

Determining the symmetry of the sitting posture





During the analysis of the measurements of the seating angle and the backrest inclination and their comparison with values of the desired reference posture, a visual inspection of the symmetry or asymmetry of the posture is also carried out. The way in which the head is carried relative to the trunk is observed.

Specific behaviour that reveals stability or the lack of stability is noted, and an impression is formed of the way in which the back is supported and of the position of the pelvis.

Use of reference lines

The symmetry or asymmetry of a posture can be checked with the help of a number of reference lines as shown in figure 1 below. It is important to discover the cause of any asymmetry and to see whether anything can be done to improve the situation.

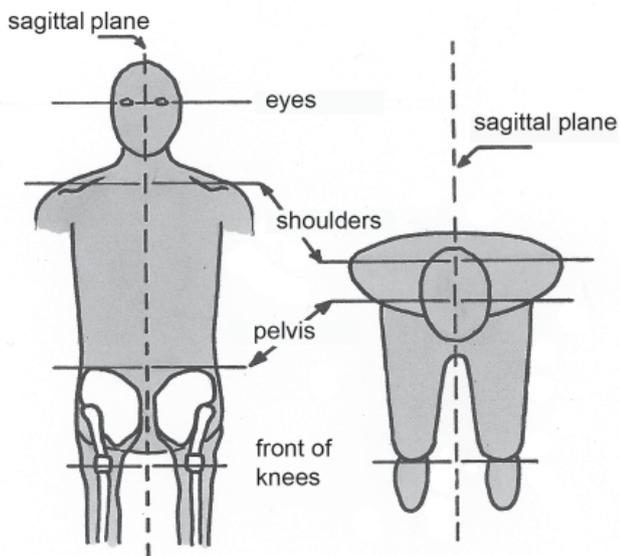


Figure 1: Reference lines for determining the (a)symmetry of a posture

In a sitting posture with anatomically sound stability, the trunk should, in principle, rest against a backrest with a normal cross-section profile. Sitting behaviour can cause the stability to be lost as the trunk slips sideways resulting in an asymmetrical posture.

If the person is not able to correct this posture on their own then an undesired situation arises that could, in the long run, lead to deformity of the lumbar spinal column.

This can be prevented in various ways. In the first place, by making the stability of the posture less critical: for example, by choosing an angle $(\varphi + \alpha) > 118^\circ$. Next, extra side supports can be fitted at the height of the lowest point of the waist triangle, and it is advisable to discuss the existing sitting behaviour explicitly.

Conscious and correct sitting behaviour is conditional for sensible use of a wheelchair.

Special circumstances concerning adjustment of the posture

A special situation arises when, due to problems, a sitting posture has to be optimised in a wheelchair with electrically adjustable tilt in combination with an electrically adjustable backrest.

The backrest adjustment is, in principle, intended for adjusting the sitting angle, angle α .

The position of the trunk in space, angle $(\varphi + \alpha)$, should, in principle, be realised by means of the tilt mechanism. The desired range of adjustment of the sitting angle, angle α , is usually only very limited in active use: $103^\circ - 105^\circ$.

With a smaller angle the tummy would quickly become too confined and with a larger angle the chance of frictional forces in the seating surface is greatly increased.

The adjustable backrest can be used to create a more comfortable posture for resting or sleeping, at least, if the seat angle, angle φ has a large enough range. Quite apart from the specific - ergonomic - demands that can be made on the movement of the backrest, it should now be obvious that sensible use of the adjustment possibilities will require a lot of instruction for the user of the wheelchair.

For the spinal column to be in a correct vertical position, it is important that the pelvis, or the sacrum, should be level.

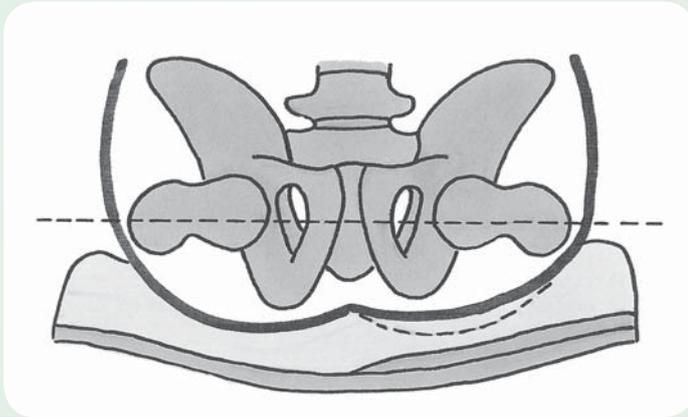


Figure 2: Correcting asymmetry in the pelvis by raising part of the supporting structure

Should there be any discrepancy in the level due to unequal height of the tuberosities or to atrophy of the gluteus maximus on one side then this should be corrected in the supporting structure.

If there is any asymmetry in the spinal column, with a scoliosis for example, then it is of the greatest importance to work from a very stable posture with angle $(\varphi + \alpha) > 118^\circ$, as otherwise the effectiveness of the generally used three point support will be seriously reduced.

Moreover, a greater angle $(\varphi + \alpha)$ will ensure more favourable loads on the spinal column and, at the same time a reduction of the load moments (force x perpendicular distance) that cause the scoliosis to increase.

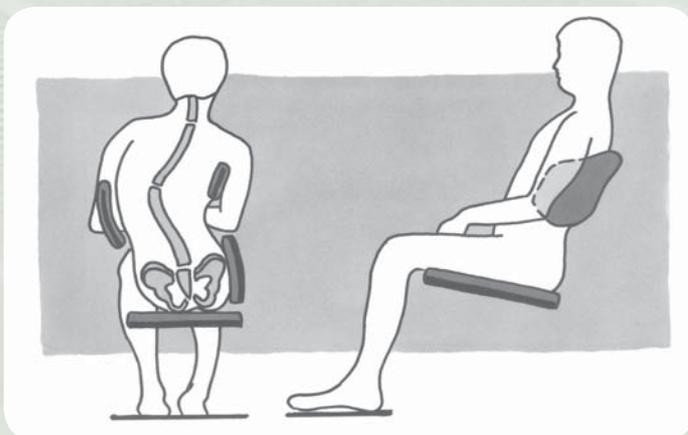


Figure 3: An effective three point support for a scoliosis in a stable sitting posture with a backrest inclination, angle $(\varphi + \alpha) > 118^\circ$

More information

For extensive work on sitting and pressure distribution, see the following books:

Staarink, H.A.M. *Zo zit het! Over zitten, stoelen en rolstoelen**, Assen: Van Gorcum. 2007

Asbeck, F.W.A. van (red.). *Handboek dwarslaesie revalidatie*, paragraaf 18.1.1: Biomechanische en (neuro)fysiologische achtergronden van het zitten, tweede herziene druk, Houten: Bohn Stafleu Van Loghum. 2007

*'All there is to know about sitting, sitting behaviour, seats and wheelchairs'. This English translation is in preperation.

