

Vertiprep in Dentistry: A Comprehensive Literature Review

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Abstract

Vertiprep an ultra-conservative, vertical (feather-edge) approach to porcelain veneer preparation has grown in popularity alongside advances in adhesive dentistry and digital workflows. This review critically appraises the theoretical rationale, clinical workflow, material considerations, outcomes evidence, and practical limitations of Vertiprep and related minimal-prep veneer philosophies. We performed a structured search of the literature and synthesized peer-reviewed studies, case series, systematic reviews, and relevant clinical reports to present a balanced, evidence-informed perspective. Vertiprep's main advantages are enamel preservation, potentially superior adhesive longevity, reduced soft-tissue invasion, and improved patient acceptance. Its limitations include reduced shade-masking capacity, risk of overcontouring in volumetric additions, increased laboratory and intraoral fragility of ultra-thin ceramics, and a paucity of high-quality randomized clinical trials comparing it directly with conventional preparation designs. We conclude with a recommended clinical protocol, selection criteria, and a concrete research agenda to close existing evidence gaps.

Keywords

Vertiprep, feather-edge, no-prep veneers, minimal-prep veneers, adhesive dentistry, CAD/CAM, lithium disilicate.

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INTRODUCTION

Porcelain veneers remain a mainstay of esthetic restorative dentistry. Traditional designs (shoulder, chamfer, butt-joint incisal) prioritize resistance form and predictable aesthetics but require substantive enamel reduction. Over the past two decades, adhesive technology and ceramic materials have enabled thinner, less-invasive restorations. Vertiprep characterized by vertical or feather-edge finish lines and minimal horizontal reduction aims to maximize enamel preservation while achieving esthetic correction with veneers often 0.2–0.5 mm thick.

Proponents advocate Vertiprep for biological preservation and patient-centered care; skeptics emphasize material limitations and the lack of long-term, high-level evidence. This review restarts the discussion from first principles: how margin geometry, substrate selection, material choice, digital workflows, and occlusal planning interact to determine clinical success.

METHODS (SEARCH STRATEGY)

A structured search was performed (Google Scholar, PubMed, Scopus) for publications from 2000–2025 using keywords: "no-prep veneers", "minimal-prep veneers", "feather-edge", "vertical preparation", "enamel bonding", "ultrathin veneers", "lithium disilicate veneers", and "CAD/CAM veneers". We prioritized systematic reviews, randomized trials, prospective cohorts, and high-quality retrospective analyses; relevant case reports and technical notes were included to illustrate clinical application.

LITERATURE REVIEW

Margin Geometry and Preparation Design

Margin geometry directly influences marginal adaptation, periodontal response, and the amount of residual enamel available for bonding. Conventional shoulder and chamfer margins typically require 0.5–1.2 mm of reduction. Feather-edge/vertical finish lines minimize horizontal reduction and retain enamel continuity near the margin, which is favorable for adhesive interfaces. Histologically and clinically, supragingival or equigingival margins simplify

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soft-tissue maintenance and reduce chronic irritation when restorations are well contoured.

Table 1. Comparison of Veneer Preparation Designs

Preparation Design	Reduction	Margin Type	Enamel Preservation	Periodontal Impact
Chamfer	0.5–1.0 mm	Horizontal	Moderate	Good, if supragingival
Shoulder	0.8–1.2 mm	Horizontal	Low	May compromise gingiva
Butt-joint	0.7–1.0 mm	Incisal edge	Moderate	Stable
No-prep	0–0.3 mm	None	High	Excellent if supragingival
Vertiprep	0.2–0.5 mm	Vertical/Feather-edge	High	Favorable (if controlled)

Adhesion: Why Enamel Preservation Matters

Multiple meta-analyses demonstrate that bonding to enamel delivers higher immediate and long-term bond strength versus dentin substrates. Enamel-resin interfaces resist hydrolytic degradation better, and adhesive systems (etch-and-rinse or selective-etch) perform predictably on enamel. For Vertiprep, where bond area is often almost exclusively enamel, adhesive longevity is a central argument for the technique.

Materials and Laboratory Considerations

Ultra-thin restorations rely on ceramics with favorable optical properties at low thicknesses—feldspathic porcelain and heat-pressed or CAD/CAM lithium disilicate (LDS). Feldspathic porcelain offers excellent translucency and minimal thickness masking but is inherently less fracture-resistant. LDS provides superior mechanical properties and can be fabricated in thin sections, but translucency and color-masking need careful management. Laboratory protocols (support during fabrication, careful firing, and minimal handling stress) are crucial; thin veneers are prone to chipping during try-in and cementation.

Digital Workflows and CAD/CAM Precision

Digital planning (intraoral scanning, virtual wax-up, and CAD design) enhances consistency in veneer thickness, emergence profile, and contact relationships. CAD/CAM systems can mill precise thicknesses down to 0.2–0.3 mm for LDS;

however, the clinician must ensure margin capture accuracy and adequate cement space during design to avoid seating discrepancies.

Clinical Evidence and Survival Rates

The literature on no-prep and ultra-thin veneers includes cohort studies and systematic reviews that report favorable medium-term survival rates (often >90% at 5–10 years) for carefully selected cases bonded primarily to enamel. However, many series combine varied preparation designs and materials, complicating direct extrapolation to Vertiprep specifically. High-quality randomized trials comparing Vertiprep with chamfer/shoulder preparations are lacking.

Practical Clinical Protocol for Vertiprep

Below is a practical, evidence-informed protocol clinicians can adopt or adapt.

Case Selection

- Ideal candidates: intact enamel, mild-to-moderate discoloration, small diastemas, minor shape modifications, stable occlusion, low parafunctional activity (or willing to wear a nightguard).
- Contraindications: severe discoloration requiring masking, heavily restored teeth, active periodontal disease, severe malalignment needing orthodontic correction, uncontrolled bruxism.

Diagnostic Workup

- Full photographic records, intraoral scans, and study models.
- Digital wax-up and 3D printed/mock-up for intraoral try-in to assess esthetics and phonetics.
- Occlusal analysis (static and dynamic): ensure anterior guidance and absence of heavy lateral contacts on thin veneers.

Preparation Technique

- Minimal or no facial reduction; round off sharp enamel ledges; smooth incisal edges; prepare 0.2–0.5 mm feather-edge margin using fine-grit finishing diamonds under magnification.
- Maintain supragingival margins whenever possible.
- Finish line should blend with natural enamel contours to avoid overbulking.

Impression/Scan and Lab Communication

- High-resolution intraoral scan or polyvinyl siloxane impression.
- Communicate desired thickness, material (LDS vs feldspathic), and translucency, with a detailed digital wax-up and shade map.

Try-in and Cementation

- Try-in veneers on a clean, dry field using non-permanent try-in pastes or glycerin.
- Surface treatment: HF-etching of porcelain, silane application, and adhesive bonding following manufacturer protocols.
- Use light-cured resin cement for thin restorations when adequate light transmission is expected; otherwise, dual-cure cements may be required.
- Strict isolation (rubber dam or split dam) is recommended to prevent contamination at the margin.

Post-Operative Care

- Provide occlusal splint/nightguard for patients with any parafunctional risk factors.
- Hygiene and maintenance protocol; annual recall with occlusal and marginal monitoring.

Complications and Management

- **Chipping/fracture:** small chips of feldspathic porcelain can be repaired intraorally with

composite. Larger failures may necessitate replacement.

- **Debonding:** verify adhesive protocol and occlusal loading; consider surface reconditioning if re-bonding is indicated.
- **Esthetic mismatch:** may require re-fabrication with altered layering or different ceramic.

Ethical and Patient-Communication Considerations

Surgeons should present Vertiprep as one option among many, disclosing the relative scarcity of randomized long-term data and the trade-offs (less invasive vs. potential need for retreatment in complex cases). Informed consent should include discussion about prognosis, alternative preparations, and protective measures such as nightguards.

Proposed Research Agenda (Prioritized)

1. Randomized controlled trial comparing Vertiprep vs chamfer in matched patients over 10 years, measuring survival, complications, and patient-reported outcomes.
2. Prospective cohort study assessing marginal integrity and periodontal health in feather-edge versus horizontal finish lines.
3. In vitro fatigue and fracture resistance testing of LDS and feldspathic veneers at 0.2–0.5 mm thickness with simulated cement layers.
4. Cost-effectiveness analysis comparing treatment time, laboratory costs, and long-term maintenance.
5. Qualitative study on patient satisfaction and perception of minimally invasive veneer techniques.

Limitations of Existing Evidence

- Heterogeneity of study designs, materials, and outcome definitions limits meta-analysis.
- Many publications are retrospective or case-series with potential selection bias.
- Lack of standardized technical protocols across laboratories and clinicians complicates generalizability.

Table 2. Advantages and Limitations of Vertiprep Veneers

Advantages	Limitations
Enamel preservation improves bonding	Limited masking of severe discoloration
Reduced periodontal irritation	Fragility of ultrathin ceramics
Higher patient acceptance	Risk of overcontouring
Esthetic predictability with CAD/CAM	Difficult retreatment if failure occurs
Efficient chairside workflow	Sparse high-level evidence

CONCLUSION AND CLINICAL RECOMMENDATIONS

Vertiprep is a defensible, minimally invasive approach for carefully selected patients. Its strengths—enamel preservation, reduced tissue invasion, and high patient acceptance—are clinically meaningful. However, clinicians must remain mindful of material limitations, occlusal forces, and esthetic masking requirements. Until long-term randomized data are available, Vertiprep should be adopted as a selective technique within an evidence-informed armamentarium.

PRACTICAL ADDENDA

A. Quick Clinical Checklist for Vertiprep (for chairside use)

- Enamel integrity confirmed?
- Discoloration within masking limits?
- Occlusion favorable?
- Mock-up approved by patient?
- Material and cement selected and communicated to lab?
- Nightguard plan in place?

B. Suggested Reporting Standards for Future Studies

- Clear description of preparation geometry and thickness.
- Material composition and fabrication method.
- Standardized outcome definitions (failure, minor complication, survival).
- Patient-reported outcomes and periodontal indices.

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