



Hard Tissue Analysis - Any Substance in it Anymore ?


David M. Sarver

Adjunct Professor
Department of Orthodontics
School of Dentistry
University of North Carolina
Chapel Hill, North Carolina

Hard tissue of course still plays a major role in treatment planning in orthodontic cases, but the question about the current emphasis on soft tissue means that soft tissues of the craniofacial area has finally gained the attention that it deserves. But the real message that orthodontists should take home from our lectures on “The Soft Tissue Paradigm” is that it is the interaction of the soft tissue to hard tissue that is the key to appropriate and contemporary treatment planning.

Let me explain more clearly what I mean. The major reason that it appears that hard tissue is being deemphasized is that up until now, our focus on hard tissue has been primarily through the lateral cephalometric head film. The amount of information that a lateral head film renders is somewhat limited simply because it is a two dimensional representation of the patient, and at the midsagittal plane at that. The lateral head film originally was meant to be a research tool and was not originally designed to be main diagnostic tool in orthodontics. When you think about it, there are many reasons that the lateral cephalogram simply does not supply as much information as is required to successfully treat orthodontic cases. The reasons that immediately come to mind are as follows:

1. It is a snap shot of a growing entity. In other words, the radiograph is a 1/4 second exposure of a patient who, in a particular age group, may be growing at different velocities with different



gender tendencies, familial patterns, and many other variables. We know, for example, that nasal growth accelerates with the onset of puberty until about age 15-16, and to make profile judgments based on the profile of a 12 year old which is not yet fully developed simply does not make sense if the facial outcome is an important consideration in orthodontic treatment planning.

2. The lateral cephalogram does not reflect soft tissue dynamics that are so important to orthodontic outcomes that our patients are looking for. Specifically, the smile is not something that we can analyze on a cephalogram. Many examples include a gummy smile, an asymmetric smile, inadequate incisor display on smile—all of which are not discernable on the lateral head film but are nonetheless very important aspects of successful orthodontic treatment planning and treatment outcomes.
3. In cephalometrically based treatment planning we have a tendency to compare the patient's numbers to our favorite cephalometric analysis, directing that patient's treatment towards the analysis. This is procrustean in nature in that each individual patient is crammed into the same bed. The interaction of hard to soft tissue occurs in many ways. How the face appears is very much a function of how the soft tissue overlays the hard tissue. If a patient has a very deficient mandible and no chin, then the soft tissue of the face will reflect that. The soft tissue thickness varies with age, gender and ethnic characteristics. Treatment planning based on one cephalometric analysis means that one size fits all!

In evaluating the miniesthetics of the smile, it is important for us to recognize and measure resting upper incisor to lip relationships in the immediate context of incisor display on smile, but also to anticipate the aging characteristics of the smile.¹⁻² The interaction of soft tissue movement during the smile is also extremely important to evaluate. For example, a smile may appear asymmetric because of:

1. The presence of a transversely canted maxilla or maxilla/mandible.
2. A tipped maxillary midline secondary to premature loss of a tooth on the affected side.
3. Uneven gingival heights presenting what appears to be an asymmetry to the smile.
4. An asymmetric lip curtain, meaning that the lip animation itself is not symmetric like a window shade, but may deviate from perfect symmetry during the smile animation.

Extensive data exists documenting the characteristics of the aging face, and there is good data which also reflects the interaction of hard tissue with soft tissue in the long term facial appearance of our patients. We have already alluded to how the aging of the face affects the smile, but it is also important to recognize the aging skeletal characteristics as well. For example, one of the most common plastic surgical procedures in the United States in the 50 year old range is cheek augmentation. Intuitively, we would think that is because the soft tissues of the face are losing their elasticity, but some recent research indicates that loss of midfacial support may be more due to underlying bony resorption and subsequent loss of soft tissue support.³

In conclusion, it is significant that we are finally recognizing how important the soft tissues are to our diagnostics in orthodontics, but we should emphasize that it is the interaction of hard and soft tissue that ultimately leads us to our final treatment decisions.

References :

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Correspondence :

E-mail : sarverd@aol.com