

Symposium “Ergonomic principles for patient treatment”.

**Manual practical course,
Timisoara, May 20, 2004.**

1. Introduction

During the practical course exercises will be carried out to learn to work in a healthy way during patient treatment. This will be done before the background is explained. Therefore a self-instruction format is worked out with the exercises to be carried out and the criteria that have to be met and that should be checked. For this also pictures are available.

The used criteria are part of the general checklist which have to be applied in the exercises. The checklist is meant for use after the course.

If necessary the procedure to reach the required outcome is described to be able to work efficiently.

The criteria for instrument handling and placement of instruments are not described in this manual and can be found in the checklist.

Two instructors will guide the exercises and explain how to solve problems.

Everybody may work at his own pace. Exercises not carried out during the practical course can also be performed later and exercises can also be repeated using the description in the manual.

2. Exercises.

The following exercises will be carried out.

1. **Sitting on the dentist’s working stool** with a sitting posture upright and symmetrical, the shoulders hanging down relaxed with the upper arms beside the upper body; the forearms have been lightly elevated.

Criteria for applying and checking.

- * Angle between lower and upper legs 105-110°;
- * Legs slightly apart making an angle of between 30-45°; feet flat on the floor;
- * Buttocks supported as much backward on the seat as possible;
- * Support of the upper/backside of the pelvis;
- * Sitting upright and symmetrically; the shoulders hanging down relaxed with the arms beside the upper body; the forearms have been lightly elevated;
- * Weight of the upper body is supported by the vertebral column by sitting as indicated.
- * Bending of the head no more than 25°

2. **Bending: only forward and no more than 20°.**

Criteria for applying and checking.

- * Moving/bending of the upper body only in the hip joint not via the spinal column;
- * No bending sideward of the upper body and head;
- * No rotation of the upper body and head;
- * Parallel lines between ears, eyes, shoulders, elbows, hip joints knees and ankles.

What happens when you bend in the lumbar region of the vertebral column, with the result that you are sitting with a C-back, so with a backward rounded back?

- * What is the difference between bending correctly and wrongly?
- * What happens in the region of the thoracic and cervical vertebral column when bending in the lumbar region?
- * What is the difference between what you are you feeling then in both situations?
- * Why is the C-back damaging for muscles and spinal column?

3. Experiencing strain from incorrect postures.

3.1. In a standing position you hold your upper arm loosely hanging down the upper body and the forearm in an angle of 90°. With the left hand you enclose/grasp the muscles before your elbow. Turn then the hand and forearm inward (endorotation) followed at first with a dorsal flexion and next with a palmer flexion.

You can combine this also with an ulnar abduction.

You will feel during these different movements - a dentist is often making – how the strain in the muscles and the attachments of the tendons goes during the different movements.

3.2. Position a hand on the opposite shoulder and grip firmly the muscles on the side of the shoulder. Move then the upper arm away of the upper body (minimally 45°)

You will feel then the straining of the muscles. If you keep on a while this position of the upper arm you will observe that the tension of the muscles is increasing.

4. Positioning of the body of the patient.

The body of the patient is positioned horizontally equally for upper and lower jaw (Exceptions later). In this position the mouth lies nearer by the upper body of the dentist and the opening of the mouth is directed more toward the viewing direction of the dentist. Otherwise the head of the patient has to be turned more backward to get a good view on the preparation field in the mouth of the patient.

Criteria for applying and checking.

- * the nose of the patient lies in principle not below the horizontal line over the knees of the patient (= comfort line) but in the same plane.
- * it is possible to move freely whilst the upper legs under the backrest of the patient chair so that you can move easily from one sitting position to an other when necessary during treatment.

What is happening when the upper body of the patient is positioned more obliquely, with an angle backwards (in the direction of the dentist) between upper legs of the dentists and the backrest of the patient chair?

- * What happens with the direction of the opening of the mouth of the patient? (Is turned more forward instead of in the direction of the dentists).
- * What happens with the position/distance of the mouth of the patient? (Is lying further away and higher so that the arms of the dentist have to be lifted).
- * What happens with the knees of the dentist? (Are fixed against the backrest due to its sloping position so that you have to bend forward/sideward and to rotate with your back and head; and you can not move

freely to change the sitting location.
Consequently you have to work in a fixed/static working posture and the muscles and vertebral column get overloaded.

5. How to position the head of the patient for providing an optimal view.

The head of the patient is appropriately rotated in 3 directions so that the operating field has been positioned symmetrically in front of the dentist's thorax; and so that it is possible to look at the operating field in the mouth as perpendicularly as possible (We strive at it but specially at the back of the mouth it is not completely possible). In case of indirect vision one looks more or less perpendicularly to the mirror (see later).

Rotate the head of the patient now in 3 directions.

- * Forward with the chin directed towards the chest to place the lower jaw more or less horizontally.
- * Backward with the occlusal plane of the upper jaw about 20° backward in relation with a vertical plane.
- * With the head tilted obliquely sideward (lateroflexion) to the right or
- * idem to the left.

NB The patient can move with his upper body in the direction of the sideward position of the head because this makes this position more convenient.

- * Round the longitudinal axis of the head to the right or
- * idem to the left.

6. Position of the operating field in the patient's mouth for the dentist.

Sit down in the 11.00 o'clock location and place the 3.6 in the right position for preparing a MO preparation by rotating the head of the patient in 3 directions.

Procedure. Rotate the head:

- backward so that the occlusal plane of the lower jaw makes an angle of about 40° with a horizontal plane. (It is the same position in which you hold your book when reading it sitting in your chair);
- sideward to the right to position your operating field in your symmetrical plane (= the mid-sagittal plane of your upper body);
- round a longitudinal axis to the right, to be able to look along the premolars etc. of the upper jaw.

Criteria for placing the operating field in the patient's mouth in the right position for the dentist; and for checking.

- * The dentist is sitting upright and symmetrical etc.
- * (As condition for this purpose): the operating field is placed symmetrically i.e. straight in front of the dentist's upper body (in his symmetrical plane).
- * The dentist is able to look as perpendicularly as possible at the operating field (or at the mirror, see later).
- * The distance from the dentist's eyes or glasses to the operating field in the patient's mouth is between 35 and 40 cm.

NB The working height has to fit a correct posture.

* The lower arms are lifted a little but no more than 25° when working in a correct posture, at the right working height.

Additional requirement:

* the beam of light of the dental operating light is positioned nearly parallel to the viewing direction of the dentist to be able to work without shadows in the preparation field, in the mouth and behind the hand's/fingers.

What is happening if you have not positioned the operating field in the right position, i.e. the symmetrical plane of the upper body?

* Are you bending forward with your upper body and head?

* Are you bending sideward with your upper body and head?

* Are you rotating your vertebral column?

* Are you lifting your arms to be able to position your hands with instruments in a position connected with the operating field?

* What happens if the dental operating light is not placed in the right way e.g. above the chest of the patient?

7. Continuation.

Sit down in the 11.00 o'clock location and place the 3.6 in the right position for a treatment of the buccal surface (examination, preparation etc).

Criteria for applying and checking: see 6.1.

8. Continuation.

Sit down in the 11.00 o'clock location and place the 4.6 in the right position for a MO preparation.

Procedure. Rotate the head:

- backward so that the occlusal plane of the lower jaw makes an angle of about 40° with a horizontal plane;

- sideward to the right to position your operating field in your symmetrical plane

- round a longitudinal axis to the left, to be able to look along the premolars etc. of the upper jaw.

Criteria for applying and checking: see 6.1.

NB 1 The sitting location of the dentist, between 9.00-12.0/01.00 o'clock is determined by the place where the best vision of the operating field can be obtained.

NB 2 The patient head is rotated and the sitting location adjusted during patient treatment so that the instrumentation can always be carried out adequately.

9. Continuation.

Sit down in the 9.00 o'clock location and place the 4.6 in the right position for an occlusal and buccal preparation.

Procedure.

- Backrest of the patient chair is positioned slightly oblique without being forced to sit in a fixed position.

- Rotate the head of the patient in 3 directions:
 - * forward, with the occlusal plane in a nearly horizontal position;
 - * obliquely sideward to the right;
 - * round the longitudinal axis to the right to get the best attainable position.

Criteria for applying and checking; see 6.1

10. Continuation.

Sit down between the 9.00-10.00 o'clock location and place the 1.6 in a right position for a buccal treatment and/or crown preparation with direct vision (as far as possible in a correct posture).

Procedure.

- Patient is placed horizontally.
- Head of the patient is rotated in 3 directions:
 - * backward with the occlusal plane of the upper jaw backward about 20° in relation with a vertical plane;
 - * obliquely sideward to the left
 - * round the longitudinal axis to the right.

Criteria for applying and checking: see 6.1.

11. Continuation.

Sit down in the 11.00 o'clock location and place the 1.6 in the correct position for a MO preparation with indirect vision.

Procedure.

- Patient is placed horizontally.
- Head of the patient is rotated in 3 directions:
 - * backward with the occlusal plane of the upper jaw 20° backward in relation with a vertical plane
 - * obliquely sideward to the right;
 - * round a longitudinal axis to get a final adjustment.
- Mirror is hold in a oblique position to be able to look on it more or less perpendicularly.
- Dental operating light is positioned near the head of the patient to be able to direct the beam of light parallel with the viewing direction of the dentist, as perpendicularly on the mirror as possible.

NB If the dental operating light is positioned more forward then the mirror has to be turned consequently toward the beam of light of the operating light so that you have to bend forward to look at the mirror.

Criteria for applying and checking: see 6.1.

12. Continuation.

Sit down in the 11.30 o'clock location and place the teeth of the lower front in the right position.

Procedure.

- *Backrest is placed parallel with the upper legs.*
- *Head of patient is rotated in different directions to obtain the right position.*

Criteria for applying and checking; see 6.1

Specially:

- * *no angle is existing between upper legs and backrest(in the direction of the dentist).*
- * *it is possible to move freely whilst the upper legs under the backrest.*

13. Continuation.

Following the procedures and criteria applied before other treatment positions can be arranged.

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