References

1. "Ergonomic requirements for dental equipment"

http://www.optergo.com/images/Ergonomic_req_april2007.pdf [accessed 26 September 2007]

2. "Adopting a sitting working posture during patient treatment" <http://www.optergo.com/uk/images/Adopting.pdf> [accessed 26 September 2007]

About the author



Oene Hokwerda is emeritus professor in dental ergonomics at the University of

Groningen, The Netherlands, where he was placed in charge of developing teaching dental ergonomics in 1965. He was also involved in designing a working stool for the dentist, which is still in use. He has been consultant of the Commission on Dental Practice of the FDI, chairman of the Dutch WG Dental Ergonomics and, from 1992, secretary general, vice-president and president of the European Society of Dental Ergonomics. Professor Hokwerda currently oversees the practical training of dental ergonomics as part of preclinical and clinical courses of dental and dental hygiene students.

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