Interdisciplinary approach in aesthetic dentistry

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Introduction

In today's dentistry, for rendering the best comprehensive dental services to our aesthetically driven patients, the paradigm has shifted to an interdisciplinary team of specialists that work together steered by a clinical co-ordinator. This person should be either a multi-competence general dentist or a specialist with additional training outside his or her specialty area. This gives him or her the ability to bring the surgical, orthodontic, restorative and technical teams together as a whole, following treatment sequences customised especially for the patients' best interests and expectations.

The challenge is making the correct diagnosis and selecting the appropriate treatment regimen. In order to achieve that, the clinician has to follow certain guidelines and understand the relations between teeth and the adjacent structures. Establishing the correct position of the incisal edge of a maxillary central incisor in relation to the lower lip, the correct ratios between the tooth's width and the length, and the level of gingival margin when smiling are very powerful diagnostic tools.

In order to aid memory, one may remember it as the 42.2 rule: (a) a maximum of 4 mm of maxillary central incisor display when the lips are at rest (a minimum of 2 mm; Fig. 1); (b) a maximum of 2 mm of gingival display during smiling; (c) a maximum of 2 mm from the incisal edge of the maxillary central incisor to the lower lip during smiling (Figs. 2 & 3); and (d) the middle third of the maxillary central incisor should be perpendicular to the occlusal plane and the incisal edge should touch the palate (± 0.5 mm; Fig. 4).

The correct ratio between the width and length of a maxillary central incisor is 78 to 80 per cent. With the incisal edge position already determined, we can identify the position of the gingival margin (Figs. 5 & 6).

Gingival margin positioning should be in accordance with the understanding of six conditions present in the oral cavity with different aetiologies and treatment regimens:

1. Altered passive eruption when the gingival margin does not re-cede to a level near the cemento-enamel junction (CEJ) during tooth eruption. Diagnostically, the gingival margin is located incisal to the CEJ. Treatment options depend on the amount of attached gingiva and the position of the bone relative to the CEJ (as a general rule, the biologic width should be a minimum of 2 mm): (a) gingivectomy; (b) osseous resection (osteotomy) with or without flap surgery (without a flap, it is difficult to control the osseous contour driven by the new gingival margins); (c) apically repositioned flap.

2. Altered active eruption when the osseous crest does not re-sorb to a level 2 mm apical to the CEJ. The gingival margin is still located incisal to the CEJ. This is treated with periodontal surgery with osseous resection.

3. Compensatory eruption when the tooth surface is lost, with the reduction in facial height or vertical dimension of occlusion un-affected (short tooth syndrome). Treatment is either restorative or, in the case of hypermobility of the lip, combined with a coronally positioned mucosal flap.

4. Delayed eruption followed by early loss of primary maxillary incisors, delayed eruption of maxillary permanent incisors or eruption of mandibular incisors. Diagnostic features are short maxillary incisors, over-erupted mandibular incisors or a Class III maxillomandibular relation. Bearing the 42.2 rule in mind, treatment should follow incisal reduction done selective-ly with crown lengthening only or crown lengthening combined with orthodontic intrusion of mandibular incisors and possi-bly minimally invasive restora-tion of maxillary teeth.

5. Vertical maxillary excess described as a hyperplastic growth of the maxillary skeletal base where teeth are positioned farther from the skeletal base, an increased facial lower third and excessive gingival display, which is classified according to three categories:
   (a) Category 1: 2–4 mm of gingival display, treated with orthodontic intrusion of incisors and excessive gingival display, treated with orthodontic intrusion, orthodon-tics and periodontics, or periodontics with restorative therapy;
   (b) Category 2: 4–8 mm of gingival display, treated with orthodontic intrusion and excessive gingival display, treated with orthodontic intrusion, orthodon-tics and periodontics, or periodontics with restorative therapy.

6. Hypermobile upper lip—the average mobility of the upper lip is from 6 to 8 mm from the rest position. More than 8 mm represents hypermobility. Considering that the average distance from the lower margin of the upper lip and the base of the nose (subnasale) is 21 mm, one could take two superimposed photographs with the patient at rest and smiling fully to calculate the lip mobile-ity very easily using the 42.2 rule. Generally normal tooth length is present and dental la-bial aesthetics is good to ideal. The treatment regimen could entail a coronally positioned mucosal flap, crown lengthening with crown lengthening followed by orthodontic intrusion, or a combination of both (Figs. 8 & 9).

Examples: Photographs captured at the same magnification opened in Adobe Photoshop: Picture 10: Full smile—length of the central exposed – measure digitally in pixels distance from incisal edge to the lower margin of the upper lip in full smile. Picture 11: Lips at rest – 2 mm central incisor reveal + 21 mm distance lower lip to base of the nose. Incisal edge to base of the nose 25 mm (incisal edge at the correct position).

x = distance from the incisal edge to the lower margin of the upper lip in full smile
y = the amount of central incisor exposed at rest 25 mm = 1,725 px; x = 900 px; mobility = x – y; y = [(25 × 900) / 1,725]; = 2 mm; = 12 mm – 2 mm; = 10 mm (Figs. 10–12).

Since the aetiology is generally multifactorial, by combining all the clinical data gathered during the initial examination, including facial, perio-, orthodontic, endodontic and restorative data, as well as radiographs and diagnostic photographs, the clinician has the ability to compose a very detailed and comprehensive treatment plan especially for a patient with high aesthetic demands.

Following the digitally designed smile concept, balancing the relations between the teeth and adjacent structures will help the clinical co-ordinator and the specialists to plan treatment planning to the patient. Presenting the plan in Keynote diagrams and restorative or orthodontic surgery (Le Fort type I);
(c) Category 3: more than 8 mm of gingival display, treated with orthodontic surgery, or overeruption of mandibular incisors. Diagnostic features are short maxillary incisors, over-erupted mandibular incisors or a Class III maxillomandibular relation. Bearing the 42.2 rule in mind, treatment should follow incisal reduction done selective-ly with crown lengthening only or crown lengthening combined with orthodontic intrusion of mandibular incisors and possi-bly minimally invasive restora-tion of maxillary teeth.

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A crown-lengthening surgical guide (a vacuum-formed Essix appliance) was manufactured on a duplicate model of the wax-up for ideal osseous contouring during the surgical procedure (Fig. 18). The gingivectomy was performed following exactly the gingival margin of the wax-up and then used for guiding the osseous contouring, through which a biologic width of a minimum of 2 mm was maintained (Figs. 19–24). The mock-up should be placed before the surgical appointment for an initial evaluation and then ideally six to eight weeks post-crown lengthening. If done earlier, a very well-adapted indirect acrylic prototype would be advised or the utmost care in adaptation of the bisacrylic resin (Figs. 25–27).

For the ultimate control and when time management in a private office is not an issue, the osseous contouring is performed and the flap is closed, followed by guided gingivectomy and mock-up placement at the next appointment in two to three months’ time. With this approach, the risk of recession or invasion of biologic width is reduced to the minimum.

Controlled tooth preparation was performed through the mock-up using 0.6 mm depth-gauge burs (Figs. 28 & 29). In designing restorations, the diagnosis of the initial situation and underlying tooth structure, the new design proposal and the patient’s expectations play a very important role. The material of choice in this case was feldspathic porcelain (VITA Zahnfabrik) on a refractory die in the anterior zone combined with pressed lithium disilicate (IPS e.max, Ivoclar Vivadent) in the posterior zone (Figs. 30–37). As a rule of thumb, when a material like feldspathic porcelain is used, which filters the light through to the underlying structure, a space of 0.2–0.3 mm is needed per shade change

The occlusion was checked after cementation and a processed acrylic night guard was delivered two weeks post-operatively.