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ORIGINAL ARTICLE

Clinical evaluation on porcelain laminate veneers bonded with light-cured composite: results up to 7 years

Camillo D'Arcangelo · Francesco De Angelis · Mirco Vadini · Maurizio D'Amario

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Abstract The purpose of this study was to evaluate the clinical performance of laminate porcelain veneers bonded with a light-cured composite. Thirty patients were restored with 119 porcelain laminate veneers. The veneers were studied for an observation time of 7 years. Marginal adaptation, marginal discoloration, secondary caries, color match, and anatomic form were clinically examined following modified United States Public Health Service (USPHS) criteria. Each restoration was also examined for cracks, fractures, and debonding. Pulp vitality was verified. In addition, plaque and gingival indexes and increase in gingival recession were recorded. Survival rate evaluating absolute failures and success rate describing relative failures were statistically determined, using both restoration and patient-related analyses. On the basis of the criteria used, most of the veneers rated Alfa. After 7 years, the results of the clinical investigation regarding marginal adaptation and marginal discoloration revealed only 2.5% and 4.2% Bravo ratings, respectively, among the 119 initially placed veneers. Using the restoration as the statistical unit, the survival rate was 97.5%, with a high estimated success probability of 0.843 after 7 years. Using the patient as the statistical unit, the survival rate was 90.0% and the estimated success probability after 7 years was 0.824. Gingival response to the veneers was all in the satisfactory range. Porcelain laminate veneers offer a predictable and successful treatment modality giving a maximum preservation of sound tooth. The preparation, cementation, and finishing procedures adopted are considered key factors for the long-term success and aesthetical result of the veneer restorations.

Keywords Adhesive luting · Ceramic · Clinical evaluation · Veneer

C. D'Arcangelo (✉) · F. De Angelis · M. Vadini
Department of Restorative Dentistry, School of Dentistry,
University G. D'Annunzio,
Via dei Vestini 31,
66100 Chieti, Italy
e-mail: cdarcang@unich.it

M. D'Amario
Department of Restorative Dentistry, Dental Clinic,
University of L'Aquila,
L'Aquila, Italy

Introduction

Due to their high aesthetic appeal, as well as their proven biocompatibility and long-term predictability, all-ceramic veneers have become a predictable restorative procedure for treatment of teeth in the front area of the mouth [1–7]. Long-term success of veneers is determined by material properties and fatigue resistance of ceramic and adhesive/luting cement systems used. Further factors for clinical success are marginal adaptation of the veneer restoration, tooth preparation design, functional and morphological condition of the abutment tooth [8, 9]. Veneer restorations appear to be a good choice also for endodontically treated teeth [10, 11]. An optimal bond is obtained if the preparation is located completely in enamel, if correct surface treatment procedures are carried out, and if a suitable composite luting agent is selected. However, from an aesthetic and periodontal point of view, a complete intra-enamel preparation cannot always be realized. The quality of the restoration can be inferior if dentin is exposed to a large extent, as the current dentin bonding agents are not yet able to prevent microleakage at the dentin margins in the long term. The periodontal response to porcelain veneers varied in the literature from clinically acceptable

to excellent [8]. Regarding the aesthetic properties of porcelain veneers, these restorations maintain their aesthetic characteristics in the medium to long term and patient satisfaction is usually high. The major shortcoming of porcelain veneers is the relatively wide marginal discrepancy. At these marginal openings, the luting composite is exposed to the oral environment and the wear resistance of the composite luting agents is not yet optimal. According to previous authors, these shortcomings had no direct impact on the success of porcelain veneers in the medium term, although their influence on the overall clinical performance in the long term is still unknown [8]. Porcelain veneers adhesive luting could be performed employing both dual-curing and light-curing cements [7, 8, 11–13]. Dual-curing materials are advantaged by their self-curing component, which favors the conversion even in the presence of scarce radiant energy, but have the disadvantages of being considerably fluid and requiring a mixture of two elements, arising in the probable formation of porosities or voids and incorporation of bubbles; moreover, their handling times are limited. On the other hand, light-curing materials used as luting agent are easily handled and are characterized by controllable hardening times; with no time restriction, it is easier to achieve a precise sitting of the veneer and to accurately remove all the excess cement, creating high-quality margins [14] and improving the overall restoration quality. Only their light activation could constitute a disadvantage, since light polymerization of all portions of the cement must be made through the thickness of the indirect veneer that can shade or block the light [15, 16].

The purpose of this study was to evaluate the clinical performance of 119 porcelain veneers bonded with a light-cured composite over a period of 7 years.

Materials and methods

Study design

This is a non-interventional evaluation of patient records and a clinical follow-up examination of patients treated with porcelain laminate veneers. An IRB approval was applied for, but not considered necessary due to the observational character of the study. Registration of the records of all patients (n=30) who had received porcelain laminate veneers (n=119) on maxillary anterior teeth during the period February 2002 to November 2003 was performed from May 2009 to January 2010 by the authors. The patients belonged to the ordinary clientele of the dental clinic of the Department of Oral Science, Nano and Biotechnology—University G. D'Annunzio (Chieti, Italy) and were treated by one dentist with over 15 years experience of restorative dentistry and a long interest in metal-free restorations. All patients hoped to have their maxillary anterior teeth treated for aesthetic deficits including a problem of diastemas, contour, size, position, and color [17, 18]. The patients were treated with a minimum of two, up to a maximum of six veneers. All records resulted updated at least yearly as patients are normally scheduled for annual check-ups after they receive treatment and are asked to contact the clinic whenever they have problems with their veneers or abutment teeth. The procedures carried out during each recall examination are outlined in a following paragraph. No records of patients with extensive loss of tooth structure, poor oral hygiene, and periodontal problems were found as they are routinely excluded from aesthetic treatment with adhesively bonded porcelain veneers in the clinic. Patients with parafunctional habits were provided with occlusal guards following treatment, and patients having gingivitis were provided with the treatment only if they showed considerable improvement in their gingival condition following oral hygiene motivation. Once the patient was entered into the clinic, his or her teeth were cleaned to remove extrinsic stains and dental calculus. Patients were informed about the need for good gingival health and were educated in effective plaque control. Both pre-operative and postoperative photographs were taken for each patient in order to evaluate the change in appearance. The distribution of veneers by tooth position is presented in Table 1.

Tooth preparation and laboratory procedures

Tooth preparation was performed taking into account the technique described by Magne et al. [17, 19], according to which the preparation depth has to be guided by the final volume of the restoration. For this purpose, diagnostic wax-ups were realized for each of the study casts. Silicon matrices derived from the diagnostic wax-up were sectioned in different planes and used to constantly check for an adequate preparation depth. Butt joint preparations, as described by Stappert et al. [20] and D'Arcangelo et al. [10,

Table 1 Distribution of veneers according to the tooth position

	Right canine	Right lateral incisor	Right central incisor	Left central incisor	Left lateral incisor	Left canine	Total veneers
Maxilla	11	23	28	26	20	11	119

11], were carried out. The incisal edge was always included in the preparation. All the finish-line margins were placed supragingival. A cylindrical round-ended diamond rotary cutting instrument (No. 880.305S Intensiv, Viganello-Lugano, Switzerland) was used under constant water irrigation. Finishing procedures were performed with stones (Dura-White Arkansas Stones; Shofu Dental Corp, San Marcos, CA) and hand chisels (Hu-Friedy, Chicago, IL) under a stereomicroscope (SOM 32; Karl Kaps GmbH & Co.KG, Asslar/Wetzlar, Germany) magnification. Ceramic thickness in the middle third of 0.7 mm and incisal ceramic thickness of 1.5 mm were ensured for veneer restorations. If a previous composite restoration was found, it was replaced with a new one. Proximal preparation was ended at the contact area, but when a composite proximal restoration was present or the color of the tooth was too dark, the preparation was extended through the contact areas. When the preparation exposed small amounts of dentin, an immediate dentin sealing (Prime & Bond NT; Dentsply DeTrey GmbH, Konstanz, Germany) was performed [21]. Care was taken to keep the dentin surface moist for bonding.

After preparation, impressions were taken using a polyether impression material (Impregum, 3M ESPE, St. Paul, MN, USA). Temporary restorations were made chair-side (Protemp 3 Garant, 3M ESPE, St. Paul, MN, USA) and were cemented with a eugenol-free temporary cement (Temp-Bond Clear, KerrHawe SA, Bioggio, Switzerland).

Casts were then poured by using phosphate refractory die material. Feldspatic porcelain laminates (Omega 900; VITA Zahnfabrik, Bad Saeckingen, Germany) were veneered and fired, according to standard laboratory procedures.

Bonding and finishing of the veneers

Patients were recalled for an appointment to try the veneers, generally after 8–10 days. Minor corrections of the glazed restorations during their initial try-out were made chair-side. Changes to the incisal and labial surfaces were re-polished using ceramic silicone polishers (Dialite Polishing Set Ceramic, Gebr. Brasseler, Lemgo, Germany). Veneers requiring major corrections or needing complete revisions were sent to the dental laboratory. Those restorations received entirely new coats of ceramic. During the next appointment, before cementation, veneers were cleaned in an ultrasonic bath, tried on, pretreated with 9.5% hydrofluoric acid for 90 s (Porcelain Prep Kit; Pulpdent, Watertown, MA), rinsed with air-water spray for 60 s, air dried, and silanized (Porcelain Prep Kit; Pulpdent) in accordance with the manufacturer's instructions.

All the bonding procedures were carried out using rubber dental dam. A 2-step etch-and-rinse technique was used for veneer cementation. Tooth surfaces were first etched for 15 s with phosphoric acid gel and then thoroughly washed by using a water spray for at least 15 s. The adhesive (Prime & Bond NT; Dentsply DeTrey GmbH) was first applied with a microbrush, gently rubbed for 20–30 s, and then distributed with an air spray for at least 15 s at a distance of 10 cm to form a slightly shiny adhesive film. To avoid inaccuracies of fit, the adhesive was not light-polymerized before restoration placement. An adhesive layer (Prime & Bond NT) was applied to the silanized surface without light curing. A light-curing composite (Enamel Plus HFO; Micerium, Avegno, Genova, Italy) was warmed up using a heater for composite (Ena Heat; Micerium) to 39°C, put on the cementation surface of each veneer, and used as luting agent. The composite used as luting agent was a dentin mass with the chroma selected on the basis of the veneer's main chroma shade. The luting composite was evenly applied over the veneer's bonding surface prior to tooth surface placement and then lightly pressed into place with finger pressure. A thin explorer was used to remove excess luting material extruded from the veneers' margins. The pressure on each veneer was stopped when no more excess of luting material extruded from the margins. Six to eight seconds of light-polymerizing at the incisal edge ensured stabilization of the veneer while other veneer surfaces remained covered (Optilux 501; Demetron/Kerr Co., Orange, CA, USA). Residual cement was removed under a stereomicroscope (SOM 32; Karl Kaps GmbH & Co.KG) magnification with explorer, scalpel, and Superfloss (Oral-B, London, UK) for interproximal sides. Oral and vestibular surfaces were then light-polymerized in two sessions of 40 s each with a light intensity of at least 1,000 mW/cm^2 (Optilux 501; Demetron/Kerr Co.). Veneer margins were then checked again under a stereomicroscope and using a dental probe. Residual excess cement was further removed with a 15c scalpel (#371716, Bard-Parker; Becton-Dickinson, Dr. Franklin Lakes, NJ, USA). The epi-gingival area was rechecked for any remaining excess cement, and if so, eventual removal using a scalpel was carried out after dental dam and retraction cord were removed. No diamond burs, polishing discs, or silicone polishers were used to finish the veneers; interproximal floss was preferred to polishing strips for interproximal sides. Static and dynamic occlusions were checked. The patient was initially recalled after 1 week for re-checking occlusion, proximal contact relationships, marginal integrity, and gingival margin health. This recall was used to define the baseline group.

Recall examinations and recording of findings

At the baseline recall and at every next annual check-up, the veneers were classified according to the modified United States Public Health Service (USPHS) criteria [22, 23]

(Table 2). Recall assessments were not performed by the clinician who had placed the restorations. The restorations were visually inspected with dental mirror and probe and clinically examined with wax-free dental floss. Deviations in color match and anatomic form were recorded. Each restoration was examined for cracks, fractures, and debonding. Pulp vitality was verified with CO_2 test. The patients were questioned about possible postoperative complaints [6, 24]. Moreover, plaque index [25], gingival index [26], and increase in gingival recession were included as an evaluation of gingival response to the veneer [27]. The involved teeth were photographed preoperatively and postoperatively, as well as at recall appointments (Fig. 1a–c).

For statistical evaluation, a survival rate evaluating absolute failures according to the in situ criterion and a success rate describing both relative and absolute failures were determined [6]. Absolute failure was defined as clinically unacceptable fractures and cracks, which required a replacement of the entire restoration, and/or secondary caries as well as endodontic complications. A relative failure was defined as minimal cohesive ceramic fractures and cracks with limited extension, which were clinically acceptable, as well as adhesion loss of a restoration which could be successfully re-bonded. Both relative and absolute failures were summarized in a success rate which was calculated according to the Kaplan–Meier analysis and graphically depicted [6]. The beginning of the observation interval started with the incorporation of the restoration, and the end of the interval was defined by the incidence of any failure.

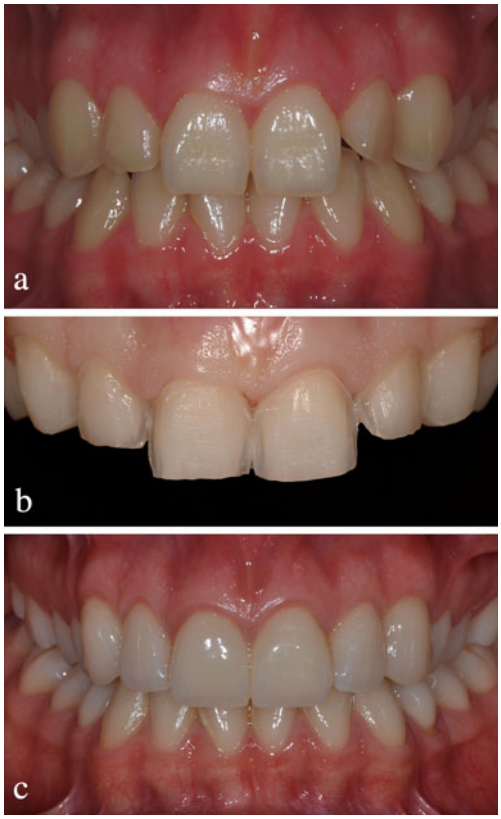

Fig. 1 **a** Preoperative photograph showing a problem of position and size of the anterior teeth. **b** Preparations for six porcelain veneers. All the amount of preparation is in enamel. Note the supragingival finish-line placement. **c** Postoperative view after the placement of the bonded porcelain laminate veneers insertion. Note the excellent gingival health

Table 2 USPHS criteria used for clinical evaluation of the restorations

Characteristics	Rating	Criteria
Secondary caries	Alfa	No evidence of caries contiguous with the margin of the restoration
	Bravo	Caries evident contiguous with the margin of the restoration
Marginal adaptation	Alfa	No visible evidence of crevice along margin; no catch or penetration of explorer
	Bravo	Visible evidence of crevice and/or catch of explorer; no penetration of explorer
	Charlie	Visible evidence of crevice; penetration of explorer
Marginal discoloration	Alfa	No discoloration on the margin between the restoration and the tooth structure
	Bravo	Superficial discoloration on the margin between the restoration and the tooth structure; does not penetrate in pulpal direction
	Charlie	Discoloration has penetrated along the margin of the restorative material in pulpal direction
Color match	Alfa	No mismatch in color, shade and/or translucency between restoration and adjacent tooth
	Bravo	Mismatch between restoration and tooth structure within the normal range of color, shade and/or translucency (<1 shade off; Vita shade guide)
	Charlie	Mismatch between restoration and tooth structure outside the normal range of color, shade and/or translucency (>1 shade off; Vita shade guide)
Anatomic form	Alfa	The restoration is continuous with tooth anatomy
	Bravo	The restoration is not continuous with tooth anatomy. The restoration is slightly under- or over-contoured
	Charlie	The restoration is not continuous with tooth anatomy. Restoration material is missing; a surface concavity is ascertainable

Two different approaches were used for the analysis:

- a restoration-related analysis, using each restoration as a statistical unit;
- a patient-related analysis, that considered the patient as the statistical unit. In this case, according to Roulet [28], where more than one restoration was placed in a patient, the evaluated restoration was selected by random, using a random table.

Results

The study population comprised of 30 patients: 17 (57%) women (mean age 31 years, range 18–45 years) and 13 (43%) men (mean age 35 years, range 20–55 years).

The tooth distribution of the 119 inserted veneers is summarized in Table 1. In 68 teeth (57%), the placement of a resin composite restoration was required prior to the fabrication of the veneer.

Diastema and minor orthodontic problems (n=36.30%), existing composite fillings (n=38.32%) and conoidal teeth (n=20.17%) were the main indications for ceramic veneer treatments. Insufficient anterior tooth lengths (n=14.12%) and crown fractures due to trauma (n=11.9%) were further indications.

All the 30 patients being initially treated with 119 butt joint veneer restorations came for a follow-up examination after 12, 24, and 36 months. A total of three patients (eight restorations) were subsequently lost to follow-up as shown in Fig. 2. The number of patients and restorations examined at each of the following annual check-ups are summarized in Table 3. Up to the 48th month, no failures were recorded, and all restorations in all categories were rated Alfa. Two patients showed negative vitality at the 48th and 60th month recalls, respectively. A further absolute failure in the form of a secondary decay at the veneer–tooth interface was observed at the 6-year follow-up. As a consequence of the three absolute failures, after 7 years, the restoration-related survival rate was 97.5%, while the patient-related survival rate was 90.0%. At the 84th month follow-up, respectively, 3 and 5 Bravo ratings were registered (Table 3) regarding marginal adaptation and marginal discoloration, 2.5% and 4.2% of the 119 initially placed restorations. Color match and anatomic form were rated as Alfa during the whole 7-year follow-up period, without recording any score decrease. Eight veneers showed minimal ceramic cohesive fractures (chippings); ceramic chippings were observed in the palatal area (five veneers), in the incisal (two veneers) and in the labial-cervical part (one veneer). The restorations were burnished and remained in situ; they were excluded from the subsequent follow-ups for success probability calculation. In seven veneers, further cracks were observed between the 60th and the 84th month of service (Table 3). Due to the minimal extension of the cracks and prolonged bonding, the restorations did not have to be renewed. No issues were observed concerning veneer retention. As a consequence of the three absolute and the 15 relative failures, after 7 years, the restoration-related estimated success probability was 0.843, according to Kaplan–Meier estimation method (Fig. 3); the patient-related success probability was 0.824 (Fig. 4).

Plaque and gingival indexes registered at each recall are summarized in Table 4. No periodontal recession was observed.

Discussion

In the present study, the longevity of porcelain veneers bonded with light-cured composite was evaluated over a period of seven years. The study design enabled the evaluation of veneer restorations placed by one operator in a general practice setting. According to Roulet [28], in the present study, the Kaplan–Meier analysis was done in two ways: a patient-related analysis, which is the very strict approach, fully respecting the statistical independence of the data; the other analysis was performed looking at the restoration as an independent data point, despite the fact that Kaplan–Meier statistics were initially designed to deal with individuals. Using the tooth as a unit instead of the mouth can be justified [28]. Within the same mouth, there are many different conditions, e.g., a bruxer may load only some teeth excessively (this is seen by the formation of wear surfaces), while other teeth within the same mouth are loaded in normal function. Since this was not a prospective study, where such restrictive conditions can be considered and balanced, it seemed reasonable not to restrict the data to one tooth per patient, which may reduce the power of the study [28].

The present study found favorable 7-year results of porcelain veneers with supragingival preparations, bonded with a light-cured composite and performed in a general dental practice. These veneers showed promising survival rate of 97.5%. In other studies, veneer restorations achieved survival probabilities of 97.6% [6], 98.8% [2], 91% [1] and 94.4% [3] after 5, 6, 10, and 12 years, respectively. In the present study, two endodontic complications (1.7%) and one secondary caries (0.8%) were detected after observation periods of 48, 60, and 72 months, respectively. To avoid secondary caries, great importance is attributed to preparation margins bound by enamel and do not end in composite fillings [29]. In a study by Peumans et al. [4], veneers with restoration margins located in composite fillings showed 10% secondary caries and 4% endodontic complication incidences after 10 years.

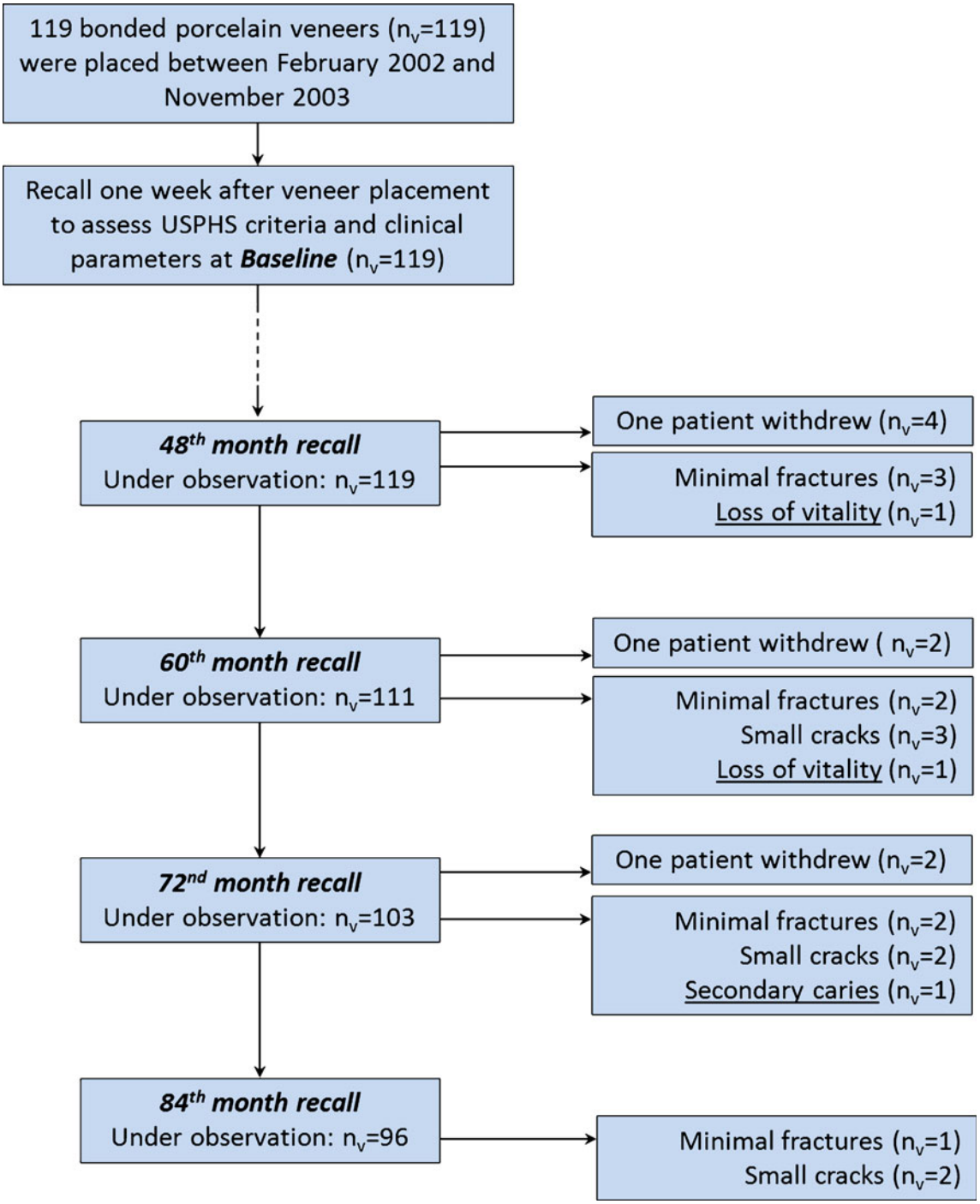

Fig. 2 The flowchart shows the flow of participants through the treatment phases (February 2002 to November 2003) and the subsequent annual follow-up examinations, indicating withdrawals, absolute and relative failures. Absolute failures are underscored

The results of the present study regarding marginal adaptation and marginal discoloration (2.5% and 4.2% Bravo rating, respectively, after 7 years) were particularly satisfying. Significantly lower Alfa ratings were reported in previous studies after 5 and 10 years [4, 6] compared to this study. Peumans et al. [4] found 36% of the veneer restoration margins to be clinically detectable by probing and described a clear increase in Bravo ratings over an observation period of up to 10.5 years. Guess and Stappert [6] reported that a decrease in marginal adaptation (20/25% Bravo rating) was accompanied by an increase in marginal discolorations in the form of higher Bravo ratings after 62 months. Only Fradeani et al. [2, 3] reported results analogous to the present study in terms of marginal

Table 3 Modified USPHS criteria and clinical evaluation of the veneer restorations (number of patients and veneers) at baseline and after a follow-up period of 36, 48, 60, 72, and 84 months

		Time elapsed from baseline (months)					
		0 (baseline)	36	48	60	72	84
Patients under observation		30	30	30	29	28	26
Veneers under observation		119	119	119	111	103	96
USPHS criteria/clinical parameters							
Secondary caries	Alfa	119	119	119	111	102	96
	Bravo	–	–	–	–	1	–
Marginal adaptation	Alfa	119	119	119	111	101	93
	Bravo	–	–	–	–	2	3
	Charlie	–	–	–	–	–	–
Marginal discoloration	Alfa	119	119	119	111	102	91
	Bravo	–	–	–	–	1	5
	Charlie	–	–	–	–	–	–
Color match	Alfa	119	119	119	111	103	96
	Bravo	–	–	–	–	–	–
	Charlie	–	–	–	–	–	–
Anatomic form	Alfa	119	119	119	111	103	96
	Bravo	–	–	–	–	–	–
	Charlie	–	–	–	–	–	–
Endodontic complications	No sign	119	119	118	110	103	96
	Vitality negative	–	–	1	1	–	–
	Percussion positive	–	–	–	–	–	–
Crack	None	119	119	119	108	101	94
	Small/acceptable	–	–	–	3	2	2
	Large	–	–	–	–	–	–
Fracture	None	119	119	116	109	100	95
	Minimal/acceptable	–	–	3	2	2	1
	Extensive	–	–	–	–	–	–
Retention of the veneer	Bonded	119	119	119	111	103	96
	Re-bonded	–	–	–	–	–	–
	Lost	–	–	–	–	–	–

As all restorations in all categories were rated Alfa and no failures occurred, data preceding the 36 months recall are not shown

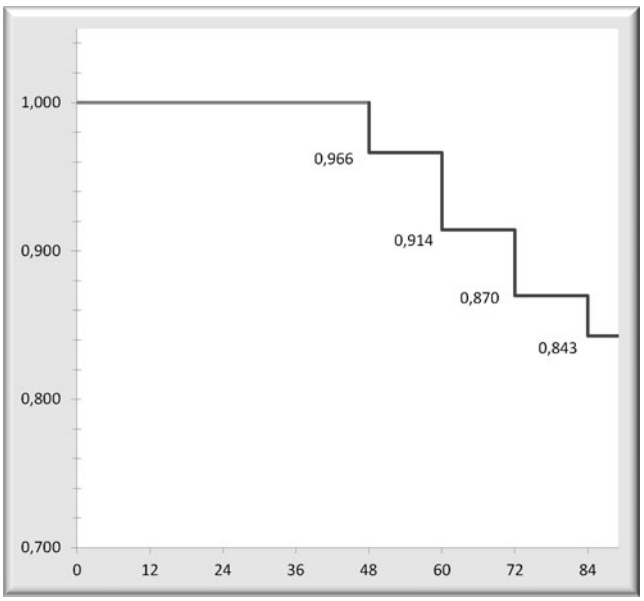

Fig. 3 Kaplan–Meier success probability, stating the time interval [months]. Each restoration was seen as a statistical unit

adaptation (97.6 and 92% Alfa rating respectively after 6 and 12 years) and discoloration (92.8 and 86.4% Alfa rating respectively after 6 and 12 years). The authors believe that the favorable quality of restoration margins obtained in this study can be correlated to the preparation, cementation and finishing procedures adopted. The satisfactory clinical results for porcelain veneers were achieved using a supra-gingival preparation and a light-cured composite adhesive used as luting agent. Dumfahrt and Schaffer [1] essentially attributed the discolorations in the marginal area and their increased occurrence in the course of the observation period to the use of a dual-polymerizing luting composite.

In the present study, eight veneers (6.7%) demonstrated small cohesive fractures (chipping), though remaining clinically serviceable; cracks occurred in seven (5.9%) restorations. Fradeani [2] reported chippings in 1.2% of the IPS Empress veneers after 6 years. Similar results for feldspathic ceramics were obtained by Dumfahrt and Schaffer [1] (2% after 10 years), Peumans et al. [4] (9% after 10 years) and Guess and Stappert [6] (8.3% of the full

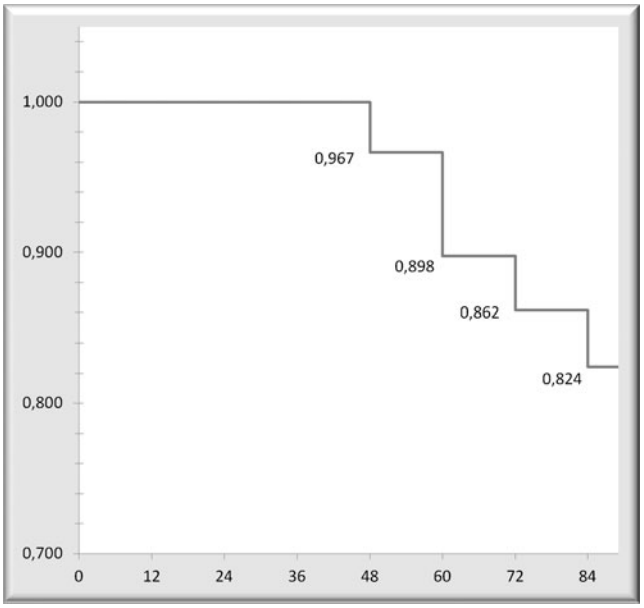

Fig. 4 Kaplan–Meier success probability, stating the time interval [months]. One restoration from each patient was selected by random and evaluated over time. As a consequence, the patient was seen as a statistical unit

veneer restorations after 5 years). Regarding cracks, similar percentages were reported in previous investigations [1, 6]. In the current study, no veneers detached after an observation period of 84 months. Guess and Stappert [6] reported a loss of retention percentage of 2.3% after 5 years, Fradeani et al. [3] a loss of 3.3% after 4.5 and 12 years, respectively. The detaching results of the present study could be correlated to the improved success rate of adhesive procedures through the constant use of rubber dam, which is permitted by the supragingival preparations. The veneers showed very good results for color match and anatomic form. Similarly to the results of Fradeani et al. [3], a decline in color quality and anatomic appearance during follow-up period was not found. The gingival response to the veneers was all in the satisfactory range. It was reported in a literature review article [30] that conventional restorations (artificial crowns and fixed partial dentures) could cause slight gingival inflammation regardless of the quality of the restorations. In this study, the periodontal parameters appeared to not be influenced by the veneers and to not increase in severity over time. The optimal periodontal conditions indicated that the preparation procedures have been fully respectful of periodontal tissues.

Conclusions

Within the methodological limitations of the present clinical study that did not include any control group, it can be observed that consistently following a protocol of tooth supragingival preparation, cementation technique using a light-cured composite with the constant use of rubber dam

Table 4 Periodontal index scores

		Time from baseline (months)							
		0	12	24	36	48	60	72	84
Veneers examined		119	119	119	119	119	111	103	96
Plaque index[a]	0	119	117	116	116	115	107	99	93
	1	–	2	3	3	4	4	4	3
	2	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–
Gingival index[b]	0	119	117	117	115	116	109	99	94
	1	–	2	2	3	3	1	3	2
	2	–	–	–	1	–	1	1	–
	3	–	–	–	–	–	–	–	–
Periodontal recession	0 mm	119	119	119	119	119	111	103	96
	1 mm	–	–	–	–	–	–	–	–
	>1 mm	–	–	–	–	–	–	–	–

[a] Plaque index: *0* no plaque in gingival area; *1* a film of plaque adhering to the free gingival margin and adjacent area of the tooth (the plaque may only be recognized by running a probe across the tooth surface, not visible by the naked eye); *2* moderate accumulation of soft deposits within the gingival pocket, on the gingival margin and/or adjacent tooth surface, which can be by the naked eye; *3* abundance of soft matter within the gingival pocket and/or on the gingival margin and adjacent tooth surface

[b] Gingival index: *0* normal gingiva; *1* mild inflammation: slight change in color and slight edema, no bleeding on probing; *2* moderate inflammation: redness, edema, and glazing, bleeding on probing; *3* severe inflammation: marked redness and edema; ulceration; tendency to spontaneous bleeding

isolation and a careful hand finishing was associated with high survival rates of porcelain veneers.

Conflict of interest The authors declare that they have no conflict of interest.

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