

## Grandio blocs – Clinical study over 2 years

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Classic dental ceramics represent established materials for the fabrication of indirect restorations. However, ceramic-based CAD/CAM blocks or discs are increasingly coming to the fore as an excellent alternative. They have comparable stabilities to those of classic ceramics, but better imitate the properties of the natural tooth. While basic mechanical properties of CAD/CAM composites are very well estimated *in vivo* studies, additional analyses are needed to make informed statements about clinical longevity. This scientific report presents the results of a 2-year clinical study, comparing indirect restorations of CAD/CAM composite blocks with direct composite restorations.<sup>[1]</sup>

### Study design

Purpose of this 2-year study was the clinical evaluation of inlay and onlay restorations, which on the one hand were fabricated from the indirect nano-ceramic composite blocks Grandio blocs (VOCO) and on the other hand from the nano-hybrid composite GrandioSO (VOCO).

30 patients who have received both a Grandio blocs and a GrandioSO restoration were selected. Very deep cavities were first filled with a calcium hydroxide preparation (Dycal, Dentsply Sirona) and then with a thin layer of a conventional glass ionomer material (Meron, VOCO). Deep cavities were lined with a conventional glass ionomer material (Meron, VOCO). In all cases, the adhesive Futurabond U (VOCO) was applied in self-etch mode referring to the manufacturer's instructions. GrandioSO was applied in 2mm increments into the cavity and cured according to the manufacturer's specifications. For the indirect restorations, inlays were milled from composite blocks of Grandio blocs, the inner surface was blasted, coated with a coupling agent (Ceramic Bond, VOCO) and finally cemented with Bifix QM and Futurabond U (VOCO).

Two independent experts carried out the clinical evaluation of the restorations on the basis of the FDI criteria after Hickey<sup>[2][3]</sup>. The following intervals were chosen for the evaluations: initial (after 7 days), after 12 months and after 24 months.

Chart 1: recall overview

Used material	Number of evaluated restorations		
	Initial	12 months	24 months
Grandio blocs	30	26	23
GrandioSO	30	26	23
Total	60	52	46

### Results

The evaluated criteria were divided into the three groups "aesthetic, functional and biological parameters". The results of the evaluation are shown in the figures 1 to 3. Fillings rated as "unsatisfactory" and "inadequate" (bars in orange and red in figures 1-3) had to be necessarily replaced.

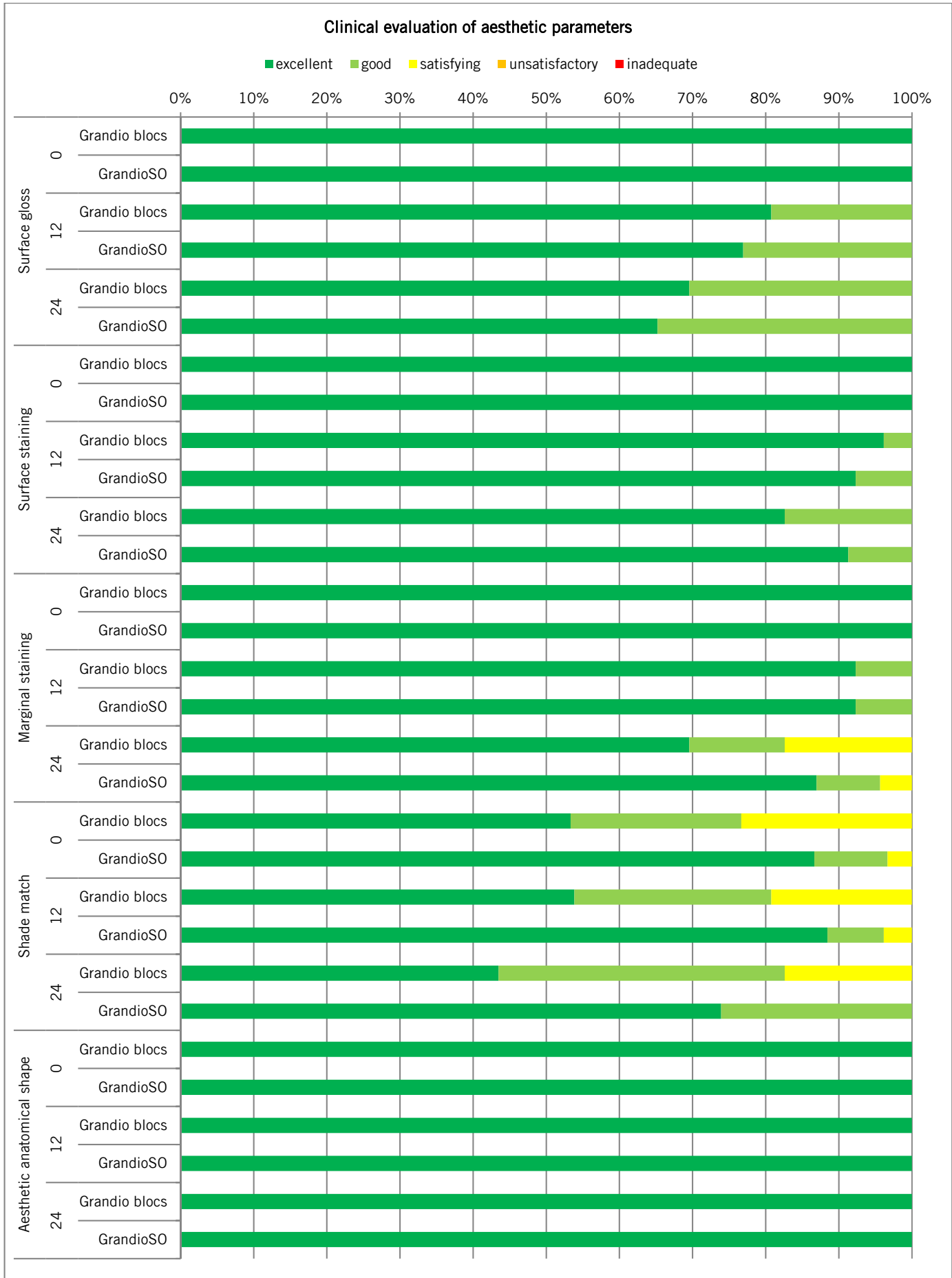


Figure 1: Aesthetic parameters

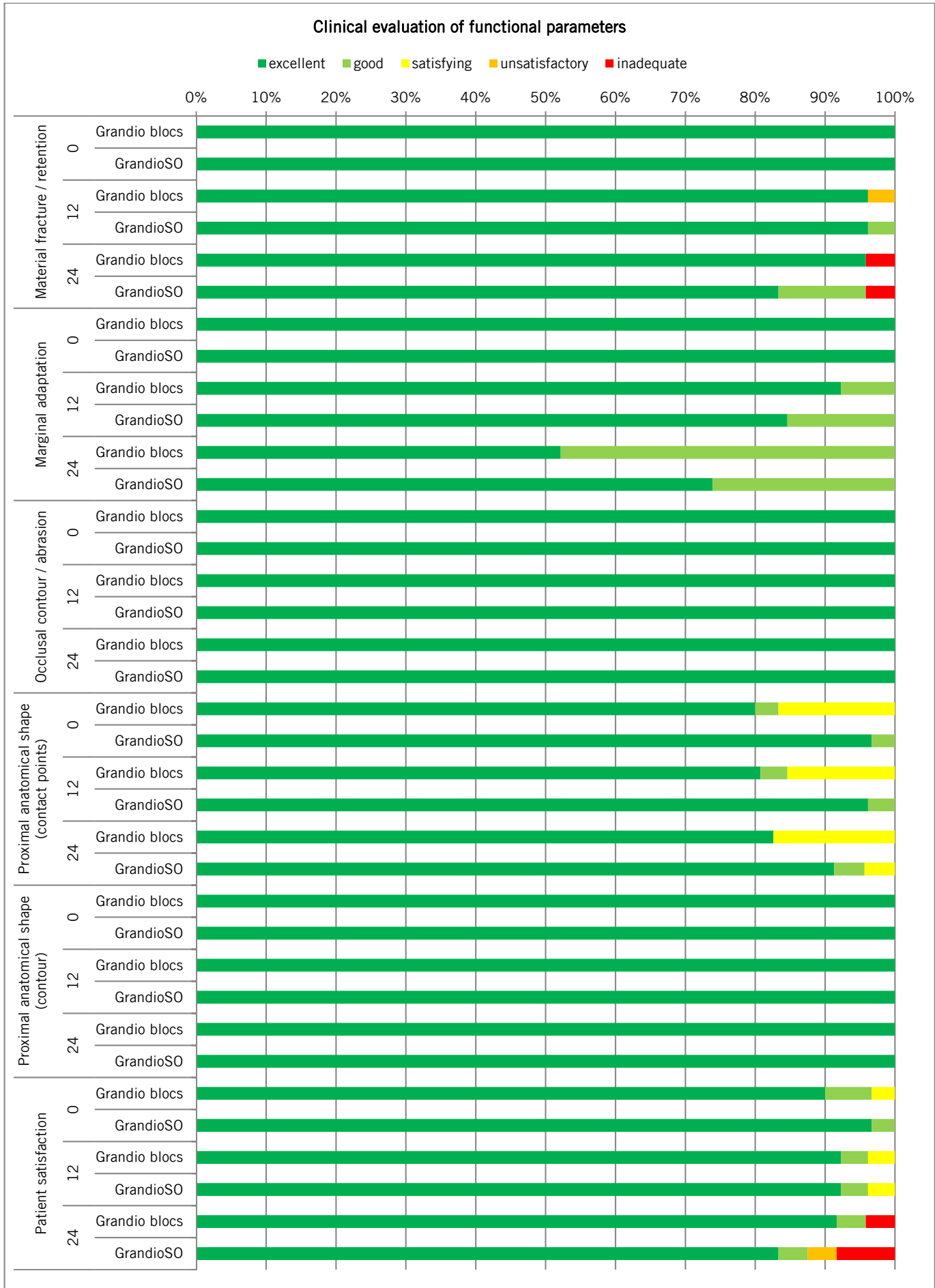


Figure 2: Functional parameters



Figure 3: Biological parameters

The clinical results after two years wearing time are consistently positive for both Grandio blocs and GrandioSO. Minor limitations only occur with Grandio blocs in terms of shade match, proximal anatomical shape and possible sensitivities. One indirect restoration showed a fracture after one year. One direct and one indirect filling were without retention after two years and had to be replaced. In addition, one patient had pulp necrosis after two years on a directly restored tooth. Accordingly, this results in dissatisfaction among patients in a total of three cases (see figure 2). Overall, this study clearly shows that the nano-ceramic composite block Grandio blocs achieves just as excellent results as the established direct nano-hybrid composite GrandioSO. Finally, figure 4 shows the summary with regard to the individual aspects from the three groups aesthetic, functional and biological parameters. As can be seen from previous figures, there was a decrease in the number of examined restorations at recall, but this was due to patients not attending. Of the 60 fillings only two have lost its retention within the examination period, one had a chipping. In total, two Grandio blocs and one GrandioSO filling had to be replaced. The patient, who was diagnosed with pulp necrosis, was transmitted to an endodontic specialist.

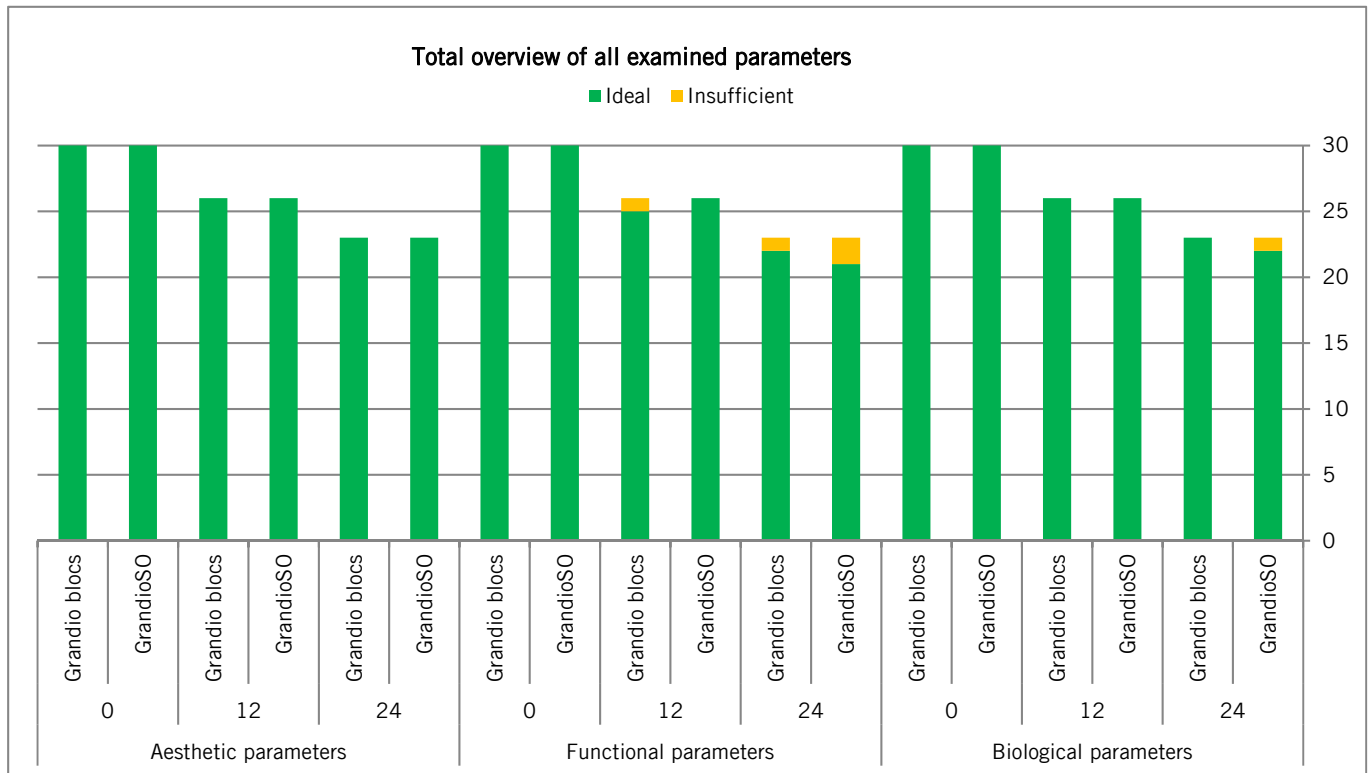


Figure 4: Total overview

**Conclusion:** The results of this 2-year study show excellent clinical results for both the nano-ceramic CAD/CAM composite block Grandio blocs as well as for the established nano-hybrid composite GrandioSO. The evaluation parameters in aesthetics, functionality and biology allow a comprehensive and reliable impression of the clinical performance of the examined filling materials.

- [1] Torres CRG, *Clinical evaluation of Grandio blocs Inlay/Onlay restorations*, University of São José dos Campos, Brazil, Report to VOCCO, **2019**.
- [2] Hickel R, Roulet JF, Bayne S, Heintze SD, Mjor IA, Peters M, *Recommendations for conducting controlled clinical studies of dental restorative materials*, Clin Oral Invest, **2007**;11(1):5-33.
- [3] Hickel R, Peschke A, Tyas M, Mjor I, Bayne S, Peters M, *FDI World Dental Federation: clinical criteria for the evaluation of direct and indirect restorations-update and clinical examples*, Clin Oral Invest, **2010**;14(4):349-66.