Orthodontics

1. Principles Pertinent to the Evaluation Criteria

Quality assurance in orthodontics comprises the following specific problems:

An ideal occlusion and harmonious facial relations can neither be expected nor demanded as the end result of the individual dentofacial development. A considerable spectrum regarding positioning of the individual teeth along the dental arch[1], the occlusal relationship[2], and the functional circumstances[3] as well as regarding the facial configuration[4] has to be accepted as arbitrary variability of a spontaneous development.[9,10]

A uniquely defined and universally approved reference system allowing to measure the quality of the spontaneous development as well as of a development guided by therapeutic interventions is not available in orthodontics.[1–3,5–7] In this respect, other dental disciplines can use much more precise criteria such as border seal, abrasion-resistance, discoloration etc.[4] In orthodontics, the range of discretion is pitched distinctly wider than in professional fields where precision to be claimed permits only minimum and clearly justifiable tolerance values. Although orthodontics is subject to vague boundaries, the quality level C (irreversible damage) and largely also B (reversible damage) is clearly discernible. The problems lie in the gray area between the upper compartment of quality level B and the lower compartment of quality level A.

A vast number of attempts have been undertaken to catalogue the orthodontic field by means of indices. On the one hand, the degree of treatment necessity should be gathered (currently: IOTN = Index for Orthodontic Treatment Need; GEM = Guidelines for the Evaluation of Malocclusion), and, on the other hand, the grade of a treatment should be able to be rated (currently: PAR = Peer Assessment Rating; ICON = Index of Complexity, Outcome and Need).[1,8,11,12] Although indices can contribute very important information for epidemiologic and health political studies, they nevertheless are fraught with immanent deficiencies.[3,8,11]

Therefore, general guidelines on a descriptive basis were designed for the quality assessment. Underlying is the opinion that in this way the essentials can be better identified than by means of the summation of isolated aspects. The present quality-oriented guideline is to be looked upon as aid and support in the personal professional sphere of activity.

2. Evaluation Criteria for the Quality Levels A+ to C

GUIDELINE	COLLECTION OF FINDINGS AND SCHEDULE
A+	▪ Regular monitoring of facial growth and the intra-/intermaxillary development, whereby the observations were registered on record ▪ The active comprehensive treatment was initiated and carried out at the point of development, when the end result could be attained most efficiently and within a timeframe reasonable for the patient. ▪ Proper application of the diagnostic means
A	▪ Upon monitoring of facial growth and the intra-/intermaxillary development serious deviations were foresightedly recognized and directed to a timely intervention. ▪ Possibly certain aspects of minor severity were overlooked, which aggravates the later planning and accomplishment of the treatment, but ultimately does not compromise the achievable treatment outcome. ▪ Preparation of clinical and radiographic records geared to the progress of development or to impending deviations ▪ Initiation of precautious interventions which prevent the progression of an actually or potentially destructive process, or which sustainably improve the starting situation for a later comprehensive treatment
B	▪ Missing recognition or underestimation of impending abnormal development and the ensuing consequences for the occlusal and esthetic end result ▪ Omission of a thorough clinical and radiographic analysis during monitoring, although an abnormal development at earlier stages already should have been recognized and an early partial intervention sustainably could have reduced the later therapeutic difficulty level ▪ Failure to initiate safeguarding measures for the stability of the dental arches following traumatic tooth loss or isolated extractions which were not indicated for orthodontic reasons, or in case of impending needs of reconstruction, failure to strive for an optimal arrangement of the tooth units in the region to be reconstructed ▪ Missing of timely interdisciplinary consultation and planning
C	▪ Missing reference to the general process of growth and development as well as to the individual characteristics of the structural facial setup ▪ Insufficient clinical attention and missing, useless, or unjustified radiographic investigation ▪ Overlooking of: ▫ Severe eruption disorders or structural damage due to supernumerary teeth, dislocations of teeth, or failure of the eruption mechanism ▫ Early ankyloses with long-term impact on growth of the alveolar process ▫ Tooth agenesis at a stage of development when clinical signs would have to elicit a suspicion and there are still various planning-related solution options ▫ Traumatization of the gingiva attributable to the occlusion

GUIDELINE	TREATMENT PLANNING
A+	▪ Clearly defined objectives considering the analytical assessment of the skeletal facial structure, the dentoalveolar, occlusal, and functional circumstances ▪ Sequence of interventions designed for time-wise short-, medium-, and long-term objectives ▪ Choice and construction of the appliance which most reliably and as quickly as possible ensures the achievement of the objectives – taking into account the precondition from the side of the patient and the biological frame
A	▪ The advantages and disadvantages of an orthodontic treatment are discussed in detail with the patient. This allowes the patient to make an independent decision. ▪ The main problems are integrated in the planning and the patient is informed about the deviations and the planned procedure. ▪ As far as the principal direction is concerned, the proposed concept is basically appropriate, but may exhibit certain, although tolerable, restrictions regarding the development-related application, the efficiency, and the final realization of the result. ▪ A reduced treatment outcome (compromise result) agreed upon with the patient is aimed at using an appropriate reduction of the treatment effort. ▪ Interdisciplinary collaboration with other medical and dental specialists, where indicated
B	▪ Disregard of missing insight and motivation of the patient ▪ Treatment procedure failing to incorporate the sum of problems to be solved into a configuration-related and time-wise logical concept ("patchwork treatment") ▪ Hubris of the practitioner to cope with the given problems of the case regarding planning and therapeutic implementation ▪ Disrespect for the principles of craniofacial growth and facial esthetics upon correction of the malocclusion ▪ Selection or deficient construction of an appliance which cannot meet the problems of the case, or faulty design concerning the problems to be solved ▪ Failure of timely interdisciplinary consultation and planning
C	▪ Disregard of unfavorable dental and periodontal conditions ▪ Planning based on scientifically unsupported concepts regarding possibilities to influence facial growth as well as regarding the potential to reshape the dentoalveolar structures (extreme expansion of the dental arches or extreme labial positioning of the mandibular incisors etc.) ▪ Missing objectives defined in detail regarding positioning of the teeth within the individual dental arches as well as regarding the intermaxillary relationship in the buccal segment and the front area ▪ Disregard of overall criteria suggesting either an unambiguous non-extraction or an unambiguous extraction concept; unjustifiable isolated extractions which leave unsolvable problems regarding effects on the dental arches and the occlusion or, as a consequence thereof, require elaborate compensation treatments ▪ Missing consideration of the patient-specific risk factors

GUIDELINE	COURSE OF TREATMENT
A+	▪ Choice and handling of the appliance precisely and with reasonable expenditure of time led to the destination. ▪ Sufficient prophylactic measures during the treatment
A	▪ The selected treatment device was adequate to the purpose and was satisfactorily used by the practitioner. ▪ The patient was thoroughly instructed, but not quite consistently checked, in oral hygiene, handling of the appliance, and care. ▪ The biological tolerance range was respected.
B	▪ A continuous check of the treatment progress and a possibly necessary revision of the treatment plan were omitted. ▪ The interval check required by the complexity of the appliance was not observed. ▪ Treatment devices were insufficiently mastered, which led to an outcome distinctly below the result to be striven for and/or which entailed an inappropriately long treatment time. ▪ Although clear signs existed that using the pursued treatment procedure the required treatment outcome cannot be achieved, as ▫ no timely information of the patient/parents was carried out; ▫ no consulting assessment was initiated; ▫ no referral to a competent place was proposed.
C	▪ Use of treatment means and appliances whose capacity to solve the problem catalogue of the case concerned is in no way suitable. ▪ Inadequacy on the part of the practitioner to exploit the possibilities of the used appliance in a controlled manner ▪ Faulty design of the appliance ▪ Omission of the cariologic and periodontal checks and the rehabilitation before the start of treatment and, if applicable, of the information of and referral to the supervising dentist ▪ Deficient instruction and clarification of the patient with respect to appliance-related care and additional requirements regarding oral hygiene ▪ Overlooking of progressive decalcification or carious lesions around or underneath the appliance elements fixed to the teeth

GUIDELINE	TREATMENT OUTCOME
A+	▪ Outstanding result for patient and dentist regarding esthetics, function, and stability ▪ Dental and periodontal health was maintained or improved. ▪ The patient is convinced to have received a contribution to an improved quality of life.
A	▪ Substantial improvement with respect to the starting condition; treatment outcome exhibiting minor to medium imperfections regarding the position of individual teeth, the space situation (crowding, spacing), and the intermaxillary relationship as well as distinct, although less than maximum improvement of the facial relationship ▪ From the professional-dental point of view responsible outcome which did not elicit unacceptable damage or losses concerning dental, periodontal, and occlusal-functional aspects
B	▪ In comparison to the starting situation no decisive improvement of the crucial aspects was achieved. ▪ There is a blatant discrepancy between the therapeutic effort and the outcome attained. ▪ The failure to achieve the intended treatment outcome can largely be attributed to deficient planning and missing mastery of the treatment means.
C	▪ Due to deficient treatment, the malocclusion and facial esthetics with respect to the initial findings remained unchanged or deteriorated (limitation: if unpredictable biological reactions entailed the negative development). ▪ Despite treatment, leaving of serious intramaxillary deviations or defective intermaxillary coordination or occlusal-functional disorders ▪ Disregard of skeletal and dentoalveolar limitations ▪ Persistence of tooth retention, in particular of the maxillary canines ▪ Damage to ▫ the enamel (except if despite demonstrable efforts of the practitioner negligence in oral hygiene of the patient persisted); ▫ tooth roots, in particular extensive apical resorption (limitation: individual predisposition for apical root resorption cannot be reliably recognized beforehand); ▫ gingiva and periodontium, whereby recessions and bone loss have to be attributed to exceeding generally approved limits (overexpansion in the transversal or labial direction)

GUIDELINE	FURTHER MONITORING
A+	–
A	▪ Regular check of the further development, the stability of the treatment result, and the retention appliances ▪ Information of the patient/parents about factors which can lead to a relapse as well as about possible side effects of the retention appliances
B	▪ Omission of the monitoring after the active treatment phase, misjudgment of the relapse tendency, or inappropriate safeguard of the retention ▪ In case of fixed retention appliances, omission of the patient instruction, their check, or the assurance that the check is undertaken by the supervising dentist if a permanent or long-term retention is desired or necessary
C	▪ Time-wise inappropriate interval checks in case of initially recognizable abnormal developments or potentially ensuing deviations ▪ Missing information of the parents/patient about the long-term effects of the detected deviation

3. References

1 Al Yami E A: Orthodontics: Treatment Need and Treatment Outcome. Benda, Amsterdam (1997).

2 Berufsverband der Deutschen Kieferorthopäden: Weissbuch Kieferorthopädie. Stand und Perspektiven der Qualitätssicherung in der Kieferorthopädie für die vertragszahnärztliche Versorgung. Pröll Druck, Augsburg (1993).

3 Helfrick J: Development of Standards of Care – The US Experience. Br Dent J 170: 228–230 (1991).

4 Lutz F, Kreijci I, Besek M: Konservierende Zahnheilkunde – Restaurationen für wen? Schweiz Monatsschr Zahnmed 108: 19–26 (1998).

5 Prahl-Andersen B (ed.): Between Brackets, Newsletter # 2. Dept of Orthodontics, Amsterdam (1998).

6 Shaw W C, O'Brien K D, Richmond S, Brook P: Quality Control in Orthodontics: Risk/Benefit Considerations. Br Dent J 170: 33–37 (1991).

7 Shaw W C, O'Brien K D, Richmond S: Quality Control in Orthodontics: Factors Influencing the Receipt of Orthodontic Treatment. Br Dent J 170: 66–68 (1991).

8 Shaw W C, Richmond S, O'Brien K D, Brook P: Quality Control in Orthodontics: Treatment Need and Treatment Standards. Br Dent J 170: 107–112 (1991).

9 Stöckli P W: Postnataler Wachstumsverlauf, Gesichts-, Kieferwachstum und Entwicklung der Dentition, 5–69. Kieferorthopädische Befunderhebung, Behandlungsindikation und Zeitpunkt, 110–115. Begleitende Abklärungen und Interventionen während der Gebissentwicklung, 166–214. In: Stöckli P W, Ben-Zur E D (ed.): Zahnmedizin bei Kindern und Jugendlichen. Thieme, Stuttgart (1994).

10 Stöckli P W: Stellung und Aufgaben der Kieferorthopädie im Rahmen der Zahnmedizin. In: Hirzel H C (ed.): 100. St. Moritzer Kurs. Administrative Kursleitung der St. Moritzer Kurse, 52–57 (1997).

11 Ter Heege G: Euro-Qual. Towards a Quality System for European Orthodontic Professionals. IOS Press, Amsterdam (1997).

12 University of Wales, College of Medicine, Department of Dental Health and Development: Courses in the use of occlusal indices. Dec. 1998.

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