

HTA-Report | Summary

Oral health with fixed appliances orthodontics

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Orthodontic treatment represents an important fraction in dental interventions. According to other medical methods the question for scientific evidence for the effectiveness of these treatments arises.

Health political background

Orthodontic treatments are a frequent intervention. The scientific position is very important due to the frequency of treatments in combination with financial expenditure. Patients or their parents or financiers pose more and more the question, whether these interventions are effective and worth the money.

Scientific background

The effectiveness of medical interventions is evaluated in scientific studies with patients. It is necessary to distinguish between standardized interventions and not standardized ones. Orthodontic measures belong to the not standardized interventions since an individual medical treatment planning and a therapy made to measure for the patient must be planned.

Furthermore, a large number of techniques and appliances are used in orthodontic treatment which have differences in their therapeutic effect.

By the techniques of fixed appliances oral hygiene is more difficult to achieve and this needs more cooperation of the patient. If this is not achieved sufficiently caries or other problems can lead to a possibly faster dental loss despite a successful orthodontic intervention.

The principal goal is the prolongation of the maintenance of natural teeth. Additionally there are also functional aspects of oral health. Therefore not only the technical success of the obtainment of a normocclusion can be regarded as a success of treatment, but oral health must be regarded as a comprehensive condition.

The question how caries must be regarded as a side effect by implementation of fixed appliances is also important.

Research questions

This HTA report follows the following research questions:

- Which evidence concerning long-term development of oral health after an orthodontic treatment with fixed appliances exists? Is the status of oral health better for treated patients in comparison with not treated patients in the long run?
- Is the correction of dental malocclusion an effective prerequisite for the preservation of the own teeth?
- Can the risk for caries be assessed when fixed appliances are used? Which methods can be taken to avoid caries?
- Which indications can be recommended for the application of fixed appliances after analysis of the scientific literature?

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Within the scope of the



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- How important is a multi professional approach and functional oriented treatment in orthodontic application of fixed appliances?
- Are there publications concerning the economic and ethical aspect of the application of fixed appliances?

Methods

The research questions should be answered evidence oriented, according to published scientific studies. The scientific literature had to be selected systematically. This was made by the retrieval of publications in literature databases. The relevant studies were evaluated for the questions in a two-step procedure and used for this review.

Results

The question, whether the application of a fixed appliance in an orthodontic treatment causes a long-term improvement in oral health, cannot be answered at the present time. The scientific status is the discussion for a definition of oral health at present. Also the question, whether in the long run dental health can be improved by the application of fixed appliances can not be answered with a level of evidence usually achieved by evidence-based medicine.

Whether correction of dental malocclusion is an effective prerequisite for the preservation of the natural dentation, cannot be answered. There is no generalizable study with sufficient scientific background for Europe or Germany to this topic.

The risk for caries can not be quantified. Caries is identified as a central topic in general but due to numerous factors influencing the risk it is not quantified.

The question of assessment of indications is completely open from the scientific literature. For the question of therapy need or therapy priority some indices were developed, which enable a numerical quantification. However, these indices are fundamentally criticised by recent research in their meaning and the empirical relevance.

Discussion

The scientific evidence for orthodontic measures is exceptionally low. None of the questions posed in this report can be answered even if lower evidence study types, like not randomised or retrospective studies are included.

The scientific investigation of not standardized interventions is a certain challenge (therapeutic setting). It is, however, a need from the scientific and ethical view, in principle, that interventions also require appropriate research and evidence. Payers of the interventions also can expect a sufficient degree of reliability, patients can expect, that the intervention is well investigated and the informed consent is based on scientific research.

Basically there is no doubt that - on the one side that orthodontic treatment is very effective. Hundreds of thousands of patients treated orthodontic successfully with great satisfaction surely give evidence, that there are very professional interventions carried out with a considerable diagnostic effort.

There is the impression that there exists a big gap between the practical application of fixed appliances and the scientific investigation of the effectiveness of the intervention. There is much research done in the area of diagnostics or further development of appliances or techniques realised, however extremely few research in the area of treatment need, analysis of the sustainability, influence factors on the success, like caries or quantifica-

tion of side effects e.g. root resorption.

Also if the intervention does not need any further research concerning effectiveness due to their obviousness (e. g. the surgical resection of a finger is effective, no study is required here), the question of the indication nevertheless must (when the surgical resection of a finger is required) be examined scientifically and the treatment must be justifiable.

This research to evaluate the indications is completely lacking, also the required evaluation parameters (e. g. means long-term dental maintenance).

This gap is in this respect dubious since a link of determining the demand (inducing demand) and supply in Central European health systems is economically given. This enables to create a possibility for a so-called supply induced demand.

To get rid of discussions that the professional work of orthodontics can be near to induced demand or unnecessary indications, research of this topic is quite essential. The required much stronger information for indications can improve confidence for patients and insurance companies. Existing indexes like the Index of Treatment Need (IOTN) seem to be of academic interest without relevance for daily work.

The question which indications can be regarded as scientifically proven for the intervention must be given big attention immediately. The individual and subjective assessment of the orthodontist (whose experience is not doubted) has to be considered as not sufficient. The scientific background is absolutely necessary due to ethic reasons for the patient, economic reasons for the social insurance system or financiers and also for the orthodontist to evaluate and legitimate the treatment.

Conclusions/recommendations

Oral health is a relatively new concept and the first definitions are published two to three years ago. The interdisciplinary aspect of the problem should increasingly be taken into account. While the technical aspect of the orthodontic treatment is in the centre of the interest, the functional aspect of the orofacial system must not be disregarded.

The cooperation of the patient also appears as important, like the consideration of mouth functions, like mastication, swallowing, hygiene or muscle activities and balance of the forces for the success of this intervention.

The concept of oral health has shown weak evidences despite far-reaching systemic consequences for human health, like gastrointestinal diseases.

The question which indications can be regarded as scientifically proven for a need of an intervention must be given attention immediately. The individual and subjective assessment of the orthodontist (whose experience is not doubted) has to be considered as not sufficient. The scientific background is absolutely necessary. Well coordinated research with the goal of collecting specific data is urgently required for individual therapeutic processes with appropriate design. The study quality is also an essential topic. It is unacceptable at the beginning of the 21st century with the conceptional background of evidence based medicine, that studies are published with enormous methodological errors. Orthodontics deserves a well discussed scientific position to prove the enormous success and to demonstrate the effectiveness of the developed treatments.