©Operative Dentistry, 2012, **37-4,** 432-441

A Clinical Study of Direct Composite Full-Coverage Crowns: Long-Term Results

V Alonso • M Caserio

Clinical Relevance

Composite full-coverage crowns are a viable option for teeth with amelogenesis or microdonts and are especially suitable for patients still undergoing growth.

SUMMARY

Objective: Long-term assessment of the clinical behavior of direct composite full-coverage crowns using transparent strip crowns as a matrix.

Method: A retrospective observational study without controls of 21 restorations was performed: nine teeth with hypoplasia, six conoid teeth, and six with microdontia. The mean patient age was 22.5 ± 8.2 years. The clinical procedure consisted of cleaning the tooth, acid etching and application of adhesive, after which a transparent strip crown was filled with composite and placed on the tooth. The gingival contour was polished using multifluted burs and interproximal spaces polished with polishing strips. Patients were examined after a period of 12.5 (±4.6) years by two observers who recorded the plaque index and evaluated the restorations in accordance with the modified U. S. Public Health Service (USPHS) criteria.

Results: Except for one case, all the scores obtained on the basis of the USPHS criteria were within the acceptable range. There were no cases of secondary caries. The statistically significant variations were anatomical form, marginal adaptation, marginal discolouration, and surface roughness.

Discussion: This technique is simple and non-invasive. It is a viable long-term treatment option for teeth with amelogenesis or microdonts and is especially suitable for patients still undergoing growth.

Victor Alonso de la Peña, DD, DDS, PhD, Faculty of Medicine and Dentistry, School of Dentistry, A Coruña, Spain

Martín Caserío Valea DDS, Lugo, Spain

*Corresponding author: Dr. Teixeiro, nº 11, 4º D, Santiago de Compostela, A Coruña 15701, Spain; e-mail: dentalinvestigation@yahoo.es

DOI: 10.2341/11-229-S

INTRODUCTION

The dental anomalies that most commonly affect the upper lateral incisors are microdontia, conoidism, or a combination of both.[1] Microdontia affects 1.5% to 2% of the population.[2]

The term "amelogenesis imperfecta" covers a clinically and genetically heterogeneous group of hereditary disorders. Epidemiological studies of

differing populations have shown prevalence to range widely, from one in 700 to one in 14,000. It is classified into three groups—hypoplasia, hypomaturation, and hypocalcification[3]—and affects the enamel of both deciduous and permanent dentitions. More rarely, amelogenesis imperfecta is associated with other dental and oral disorders, such as taurodontism, and predominantly extraoral systemic syndromes, such as cone-rod dystrophy, oculodento-digital syndrome, tricho-dento-osseous syndrome, nephrocalcinosis, or Usher's syndrome.[4] Hypoplasic teeth exhibit a varying decrease in the enamel thickness, along with pitting and other irregularities. However, their hardness and transparency are preserved.

Histological alterations are seen in the enamel of teeth affected by amelogenesis imperfecta. Such alterations may affect the quality of the adhesive bond that may be achieved. In particular, hypocalcification reduces the quality of the bond because of the lack of mineralized structure. Some authors consider that deproteinization, through application of sodium hypochlorite a minute after acid etching, can improve enamel bonding in primary teeth,[5,6] while others prefer to limit the application of orthophosphoric acid to a maximum of 30 seconds in order to prevent further demineralization.[7]

These histological alterations affect the esthetics of the anterior sector. Such teeth are typically restored by indirect methods, using veneers,[8-10] porcelain,[11-13] or metal-ceramic[14] crowns. Another option is composite reconstruction,[15-20] indicated in growing patients and as a transitional restoration in readiness for future prosthetic rehabilitation.

Strip crowns have been used successfully for many years for restoring carious deciduous anterior teeth,[21-28] serving in the anterior sector as a matrix for a composite reconstruction. Little has been published on their use in permanent teeth.[29,30] There are very few long-term studies on direct composite restorations that modified the size and form of affected teeth in adult patients. In fact, strip crowns[31,32] were not used in any study.

The aim of this work was to study the long-term clinical outcome of direct composite complete crowns fabricated using transparent strip crown matrices on caries-free permanent teeth with microdontia, conoidism, or hypoplasia.

MATERIALS AND METHODS

This observational retrospective study without controls assessed a total of 21 restorations provided between 1992 and 2006: 14 in men and seven in women with a mean age of 22.5 ± 8.2 years. All restorations were in the anterior sector, 16 upper and five lower, and without endodontic treatment. There were six conoid teeth, six with microdontia (all upper lateral incisors), and nine with hypoplasia. At the time of the restoration, five patients were receiving orthodontic treatment, none had bruxism, and only one was a smoker (Table 1).

All participating patients signed an informed consent form. The study was approved by the Ethics Committee of the Faculty of Medicine and Dentistry of the University of Santiago de Compostela.

The restorations in this study were performed at a private clinic by the same operator. The clinical procedure used was as follows. Infiltration anesthesia was administered. A mouth opener was applied and gauze placed on the tongue. Nonimpregnated retraction cord was introduced in the gingival sulcus to improve access to this area. Wedges were placed in cases where interproximal contacts could interfere with the gingival adjustment of the crown. Additionally, it was necessary to separate adjacent teeth with wedges to compensate for the thickness of the matrix and avoid diastemas. The choice of crown was made according to form and size, aiming for a mesiodistal diameter that matched as closely as possible the tooth's gingival contour. The crown should normally be of a slightly larger size to compensate for the thickness of the matrix and the removal of material during polishing and esthetic recontouring. The crown was then trimmed back gingivally to obtain the correct height, and a hole was made in the palatal area of the matrix to allow any excess resin to escape when placing the crown on the tooth. The tooth was subsequently cleaned with pumice powder, taking care not to cause the gums to bleed. This was followed by etching with 37% orthophosphoric acid for 20 seconds, rinsing, and drying. Before curing the adhesive, it was verified that there was no contact with adjacent teeth. The adhesives used were Scotchbond 2 in eight cases, Prime & Bond 2.0 in four cases, Prime & Bond 2.1 in two cases, and Prime & Bond NT in seven cases.

The composites used were TPH Spectrum (Dentsply-Detrey, Konstanz, Germany) in 12 cases, Herculite XRV (Kerr, Orange, CA, United States) in seven cases, and Filtek A110 (3M ESPE, Seefeld Germany) in two cases. Medium or "body" opacity and a single color were used for all teeth. Frasaco® strip crowns (Franz Sachs & Co, Tettnang, Germany) were used in all cases. They have a thickness of 0.20 to 0.30 mm. Six different sizes are available

Table 1: *Teeth Included in the Study*

Age	Sex	Tooth	Anomaly	Year of Treatment	Adhesive	Composite	Plaque Index	Restorations Years
47	F	22	Conoid	1992	Scotchbond 2	XRV	0	18
31	M	12	Microdontia	1992	Scotchbond 2	XRV	2	18
32	M	22	Microdontia	1993	Scotchbond 2	XRV	2	17
16	M	21	Hypoplasia	1994	Scotchbond 2	TPH	0	16
16	M	11	Hypoplasia	1994	Scotchbond 2	TPH	0	16
16	M	31	Hypoplasia	1994	Scotchbond 2	TPH	1	16
16	M	41	Hypoplasia	1994	Scotchbond 2	TPH	1	16
22	F	22	Conoid	1994	Scotchbond 2	TPH	1	16
17	M	22	Hypoplasia	1995	Prime&Bond 2.0	TPH	0	15
17	M	12	Hypoplasia	1995	Prime&Bond 2.0	TPH	0	15
17	M	32	Hypoplasia	1995	Prime&Bond 2.0	TPH	1	15
17	M	42	Hypoplasia	1995	Prime&Bond 2.0	TPH	1	15
23	F	12	Microdontia	1997	Prime&Bond 2.1	XRV	0	11
23	F	22	Microdontia	1997	Prime&Bond 2.1	XRV	0	11
32	F	12	Microdontia	2000	Prime&Bond NT	TPH	0	10
33	F	22	Microdontia	2001	Prime&Bond NT	TPH	0	9
26	F	12	Conoid	2001	Prime&Bond NT	A110	0	9
19	M	43	Hypoplasia	2002	Prime&Bond NT	TPH	1	8
13	M	22	Conoid	2001	Prime&Bond NT	A110	2	4
16	M	22	Conoid	2006	Prime&Bond NT	XRV	2	4
16	M	12	Conoid	2006	Prime&Bond NT	XRV	2	4

for the upper incisors and three for the lower incisors. When filling the strip crown forms, it was important to avoid the formation of pores, especially in the corners of the incisal edge. Deformation of the crown by pressing too hard with the fingers was avoided. Any excess material escaping from the gingival area and palatal opening was removed with an explorer. The vestibular and palatal surfaces were light cured, and the crown was finally removed by breaking it with an explorer.

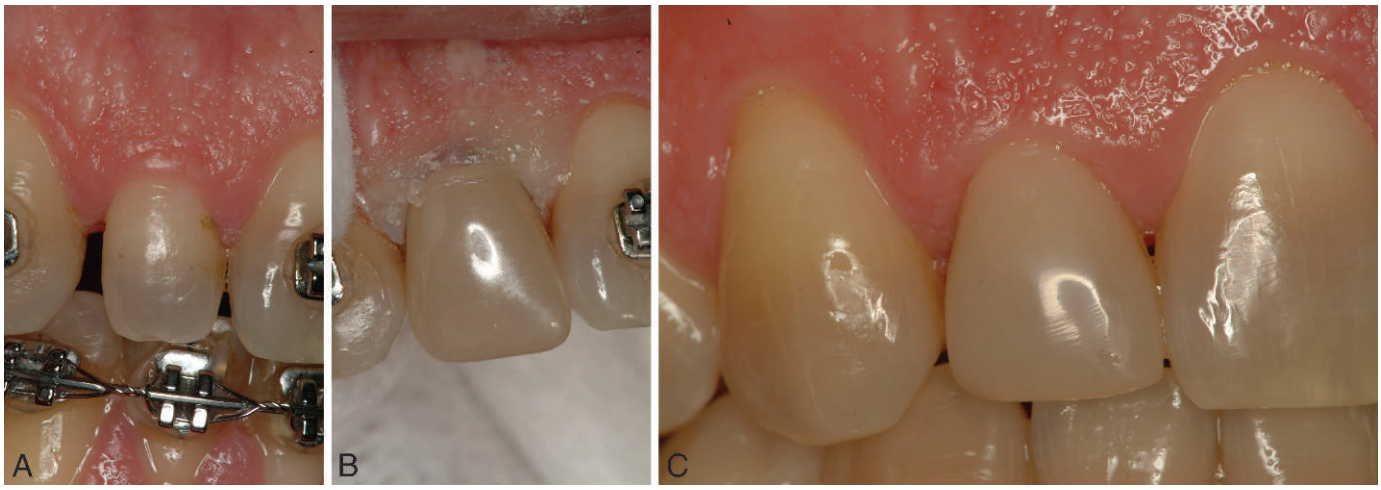

Figure 1. *(A) Tooth 12 with microdontia; the only procedure required is cleaning of the tooth with pumice powder. (B) The strip crown with composite filling is placed on the tooth; excess material is removed prior to polymerization. (C) Restoration is complete after one week.*

The gingival area was polished with multifluted tungsten burs, and an explorer was subsequently used to verify the uniformity of the surface and the absence of ridges. Strips were used in the interproximal area, and vestibular and incisal areas were finished and recontoured with discs. Occasionally, occlusal adjustment required removal of composite resin from the palatal area, possibly exposing the tooth surface.

Photographs were taken pre-, intra-, and postoperatively and during the examinations using a Medical Nikkor 120-mm lens (Fig. 1). The examinations were conducted by two external evaluators, postgraduate dental students specifically trained for this study. The postoperative evaluation was based on photographs taken seven days after completion of the restoration.

Restorations were assessed clinically in 2008 and 2010 (after 12.5 ± 4.6 years). The mean patient age was 35.0 ± 10.2 years. Dental health was evaluated by means of the Silness and Löe[33] plaque index in accordance with U.S. Public Health Service (USPHS) criteria modified by van Dijken[34,35] (Table 2). The SPSS (version 17, IBM, New York, USA) software was used for the statistical analysis and the Kaplan-Meier analysis for estimating survival curves.

RESULTS

Based on the analysis of the immediate postoperative photographs, the examiners gave a score of 0 in all categories of the USPHS criteria. In the examinations, the criteria obtaining statistically significant ($p<0.05$) values were anatomical form, surface roughness, marginal discoloration, and marginal adaptation (Table 3), with the greatest changes being found in the last three (43%, 62%, and 43%, respectively). However, all scores were in the "acceptable" range except for one case.

According to the USPHS criteria, a color change was observed in only one restoration, but there were no cases of secondary caries. The anatomical form of the crowns varied in six cases. Of these, four were due to locally reduced occlusal surface, one was due to slight undercontouring, and the last, which obtained a score of 2 (not acceptable), was due to fracturing where the dentin was exposed (Fig. 2).

Regarding marginal adaptation, in nine cases the margin was detectable with the explorer, showing an invisible gap (score of 1). As for marginal discoloration, in 11 cases there was slight staining that was removable by polishing, obtaining a score of 1, and two cases showed a stain that could not be polished out (score of 2). Nine restorations presented small pores and obtained a score of 1 for surface roughness (Figure 3 and 4).

Of the 21 composite crowns, only one had to be repaired after 10 years because of partial fracture. In three cases, the patients decided to change them for ceramic crowns at the end of the orthodontic treatment after four and 11 years (Figure 5).

Survival analysis after two years of follow-up was 95.2%, 88.9% after 10 years, and 75.2% after 11 years. From 11 years on, the survival rate remained constant.

Table 2: *Modified USPHS Criteria for Direct Clinical Evaluation of the Restorations*

Category	Score		Criteria
	Acceptable	Unacceptable	
Anatomical form	0		The restoration is continuous with tooth anatomy
	1		Slightly under- or overcontoured restoration; marginal ridges slightly undercontoured; contact slightly open (may be self-correcting); occlusal height reduced locally
		2	Restoration is undercontoured, dentin or base exposed; contact is faulty, not self-correcting; occlusal height reduced, occlusion affected
		3	Restoration is missing or traumatic occlusion; restoration causes pain in tooth or adjacent tissue
Marginal adaptation	0		Restoration is continuous with existing anatomic form; explorer does not catch
	1		Explorer catches, no crevice is visible into which explorer will penetrate
	2		Crevice at margin, enamel exposed
		3	Obvious crevice at margin, dentin or base exposed
		4	Restoration mobile, fractured, or missing
Color match	0		Very good color match
	1		Good color match
	2		Slight mismatch in color, shade, or translucency
		3	Obvious mismatch, outside the normal range
		4	Gross mismatch
Marginal discoloration	0		No discoloration evident
	1		Slight staining, can be polished away
	2		Obvious staining can not be polished away
		3	Gross staining
Surface roughness	0		Smooth surface
	1		Slightly rough or pitted
	2		Rough, cannot be refinished

Table 2: Continued.

Category	Score		Criteria
	Acceptable	Unacceptable	
	3	Surface deeply pitted, irregular grooves	
Secondary caries	0		No evidence of caries contiguous with the margin of the restoration
		1	Caries is evident contiguous with the margin of the restoration

DISCUSSION

The crowns were chosen according to size and shape, with a mesiodistal diameter that fitted as well as possible to the gingival contour of the tooth. Crowns should be slightly longer than the tooth to compensate for the thickness of the matrix and material removal during polishing and esthetic recontouring. Pore formation should be avoided, especially in the incisal angles, when filling the transparent crown. During insertion onto the tooth, distortion of the crown due to excessive finger pressure should also be avoided.

This procedure simplifies the fabrication of the restoration. No composite modeling or layering is required, just recontouring and polishing. A full coverage crown is completed in a single step. In orthodontic treatment where microdontia is very marked or associated with conoidism, applying this clinical procedure provides a greater facial surface for bracket adhesion[36] and simultaneously improves tooth esthetics. Therefore, in such cases a tooth cannot be treated when a bracket has already been attached.

In this work, all the restorations were full coverage composite crowns with no restoration-tooth interface on the visible surfaces, a fact that possibly enhanced the long-term esthetic results. Of the 21 composite crowns, 20 showed a good color match, and 15 preserved well their anatomical shape after 12.5 $\pm$ 4.6 years. In this study, 52% of the restorations were carried out in patients younger than 19 years of age. In the view of the authors, this technique could be the treatment of choice in patients still undergoing growth.

Peumans and others[31,32] studied direct composite restorations correcting form and position in the anterior sector. They reported that after five years, these restorations maintained a perfect color in 56% of cases, but only 20% retained their anatomical

Table 3: *USPHS Criteria Values at Follow-Up*[a]

USPHS Criteria Value	Anatomical Form	Marginal Adaptation	Color Match	Marginal Discoloration	Surface Roughness	Secondary Caries
0	15	12	20	8	12	21
1	5	9	1	11	9	0
2	1	0	0	2	0	—
3	0	0	0	0	0	—
4	—	0	0	—	—	—
	p=0.031*	p=0.004*	p=1.000	p=0.000*	p=0.004*	p=1.000*

[a] *At baseline, a score of 0 was given in all USPHS criteria. n=21.*
** Statistically significant* $p<0.05$.

Figure 2. *(A) 47-year-old woman with conoid tooth 22. (B) Completed restoration; an indentation on the buccal surface can be observed, caused by excessive pressure exerted with the fingernail when placing the transparent strip crown. Composite used: Herculite XRV (Kerr). (C and D) State of the restoration after 18 years; this was the only case included in the study where an unacceptable score was obtained (anatomical form) due to fracturing of the restoration.*

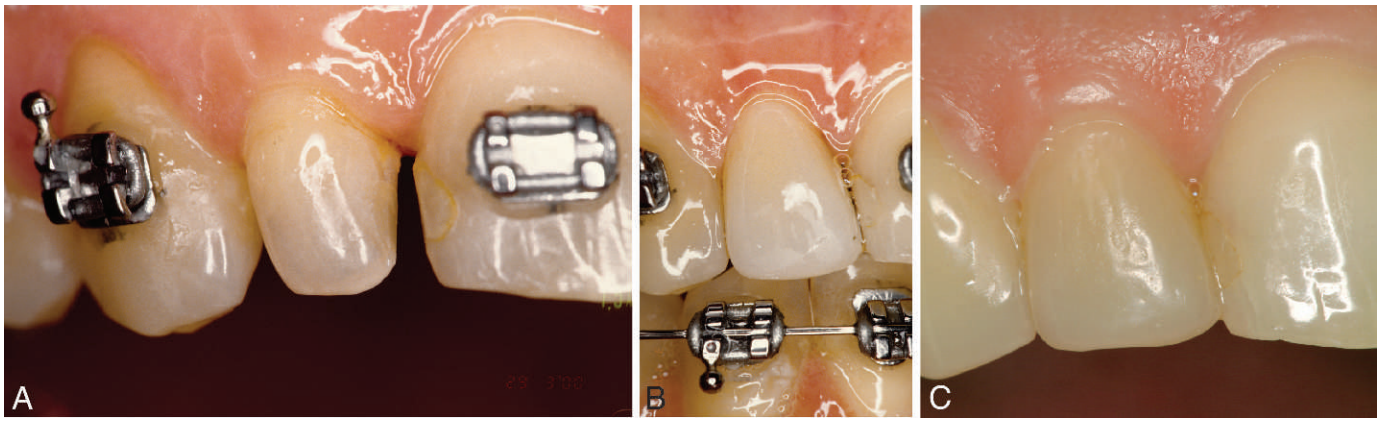

Figure 3. *(A) 23-year-old woman with microdontia in both upper lateral incisors. At the time of the restoration, the subject was undergoing orthodontic treatment. (B) Restoration is complete after one week. The composite used was Prodigy (Kerr). (C) Appearance of the restoration after 11 years.*

Figure 4. *Conoid tooth 12 restored with composite A110 (3M ESPE); appearance after 9 years. Observe the healthy gingival margin and the long-term esthetic behavior of the composite.*

form as a result of restoration material loss. They considered that the size of the restoration was a determining factor for esthetics. Moreover, they found that central incisors performed best, followed by canines and then lateral incisors. In 89% of their cases, they reported cervical region discoloration due to chip fractures, leading to loss of adaptation and consequent microfiltration. Additionally, they found no recurrence of caries, and only 5% of their restorations presented perfect margins.

No cases of secondary caries were observed in this study. An influencing factor could be that decayed teeth were not restored without prior cavity preparation. Marginal adaptation obtained scores of zero in 12 cases (57%) and one in the remainder. Marginal discoloration scored zero in eight cases (38%) and one in 11 cases (52%).

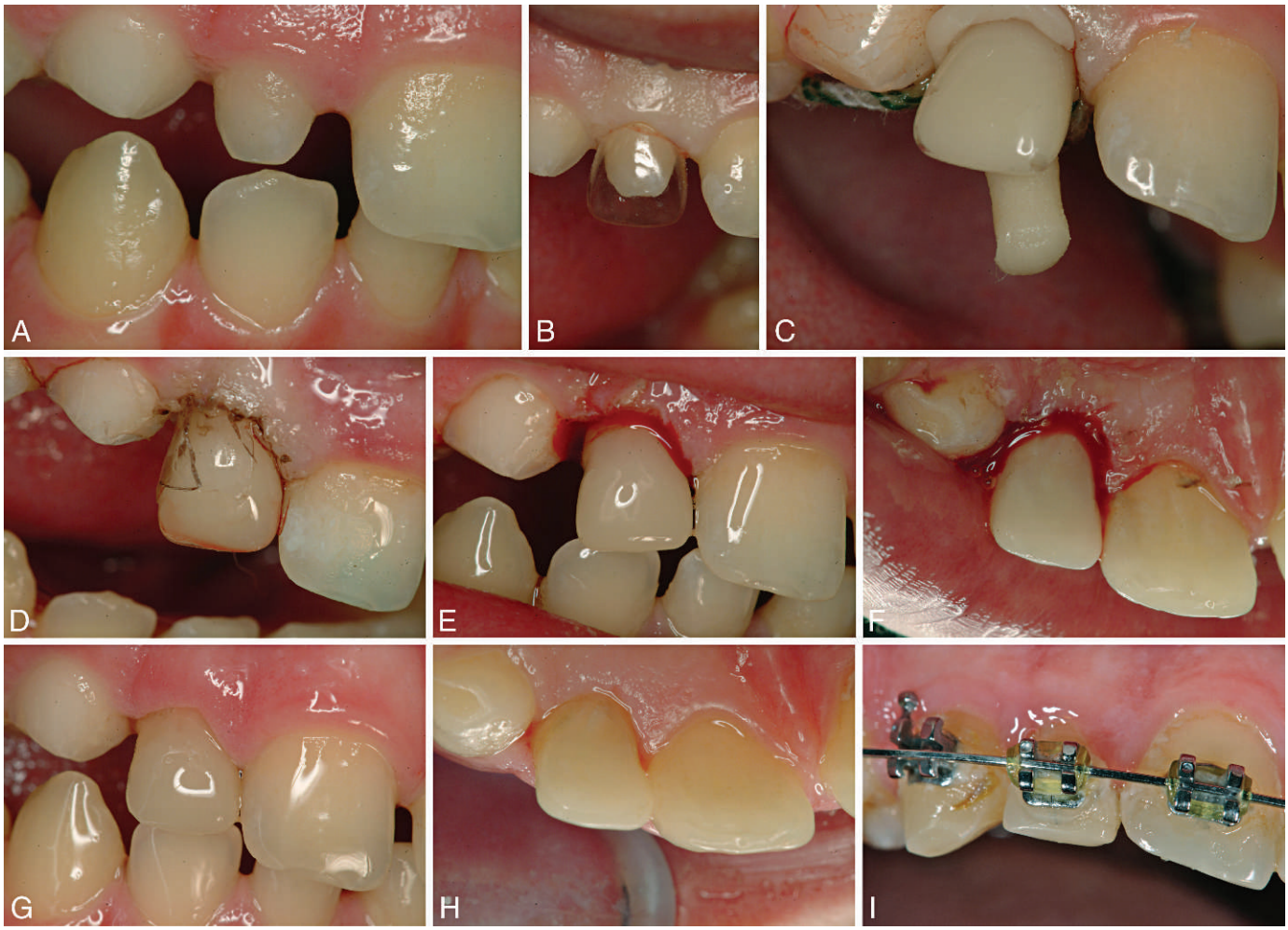

Figure 5. *(A) A 16-year-old male with microdontia of the upper right lateral incisor that will be orthodontically treated. (B) Try-in of the strip crown to evaluate the gingival fit, the mesiodistal diameter, and its size. (C) Insertion of the strip crown with composite, excess composite exits through the hole previously made in the palatal region of the matrix. (D) The strip crown is removed by breaking it through forcing a probe up from the gingival margin. (E and F) Gingival polishing with multifluted tungsten burs with non cutting tips. (G and H) Revision after seven days. The bracket is later placed. (I) Evaluation after four years.*

In a study comparing metal-ceramic crowns with composite reconstructions, it was concluded that while composites suffered more fractures, they were at least reparable, especially in the anterior sector. However, failures in metal-ceramic crowns tended to involve root-canal treatments and extractions. They also reported that there were no statistically significant differences in durability between the two types of restorations over a 10-year period.[37] In this study, only one fracture occurred and was easily reparable, requiring only composite to be added to the existing restoration. Endodontic therapy was not required later in any case.

Little exists in the literature regarding composite reconstruction of permanent teeth using a strip crown as a matrix.[29,30] However, there are several studies analyzing their performance in carious deciduous teeth[21-28] and teeth with amelogenesis imperfecta.[38] A review of the literature[24] concluded that while esthetic results are satisfactory, more prospective studies are needed to validate the technique. Kupietzky and others[22] used this technique on 112 carious deciduous incisors in 40 children and found none had lost the complete restoration after assessment at 18 months, the retention rate being 88%. Another study by the same authors[25] examined 145 restorations of deciduous upper incisors with caries. After three years, not a single restoration had been lost, and only two of them showed radiographic evidence of pulpal pathology. In another study, Ram and others[23] concluded that more than 80% survived successfully for at least two years and reported that the retention rate was lower in teeth with caries affecting three or more surfaces.

In some studies, hypoplasia in the anterior sector was treated using porcelain veneers,[10] porcelain crowns,[12] or metal-ceramic crowns.[14] Others, on the other hand, opted for composite restorations[15-18] but without the use of strip crowns.

This clinical procedure does not require any preparatory tooth drilling, and there is therefore no biological cost attached to it, and the adhesion is entirely on the enamel. It is a reversible, reparable, and modifiable treatment and moreover does not preclude the use of a different technique in the future. Because it is performed in a single clinical session, it could be considered a technique with hardly any contraindications.[30]

The authors believe that the long-term outcomes in the cases performed using this clinical technique are satisfactory. However, further studies with a larger sample size are needed in order to assess the longevity of these restorations for the indications described.

(Accepted 6 September 2011)

REFERENCES

1. Altug-Atac AT, & Erdem D (2007) Prevalence and distribution of dental anomalies in orthodontic patients *American Journal of Orthodontics and Dentofacial Orthopedics* **131(4)** 510-514.
2. Namdar F, & Atasu M (1999) Macrodontia in association with a contrasting character microdontia *Journal of Clinical Pediatric Dentistry* **23(3)** 271-274.
3. Crawford PJ, Aldred M, & Bloch-Zupan A (2007) Amelogenesis imperfecta *Orphanet Journal of Rare Diseases* **2** 17.
4. Balmer R, & Fayle SA (2007) Enamel defects and ectopic eruption in a child with Usher syndrome and a cochlear implant *International Journal of Paediatric Dentistry* **17(1)** 57-61.
5. Saroğlu I, Aras S, & Oztaş D (2006) Effect of deproteinization on composite bond strength in hypocalcified amelogenesis imperfecta *Oral Diseases* **12(3)** 305-308.
6. Sönmez IS, Aras S, Tunç ES, & Küçükeşmen C (2009) Clinical success of deproteinization in hypocalcified amelogenesis imperfecta *Quintessence International* **40(2)** 113-118.
7. Hiraishi N, Yiu CK, & King NM (2008) Effect of acid etching time on bond strength of an etch-and-rinse adhesive to primary tooth dentine affected by amelogenesis imperfecta *International Journal of Paediatric Dentistry* **18(3)** 224-230.
8. Sari T, & Usumez A (2003) Restoring function and esthetics in a patient with amelogenesis imperfecta: A clinical report *Journal of Prosthetic Dentistry* **90(6)** 522-525.
9. Ozturk N, Sari Z, & Ozturk B (2004) An interdisciplinary approach for restoring function and esthetics in a patient with amelogenesis imperfecta and malocclusion: A clinic report *Journal of Prosthetic Dentistry* **92(2)** 112-115.
10. Chu FC (2009) Clinical considerations in managing severe tooth discoloration with porcelain veneers *Journal of the American Dental Association* **140(4)** 442-446.
11. Williams WP, & Becker LH (2000) Amelogenesis imperfecta: functional and esthetic restoration of a severely compromised dentition *Quintessence International* **31(6)** 397-403.
12. Gokce K, Canpolat C, & Ozel E (2007) Restoring function and esthetics in a patient with amelogenesis imperfecta: A case report *Journal of Contemporary Dental Practice* **8(4)** 95-101.
13. Akin H, Tasveren S, & Yeler DY (2007) Interdisciplinary approach to treating a patient with amelogenesis imperfecta: A clinical report *Journal of Esthetic and Restorative Dentistry* **19(3)** 131-136.
14. Robinson FG, & Haubenreich JE (2006) Oral rehabilitation of a young adult with hypoplastic amelogenesis

imperfecta: A clinical report *Journal of Prosthetic Dentistry* **95(1)** 10-13.

15. Shigli K, Angadi GS, & Shigli AL (2006) Restoration of esthetics and function in a patient with amelogenesis imperfecta: A clinical report *Journal of Indian Prosthodontic Society* **6(1)** 43-46.
16. Sabatini C, & Guzmán-Armstrong S (2009) A conservative treatment for amelogenesis imperfecta with direct resin composite restorations: A case report *Journal of Esthetic and Restorative Dentistry* **21(3)** 161-170.
17. Luzzi V, Bossù M, Cavallè E, Ottolenghi L, & Polimeni A (2003) Case report: Clinical management of hypoplastic amelogenesis imperfecta *European Journal of Paediatric Dentistry* **4(3)** 149-154.
18. Soares CJ, Fonseca RB, Martins LR, & Giannini M (2002) Esthetic rehabilitation of anterior teeth affected by enamel hypoplasia: A case report *Journal of Esthetic and Restorative Dentistry* **14(6)** 340-348.
19. Yamaguti PM, Acevedo AC, & de Paula LM (2006) Rehabilitation of an adolescent with autosomal dominant amelogenesis imperfecta: Case report *Operative Dentistry* **31(2)** 266-272.
20. Pena CE, Viotti RG, Dias WR, Santucci E, Rodrigues JA, & Reis AF (2009) Esthetic rehabilitation of anterior conoid teeth: Comprehensive approach for improved and predictable results *European Journal of Esthetic Dentistry* **4(3)** 210-224.
21. Webber DL, Epstein NB, Wong JW, & Tsamtsouris A (1979) A method of restoring primary anterior teeth with the aid of a celluloid crown form and composite resins *Pediatric Dentistry* **1(4)** 244-246.
22. Kupietzky A, Waggoner WE, & Galea J (2003) The clinical and radiographic success of bonded resin composite strip crowns for primary incisors *Pediatric Dentistry* **25(6)** 577-581.
23. Ram D, & Fuks AB (2006) Clinical performance of resin-bonded composite strip crowns in primary incisors: A retrospective study *International Journal of Paediatric Dentistry* **16(1)** 49-54.
24. Waggoner WF (2006) Anterior crowns for primary anterior teeth: An evidence based assessment of the literature *European Archives of Paediatric Dentistry* **7(2)** 53-57.
25. Kupietzky A, Waggoner WE, & Galea J (2005) Long-term photographic and radiographic assessment of bonded resin composite strip crowns for primary incisors: Results after 3 years *Pediatric Dentistry* **27(3)** 221-225.
26. Pollard MA, Curzon JA, & Fenlon WL (1991) Restoration of decayed primary incisors using strip crowns *Dental Update* **18(4)** 150-152.
27. Parisotto TM, de Souza-E-Silva CM, Steiner-Oliveira C, Nobre-dos-Santos M, & Gavilão MB (2009) Prosthetic rehabilitation in a four-year-old child with severe early childhood caries: A case report *Journal of Contemporary Dental Practice* **10(2)** 90-97.
28. Kupietzky A, & Waggoner WF (2004) Parental satisfaction with bonded resin composite strip crowns for primary incisors *Pediatric Dentistry* **26(4)** 337-340.
29. de la Peña VA, & Cabrita OB (2005) Direct composite coronal reconstruction of two fractured incisors: an 8-year follow-up *Dental Traumatology* **21(5)** 301-305.
30. Opdam NJ, & Roeters FJ (2003) The direct composite crown *Nederlands Tijdschrift voor Tandheelkunde* **110(6)** 239-243.
31. Peumans M, Van Meerbeek B, Lambrechts P, & Vanherle G (1997) The 5-year clinical performance of direct composite additions to correct tooth form and position. I. Esthetic qualities *Clinical Oral Investigation* **1(1)** 12-18.
32. Peumans M, Van Meerbeek B, Lambrechts P, & Vanherle G (1997) The 5-year clinical performance of direct composite additions to correct tooth form and position. II. Marginal qualities *Clinical Oral Investigation* **1(1)** 19-26.
33. Loe H, & Silness J (1963) Periodontal disease in pregnancy. I. Prevalence and severity *Acta Odontologica Scandinavica* **21** 533-551.
34. van Dijken JW (2003) A 6-year clinical evaluation of class I poly-acid modified resin composite/resin composite laminate restorations cured with a two-step curing technique *Dental Materials* **19(5)** 423-428.
35. van Dijken JW (2008) Durability of resin composite restorations in high C-fator cavities: A 12-year follow-up *Journal of Dentistry* **38(6)** 469-474.
36. Alonso V, Pérez MC, & Lima MJ (1994) Coronas de acetato de celulosa: Su uso para mejorar la estética del frente anterior en dientes con alteraciones morfológicas *Quintessence (ed. Esp.)* **7(3)** 149-155.
37. Smales RJ, & Berekally TL (2007) Long-term survival of direct and indirect restorations placed for the treatment of advanced tooth wear *European Journal of Prosthodontics and Restorative Dentistry* **15(1)** 2-6.
38. de Souza-e-Silva CM, Parisotto TM, Steiner-Oliveira C, Gavião MB, & Nobre-Dos Santos M (2010) Oral rehabilitation of primary dentition affected by amelogenesis imperfecta: A case report *Journal of Contemporary Dental Practice* **11(3)** 71-77.
39. Messina G, Verzì P, & Pappalardo S (1999) Conservative treatment of upper anterior dental discrepancy during orthodontic therapy *Minerva Stomatologica* **48(6)** 59-64.