Abstracts

A qualitative investigation of specialist orthodontists in New Zealand. Part 1. Orthodontists and orthodontic practice
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Background: Current knowledge of orthodontic practice is largely anecdotal and the lack of systematic knowledge can create barriers to better identifying the factors that make a successful orthodontist. The aim of this study was to investigate the routine practising lives of New Zealand orthodontists in order to generate an understanding of the reality of orthodontic specialist practice and its effects on their professional and personal lives.

Methods: Semi-structured interviews were conducted involving 19 practising orthodontists (four females, 15 males; mean age 50 years) throughout New Zealand. Transcribed interviews were analysed for themes using an applied grounded theory approach.

Results: A core category of ‘practising orthodontists’ was derived, and related themes were grouped under the sub-categories of: (a) NZ orthodontic specialist practice; (b) NZ specialist orthodontists; and (c) work-life balance. The present paper reports on the first two sub-categories. Themes elucidated under the specialist practice sub-category included modernisation, changing social norms, practice arrangement, branch practice, staffing, competition, legislation, advertising, the future and the provision of orthodontics by non-specialists. Themes in the orthodontic specialist sub-category were prior experience, postgraduate training, recent graduates, reasons for specialising, generational differences, females in orthodontics, NZ and overseas practice, the ageing profession and the prospect of an orthodontist shortage.

Conclusions: This investigation has shed light on orthodontists and the practice of orthodontics in New Zealand and determined aspects rarely discussed in the current or previous literature. It will be valuable to observe how orthodontists and orthodontic practice continue to evolve in response to changes in NZ society.

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The safety zone for mini-implant maxillary anchorage in Mongoloids
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Aim: This study aimed to establish a safety zone for the placement of mini-implants in the buccal surface between the second maxillary premolar (PM2) and first maxillary molar (M1) of Mongoloids.

Methods: Thirty-two digital orthopantomograms of Mongoloids were selected and the interdental distance between the second premolar and first molar at 2, 5, 8 and 11 mm from the cemento-enamel junction (CEJ) was measured. The distance between the PM2 and M1 root apices and from the apices to the maxillary sinus was also determined.

Results: The average width (mm) at 2 mm was 2.58 ± 0.53; 5 mm was 3.47 ± 0.61; 8 mm was 4.00 ± 0.74, 11 mm was 4.36 ± 0.71 and the distance between the apices was 7.49 ± 0.79. Only half of the samples were measured at 11 mm, as many of the root apices were superimposed over the maxillary sinus. The measurement (mm) from PM2 root apex to the sinus was -0.18 ± 1.56, from the mesiobuccal root apex of M1 (MB1) to the sinus was -1.94 ± 1.70 and from the midpoint between their apices to the sinus was -2.96 ± 2.06 (superimposed on the sinus).

Conclusion: The safest area to place mini-implants between the second premolar and the first molar in the maxilla of Mongoloids is between 5 to 8 mm above the CEJ.

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Validity and reliability of tooth size and dental arch measurements: a stereo photogrammetric study
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Background: The development of three-dimensional computer imaging has many applications in dentistry, including the analysis of dental casts.

Aims: To assess the validity and reliability of a dental stereophotogrammetric imaging system.

Methods: The sample consisted of 35 sets of dental casts. Maxillary and mandibular dental crown widths and selected dental arch dimensions were measured directly using digital calipers. Cast images were also captured by a stereophotogrammetric system and analysed using Australis software. Dahlberg's formula, paired t-tests and intra-class correlations were used to assess the random error, validity and reliability of the measurements, respectively.

Results: Most values demonstrated no significant difference between the direct and three-dimensional measurements with mean differences ranging from 0.05 - 0.21 mm. Moreover, values of intra-class correlation coefficients ranged between 0.80 - 0.99 for intra-examiner reliability.

Conclusions: Mesiodistal crown widths and dental arch dimensions may be measured accurately with relatively small error by the specially-designed 3D system and confirms its suitability for clinical and research purposes.

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A comparison of two orthodontic aesthetic indices
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Objectives: A cross-sectional study was conducted to determine the level of agreement between the Dental Aesthetic Index (DAI) and the Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN).

Methods: DAI and AC scores were recorded in 728 subjects (340 females and 388 males, aged 11-20 years). The percentage of subjects needing treatment and the different treatment categories for the DAI and AC were gender compared. Spearman’s rank correlation coefficient (rho) was used to explore the relationship between the DAI and AC scores. Observer determined and Kappa statistics were used to analyse the diagnostic level of agreement between the DAI and AC, sorted into ‘yes’ or ‘no’ categories of orthodontic treatment need.

Results: According to the DAI and AC, 21.8 and 10.9% of subjects were in need of treatment, respectively. Significant positive correlations existed between the DAI and AC scores (rho = 0.795). The DAI had a lower treatment need threshold compared with the AC. The Kappa statistics and percentage agreement between the DAI and AC was 0.55 (95% CI: 0.46-0.63) and 87.6%, respectively.

Conclusion: The DAI and AC showed strong association. However, only a moderate level of diagnostic agreement was identified (12.4% difference in observed percentage agreement) which highlights the need for a unified and universal orthodontic index for consideration when interpreting, comparing, or quantifying treatment needs.

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The effects of non-extraction orthodontic treatment on the vertical dimension: a comparison of a dolichofacial and a mesofacial group

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Objective: The decision regarding extraction or non-extraction orthodontic treatment for patients with different skeletal facial patterns is more commonly based on traditional concepts rather than scientific facts. The present study aimed to investigate whether dolichofacial patients responded differently compared with mesofacial patients to non-extraction orthodontic treatment with respect to vertical changes in facial height.

Methods: Twenty-eight dolichofacial patients and 29 mesofacial patients who underwent non-extraction orthodontic treatment were selected. All patients commenced treatment prior to 15 years of age and had a mean age of 12.3 years for the dolichofacial group and 12.6 years for the mesofacial group. Serial lateral cephalometric radiographs were traced by hand on acetate paper and digitised using the Rocky Mountain Orthodontics JOE 32 programme. Statistical analysis examined the recorded changes in facial axis angle, facial angle, menton-to-ANS distance and facial convexity.

Results: An increase in menton-to-ANS distance and facial angle and a decrease in facial convexity were observed in both groups to a similar extent. Interestingly, the facial axis of both groups remained constant throughout treatment and up to two years post-treatment. Both groups showed slightly increased facial axis angle beyond the original value at two years post-treatment. No statistically significant difference between the two groups was observed in the changes of any of the variables over time.

Conclusion: The results countered the traditional concept that dolichofacial patients would have an increased facial height after being subjected to non-extraction orthodontic mechanics. It appeared that long-term vertical height of the face was more dependent on genetics rather than environmental influences.

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The effect of changing crosshead speed on the shear bond strength of orthodontic bonding adhesive
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Objective: To examine the influence of different crosshead speeds on the in vitro shear bond strength and adhesive remnant index scores for the same orthodontic adhesive.

Materials and methods: One hundred human molars were randomly allocated to four groups. Brackets (.022 inch Victory series, 3M, Monrovia, CA, USA) were bonded with Ortho Solo primer (Ormco, Glendora, CA, USA) and Enlight (Ormco, Glendora, CA, USA) adhesive paste to their buccal surfaces. The brackets were debonded with a universal testing machine (Instron, Canton, MA, USA) with each group subjected to a different crosshead speed of 0.5 mm/min, 1.0 mm/min, 2.0 mm/min and 5.0 mm/minute. Shear bond strength (SBS) was measured and enamel surfaces were examined to determine the adhesive remnant index (ARI) score.

Results: No significant differences were found between the mean SBS or ARI score for any of the groups.

Conclusions: Studies using different crosshead speeds when testing identical adhesives may be used to compare the SBS of other orthodontic adhesives, provided the testing protocols are similar.

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Risk factors associated with external apical root resorption of the maxillary incisors: a 15-year retrospective study

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Aim: To determine the possible risk factors for external apical resorption (EARR) of the maxillary incisors.

Methods: Panoramic radiographs of 132 orthodontic patients with a mean age of 16.9 ± 3.6 years were selected from two practice centres in Tehran. The radiographs were taken between 1990 and 2005 and 63.6% of the subjects were female. Mean, standard deviation and distribution of EARR for various variables were assessed. Prevalence significance, as well as differences between frequency distributions of clinical EARR (≥ 1.2 mm) between genders, treatment plans (extraction/non-extraction), initial overjet and overbite magnitude, and incisor types (centrals/laterals) were evaluated by the chi-squared test. The mean resorption rates on central and lateral incisors were compared using the independent-samples t-test. Associations between EARR with the age, duration of treatment, pretreatment overjet and overbite were assessed by the Pearson’s correlation test. The reliability of the method was determined by remeasuring 117 randomly selected incisors and determining the associations between both sets of measurements with the Pearson’s correlation coefficients.

Results: The prevalence of EARR, and clinical EARR (≥ 1.2 mm) were 91.8% and 44.78% respectively. The average of EARR was 1.377 ± 1.214 mm, or 8.165 ± 8.021% of pretreatment root lengths. The prevalence of clinical EARR was significantly higher in extraction cases, cases with greater initial overjet and on lateral incisors. Using the t-test, significant differences (p < 0.05) were observed between the extent of resorption between genders (higher in females), treatment plans (higher in extraction cases) and incisor types (greater on lateral incisors). Longer treatment times and excessive initial overjet were correlated with higher EARR levels (p < 0.05, r < 0.2).

Conclusions: Factors related to premolar extraction, initial overjet size, treatment time and being female may be correlated with higher EARR. Clinically significant resorption did not occur more in females.

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Objective: To compare palatal height index, arch width, and arch length characteristics in Iranian patients presenting with palatal and buccal canine impaction with a matched control group.

Materials and methods: The case-control study examined 53 patients with canine impaction. The subjects were divided into two groups determined by buccal or palatal impaction which were compared with 53 control subjects presenting without impaction. Subjects in the experimental groups were matched with individuals in the control group according to age, gender, crowding and type of malocclusion. Palatal height and arch length were measured with a Korkhaus three-dimensional divider. Arch width was determined in the anterior and posterior portions of the maxillary arch with a digital caliper. Data were compared with paired t-tests.

Results: The buccal canine impaction group exhibited mean differences in arch length between the case and control groups of 0.8 mm (SD 1.63, p = 0.041). The differences between the case and control groups in intermolar width, interpremolar width, intercanine width, palatal depth, and palatal height index were not statistically significant. The palatal impaction group showed no statistically significant differences between the case and control group in any of the dependent variables (p ≤ 0.05). In a retest examination of arch dimensions, Bland-Altman plots showed no differences between the first and second measurements.

Conclusions: Arch length in the buccal canine group was the only statistically significant variable. The difference was small and was considered not clinically significant.

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The effects of face mask therapy with and without rapid maxillary expansion in adolescent patients
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Objective: To examine the effects of face mask therapy with and without associated rapid maxillary expansion (RME) in adolescent patients presenting with skeletal Class III malocclusion characterised by maxillary retrognathism.

Methods: Case records consisting of lateral cephalograms and hand-wrist films of 43 patients with hypoplastic maxillary Class III malocclusions treated using a face mask with and without an RME were analysed. The patients were divided into two groups; Group A (N = 27) were treated with a face mask coupled with rapid maxillary expansion and patients in Group B (N = 16) were treated with a face mask appliance only. Ten cephalometric linear and 9 angular variables were measured to assess the dentofacial changes. Within group and between groups comparisons were determined by a paired t-test and Student’s t-test, respectively.

Results: Forward displacement of the maxilla and a clockwise rotation of the mandible occurred in both groups. The maxillary-mandibular relationship improved and soft-tissue changes resulted in a more convex profile. The maxillary incisors moved forward only in Group B subjects but the mandibular incisors moved backward in both groups.

Conclusions: Face mask therapy with and without an associated RME improved skeletal Class III malocclusion by a combination of skeletal and dental changes. These results suggested that the use of an RME should be based on clinical criteria rather than assisting the Class III correction.

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The effect of fluoride exposure on the loaddeflection properties of superelastic nickel-titanium-based orthodontic archwires

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Background: It has been demonstrated that fluoride prophylactic agents may cause hydrogen absorption in NiTi wires and degrade their mechanical properties.

Aims: To investigate the effect of a fluoride mouthwash on load-deflection characteristics of three types of nickel-titanium-based orthodontic archwires.

Methods: Twenty maxillary 0.016 inch round specimens from each of the single-strand NiTi (Rematitan 'Lite'), multi-strand NiTi (SPEED Supercable) and Copper NiTi (Damon Copper NiTi) wires were selected. The specimens were kept in either 0.2% NaF or artificial saliva solutions at 37°C for 24 hours (N = 10). The wire load-deflection properties were measured by a Zwick testing machine, using a three-point bending test. An un-paired student's t-test, a one-way ANOVA and a Tukey post-hoc test were used to assess statistical significance.

Results: Immersion in NaF solution affected the load-deflection properties of NiTi wires. The unloading forces at 0.5 and 1.0 mm deflections were significantly lower in fluoride-treated specimens compared with the control groups (p < 0.05). Unloading forces at 1.5, 2.0 and 2.5 mm deflections were not statistically different between fluoride- and saliva-treated specimens (p > 0.05).

Conclusions: The results suggested that subjecting NiTi wires to fluoride agents decreased associated unloading forces, especially at lower deflections, and may result in delayed tooth alignment.

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Orthodontic treatment of a patient with unerupted maxillary central and lateral incisors and canine: a case report
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**Aim:** The aim of this case report was to describe the orthodontic and periodontal management of a patient with three impacted anterior teeth.

**Methods:** An 18-year-old female with Class I crowding on a Class I skeletal base presented with the chief complaint of an unaesthetic smile. Clinical examination revealed an impacted upper right permanent canine (13), lateral (12) and central incisor (11), a retained deciduous incisor and moderate crowding in the lower arch. The impacted teeth were surgically exposed (closed exposure) and aligned with fixed appliances. The 12 was extracted due to root resorption and 44 extracted to resolve the lower arch crowding. A fraenectomy and gingival recontouring were required.

**Results:** Orthodontic treatment resulted in improved overjet, overbite and an acceptable facial profile. The patient reported improved self esteem.

**Conclusions:** While impacted anterior teeth are a clinical challenge, their surgical exposure, in combination with fixed appliances, is a conservative treatment plan which is not without complications.

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Hemimandibular hyperplasia: a rare case of vertical facial asymmetry. A case report
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TP Orthodontics Australasian Orthodontic Board Postgraduate Clinical Award Case 2009
This case presentation received the TP Orthodontics Australasian Orthodontic Board Postgraduate Clinical Award 2009.

Background: Hemimandibular hyperplasia (HH), also known as hemimandibular hypertrophy, is characterised by excessive unilateral three-dimensional growth of the mandible after birth. Vertical elongation of the mandible on one side becomes clinically evident as a rare form of vertical facial asymmetry. Aberrant growth of the facial skeleton affects the developing dentition and dental compensation is usually unable to maintain optimal occlusal relationships. The resulting malocclusion is best managed surgically to address the various facial, skeletal and dental problems that confront clinicians.

Aim: To present a case of hemimandibular hyperplasia treated using a combined surgical-orthodontic approach.

Methods: Combined surgical-orthodontic treatment was accomplished in four phases: 1) presurgical orthodontic, 2) surgical, 3) post-surgical orthodontic and 4) orthodontic retention. Comprehensive records (including photographs, study models and radiographs) were taken at the pre-treatment, pre-surgery and debanding stages of treatment.

Results: A significant improvement in facial symmetry and a positive occlusal outcome were achieved. A more balanced gingival display has improved the patient’s smile aesthetics.

Conclusion: Hemimandibular hyperplasia is a rare condition causing vertical facial asymmetry and a resulting malocclusion. A combined surgical-orthodontic approach is able to accomplish sound facial, skeletal and dental treatment outcomes.

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A severe open bite case treated with orthodontics and tongue reduction surgery: 13-year followup. A case report
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Background: The management of open bite malocclusions creates controversy when treatment approach and long-term stability are considered. Tongue size, posture and habits have been associated as aetiological and compounding factors. Reduction tongue surgery has therefore been advocated as an aid in treatment, especially when the open bite is accompanied by perceived macroglossia.

Aim: The present article describes a clinical case of a 10-year-old girl who started treatment in the mixed dentition with an excessive open bite and speech defects.

Methods: A combination of orthodontics and a partial glossectomy was necessary to successfully address the open bite associated with an enlarged tongue.

Results: The need for orthognathic surgery treatment was eliminated and the patient was satisfied with the post-treatment aesthetics, function and speech.

Conclusion: After 13 years of follow-up, a stable occlusion was maintained with only minor relapse.

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