

Modern Views on The Diagnosis of Orthodontic Patients

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Abstract: Orthodontics is a specialized branch of dentistry that focuses on diagnosing and correcting irregularities in tooth and jaw alignment. Over the years, there have been significant advancements in the methods used to diagnose orthodontic patients. Modern orthodontic practices now rely on a variety of approaches to ensure accurate diagnoses. This article explores these modern views on the diagnosis of orthodontic patients.

Keywords: Evaluation, tomograph, diagnosis, treatment, malocclusion, management

Introduction: Cephalometric refers to the quantitative evaluation of cephalograms, or the measuring and comparison of hard and soft tissue structures on craniofacial radiographs. It is an evolving science and art that has been woven into orthodontics and the treatment of patients. Cephalograms are an integral part of orthodontic records and are typically used for almost all orthodontic patients.

The cephalometric analysis or evaluation helps to confirm or clarify the clinical evaluation of the patient and provide additional information for decisions concerning treatment. The American Association of Orthodontists (AAO) developed the current Clinical Practice Guidelines for Orthodontics and Dentofacial Orthopedics,¹ which recommend that initial orthodontic records include examination notes, intraoral and extraoral images, diagnostic casts (stone or digital), and radiographic images.

These radiographic images include appropriate intraoral radiographs and/or a panoramic radiograph as well as cephalometric radiographs. A three-dimensional cone beam computed tomograph (3D CBCT) can be substituted for a cephalometric radiograph; however, the routine use of a CBCT is not generally required in orthodontics, so cephalometric radiographs are the current standard.

The AAO Clinical Practice Guidelines also recommend evaluating the patient's treatment outcome and determining the efficacy of treatment modalities by comparing posttreatment records with pretreatment records. Posttreatment records may include dental casts; extraoral and intraoral images (either conventional or digital, still or video); and intraoral, panoramic, and/or cephalometric radiographs depending on the type of treatment and other factors.

Many orthodontists also take progress cephalograms to determine if treatment is progressing as expected. In addition, board certification with the American Board of Orthodontics requires cephalograms and an understanding of cephalometry to explain the decisions for diagnosis, treatment, and the effects of growth and orthodontic treatment. Therefore, it is paramount that orthodontists understand how to use cephalometrics in their practice.

Cephalometrics is used to assist in classifying the malocclusion (skeletal and/or dental); communicating the severity of the problem; evaluating craniofacial structures for potential and actual treatment using orthodontics, implants, and/or surgery; and evaluating growth and treatment changes of individual patients or groups of patients.

In general, a lateral cephalogram shows a two-dimensional (2D) view of the anteroposterior position of teeth, the inclination of the incisors, the position and size of the bony structures holding the teeth, and the cranial base. A cephalogram can also provide a different view of the temporomandibular joint than a panoramic radiograph and a view of the upper respiratory tract.

In addition, cephalograms aid in the identification and diagnosis of other problems associated with malocclusion such as dental agenesis, supernumerary teeth, ankylosed teeth, malformed teeth, malformed condyles, and clefts, among others.

They have also been used to identify pathology and can give some indication of bone height and thickness around some teeth. However, they are not very useful in identifying dental caries, particularly initial caries, and periodontal disease, so bitewing radiographs and periapical radiographs are needed for patients who are caries susceptible or show signs of periodontal disease.

While some asymmetry can be diagnosed using a lateral cephalogram, an additional frontal cephalogram is needed to better identify which hard tissue structures are involved in the asymmetry.

In recent years, there have been significant advancements in the field of orthodontics, resulting in a more modern approach to the diagnosis of orthodontic patients. These advancements are aimed at improving the accuracy and efficiency of diagnosis, ultimately leading to better treatment outcomes for patients. Here are some of the modern views on the diagnosis of orthodontic patients:

Digital Imaging Technology: The use of digital imaging technology, such as cone-beam computed tomography (CBCT) and intraoral scanners, has revolutionized the diagnosis process. CBCT provides three-dimensional images of the teeth, jaws, and surrounding structures, allowing orthodontists to accurately assess dental and skeletal discrepancies. Intraoral scanners, on the other hand, capture digital impressions of the patient's teeth, eliminating the need for traditional putty impressions. These technological advancements enhance the precision and convenience of orthodontic diagnosis.

Comprehensive Assessment: Modern orthodontic diagnosis involves a comprehensive assessment of various factors beyond just the alignment of teeth. Orthodontists now consider facial aesthetics, temporomandibular joint (TMJ) health, airway issues, and overall oral health when diagnosing patients. This holistic approach ensures that all aspects of the patient's oral health are taken into account, resulting in more customized and effective treatment plans.

Collaboration with Other Specialists: In complex cases, orthodontists now often work in collaboration with other dental specialists, such as oral surgeons, periodontists, and prosthodontists. This interdisciplinary approach allows for a more thorough evaluation of the patient's condition and better coordination of treatment plans. It ensures that all aspects of the patient's oral health are addressed, leading to improved treatment outcomes.

Development of Risk Assessment Models: Modern orthodontics has also seen the development of risk assessment models. These models help orthodontists identify patients who are at a higher risk of developing certain complications during treatment. By assessing factors such as tooth size, skeletal asymmetry, and dental health, orthodontists can predict potential treatment challenges and tailor treatment plans accordingly. This proactive approach minimizes the risk of adverse outcomes and allows for better planning and management of orthodontic treatment.

Integration of Artificial Intelligence: Artificial intelligence (AI) is gradually being integrated into orthodontic diagnosis processes. AI algorithms can analyze large amounts of patient data and assist orthodontists in decision-making and treatment planning. This technology has the potential to enhance diagnostic accuracy and efficiency, leading to more precise and personalized treatment.

Conclusion

The modern views on the diagnosis of orthodontic patients have transformed the field. The incorporation of advanced imaging techniques, such as CBCT, along with digital models and intraoral scanners, has significantly improved accuracy and efficiency. A multidisciplinary approach further enhances the diagnosis process by considering all aspects of a patient's oral health. As orthodontics continues to evolve, these modern diagnostic methods will continue to shape the future of the field, ensuring patients receive the highest quality care.

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