

Section 6: Orthodontically-Related Outcomes of Primary Infant Protocols

a. Dental Arch Relationships Outcomes:

- **Accomplishments and Findings to Date**

The initial meeting of meeting of the “Americleft” project was held February 23-26, 2006 at the Lancaster Cleft Palate Clinic in Lancaster, Pennsylvania. Investigators representing six North American Centers were in attendance. It was here that the Goslon Yardstick (see below) method of scoring dental casts for the evaluation of dental arch relationships was proposed to the cohort of orthodontists. Initial target for sample sizes from each center was 40 patients with appropriate dental casts for statistical significances to be detected based on our power analysis. The material for this retrospective pilot study involved the pre-treatment diagnostic dental casts on patients who had already received their primary cleft lip and palate surgeries. Thus, consecutive records taken as part of the normal clinical treatment protocol for a phase of orthodontic care routinely done in the 7-10 year old age range collected by each center were used.

The results of this first meeting confirmed the conclusions of the studies carried out previously in Europe that used the same rating method to identify differences in dental arch relationships that were possibly related to primary surgical outcomes. Since the protocols for infant treatment were completely different between these centers, the results were a first step to identify more or less favorable approaches to initial treatment options.

The second meeting of the “Americleft” project was again held at the Lancaster Cleft Palate Clinic in March of 2007 and ratings were again performed on dental study casts representing six centers. The results of the six center comparison for the parameter of dental arch relationships demonstrated significant differences between the highest and lowest scoring centers. This was very similar to the Eurocleft experience that show the worst outcomes for centers employing primary alveolar bone grafting in their surgical protocol that was also associated with a threefold increase in the likelihood of a patient requiring orthognathic procedures in later years. In the Eurocleft study, a detection of a 0.5 Goslon scale point difference indicated a 20% difference in osteotomy rate (for samples of n=42, 5% probability and 80% power).

Finally, a third interim meeting of the “Americleft” project was held at the Peyton Manning Children’s Hospital Craniofacial Center in Indianapolis, Indiana in October of 2007. At this meeting, bilateral casts were scored from two centers that now had adequate complete bilateral cleft sample sizes using the same criteria as the unilateral study. Similar results were demonstrated with the bilateral sample that received primary alveolar bone grafting having a significantly greater likelihood of requiring orthognathic surgery.

Based on these preliminary results and experiences, the following are the recommendations for future participation by additional centers in dental arch relationship studies. These comparisons represent the easiest way for centers to become involved in inter-center comparisons, since (1) dental study models are normally taken on a routine basis for any

orthodontic intervention, especially in the mixed dentition, (2) they represent a non-invasive (low risk) procedure, (3) they allow for easy patient privacy protection, and (4) the Goslon Yardstick and other rating systems have been shown to be reliable, valid and simple outcome assessment methods which are easily mastered through brief training and calibration exercises.

- **Protocol for Dental Arch Relationship Comparisons**

1) ***Example of Request Application for IRB approval*** – For all aspects of inter-center comparisons, participating Centers must obtain IRB approval. An example of such a request that has been used successfully in Americleft is provided in APPENDIX 2 of the Americleft Study Guide. (add a link) Please note that it includes a request to waive specific informed consent from the patients. Depending on the sample you may be using (current patients vs. historical records) and depending on the agreeability of your IRB, this may or may not be accepted and especially for more current or even prospectively gathered records, may not be suitable, so specific informed consent might be necessary for the outcome audit. Also, keep in mind that with our ability to carry out 5-year old assessments, depending on your Center's protocol 5-year study models may not fall under the category of those taken routinely for orthodontic treatment planning purposes, and therefore require special approval and informed consent for taking them and also for using them in such an inter-center comparison.

2) ***Sample Considerations*** - Various aspects of the inclusion criteria have been mentioned previously in Section 2 of the Americleft Study Guide (add a link) and in the preceding description of the Americleft accomplishments to date. To summarize, the following are the main inclusion criteria for samples to be satisfy the requirements for inter-center collaborative studies of dental arch relation outcomes in the 7-10 year old mixed dentition patient using the Goslon Yardstick

- ✓ Sample size approximately 40
- ✓ Complete, non-syndromic unilateral cleft lip and palate with no additional associated facial or dental malformations (expanding outcomes to include BCLP and CPO being developed, requiring stratification on those cleft types also)
- ✓ Consecutively enrolled (documented by patient number, charts, birth dates, etc)
- ✓ All primary treatment received at same center
- ✓ No additional orthodontic treatment between primary management and the date the dental study casts were taken
- ✓ Availability of total treatment history
- ✓ Availability of infant presurgical records to confirm complete skeletal clefts (study models, photographs, chart notes, and/or op notes.
- ✓ Availability of 9-year old dental casts (range 7-12) trimmed in occlusion (matching standard lateral cephalometric radiographs also desired to allow for concurrent evaluation of facial morphology outcomes)

3) ***Rating Scales,***

- ✓ **The Goslon Yardstick.** This rating system for unilateral complete clefts is a valid and well-tested 5 point scale (1=excellent, 5=poor). It was used in the original Eurocleft study (CPCJ, 1992) and has been used extensively since then as many additional European centers collected samples and dental study models

for outcome assessments. It is based on clinical features that simplify or complicate treatment and the “burden of care”(Mars M, Plint DA, Houston WJ, et al.: The Goslon Yardstick: a new system of assessing dental arch relationships in children with unilateral clefts of the lip and palate. *Cleft Palate J* 24:314, 1987). It is necessary to have the reference yardstick (the plaster casts) available for comparison with any given cast to be rated when conducting a study. A photographic representation of the discrete Goslon categories can be found in APPENDIX 3 of the Americleft Study Guide (add a link), but it is not intended to substitute for the original plaster casts that constitute the yardstick methodology. However, in a 2017 study (Long et al., *J Craniofac Surg*, 28:1269, 2017) the use of a photo gallery made from digital dental casts, was found to be equally as reliable and valid as actual plaster dental casts in a Goslon Yardstick comparison. This opens the possibility of less costly and more convenient comparisons than the use of plaster casts.

All dental casts from all centers need to be prepared identically (see below) and randomized in their order of presentation to insure the records are blinded. The entire set of casts is rated twice by at least 3 experienced, calibrated raters to calculate percentage distribution of cases within each Goslon category and the mean Goslon score for each center. It is possible to add new cohort centers to the “Americleft” arch relationship study using this method with different, yet calibrated raters. However, to maintain a continuous link back to the original Americleft ratings, at least two of the raters will always be from the cohort of original Americleft raters. Inter- and intra- rater reliability testing is done with a weighted Kappa statistic. Means, medians and standard deviations are calculated for each group for description of central tendency. Because of the categorical-ordinal Goslon scale, statistical testing is done using the Kruskal-Wallis test with Dunn’s test for pairwise comparisons and a Bonferroni adjustment for multiple comparisons.

The application of the “yardstick” has 3 determinants that influence the score given to each cast. The greatest influence is from the antero-posterior assessment or overjet. If there are dental compensations present such as proclinations of maxillary incisors or retroclination of mandibular incisors, the score may become the next higher or lower score, depending on the magnitude of the compensation. The second determinant is the vertical assessment. A deep overbite is preferable to an openbite. Only in a borderline case, can a deep overbite influence the score to the next lower whole number indicating a better score. But, an openbite would likely raise the score to the next higher whole number indicating a poorer score. Finally, the third determinant is the transverse assessment of the arch relationships. Here, the transverse relationships infrequently influence to the Goslon score as this factor is weighted less than the others based on the assumption that many transverse relationships can be treated with orthodontic therapy. Severe narrowing of the arch might alter the score. The influence of the three determinants (antero-posterior, vertical, and transverse) is built into the Goslon Yardstick and this emphasizes the need to use the yardstick models as a reference for any calibrations or ratings that are done.

The Goslon Yardstick



Goslon Yardstick

1



Goslon Yardstick

2





- ✓ **The Five Year Yardstick.** Given the success of the Goslon Yardstick in identifying more and less favorable dental arch relationship outcomes, a desire to do the same type of evaluation, but on younger patients, led to the development of the 5-Year Yardstick (Atack NE, Hathorn IS, Semb, G, et al.: A new index for assessing surgical outcomes in unilateral cleft lip and palate subjects aged 5 – reproducibility and reliability. *Cleft Palate Craniofac J* 34:242, 1997). The same basic assessment methods described above, are used for the 5-Year ratings, but the reference dental casts are all primary dentition. This system is intended for use in the late primary dentition. With earlier identification of the protocols leading to the most favorable results, the ability for a Center to understand the key beneficial or harmful features of a protocol allow for adjustments to be made sooner. See reference models below.

- ✓ **The Refined Bilateral (Bauru) Yardstick.** A new yardstick for rating dental arch relationships in BCLP patients in the mixed dentition stage has been developed and tested for reliability. There was a need for a different yardstick, as the Goslon was designed for children with UCLP, a different anatomical condition. The only outcome assessment available for BCLP was designed from the Goslon concept (Ozawa, Soares, Santo, et al., 2005). The newer generation of this Bauru Yardstick is known as the “Refined” Bauru Yardstick and is based on identical assessment steps as described for both the Goslon and the 5 Year Yardsticks, but with bilateral complete cleft lip and palate reference casts. It is a modification of the Bauru Yardstick to increase reliability. An initial set of reference models is available, but will be expanded.

The Five-Year Yardstick



**5-Year Yardstick
1**



**5-Year Yardstick
2**



**5-Year Yardstick
3**



**5-Year Yardstick
4**



5-Year Yardstick 5

✓ The Refined Bauru Yardstick, like the Goslon, is a rating system with a valid and well tested 5 point scale (1=Excellent, 5=Poor). Unlike the Goslon, more attention is given to the A-P relationship of the apical bases of the premaxilla and mandible and also to the transverse dimension as a potential “modifier” of the score. A photographic representation of the discrete BCLP categories can be found in Appendix 5, but is not intended to substitute for the original casts that constitute the Refined Bauru Yardstick. Guidelines for scoring are as follows:

- Consider apical base relationship first
- Correct inclination of the incisors mentally (also consider excessive retroclination of lower incisors)
- Ignore crossbite of deciduous and permanent lateral incisors and/or canines
- Ignore edge to edge buccal cusp relationships
- If there is evidence of orthodontics, assume there was a crossbite pre-treatment (e.g. bands, teeth flared buccally or over expanded)

Score 1:

- Class I or Class II apical base relationship
- Positive overjet and overbite (no open bite)
- No crossbite
- Good arch form

Score 2:

- Class I or Class II apical base relationship
- Corrected incisors would be in positive overjet and overbite (or minimal open bite)
- May have crossbites or minor deviation in arch form
- If severe deviation in arch form or severe open bite: Score 3

Score 3:

- Edge to edge apical base relationship
- Corrected incisors would be edge to edge
- May have crossbites or major deviation in arch form

Score 4:

- Class III apical base relationship
- Corrected incisors would not be edge-to edge
- May have crossbites or major deviation in arch form

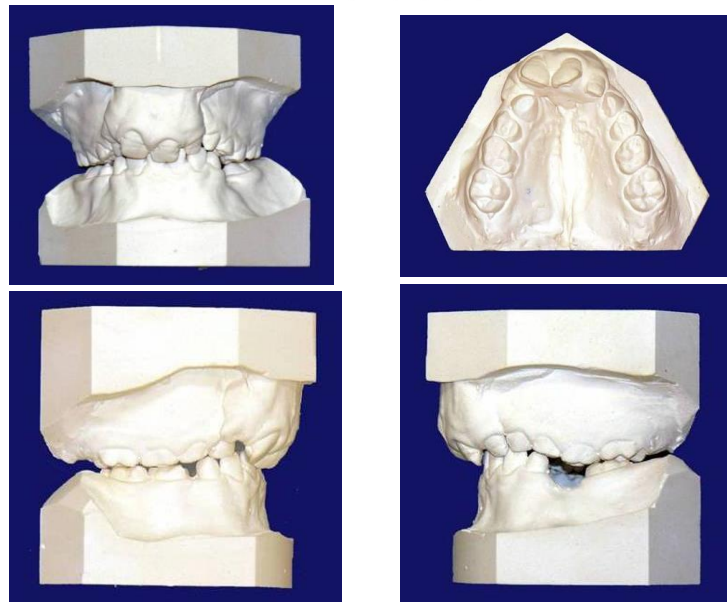
Score 5:

- Class III apical base relationship
- Corrected incisors would no touch lower incisors
- May have crossbite or poor arch form

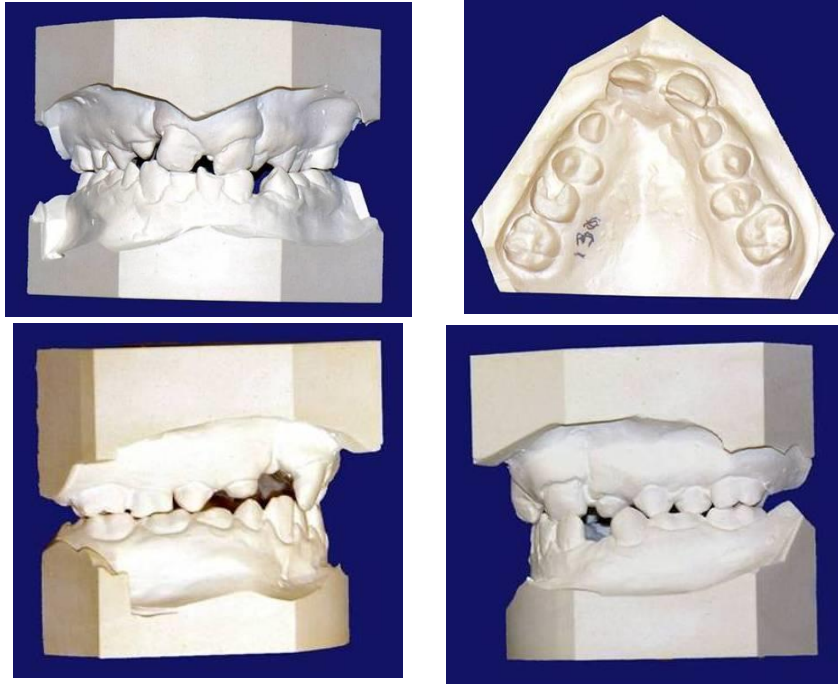
All dental casts from all centers need to be prepared identically and randomized in their order of presentation to insure the records are blinded. The entire set of casts is rated twice by at least 3 experienced, calibrated raters to calculate percentage distribution of cases within each Refined Bauru category and the mean score for each center. It is possible to add new cohort centers to the “Americleft” arch relationship study using this method with different, yet calibrated raters. However, to maintain a continuous link back to the original Americleft ratings, at least two of the raters will always be from the cohort of original Americleft raters. Inter- and intra- rater reliability testing is done with a weighted Kappa statistic.. The guidelines for the preparation of the dental casts are in the index and are the same as for the unilateral casts.. Similar results (to the unilateral study) were demonstrated with the bilateral sample that received primary alveolar bone grafting having a significantly greater likelihood of requiring orthognathic surgery. Reference models are shown below.

Bauru Bilateral Yardstick

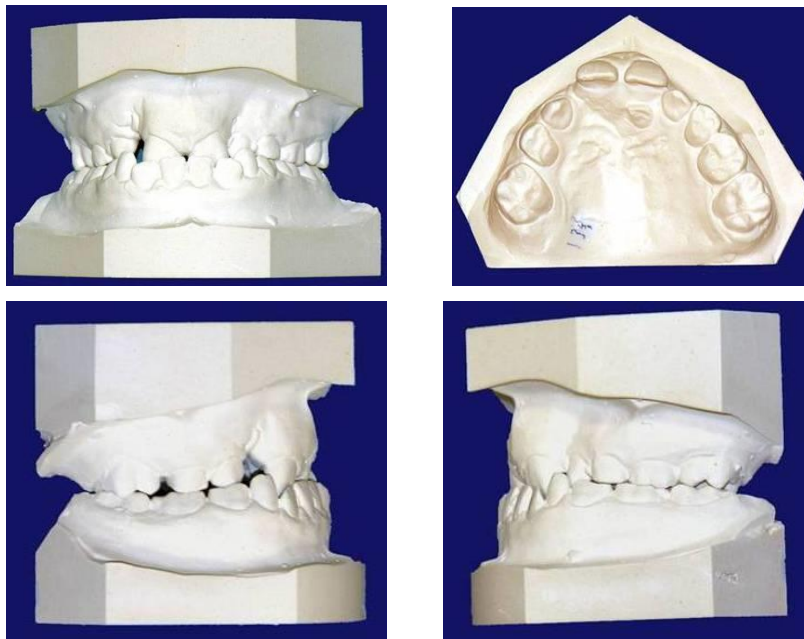
BCLP Yardstick 1



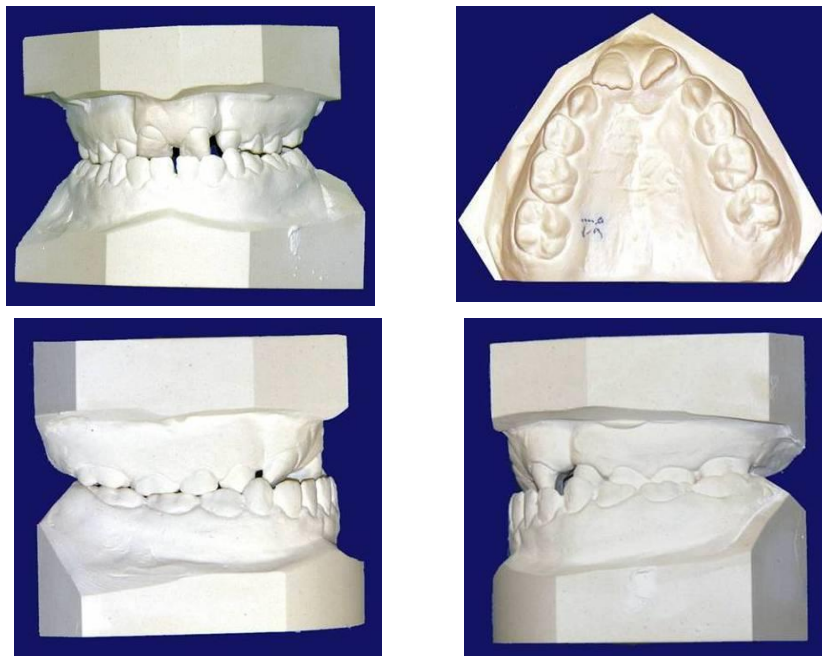
BCLP Yardstick 2



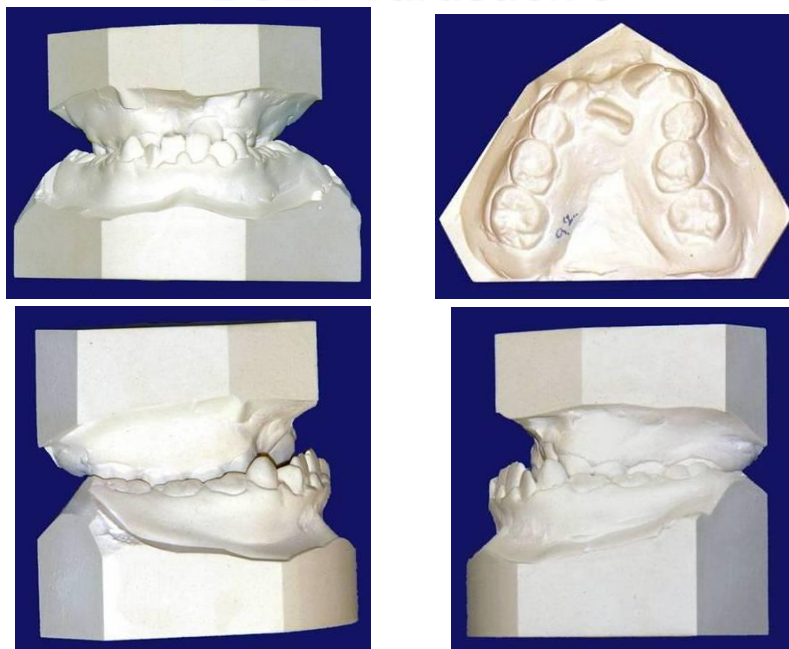
BCLP Yardstick 3



BCLP Yardstick 4



BCLP Yardstick 5



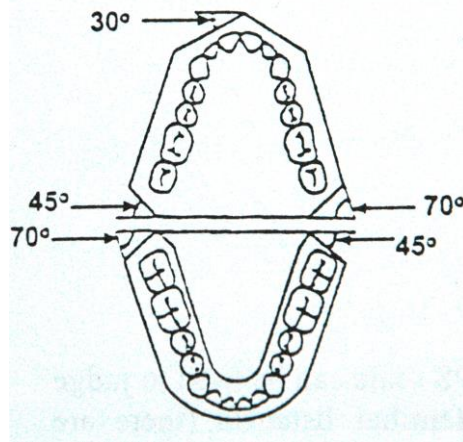
-
- ✓ **The Eurocran Yardstick.** A final dental model rating system which is a refinement of the original Goslon Yardstick and is based on a four point scale, but also places additional emphasis on maxillary arch form, is also being developed and tested. In Americleft we will continue to use the Goslon and 5

Year Yardsticks for now to enable outcome studies to be comparable to the many other similar assessments done in Europe to this point.

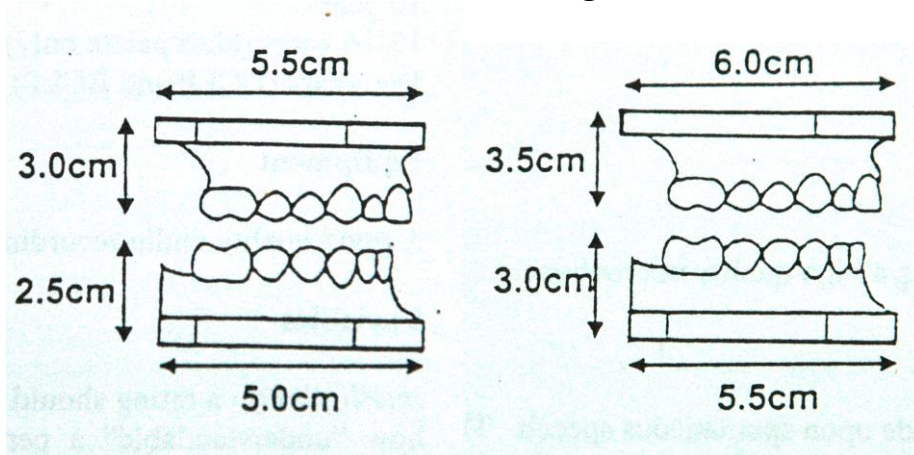
4) Dental Model Preparation – In order to insure blinding of the models during the rating sessions, so that raters would be unable to determine the center(s) from which a given set of models originated, it is essential that the duplicated models all be prepared similarly from all centers, including type of stone used as well as trimming. In this regard, we have elected to follow the guidelines set in the Eurocleft Project. (It is understood that there will be variation in the model preparation from patient to patient and center to center, but significant deviations from the guidelines would require re-preparation of those models or exclusion from the study)

- ✓ Cast in vacuum mixed white stone
- ✓ Trimmed with a fine wheel to the standard heights and angles shown in APPENDIX 6
- ✓ Trimmed with heels parallel so that when models are placed on their heels, teeth are in centric occlusion
- ✓ Finished with light sanding, but NOT soaped

Dental Cast Preparation



Dental casts' base angles



**Dental casts dimensions
For 5-year Yardstick**

**Dental casts dimensions
for Goslon Yardstick**

5) *Model Rating procedures-*

- ✓ Once samples have been identified, assistance in preparation and duplication of dental casts is available at the Lancaster Cleft Palate Clinic (LCPC), Lancaster, PA. The original Americleft sample is archived there, and samples from new Centers wishing to participate will be mixed in with select samples from the original Americleft study to insure a commonality between the original Americleft results and those from additional Centers joining the project. Dental casts would need to be shipped to LCPC in advance of a rating, so the LCPC's dedicated Data Manager and her team would have time to randomly number the casts, and mix/blind them with casts from other Centers already archived. LCPC Data Management team would be responsible also for randomly reassigning numbers between ratings, and for data entry and analysis. Web-based ratings which would eliminate the need for travel, are being explored but are currently not available.
- ✓ As stated above, ratings are done by at least 3 trained and calibrated raters on two separate occasions at least one day apart. Currently there are at least 8 experienced raters from the original Americleft team who have volunteered to meet as needed for blinded ratings. A representative of a new Center wishing to join is not required, and the dental casts can be rated by just a select group of the original Americleft team. However, it is **STRONGLY** recommended that a member from a Center sending dental casts to be rated actually travel to LCPC or Phoenix to participate in the process. Not only does that offer the opportunity for new participants to experience the positive benefits of these outcome comparisons with other Americleft members, but it also reduces the chances that findings might be attributed to bias against a newly participating Center if it had no representation on the panel. The training and calibration in the use of the Yardsticks has proven to be a straightforward and simple process taking only approximately one hour.
- ✓ Statistical analysis for intra- and inter-rater reliability, and tests for statistical significance are described above and will be carried out at the LCPC at the time of the ratings or shortly thereafter, so that new participating Centers will know the relative ranking of their dental arch relationship outcomes at the time of the study.

6) **Sample of IRB Application for Dental Arch Relationship Audit**

Title: An Inter-center Comparison of Treatment Outcomes in Unilateral Cleft Lip and Palate.

Investigators:

Site:

Background: Desirable outcomes in the treatment of patients with cleft lip and palate can be measured in a number of different areas important to successful rehabilitation of the patient. These include intelligible speech, normalized facial esthetics, normal hearing and favorable facial and dental growth and development. In landmark inter-center comparative studies in Europe,

called the “Eurocleft Project”, all of these outcomes have been shown to be significantly related to the initial surgical protocol used for repair of the cleft in the infant, as well as patient volumes treated by the primary surgeons. The initial identification of primary protocols which produce favorable vs unfavorable outcomes has been started, although a recent survey of 201 European cleft palate centers revealed a total of 196 different primary protocols being used! Recently a similar initiative has been started in the North America, called “Americleft”. This provides opportunity for additional attempts, through inter-center outcome comparisons, to examine outcomes from centers using different protocols, and especially to involve the North American centers in this international initiative.

Of all the outcomes, the one that has the greatest impact is the subsequent development of the bones of the face, jaws and dental arches. Coincidentally, this outcome is also one which is most easily quantified and rated using non-invasive clinical records routinely gathered on patients for orthodontic diagnosis and treatment planning procedures. Plaster dental study casts, made from standard dental impressions are routinely taken in the 7-10 year age range for patients with cleft lip and palate in almost all centers. These are taken for the purpose of diagnosis and planning coordinated surgical and orthodontic treatment for bone grafting at this age and are considered as a valuable indicator of future treatment needs. As part of the routine necessary inclusion of these dental casts for treatment, no informed consent in addition to that obtained routinely for evaluation, diagnosis and treatment, is normally obtained for the dental study casts. A dental model rating system developed in England has been show to be a robust, valid and reliable method of differentiating between favorable vs unfavorable outcomes to that point in a patient’s life, using future treatment needs as the index. Since the results observed and rated represent the outcomes of the particular primary surgical protocol used, the rating of these models becomes a method of quantifying favorable vs unfavorable infant management procedures.

Previous investigations have established well-defined inclusion criteria for such dental model rating studies, in order to reduce and eliminate sources of bias. These criteria include: (1) verification of initial condition being complete, non-syndromic unilateral cleft lip and palate; (2) verification of consecutively enrolled patients; (3) availability of dental study casts at the appropriate age; (4) confirmation of primary surgical procedures used, and numbers of primary surgeons involved; (5) verification of no other surgical or orthodontic treatment other than the primary procedures, up to the time of the dental casts; (6) verification of patient age at time of dental casts.

The _____ Clinic has been a regional leader in the field of craniofacial anomalies and cleft lip and palate for the past ____ years. The availability of facial growth and treatment records on patients at this Center provides an opportunity for us to participate in the Americleft project. Intercenter collaborative outcome studies such as this have also recently been endorsed and supported by the World Health Organization. The possibility of expanding the number of participating teams and initiating similar collaborative efforts in North America has also been endorsed and supported by the American Cleft Palate-Craniofacial Association. As a result, to date, ___ centers have been identified which have patient samples which meet the inclusion criteria and are of sufficient size to allow for statistically valid comparisons of outcomes. We are seeking approval to become involved in this important project.

Research Design: A retrospective review of patient records is carried out to identify patients meeting the inclusion criteria. These records reviews are carried out by the professional staff members of this Center. The initial sample lists include only patient name and date of birth as PHI’s in order for the sample selection to allow for determination of inclusion/exclusion, and once included, to determine surgeon of record, surgical protocol used, and age at the time dental

models were taken. No dental model records are taken which are not already available as part of the patients' normal diagnostic and treatment procedures. Once dental models are identified for inclusion, duplicate models are made which remove all PHI from the dental casts themselves. The only identifiers used on the casts are a number assignment for the center from which they came, and a randomly assigned patient number. At this point, a data manager is assigned from professional staff, who is not part of the investigative team. The data manager is then responsible for generating a sample list which consists solely of the patients' randomly assigned numbers on the dental casts, the patient age at the time the dental casts were taken, a number corresponding to the surgeon of record, and a description of the surgical procedures used. At this point, all PHI becomes permanently de-linked from the dental casts and inaccessible to any of the investigators.

The numbered dental casts from all this Center and all others who will be participating in this outcome comparison are duplicated identically to blind the investigators/raters from the source of the records. The entire sample for all Centers is then randomly renumbered removing all indication of the center of origin.

The actual rating is carried out after a preliminary review of the rating system with the rating team, a training period and a calibration trial rating. All investigators for the collaborating centers are following the same procedures and have been informed as to the methods used to insure no risk to patients regarding record taking or PHI disclosure. Two separate ratings of the entire sample are carried out. The data gathered are given to the data manager who is then responsible for entering the data and statistically analyzing the results. Access to the computer used by the data manager is secure and password protected, even though the final outcomes assessment data will still contain no PHI. In addition, no photo or other reproduction of any of the patients' dental casts will ever appear in any presentation or publication which may result from this outcome assessment. Only group data are presented.

Once ratings and data analysis are complete, all duplicated dental study casts will be archived with no PHI attached. The data manager and the will be responsible for insuring adherence to the methods and procedures described above.

Finally, it is proposed that due to the nature of this outcomes assessment that the informed consent and HIPAA requirements be waived, for several reasons. First, due to the nature of this retrospective study, the majority of patients whose dental casts are included in the sample, have long since completed their treatment and have been dismissed from their respective centers, thereby most likely making new contact with these patients both intrusive and possibly inconsistent. The likelihood that some patients meeting the inclusion criteria would be excluded from the study simply due to inability to contact them, would significantly reduce sample sizes to levels that would be statistically invalid. Second, the records being analyzed pose absolutely no risk to the patient since they have already been taken. Third, all dental casts were taken as part of the routine diagnostic and treatment planning procedures for all centers and considered as covered under the normal informed consent signed by all patient/parents. Since the purpose of the dental casts was to evaluate treatment needs, the rating system used in this study is simply a method to quantify those needs and allow for statistical analysis of group results. Therefore, with the assumption that treatment needs are directly and inversely related to outcomes, the only use of the dental casts in addition to that for which they were taken, is the statistical analysis of those treatment needs or outcomes, in the context of the primary surgical protocols used. Fourth, in the execution of the outcomes assessment, once the sample is identified, all PHI will be permanently de-linked from the dental casts used in the study, so there would also be absolutely no risk to patients of unintended PHI disclosure. Last, no copy, photo or other reproduction of any of the

dental casts used would appear in presentation or publication, even though dental casts per se are not considered PHI.

Significance: The significance of this study lies in its potential value in the quest for information which would allow us to determine those primary infant management protocols which produce the most desirable outcomes. Since most centers providing care for patients with clefts use their own specific approaches, and since the number of different approaches used is overwhelming, and since it has been shown in Europe that not all approaches produce desirable results, it is incumbent on those of us treating these patients that we be willing to compare and scrutinize our results and outcomes methodically and scientifically in order to be able to make evidence-based decisions about treatment choices we offer to patients. Thus collaboration between centers is essential. Such collaboration as started in Europe in the 1990's has led to a rapid growth in our knowledge base as well as having laid the groundwork for more sophisticated investigations such as randomized control clinical trials and standards for recording and reporting outcomes, which offer even better chances to identify "good practices". "Americleft", the first of its kind in North America, has the potential to stimulate similar progress in the US and Canada, and thereby add substantially to the growing body of knowledge necessary to improve care for patients with cleft lip and palate.

Sample Protocol Table

Treatment	Center A	Center B	Center C	Center D	Center E	Center F
Pre-surgical orthopedics	No	Yes	No	No	Yes	Yes
Lip repair	6 wks Millard or 6 mos Delaire	2-3 mos Millard	3 mos Tennison	3 mos Variable	7 wks Lip Adhesion; 7 mos Millard	3-4 mos Millard
Primary bone grafting	No	Yes 6-9 mos	No	No	No	No
Hard palate repair	9-12 mos Bardach or Delaire	11-15 mos Hard palate Wardill-Kilner	12 mos Vomer flap	12 mos Vomer flap	14 mos V-Y pushback	? mos Vomer flap/ Von Langenbeck
Soft palate repair	9-12 mos Bardach Or 6 mos Delaire	11-15- mos Furlow (1 surgeon) or IVV	18 mos Median suture with IVP	12 mos Von Langenback with IVP		? Veau pushback
Secondary bone grafting	6 yrs Delaire	8-9 yrs If needed	9 yrs	7-10 yrs	9 yrs	9-11 yrs
Surgeons	2	4	1	1	1	4
Sample Size	18	40	38	38	18	35
Avg Age	9:4	8:6	9:0	9:1	9:0	9:2

Average Dental Arch Relationship (Goslon) Ratings

Center	Goslon	PSOT	Latham	NAM	GPP	1° ABG	Delayed HP	# Surgeons
A1	2.36	√						1
E1	2.47							1
A2	2.50							1
E2	2.59							6
E3	2.64	√					√	6
E4	3.03	√				√		7
E5	3.04							10
A11b	3.07							4
A3	3.13							4
A4	3.13			√				2
A5	3.18	√						4
A6	3.32			√				4
A7	3.32							1
A8	3.38							2
E6	3.46	√						12
A9	3.53			√				4
A10	3.63			√	√			1
A11a	3.66	√				√		4
A12	3.75			√				3
A13	3.77	√				√		4
A14	3.91			√	√			3
A15	3.92		√		√			2
A16	3.94		√					3

PUBLICATIONS

1. Hathaway RR, Daskalogiannakis J, Mercado AM, Russell KA, Long Jr RE, Cohen MA, Semb G, Shaw W: The Americleft Study: An intercenter study of treatment outcomes for patients with unilateral cleft lip and palate. Part 2 – Dental arch relationships. Cleft Palate-Craniofacial Journal, 48:244-251, 2011.
2. Hathaway RR, Long Jr RE, Mercado AM, Daskalogiannakis J, Russell KA, Semb G, Shaw WC, Gregory J. The Americleft Project: Use of a standardized outcome measure of dental arch relationships (Goslon) to allow international interstudy comparisons. Transactions of the 12th International Congress on Cleft Lip/Palate and Related Craniofacial Anomalies, Orlando, FL, May 5-10, 2013.
3. Peanchitlertkajorn S, Mercado AM, Daskalogiannakis J, Hathaway RR, Russell KA, Semb G, Shaw WC, Lamichane M, Fessler, J, Long Jr RE. An inter-center comparison of dental arch relationships and craniofacial form including a center using nasoalveolar molding. Accepted for publication, Cleft Palate Craniofacial J, 2018.
4. Long Jr RE, Daskalogiannakis J, Mercado AM, Hathaway RR, Fessler J, Russell K. The Americleft Project: Plaster dental casts versus digital images for GOSLON Yardstick ratings when used in intercenter comparisons. J of Craniofacial Surgery, 28:1269-1273, 2017.
5. Kornbluth M, Campbell RE, Daskalogiannakis J, Ross EJ, Glick PH, Russell KA, Doucet JC, Hathaway RR, Long Jr RE, Sitzman TJ. Active presurgical infant orthopedics for unilateral cleft lip and palate: Intercenter outcome comparison of Latham, modified McNeil, and nasoalveolar molding. Cleft Palate Craniofacial J, 55:639-648, 2018.
6. Singer E, Daskalogiannakis J, Russell KA, Mercado A, Hathaway RR, Stoutland A, Long Jr RE, Fessler J, Semb G, Shaw WC. Burden of care of various infant orthopedic protocols for improvement of nasolabial aesthetics in patients with CUCLP. Cleft Palate-Craniofacial J, 55:1236-1243, 2018.

ABSTRACTS OF PRESENTATIONS

2007 – ACPA Broomfield, CO

A TWO-CENTER COMPARISON OF DENTAL ARCH RELATIONSHIP OUTCOMES RESULTING FROM SIGNIFICANTLY DIFFERENT PRIMARY MANAGEMENT PROTOCOLS FOR COMPLETE UNILATERAL CLEFT LIP AND PALATE

Long, Hathaway, Cohen, Daskalogiannakis, Howard, Russell

THE AMERICLEFT PROJECT - A 6-CENTER PILOT PROJECT USING THE EUROCLEFT PROTOCOL FOR INTERCENTER COLLABORATIVE OUTCOME STUDIES

Long, Hathaway, Cohen, Daskalogiannakis, Howard, Russell, Mercado, Shaw, Semb, Ruda, Ahmed

2010 ACPA Fort Worth, TX

AN EXPANSION OF THE AMERICLEFT INTERCENTER COMPARISON OF DENTAL ARCH RELATIONSHIPS TO INCLUDE A CENTER USING NAM +/- GPP AS PART OF ITS PRIMARY PROTOCOL

Peanchitlertkajorn, Russell, Daskalogiannakis, Lamichane, Mercado, Hathaway, Long, Gregory

THE AMERICLEFT PROJECT: A COMPARISON OF RELIABILITY BETWEEN GOSLON YARDSTICK RATINGS USING PLASTER DENTAL CASTS VS DIGITAL IMAGES

Mercado, Daskalogiannakis, Long, Russell, Hathaway, Gregory

2014 ACPA Indianapolis, IN

THE AMERICLEFT PROJECT: USE OF A STANDARDIZED OUTCOME MEASURE OF DENTAL ARCH RELATIONSHIPS (GOLSON) TO ALLOW INTERNATIONAL, INTER-STUDY COMPARISONS

Hathaway, Long, Daskalogiannakis, Mercado, Russell, Semb, Shaw

2015 ACPA Palm Springs, CA

THE AMERICLEFT PROJECT: COMPARISON OF CUCLP DENTAL ARCH RELATIONSHIPS BETWEEN 5 CENTERS WITH VARIED INFANT MANAGEMENT PROTOCOLS (NAM, GPP, PRIMARY GRAFTING, INFANT

ORTHOPEDICS.

Beals, Glick, Long, Daskalogiannakis, Hathaway, Russell, Sitzman, Smith, Semb, Shaw

2016 ACPA Atlanta, GA

THE AMERICLEFT PROJECT: A COMPARISON OF DENTAL ARCH RELATIONSHIPS AMONG FIVE CENTERS USING DISTINCT TYPES OF PRESURGICAL ORTHOPEDICS.

Kornbluth, Daskalogiannakis, Doucet, Ross, Sitzman, Campbell, Glick, Beals, Russell, Mercado, Hathaway, Long

2017 ACPA Colorado Springs, CO

THE AMERICLEFT PROJECT: A COMPARISON OF MIXED DENTITION DENTAL ARCH RELATIONSHIPS AMONG FOUR CENTERS USING DISTINCTLY DIFFERENT INFANT MANAGEMENT PROTOCOLS.

Anderson-Cermin, Daskalogiannakis, Glick, Beals, Russell, Doucet, Mercado, Hathaway, Long

2019 ACPA Tucson, AZ

THE AMERICLEFT PROJECT: AN INTERCENTER COMPARISON OF CHANGES IN UCLP DENTAL ARCH RELATIONSHIP BEFORE AND 10 YEARS AFTER A CHANGE IN ONE CENTER'S TREATMENT PROTOCOL.

Hall, Beals, Beals, Hathaway, Daskalogiannakis, Mercado, Russell, Doucet, Dabbagh, Weaver, Long