

**1367** Post Retention Changes in the Lower Curve of Spee Following Premolar Extraction  
Orthodontics: M. PETERS\*, V. CARIAPA, D. FERGUSON, V. DHURU, J. STENGER (Marquette University, Milwaukee, WI).

Long-term stability is a primary goal in orthodontic treatment. The purpose of this study was to evaluate post retention changes in the mandibular curve of Spee and determine the strength of relationship between curve changes and selected mandibular arch dimensions, i.e., overbite, arch circumference and interdental widths of canines, premolars and molars. The sample consisted of 24 randomly selected cases treated by the extraction of first premolars in the permanent dentition; average post-retention time was about 6 years. Pre-treatment, post-treatment and post-retention study models were measured in three-dimensions utilizing a precision milling machine. Lateral cephalometric radiographs were traced and evaluated. Paired t-tests and Pearson's correlations were used to identify statistically significant differences at  $P < 0.05$ . For the post retention sample of mandibular arches studied, arch circumference continued to decrease, retracted canines were stable A-P and inter-canine width decreased to near its pre-treatment dimension during the post-retention period. The premolars underwent the greatest extrusion during active therapy and demonstrated a slight tendency to relapse post-retention; inter-premolar width decreased. Molars showed little change vertically and continued their mesial migration post retention; width of the first molars continued to decrease while second molar width remained stable. The strength of relationship between curve of Spee change and overbite change post-retention was not high enough to be able to predict on an individual case basis, i.e.  $r < 0.7$ . We conclude that orthodontic leveling in the mandibular arch remained relatively stable post retention in the first premolar extraction cases treated orthodontically.

**1368** Post-retention Stability of Mandibular Incisor Irregularity in Successfully Treated Class II/1 Cases. G. Altuna, B. Freemann, S. Niegel, G. Schmuth, H. Schumacher, University of Toronto, Canada, University of Bonn, Germany.

The stability of orthodontic treatment results is a major problem facing the orthodontic profession today. The purpose of this investigation is to describe and compare the post-retention mandibular incisor irregularity in Class II/1 cases treated successfully with fixed versus removable and functional appliances, and then to compare these cases to an untreated Class I group. The samples consisted of 42 patients treated with edgewise orthodontic appliances, 40 patients treated with removable and functional appliances and 38 untreated Class I cases from the Burlington Growth Centre. The average time out of retention was 8.83 years, with a minimum of 5 years. Mandibular inter-first molar, inter-premolar, and inter-canine width, Little's irregularity index, mandibular available space, overbite and overjet were measured on pre-treatment, post-treatment and post-retention dental casts. Independent and paired t-tests and Anova/Duncan analysis of variance were used to analyze the data.

The results indicated that there are no clinically or statistically significant differences in the amount of mandibular incisor irregularity at the post-retention time period between extraction and nonextraction cases, between cases treated with fixed appliances and cases treated with removable/functional appliances, and between cases treated with either fixed or removable/functional appliances and untreated cases. Mandibular incisor irregularity at the post-retention period is independent of orthodontic treatment.

**1369** The Decision to Extract in Orthodontic Treatment: Agreement Among Clinicians. R. MAXWELL\*, E.L. KORN, R.L. BOYD and S. BAUMRIND (University of California, San Francisco CA, Biometric Research Branch, NCI, Bethesda, MD).

The decision whether or not to extract is one of the most crucial considerations in the planning of orthodontic treatment but little quantitative information has been available on between-clinician agreement. Such information is now available for a sample of 148 subjects (100 adolescents and 48 adults) evaluated in a randomized clinical trial of orthodontic treatment (Lancet 337:148,1991; JDR 70:431,1991). Prior to treatment, full orthodontic records for each subject were evaluated independently by each of five experienced clinicians. There was unanimous agreement not to extract for 28% of the subjects (28 adolescents and 10 adults), unanimous agreement to extract for 49% (36 adolescents and 23 adults) and a split decision for 34% (36 adolescents and 15 adults). While some statistically significant differences in propensity to extract were identified among individual clinicians, these differences were not as great as had been anticipated. None of the 14 judges differed from the majority decision of his peers more than 10% of the time. The unexpectedly high concordance among clinician decisions appears to extend to the choice of extraction pattern. For purposes of grouping the data, all possible extraction choices were divided post hoc into five categories: 4 bicuspids, 2 bicuspids, 3 bicuspids, 1 lower anterior, and other. Among the 69 adult and adolescent subjects for whom the judges had unanimously agreed that extraction was the most desirable course of treatment, all five agreed on extraction pattern in 56% of cases (4 bi = 27, 2 bi = 2, 3 bi = 2, 1 lower incisor = 2). In 12 additional cases (20%), four of the five judges agreed on extraction pattern (4 bi = 8, 2 bi = 2, 3 bi = 2). In only 7 of the 59 cases of the 59 cases, were more than two different extraction patterns chosen among the five clinicians. We conclude that despite differences in training and experience, this representative group of judges shared strong common patterns of clinical decision-making. Supported by NIDR Grant #DE08713.

**1370** Clinicians' Reasons for Extracting in Orthodontic Treatment. R.L. BOYD\*, E.L. KORN, R. MAXWELL and S. BAUMRIND (University of California San Francisco CA and Biometric Research Branch, NCI, Bethesda, MD).

The reasons why clinicians decide to extract in orthodontic treatment are being studied as part of a randomized clinical trial. The pretreatment records of a randomly selected subsample of 72 (of 148) subjects were evaluated independently by each of five experienced clinicians (from a panel of 14). In 21 of the 72 cases, all five clinicians decided to treat without extraction. Among the remaining 51 cases, there were 202 decisions to extract (31 unanimous extraction cases and 20 split decisions). The clinicians cited a total of 489 reasons to support these decisions. Crowding was cited as the first reason in 49% of decisions of decisions to extract, followed by incisor protrusion (14%), need for profile correction (8%), Class II severity (5%), and achievement of a stable result (5%). When all reasons for extraction were considered, crowding was cited in 73% of decisions, incisor protrusion in 35%, need for profile correction in 27%, Class II severity in 16% and post treatment stability in 9%. Tooth size anomalies, midline deviations, reduced growth potential, severity of overjet, maintenance of existing profile, desire to close the bite, periodontal problems, and anticipation of poor cooperation accounted collectively for 12% of the first reasons and were mentioned in 54% of decisions, implying that these considerations play a secondary but consequential role in the decision-making process. All other reasons taken together were mentioned in fewer than 20% of cases. The most commonly mentioned reasons for extraction relate strongly to facial appearance. In general, the reasons given for extraction in adults differed little from those cited for children. Within-case agreement on a reason was much greater than chance but much less strong than within-case agreement on the primary decision to extract.

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**1371** Severity of Malocclusion and Reduction in PAR: Class I versus Class II. D. VAYDA\*, K. O'BRIEN, H. SHNORHOKIAN, K. VIG, P. VIG, R. WEYANT. (University of Pittsburgh, PA USA)

The PAR index is an objective, validated and reliable measure of malocclusion severity. Reduction in PAR scores, both absolute values and percentage changes, have been applied as outcome measures to assess the effectiveness of orthodontic treatment. The aims were to utilize the PAR index to compare Class I and Class II malocclusions with respect to pre-treatment malocclusion severity and changes in malocclusion severity with treatment. METHODS: Two samples comprised 311 Class II, and 176 Class I cases. The samples included patients aged 11-14 years, treated between 1977-90 in the orthodontic clinic of the University of Pittsburgh, with complete records, and which met the Class I & II classification inclusion criteria. Pre- and post-treatment casts were assigned PAR scores by a calibrated observer. RESULTS: 1. For Class I and Class II pre-treatment PAR scores mean and (S.E.) were 27.6 (1.0) and 49.1 (0.8). [t=16.16 p<0.0001] 2. Corresponding values post-treatment were 7.8 (0.5) and 11.9 (0.4). [t=5.90 p<0.0001] 3. %PAR reductions were 68.6 (0.04) and 74.4 (0.01). [t=3.21 p<0.001] CONCLUSIONS: 1. The mean pre-treatment severity of Class II malocclusions was significantly greater than for Class I. 2. Percentage reductions in PAR scores were proportionally greater for Class II. 3. For both Class I and Class II malocclusions, more than 85% of patients had a greater than 50% reduction in PAR upon completion of treatment. This study was supported by NIH/NIDR Grant DE 09883.

**1372** Predictors for Class I & Class II Treatment Duration Differ. K. VIG\*, K. O'BRIEN, H. SHNORHOKIAN, D. VAYDA, P. VIG, R. WEYANT, C. COLELLA, J. IZEN, & R. MCGROGAN. (Univ. of Pittsburgh, PA USA)

Previous studies of Class II malocclusion have identified variables that contribute to increasing duration of treatment. The aim was to compare Class II and Class I treatment with respect to the relative contributions of the same independent variables. METHODS: The samples were comprised of 311 Class II and 176 Class I patients, aged 11-14 years, treated between 1977-90 at the University of Pittsburgh. All cases met the Class II & I classification inclusion criteria with complete records. Regression models were created with the R-square value determining the 'best model'. Parameter estimates and effect tests for Classes I & II were performed. Factors included operator characteristics, patient demographics, malocclusion features, treatment variables and the reduction in PAR scores as a measure of treatment outcome. RESULTS: Major significant findings [all p<0.003] were; 1. Effect of broken appointments was twice as great in Class II; 2. Number of years of clinicians' experience was not predictive for Class I; 3. The % improvement, as measured by PAR scores, increases Class I but not Class II duration; and 4. Headgear wear increases Class I [p<0.03] but not Class II duration. CONCLUSIONS: 1. The predictive value of variables across malocclusion types differs and applies specifically to Class I or Class II. 2. Patient compliance and cooperation reduce treatment time for Class II but does not affect Class I. 3. Clinicians with longer experience reduce Class II treatment duration, but not Class I. 4. The amount of occlusal improvement, measured by percent change in PAR, increases Class I treatment duration. Supported by NIH/NIDR Grant DE 09883.

**1373** The efficacy of growth modification: A 5 year randomized clinical trial. J.F.C. TULLOCH\*, C. PHILLIPS. University of North Carolina, Chapel Hill.

Early treatment for Class II malocclusion is frequently undertaken with the objective of altering growth or modifying skeletal imbalance. The efficacy of such treatment has not been established. We report here the annualized skeletal and dental changes seen in 152 children (42:F) in the mixed dentition (age 7.3-12.6 yrs) with O27 mm who were randomly assigned to 3 groups (Headgear n=51, modified functional appliances n=53) and followed for 15 months. No additional appliances were used. Pre-treatment group equivalence, tested using multivariate analysis of variance on sets of 5 maxillary, 7 mandibular, and 3 dental measures, showed no statistically significant differences between the control and early treatment groups (Wilks'Lambda p=.56, .61, .80 respectively). The mean annualized changes for each group are given in mm or degrees. Significant contrasts (p<.01) from a one way ANOVA between each treatment and the control group are indicated by an \*.

Group	SNA	A-N perp	SNB	Md unit lth	ANB	Unit diff	OJ
CTRL	0.31	0.27	0.52	2.40	-0.21	0.99	-0.05
FGNC	0.21	0.15	1.10*	3.74*	-0.89*	2.17*	-2.52*
HG	-0.91*	-0.92*	0.14	2.90	-1.05*	1.93*	-1.47*

The results suggest early treatment for Class II patients reduces the severity of the skeletal imbalance. Headgear restricts forward movement of the maxilla and functional appliance treatment increases the forward position of the mandible. The permanence of these changes remains to be evaluated. Supported by NIH DE 08708.

**1374** Effective Age for Application of Orthopedic Maxillary Protraction. P. NGAN\*, D. MERWIN, C. YIU, U. HAGG, S.H.Y. WEI (The Ohio State Univ. and Univ. of Hong Kong).

Maxillary protraction has been used in early treatment of patients with skeletal Class III malocclusion. The objective of this study was to determine the effective age for intervening the developing malocclusion using protraction headgear (PH) and maxillary expansion appliances. Thirty patients were divided into three groups: primary dentition (5-6.5 years, n=6), early mixed dentition (6.5-10, n=18), and late mixed dentition (10-12 years, n=6) groups. Lateral cephalograms were taken 6 months prior to treatment (T<sub>0</sub>), at the initiation of PH treatment (T<sub>1</sub>) and 6 months after treatment (T<sub>2</sub>). Thus, each experimental subject served as its own control. The occlusal plane and a line perpendicular to this plane through sella were used as a reference grid. Radiographs were superimposed on midsagittal cranial structures. Data were analyzed by ANOVA. Significant overjet and molar corrections were found in all three groups after 6 months of treatment. No significant differences were found when comparing the three groups for maxillary skeletal advancement (1.1 ±1.8, 1.9±1.2, 1.9±1.3mm), maxillary incisal movement (2.7±1.8, 3.9 ±2.8, 2.8±2.9mm) and mandibular repositioning (-1.4±1.1, -2.8±1.9, -2.6±2.9mm). Significant differences were found among the 3 groups when comparing changes in lower facial height (0.7±1.1, 3.3±2.3, 3.3±1.6mm, p<0.05). These results suggest possible orthopedic effects of maxillary protraction on dentofacial morphology when it is applied in primary dentition, early or late mixed dentition.