Chipping of Ceramic Restorations

Whilst chipping of ceramic restorations is infrequent, it has appeared more often with zirconia than metal-ceramic.

Zirconia was introduced as the big white hope of the All Ceramic Restoration. Zirconia is an excellent material and we have gained a wealth of knowledge over the short time we have been working with this material. Our experience has shown that it does require adherence to correct handling protocol. It is not a material that can be used in all restorations and careful case selection is necessary.

As is venerably the case, the introduction of a new material comes with a learning curve and zirconia has been no exception.

The two major aspects of zirconia, which have caused many clinicians to re-evaluate the use of this material, has been the chipping of the veneer porcelain and the bright show through of the zirconia core.

No current material has exclusivity to all restorations and sundry. Zirconia as a substructure is an excellent material/frame, but support and adequate depth of veneering porcelain is crucial to achieve a durable, aesthetic result.

Since the introduction of zirconia into dentistry, many studies have been undertaken. One such study recently released by DeguDent, has investigated the origin of chipping in ceramically veneered restorations. Professor Kerschbaum and co-workers (Cologne, Germany) have published a fundamental study on zirconia restorations. The results have indicated that:

- An optimized cooling protocol after fusion of the veneering ceramic to the framework, is essential.
- Zirconia connectors and copings are highly resistant to fracture. If fractures do occur, it is usually shortly after insert and often related to technical error.
- Clinical mistakes would include abrasive adjustment without water cooling or failure to perform surface polishing thereafter.

The main emphasis, is on framework design, homogeneous support for the veneering porcelain is paramount.

The results of this report indicate, that what really matters is the technician’s adherence to specific holding temperatures and cooling rates in the interim phases.

Frame Support.
Building support into the zirconia frame for the veneering porcelain is essential, especially in marginal ridge areas.

The advantage of recently introduced CAD design enables the operator to digitally create a full anatomical form, prior to reducing a controlled homogeneous layer, to be recreated in veneering porcelain.

Zirconia is primarily a substitute for metal and whilst in some instances it is built to full anatomical form, stained and glazed, its primary purpose is as a substrate for veneering.

To achieve excellent aesthetic results, it is necessary to have adequate room available, as would be required for porcelain fused to metal.

Ref: Schusser, Vollmann, Volkl, Wiesner, MDT Carsten Wiesner, Hanau, Germany, “Chipping: Solid figures vs. Bold guesswork” 2010
Research findings by DeguDent identify the origin of chipping in ceramically veneered fixed crowns and partial dentures.