

# **Lecture Summary: An Evidence-Based Assessment of Anterior Open-Bite Therapy**

**Dr. Greg Huang**

**July 17, 2006**

**9:00-10:30 AM**

Summary by: Dr. Rodney D. Hyduk

Dr. Greg Huang's presentation focused on assessing specifically the open-bite stability literature using the evidence-based model.

Dr. Huang was a full time clinical orthodontist for ten years and has been in full time academics for seven years. Now, evidence-based assessments allow Dr. Huang and all orthodontists to balance the dual role of scientist and clinician.

In his presentation, he addressed in order the hierarchy of evidence, the prevalence of open-bite, a well-performed literature search, assessment of the pertinent literature and how to formulate an evidence-based conclusion.

As reiterated from previous lectures, the hierarchy of evidence is weakest to strongest: expert opinion, case series, case/control studies, cohort study, randomized trial, systematic review, and the meta analysis.

Examples of each of these were given. Expert opinion is self-explanatory. The case report/case series reflected anecdotal evidence. When evaluating these studies we should consider the feasibility of "possible" versus "probable".

Case/control (retrospective) design studies may reveal an association, but are not very useful for proving cause and effect. One must determine other factors influencing the study. Case control studies are good when there is overwhelming data/association. Examples of this would be the cause and effect of smoking relating to lung cancer and hepatitis B relating to liver cancer.

Cohort studies establish the correct temporal sequence but the two groups may differ in characteristics other than the factor of interest.

Randomized trials offer the best chance to find true association, as the groups should be balanced in all aspects other than the factor of interest. Even though randomized trials are preferred due to the increased level of evidence obtained, many times we are not allowed to perform the study in this fashion due to longer time requirements and increased costs.

Moving up in the hierarchy, systematic reviews are very desirable due to the ability to synthesize our knowledge and sets itself apart from narrative reviews by using A priori

inclusion criteria, judging quality of studies, less chance of bias, and its reproducibility. Systematic reviews are becoming more available. The AAO presently has approximately 50 systematic reviews listed on their website, with two to three being added monthly. Systematic reviews attempt to identify all available literature, although often, only a few available articles satisfy inclusion criteria. At times, the “conclusion” is, ‘We don’t know the answer’. As new evidence becomes available the positions are subject to change. Some reviewers even list articles that are excluded in the systematic reviews.

The meta-analysis being the strongest evidence is similar to systematic review. but takes additional steps to pull data and make statistical analyses. This produces a quantitative evaluation as apposed to a systematic review, which produces a qualitative evaluation. Using these factors as our base, Dr. Huang addressed the open-bite and its various aspects.

Prevalence of open-bite is dependent on definition, age group, and race. The definition can vary dramatically from one study to another. The reference for measurement is the defining factor. Dr. Huang believes the truest form or definition of an open-bite is no (vertical) overlap.

He cites a number of studies relating to the self-correction of open-bite and prevalence of open-bite. The most commonly cited study is that of Worms, AJO 59:289, 1971 where 1408 Navajo children were divided into five different age groups with a conclusion of 80% spontaneous correction between the 7-9 year old group. Dr. Huang warned to be careful of the cross-sectional data, which shows 50% increase in 13-15 year olds.

Some studies show the prevalence of open-bite decreases with age, but NHANES III, '89-'94 shows a relative constant percentage from 8 up to 50 years.

The question which Dr. Huang poses is “In patients with anterior open-bite is orthodontic treatment less stable than combined ortho/surgical treatment as evaluated by long term over-bite?” This format is known as the PICO system. P is the population of interest. I is the topic of interest. C is the comparison group. O is the outcome.

Initially the search was on Pub Med with 1,200 citations, but with the use of higher-level evidence, this number was able to be reduced. When doing this protocol it is always a preferred path to go from the question, in this case open-bite stability, to locating a systematic review and producing evidence based answer. When this is not possible, then we need to search the literature, identify the appropriate studies, assess their strengths and compare results.

After searching the literature and assessing it for both non-surgical and surgical approaches for the correction of open-bite, a summary was devised to weigh the strengths and weaknesses of the various studies. It was difficult to compare numbers and statistics since surgical studies used different times and different intervals at which diagnostic records and measurements were taken. When comparing the non-surgical versus the surgical studies, the surgical studies employed more evidence criteria and were more

favorable to analyze. In comparison the non-surgical group, which were adolescents, had a mean-stability measure of 76% while the surgical group, which were adults, had a mean stability measure of 84%.

The limitations of existing literature related to the quality of the studies evaluated, with most of them case series with a lack of untreated controls, a potential for selection bias and inadequate follow up time, especially the surgical studies. The other limitation was the age and severity differences in orthodontic versus surgical studies and as stated previously the lack of uniform reporting (measures and time points).

The clinical implications based on the existing literature are: long term difference in stability is not large (>10%), patient desires and expectations should be given high priority and while maxillary surgery may increase stability slightly, it may also have aesthetic impact.

When employing an evidence-based approach, advantages are that the findings are based on the best literature available, there is minimum bias by avoiding conflicts of interest, the material can be updated periodically and the evidence is useful to providers and patients.

To take this a step further, when enough systematic reviews exist on a topic a panel may attempt to form a summary statement, which should also be updated periodically.

Orthodontists in the past have preferred not to have summary guidelines in a formal manner because it impinges on their “practice model”. Rather than ignore these practice guidelines, we should be proactive.