Abstracts

The dimensions of the roots of the human permanent dentition as a guide to the selection of optimal orthodontic forces
Brian Lee
Bonnet Hill, Tasmania, Australia

**Background:** The dimensions of the roots of the teeth are important in the assessment of orthodontic anchorage and to estimate the forces to be used during orthodontic tooth movement.

**Aims:** To investigate the relations between the lengths, widths and projected areas of the roots of the permanent teeth.

**Methods:** Intact, extracted human permanent teeth were photographed and the lengths, widths and projected areas of selected surfaces measured. Descriptive statistics and associations between selected linear dimensions and root areas were calculated.

**Results:** The data showed significant kurtosis and skewness. Neither exponential nor polynomial transformations improved the goodness of fit, and there was no a priori reason to use other than linear regression. When the lengths of all teeth were multiplied by the respective widths of the mesial, distal and lingual surfaces, the correlations between the product of length and width and area improved in 28 out of 30 surfaces. In the lower arch the correlation coefficients ranged from $r = .343$ (mesial surface first premolar) to $r = .845$ (mesial surface of the canine). The correlations in the upper arch ranged from $r = .201$ (mesial surface of the second molar) to $r = .847$ (mesial surface lateral incisor).

**Conclusions:** For clinical purposes, root length may be an acceptable indicator of root area. Low correlations were attributed to variations in root shape.

Appendix: Additional data (Excel spreadsheet - 1 Mb)

(Aust Orthod J 2010; 26: 1-9)
Received for publication: January 2009
Accepted: February 2010

Brian Lee: bjlee3@bigpond.com
Amorphous calcium phosphate-containing orthodontic composites. Do they prevent demineralisation around orthodontic brackets?
Tancan Uysal,* Mihri Amasyali,† Alp Erdin Koyuturk, Suat Ozcan, and Deniz Sagdic†
Department of Orthodontics, Erciyes University, Kayseri, Turkey and King Saud University, Riyadh, Saudi Arabia,* Department of Orthodontics, Gülhane Military Medical Academy, Ankara, Turkey,† Department of Pediatric Dentistry, Ondokuz Mayis University, Samsun, Turkey,+ and the Department of Conservative Dentistry and Endodontics, Gazi University, Ankara, Turkey±

Background: A preliminary study using laser fluorescence suggested that amorphous phosphate-containing orthodontic composites may prevent demineralisation around bonded orthodontic brackets.
Objective: To compare the microhardness of the enamel around brackets bonded with an amorphous calcium phosphate containing orthodontic composite (ACP-containing) with the microhardness of the enamel around brackets bonded with a conventional composite resin.

Methods: Forty extracted upper premolars were used. Orthodontic brackets were bonded to the teeth with either an ACP-containing composite resin (N = 20) or a conventional composite resin (N = 20). The latter were used as the control. The crowns of all teeth were painted with an acid resistant varnish, leaving a 2 mm ring of exposed enamel around the brackets. The teeth were then subjected to a daily cycle of demineralisation for 6 hours and remineralisation for 18 hours for 21 days. Each tooth was sectioned and the microhardness of the enamel determined 25, 50, 75, 100 and 150 μm from the surface.

Results: The enamel was significantly harder 25 μm (p = 0.000) and 50 μm (p = 0.001) from the enamel surface in the teeth with brackets bonded with the ACP-containing composite resin as compared with the control teeth.
Conclusion: ACP-containing orthodontic composite resins may reduce the enamel decalcification found in patients with poor oral hygiene.

(Aust Orthod J 2010; 26: 10–15)
Received for publication: April 2009
Accepted: July 2009

Tancan Uysal: tancanuysal@yahoo.com
Mihri Amasyali: mamasyali@yahoo.com.tr
Alp Koyuturk: alperdinkoyuturk@hotmail.com
Suat Ozcan: suatozcan@gazi.edu.tr
Deniz Sagdic: dsagdic@hotmail.com
Cytotoxicity of orthodontic separating elastics
Matheus Melo Pithon, Rogério Lacerda dos Santos, Fernanda Otaviano Martins, Maria Teresa Villela Romanos and Mônica Tirre de Souza Araújo
Federal University of Rio de Janeiro-UFRJ, Rio de Janeiro, Brazil

Background: Separating elastics may be cytotoxic to the interdental gingival tissues. Both latex and non-latex separating elastics are widely used and both types should be biocompatible.

Objective: To determine if latex and non-latex orthodontic separating elastics are cytotoxic.

Methods: The cytotoxicity of natural latex (Groups A, D and O) and non-latex (Group M) orthodontic separating elastics were determined by incubating 15 elastics of each type in Eagle’s essential medium (MEM), removing the supernatant after 24, 48, 72 and 168 hours and adding it to cultures of L-929 mouse fibroblasts in growth medium (MEM plus glutamine, garamicine, fungizone, sodium bicarbonate, buffered saline and foetal calf serum). To verify the cell response in extreme situations, three additional groups were included: Group CC (cell control), consisting of L-929 cells not exposed to supernatants from the maintenance medium with the elastics; Group C+ (positive control), consisting of Tween 80; Group C- (negative control), consisting of phosphate buffered saline solution. The positive and negative controls were incubated in MEM maintenance medium for 24, 48, 72 and 168 hours and the extracted elutes were added to L-929 line cells incubated in the growth medium. The viability of the cells was determined with neutral red (dye-uptake method) at 24, 48, 72 and 168 hours. The data were analysed with the analysis of variance (ANOVA) and Tukey’s multiple comparison test. The significance level was $p \leq 0.05$.

Results: The elastics in Groups A, D and O induced greater cell lysis at 72 hours compared to the other experimental times. There were statistically significant differences between the cytotoxicity of the elastics in Groups A, D and O in relation to Group CC for experimental times of 24, 48, 72 and 168 hours ($p > 0.05$). There was not, however, a statistically significant difference between Groups D and CC at 24 hours.

Conclusion: The latex and non-latex orthodontic separating elastics tested were considered to be biocompatible.

(Aust Orthod J 2010; 26: 16–20)
Received for publication: June 2009
Accepted: August 2009

Matheus Melo Pithon: matheuspithon@bol.com.br
Rogério Lacerda dos Santos: lacerdaorto@hotmail.com
Fernanda Otaviano Martins: fernandamartins@gmail.com
Maria Teresa Villela Romanos: teresaromanos@micro.ufrj.br
Mônica Tirre de Souza Araújo: monicatirre@gmail.com
Porcelain brackets during initial alignment: are self-ligating cosmetic brackets more efficient?
Peter Miles* and Robert Weyant†
Private practice, Caloundra, Queensland, Australia* and the Division of Pediatric and Developmental Dental Sciences, School of Dental Medicine, University of Pittsburgh, Pittsburgh, U.S.A.†

Objective: To compare the effectiveness of a self-ligating (SL) porcelain bracket with a conventional porcelain (CP) bracket tied with ligatures for initial alignment in the upper arch, to compare the discomfort of both bracket – archwire combinations and to compare the times taken (both assisted and unassisted) to untie and ligate both bracket – archwire combinations.

Methods: Sixty nonextraction patients were randomly assigned to either a group with CP brackets on the upper six anterior teeth and conventional metal brackets on the premolars and first molars, or a group with SL porcelain brackets on the anterior teeth and SL metal brackets on the posterior teeth. The CP brackets were tied with coated ligatures. The irregularity index was measured at the start of treatment and at the first recall 10.7 weeks later. Discomfort was recorded over the first week with a Likert scale and the times to untie and ligate the six anterior porcelain brackets (assisted and unassisted) were recorded.

Results: There were no differences in irregularities at the start of treatment (p = 0.91) or 10.7 weeks later (p = 0.12). No significant difference in discomfort was found between the bracket types (p = 0.90). The porcelain SL brackets were significantly faster (p < 0.001) to untie and ligate than the CP brackets with ligatures.

Conclusion: Porcelain SL brackets were faster to untie and ligate by 22 seconds per bracket, but there were no significant differences in the alignment achieved or discomfort experienced.

(Aust Orthod J 2010; 26: 21–26)
Received for publication: September 2009
Accepted: October 2009

Peter Miles: pmiles@beautifulsmiles.com.au
Robert Weyant: rjwl@pitt.edu
Display of the incisors as functions of age and gender
Andrea Fonseca Jardim da Motta,* Margareth Maria Gomes de Souza,* Ana Maria Bolognese,* Clarice Júlia Guerra† and José Nelson Mucha†
Department of Orthodontics, School of Dentistry, Federal University of Rio de Janeiro* and the Department of Clinical Dentistry, School of Dentistry, Fluminense Federal University,† Rio de Janeiro, Brazil

Background: Older subjects usually show less of their upper incisors and more of their lower incisors than younger subjects.

Objectives: To determine how much of the upper and lower central incisor crowns are visible in Brazilian subjects with their lips at rest.

Methods: The subjects were 240 white Brazilian subjects divided into four age groups: Group 1, 12 to 15 years of age; Group 2, 20 to 30 years of age; Group 3, 31 to 50 years of age and Group 4, 51 years of age and older. Each group contained 30 males and 30 females. The vertical display of the incisors was measured in millimetres from the midpoints of the incisal edges of the upper and lower central incisors to the borders of the upper and lower lips.

Results: In females, the mean upper central incisor display reduced from 4.45 mm in Group 1 to 1.32 mm in Group 4, and in males it reduced from 3.35 mm in Group 1 to 0.57 mm in Group 4. Less of the lower central incisor crowns were displayed in Group 1 females (Mean: 0.47 mm) than in Group 4 females (Mean: 2.22 mm), and in Group 1 males (Mean: 0.61 mm) than Group 4 males (Mean: 3.05 mm). Brazilian women showed significantly more of their upper incisor crowns than Brazilian men in Groups 1, 2 and 4, whereas Brazilian men showed significantly more of their lower central incisors than Brazilian women in Group 4.

Conclusions: With the lips at rest, older Brazilians display less of their upper central incisors and more of their lower central incisors than young Brazilians. Women show more of their upper incisors than men, while men display more of their lower central incisors than women.

(Aust Orthod J 2010; 26: 27–32)
Received for publication: June 2009
Accepted: November 2009

Andrea Fonseca Jardim da Motta: afjmotta@gmail.com
Margareth Maria Gomes de Souza: margasouzaster@gmail.com
Ana Maria Bolognese: anabolognes@yahoo.com.br
Clarice Júlia Guerra: neycurvo@yahoo.com.br
José Nelson Mucha: nelsonmucha@wnetrj.com.br
McNamara norms for Turkish adolescents with balanced faces and normal occlusion
Nihat Kilic, Gülhan Catal and Hüsamettin Oktay
Department of Orthodontics, Faculty of Dentistry, Atatürk University, Erzurum, Turkey

Background: There are no norms for the McNamara analysis for Turkish adolescents.

Objective: To obtain cephalometric standards for the McNamara analysis for Turkish adolescents with balanced faces and Class I occlusions, and to compare the standards with published data.

Methods: The cephalometric radiographs of 116 children (83 female, 33 male) between 11 and 16 years of age with Turkish grandparents and Class I occlusion, well-aligned upper and lower dental arches, no anterior and/or posterior crossbites and normal dentofacial structures were used. The eight linear and two angular measurements in the McNamara analysis were measured on images of the scanned radiographs. Measurements of the male and female subjects were compared with each other and with published norms for North American adolescents and adults.

Results: The Co-Gn, Co-A, ANS-Me and Ui-A were larger in the male subjects. Comparisons between the present study and McNamara’s original study revealed that Anatolian Turkish adolescents, particularly girls, have smaller midfacial and mandibular lengths and longer and more retrusive faces than North American adolescents and adults.

Conclusions: The small, but statistically significant, gender differences in mandibular and midfacial lengths and lower anterior face height may not be clinically significant. A single set of Turkish norms for the McNamara analysis may be appropriate.

(Aust Orthod J 2010; 26: 33–37)
Received for publication: January 2009
Accepted: November 2009

Nihat Kilic: drnkilic@yahoo.com
Gülhan Catal: drgulhancatal@yahoo.com
Hüsamettin Oktay: hoktay@atauni.edu.tr
Assessment of slot sizes in self-ligating brackets using electron microscopy

Nidhi B. Bhalla,* Sarah A. Good,+ Fraser McDonald,* Martyn Sherriff† and Alex C. Cash±
Department of Orthodontics, King’s College Hospital;* ‘Guys and St Thomas’ NHS Foundation Trust, London,+ Department of Biomaterials, King’s College London Dental Institute† and the Queen Victoria Hospital, East Grinstead,± United Kingdom

Objective: To measure the slot dimensions of 0.022 inch self-ligating upper central incisor brackets from six manufacturers using electron microscopy, to compare the measured dimensions with the manufacturers’ published dimensions, and to determine if the walls of the slots were parallel.

Materials: Six self-ligating upper central incisor brackets from four manufacturers (SmartClip and Clarity SL, 3M Unitek, Monrovia, CA, USA; Speed, Strite Industries Ontario, Canada; Damon MX,Ormco, Orange, CA, USA; In-Ovation R and In-Ovation C, Dentsply GAC, Bohemia NY, USA) were imaged with a scanning electron microscope and the slots heights measured. Intra-operator repeatability and accuracy were determined.

Results: All brackets had slot sizes that were significantly larger (p < 0.05) than the stated 0.022 inch. Speed brackets were 5.1 per cent larger (0.02311 inch) and the closest to the published dimension. The SmartClip brackets were 14.8 per cent larger (0.02526 inch) than the quoted slot size of 0.022 inch. In most brackets the distances between the slot walls was generally greater further from the bracket bases.

Conclusions: The actual measurements of upper central incisor self-ligating brackets from six manufacturers were larger than the manufacturers’ stated dimension, and the walls of the slots diverged from the bracket bases.

(Aust Orthod J 2010; 26: 38–41)
Received for publication: March 2009
Accepted: November 2009

Nidha Bhalla: nbbhalla@hotmail.com
Sarah Good: sarah.good@gstt.nhs.uk
Fraser McDonald: fraser.mcdonald@kcl.ac.uk
Martyn Sherriff: martyn.sherriff@kcl.ac.uk
Alex Cash: alex.cash@qvh.nhs.uk
Space planning sensitivity and specificity: Royal London Space Planning and Korkhaus Analyses
Rania Dause, Martyn Cobourne and Fraser McDonald
Department of Orthodontics, King's College London Dental Institute, London, United Kingdom

Objectives: To establish the sensitivity and specificity of the Korkhaus and Royal London Space Planning Analyses.

Methods: The sample consisted of 30 cases with two sets of study models and lateral cephalometric radiographs taken at least three years apart. These were then further subdivided into Class I (N = 10), Class II division 1 (N = 10) and Class II division 2 cases (N = 10). The Royal London Space Planning Analysis and the Korkhaus Analysis were applied on these cases at both times.

Results: Study model analysis: The Royal London Planning Analysis revealed that in Class I malocclusions, upper and lower arch crowding and spacing changed significantly with time. The total space required and tooth size reduction for the lower arch had also changed significantly. Additionally, in the Class II division 1 malocclusions, lower arch crowding and spacing, total space required and the need for tooth size reduction had significantly increased, while, in Class II division 2 malocclusions, a statistically significant increase was observed in the upper and lower arch crowding and spacing.

The Korkhaus Analysis showed that in Class I malocclusions a significant decrease was observed in the lower arch length and the lower anterior arch width. The upper posterior (inter-molar) arch width had significantly increased. In Class II division 1 malocclusions the lower right posterior space available had decreased significantly. The upper posterior arch width and the lower posterior arch width also significantly increased. In Class II division 2 malocclusions, a statistically significant decrease was observed in the lower anterior arch length. There were no significant changes in all angular and the two linear measurements for all classes.

Conclusions: The Royal London Space Planning Analysis and the Korkhaus Analysis are clinically sensitive analyses. The Royal London Space Planning Analysis lacks specificity to be a robust model for treatment planning; modification may be required before this technique is accepted.

(Aust Orthod J 2010; 26: 42–48)
Received for publication: July 2009
Accepted: December 2009

Rania Dause: rania.dause@kcl.ac.uk
Martyn Cobourne: martyn.cobourne@kcl.ac.uk
Fraser McDonald: fraser.mcdonald@kcl.ac.uk
Response of the expanded inter-premaxillary suture to intermittent compression.

Early bone changes
Tancan Uysal,* Huseyin Olmez,† Mihri Amasyali,† Yildirim Karslioglu,+ Atilla Yoldas±
and Omer Gunhan+
Department of Orthodontics, Erciyes University, Kayseri, Turkey and the King Saud
University, Riyadh, Saudi Arabia,* Departments of Orthodontics† and Pathology+Gülhane Military Medical Academy, Ankara and the Veterinary Research and Control
Institute, Adana,± Turkey

Objective: To determine the response of the expanded premaxillary suture in the
rat to an externally applied force. Specifically, to investigate early bone changes in
the expanded suture to intermittent loading and unloading.

Methods: Twenty-four 50 to 60 day-old Wistar rats were assigned to three groups.
The inter-premaxillary sutures in all animals were expanded with a 50 g force
applied to the upper incisors. Group I served as the control, whereas in Groups II
and III the incisors were subjected to intermittent loading and unloading after five
days of expansion. The intermittent forces were produced by a cam (0.416 mm, 100
cycles per minute) applied to the disto-gingival margins of the upper incisors. The
mechanical stimuli were applied daily over nine days for six seconds in Group II (30
grams force, 10 cycles/day) and 10 minutes in Group III (30 grams force, 1000
cycles/day). Bone regeneration in the suture was evaluated histomorphometrically.

The area of new bone (μm²), the perimeter around the new bone (μm), Feret’s
diameter (μm) and the percentage of new bone to non-ossified tissue (%) were
measured and compared.

Results: Statistically significant differences were found between the groups for all
histomorphometric parameters. New bone area (p < 0.001), bone perimeter (p <
0.001), Feret’s diameter (p < 0.001) and percentage of new bone (p < 0.001) were
significantly larger in the experimental groups as compared with the Control group.
The histomorphometric measurements confirmed that more new bone was
deposited in the sutures subjected to intermittent loading and unloading.

Conclusion: The application of cyclic loading and unloading to the orthopaedically
expanded inter-premaxillary suture during the early retention phase stimulated the
formation of new bone.

(Aust Orthod J 2010; 26: 49–55)
Received for publication: July 2009
Accepted: January 2010
Tancan Uysal: tancanuysal@yahoo.com
Huseyin Olmez: holmez60@yahoo.com
Mihri Amasyali: mamasyali@yahoo.com.tr
Yildirim Karslioglu: ykarslioglu@gmail.com
Atilla Yoldas: yoldasatilla@yahoo.com
Omer Gunhan: omergunhan@gata.edu.tr
Associations between upper lip activity and incisor position
Nihat Kilic
Department of Orthodontics, Faculty of Dentistry, Atatürk University, Erzurum, Turkey

**Background:** Muscle activity in the upper lip may influence the positions of the upper and lower incisors.

**Objective:** To determine the associations between muscle activity in the upper lip and the inclinations of the incisors, overjet and overbite.

**Methods:** Forty-five subjects (29 girls, 16 boys), between 11 and 15 years of age with predominantly Class I malocclusion, were used. The inclinations of the incisors, overjet and overbite were measured on lateral cephalometric radiographs. Bipolar electrodes were placed on the upper lip to record the activity in orbicularis oris muscle at rest, during maximal clenching, chewing hazelnuts and swallowing. Correlation coefficients between the cephalometric variables and the electromyographic (EMG) activity in the upper lip were calculated.

**Results:** There was no gender difference in the EMG activity in the upper lip. There were no statistically significant associations between the EMG activities in the upper lip and the inclinations of the incisors, overjet and overbite.

**Conclusions:** The positions of the incisors do not appear to be influenced by muscle activity in the upper lip.

(Aust Orthod J 2010; 26: 56–60)
Received for publication: March 2009
Accepted: January 2010

Nihat Kilic: drnkilic@yahoo.com
Effects of levelling of the curve of Spee on the proclination of mandibular incisors and expansion of dental arches: a prospective clinical trial
Nikolaos Pandis,* Argy Polychronopoulou,† Iosif Sifakakis, + Margarita Makou + and Theodore Eliades±
Private practice, Corfu,* Departments of Community and Preventive Dentistry† and Orthodontics, + School of Dentistry, University of Athens and the Department of Orthodontics, School of Dentistry, Aristotle University of Thessaloniki, ± Greece

Objectives: To investigate the effects of levelling the curve of Spee (COS) on the inclination of the mandibular incisors and the width of the mandibular arch.

Methods: Fifty patients, 10–18 years of age, were selected using the following inclusion criteria: nonextraction treatment in the mandibular arch; eruption of all mandibular teeth; no spaces in the mandibular arch; no crowding in the posterior mandibular segments; a mandibular irregularity index greater than 2.5. The depth of the COS, the amount of crowding of the mandibular anterior dentition and the intercanine and intermolar widths were measured on standardised photographs of the casts. The inclinations of the mandibular incisors were measured on cephalometric radiographs. The paired t-test was used to analyse changes in the intercanine and intermolar widths and incisor inclinations before and after treatment, whilst the Wilcoxon signed ranks test was used to examine changes in the COS with treatment. The data were further analysed with a regression analysis to determine the measurements that predicted a reduction of the curve of Spee at the 5 per cent level of significance.

Results: The COS showed a median decrease of 0.9 mm, with 50 per cent of the cases ranging between 0.4 mm and 1.4 mm. The sole predictor of curve flattening was the lower incisor to mandibular plane angle.

Conclusions: The COS is mainly ‘flattened’ by proclining the mandibular incisors. For 1 mm of levelling the mandibular incisors were proclined 4 degrees, without increasing arch width.

(Aust Orthod J 2010; 26: 61–65)
Received for publication: August 2009 Accepted: January 2010

Nikolaos Pandis: npandis@yahoo.com
Argy Polychronopoulou: argypoly@dent.uoa.gr
Iosif Sifakakis: isifak@gmail.gr
Margarita Makou: mmakou@dent.uoa.gr
Theodore Eliades: teliades@ath.forthnet.gr
A comparison of dental changes produced by mandibular advancement splints in the management of obstructive sleep apnoea
Hui Ching Ang and Craig Dreyer
School of Dentistry, The University of Adelaide, Adelaide, Australia

**Background:** Mandibular advancement splints (MAS) are a recognised and popular treatment option for obstructive sleep apnoea (OSA) due to their simplicity, tolerance and non-invasiveness.

**Objectives:** To investigate and compare the dental changes associated with the use of monoblock and duoblock appliances.

**Methods:** Fifty-two pretreatment and follow-up study models of patients from a public hospital and private dental clinic were assessed. Seventeen subjects used a soft elastomeric monoblock appliance (MB), 29 subjects used a hard acrylic duoblock (DB) and six subjects wore a monoblock followed by a duoblock appliance (MB-DB). Measurements of dental and arch changes were obtained and analysed on study models and standardised bitewing radiographs.

**Results:** A statistically significant reduction was observed in the maxillary intercanine distance in all splint categories, with DB users showing the greatest decrease (p < 0.05). The change in the mandibular intercanine distances differed according to splint categories (p < 0.05). MB and MB-DB patients demonstrated a decrease in this measurement variable, whereas an increase was seen in DB users. A statistically significant increase in the mandibular intermolar distance was also observed in all splint categories (p < 0.05), with DB users showing the greatest increase.

**Conclusions:** Both MB and DB appliance systems produced similar, but mild dental effects. No particular appliance can be recommended and the choice of appliance should be considered on a case-by-case basis.

(Aust Orthod J 2010; 26: 66–72)
Received for publication: June 2009
Accepted: March 2010

Hui Ching Ang: cori.ang@gmail.com
Craig Dreyer: craig.dreyer@adelaide.edu.au
Does ozone water affect the bond strengths of orthodontic brackets?
Matheus Melo Pithon and Rogerio Lacerda dos Santos
Faculty of Dentistry, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

Background: Ozone water can be used to eliminate micro-organisms from the water systems in dental offices.

Objectives: To determine if ozone water diminishes the bond strength of orthodontic adhesives.

Methods: One hundred and twenty bovine mandibular incisors were randomly divided into four equal groups. The teeth were cleaned with pumice and washed either with tap water (Groups 1 and 3) or with ozone water Groups (2 and 4) before bonding stainless steel orthodontics brackets to the teeth with either a composite resin (Groups 1 and 2; Transbond XT, 3M Unitek, Monrovia, CA, USA) or a resin-modified glass ionomer cement (Groups 3 and 4; Fuji Ortho LC, GC America Corporation, Tokyo, Japan). The manufacturers’ recommendations for bonding were followed. All samples were subjected to thermal cycling and the shear bond strengths were determined with a universal testing machine. The Adhesive Remnant Index (ARI) was used to score the amount of resin remaining on the teeth after debonding the brackets.

Results: There were no statistical differences in the shear bond strengths of the brackets debonded from enamel washed with either ozone water or tap water or between the groups bonded with the two adhesive resins (p = 0.595). The ARIs in Groups 2 and 3 were significantly different from the ARIs in Groups 3 and 4 (p = 0.030).

Conclusion: Ozone water did not alter the bond strength of brackets bonded with composite resins, but it did alter the sites of resin fracture when Fuji Ortho LC was used.

(Aust Orthod J 2010; 26: 73–77)
Received for publication: August 2009
Accepted: February 2010

Matheus Pithon: matheuspithon@col.com.br
Rogerio Lacerda dos Santos:
Incremental effects of facemask therapy associated with intermaxillary mechanics

Guilherme Thiesen,* Juliana de Oliveira da Luz Fontes,† Michella Dinah Zastrow+ and Naudy Brodbeck May*
Departments of Orthodontics* and Radiology,+ School of Dentistry, University of South Santa Catarina and Private Practice,† Florianópolis, Santa Catarina, Brazil

Objectives: To determine the dentofacial changes in children with skeletal Class III malocclusions treated with maxillary expansion, external maxillary protraction and intermaxillary traction.

Methods: Fifteen Class III patients in either the deciduous or the mixed dentition (Mean age: 7.6 years; SD: 1.9 years) were used. The children were treated with a modified Haas expander, a modified lingual arch, intermaxillary elastics and facemask for nine months. Lateral cephalometric radiographs were taken at the beginning of treatment (T1) and at 3-month intervals (T2, T3, T4).

Results: Most significant sagittal skeletal modifications occurred in the first three months of treatment. During the first three months of treatment the upper and lower incisors tipped lingually and the face height increased. Towards the end of treatment the upper incisors proclined and the upper lip became more protrusive.

Conclusion: The therapy corrected the horizontal skeletal and arch discrepancies and improved the positions of the lips.

(Aust Orthod J 2010; 26: 78–83)
Received for publication: October 2009
Accepted: February 2010

Guilherme Thiesen: guilhermethiesen@yahoo.com.br and guilherme.thiesen@unisul.br
Juliana de Oliveira da Luz Fontes: xaozinha@hotmail.com
Michella Dinah Zastrow: michelladz@yahoo.com.br
Naudy Brodbeck May: naudy@unisul.br
Bond strengths of different orthodontic adhesives after enamel conditioning with the same self-etching primer
Rogelio J. Scougall-Vilchis,* Chrisel Zárate-Díaz,† Shusuke Kusakabe+ and Kohji Yamamoto+
Department of Orthodontics, School of Dentistry, Autonomous University State of Mexico,* Private Practice, Toluca City, Mexico† and the Division of Oral Functional Sciences and Rehabilitation, School of Dentistry, Asahi University, Japan+

Aim: To determine the shear bond strengths (SBS) of stainless steel brackets bonded with seven light-cured orthodontic adhesives after the enamel was conditioned with the same self-etching primer.

Methods: A total of 140 extracted human molars were randomly divided into seven groups (N = 20). In all the groups, the enamel was conditioned with Transbond Plus SEP (TPSEP). Stainless steel brackets were bonded with the following orthodontic adhesives: Group I, Transbond XT; Group II, Blºugloo; Group III, BeautyOrtho Bond; Group IV, Enlight; Group V, Light Bond; Group VI, Transbond CC; Group VII, Xeno Ortho. The teeth were stored in distilled water at 37 °C for 24 hours and debonded with a universal testing machine. The modified adhesive remnant index (ARI) was also recorded.

Results: There were no significant differences in the SBS values among the groups: I (18.0 ± 7.4 MPa); II (18.3 ± 5.1 MPa); III (14.8 ± 4.3 MPa); IV (18.3 ± 7.0 MPa); V (16.4 ± 4.3 MPa); VI (20.3 ± 5.3 MPa); VII (15.9 ± 6.4 MPa), but significant differences in ARI were found.

Conclusions: The seven orthodontic adhesives evaluated in this study can be successfully used for bonding stainless steel brackets when the enamel is conditioned with TPSEP, however, the differences among some groups might influence the clinical bond strengths. In addition, the amount of residual adhesive remaining on the teeth after debonding differed among the adhesives. Further studies are required to better understand the differences in SBS and ARI.

(Aust Orthod J 2010; 26: 84–89)
Received for publication: December 2008
Accepted: February 2010

Rogelio J. Scougall-Vilchis: rogelio_scougall@hotmail.com
Chrisel Zárate-Díaz: chzd@yahoo.com
Shusuke Kusakabe: kusakabe@dent.asahi-u.ac.jp
Kohji Yamamoto: yamamoto.k@ray.ocn.ne.jp
Multidisciplinary treatment of a fractured root: a case report

Osmar Aparecido Cuoghi,* Álvaro Francisco Bosco,† Marcos Rogério de Mendonça,* Pedro Marcelo Tondelli* and Yésselin Margot Miranda-Zamalloa*
Departments of Pediatric and Community Dentistry* and Surgery and Integrated Clinic,† Dental School of Araçatuba, São Paulo State University, Araçatuba, Brazil.

**Aim:** To describe the orthodontic, periodontal and prosthetic management of a case with a 3 mm root fracture below the crest of the alveolar bone.

**Methods:** The root was extruded and periodontal surgery carried out to improve aesthetics and dental function.

**Conclusion:** A multidisciplinary approach to the management of dental root fractures is necessary for successful treatment.

(Aust Orthod J 2010; 26: 90–94)
Received for publication: October 2009
Accepted: January 2010

Osmar Aparecido Cuoghi: osmarorto@terra.com.br
Álvaro Francisco Bosco: afbosco@foa.unesp.br
Marcos Rogério de Mendonça: marcosrm@foa.unesp.br
Pedro Marcelo Tondelli: tondelli.ortodontia@hotmail.com
Yésselin Margot Miranda-Zamalloa: yesselimiranda@hotmail.com