GUERINO PAOLANTONI AND ATTILIO SOMMELLA

Procedural benefits of the digital workflow shown in the case of a highly esthetic rehabilitation

Initial situation

The patient is a 28-year old woman. Three years before the examination in the author's practice, she received a fixed prosthetic rehabilitation of the upper arch from 13 to 23, while on the lower arch the rehabilitation was extended from 42 to 52 (fig. 1). The patient's request was to achieve an improvement in esthetics and function. Due to their imprecise margins, the above-mentioned prosthetic restorations had caused an inflammation of the supporting periodontal tissues, with consequent gingival margin shrinkage and edema of the interdental papilla. Moreover, there were some visible remains from incongruous endodontic therapies on the mandibular teeth. Furthermore, the esthetic quality of the composite resin bridges was unsatisfactory – due to the inappropriate choice of materials used for the fabrication of the prosthesis.

Treatment plan

The proposed treatment plan was accepted by the patient and included: replacement of the existing prosthetic restoration in order to solve the iatrogenic esthetic-functional problems, repreparation of the abutments, creation of a precise marginal line and subsequent reinstatement of an ideal tooth-periodontium relationship to be achieved through correct temporary rebasing of the resin restorations, endodontic retreatment and whitening of the mandibular abutments from 42 to 32, and lastly, reconstruction of the prosthetic crowns using appropriate materials as regards esthetics and functionality.

Clinical procedure

Initial periodontal therapy was carried out which included several scaling and root-planning sessions, and compliance

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

optimization in order to improve the condition of the marginal periodontium and ensure more effective collaboration from the patient. The old prosthetic crowns **(figs. 2–4)** were then removed. After an accurate clinical examination, we decided to heal the inflammation of the marginal periodontium by simply reinstating a correct tooth-restoration relationship between the prosthetic restoration and the abutments. The existing prosthetic restorations had caused a minimal invasion of the biological tissue on the portion of the junctional epithelium closer to the crown. After placing a retraction fiber on the gingival sulcus, the maxillary preparations were trimmed on the upper arch. On the lower arch, some endodontic retreatments were performed. After this, whitening and reconstruction of the abutments with composite resin took place **(figs. 5–7)**. Rebasing of the temporary restoration **(fig. 8)** is a very important step – in fact, if this procedure is correctly carried out, it leads to a significant improvement in periodontal health. After a few weeks, the edema was fully healed and the periodontal tissues were mature and stable. Only from this point were we able to proceed with what is probably the most delicate step in the entire rehabilitative procedure: taking the impression and transferring the data to the laboratory. Amongst other benefits (see conclusion), by using a technology as sophisticated as CADENT iTero™, we are able to take an impression in a minimally invasive way. From our experience, a frequent cause of gingival recession after taking the final impression is that the retraction cord is kept in the gingival sulcus for too long. For us, the phenomenon becomes more evident in those cases where an impression of more teeth is required, or where we have to handle thin

Fig. 7

Fig. 8

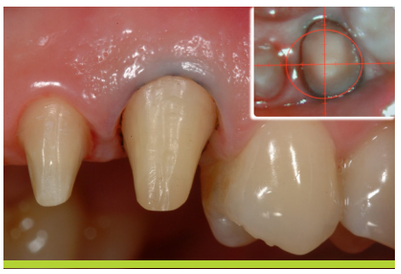

Fig. 9

Fig. 10

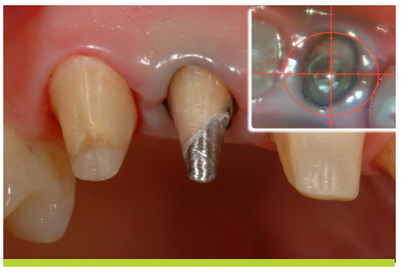

Fig. 11

Fig. 12

and scalloped periodontal tissues. With the iTero™ intraoral scanner (which works in photo mode), we managed to eliminate this risk. This means that we can take single photos and integrate others at any time, allowing us to place the retraction fiber just before we are about to take the impression of the abutments and remove it just after capturing the image **(figs. 9 to 13)**. Following digitalization **(fig. 14)**, the information is sent online to the CADENT Data Center in Israel, specifying the desired kind of restoration (zirconia, lithium disilicate, chrome-cobalt). The CADENT Data Center processes the data and sends them back to the dental lab. Once the data have been approved, they are ready for the fabrication of the polyurethane model **(fig. 15)** and are sent to the Straumann Milling Center in Leipzig/Germany .

Prosthetic procedure

In this case, we decided to make IPS e.max® CAD lithium disilicate cores (substructures) for all the crowns, except 12. For this tooth, we preferred a zirconia core, because of its greater opposition to color transmission from the gold abutment **(fig. 16)**. The precision of the copings was checked. They are in an intermediate state (bluish coloring, **fig. 17 and 18**) and at this point, everything was sent to a laboratory where the layering work was completed with IPS e.max® Ceram ceramics **(figs. 19–23)**. After evaluating the esthetic and functional output, the restorations were fitted and then cemented (with resin cement) in the oral cavity **(fig. 24)**.

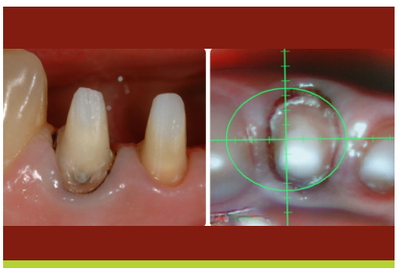

Fig. 13

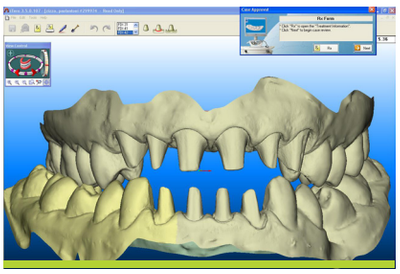

Fig. 14

Fig. 15

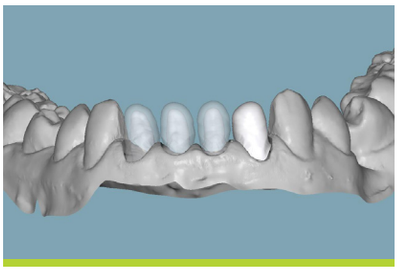

Fig. 16

Fig. 17

Fig. 18

Discussion

Obtaining and accurately transferring the patient's oral cavity information to the laboratory is an extremely crucial step in the prosthetic workflow. By using the new technology of three-dimensional digital intraoral scanners such as iTero™ from CADENT, traditional procedures become obsolete and we are able to enter a new "impression-free" era. The advantages for dentists: (1) Dentists are able to carry out an immediate check of the scan and an accurate evaluation of the preparation, thus avoiding the need to make further impressions. (2) It is feasible to perform an accurate occlusal check, thanks to the software. (3) The procedure is very fast. (4) It is minimally invasive on the periodontal tissues which support the teeth to be restored. (5) It does not require storage of conventional materials, such as elastomers and alginates. (6) Data transmission is completely electronic, simplifying the workflow with our laboratory. (7) The procedure is extremely safe and comfortable for our patients, who in most cases give very positive feedback. The advantages

Fig. 19

Fig. 20

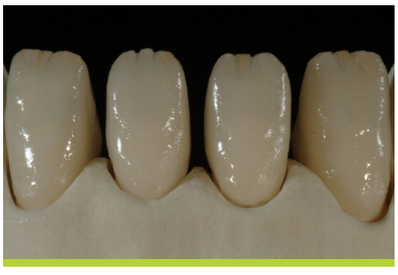

Fig. 21

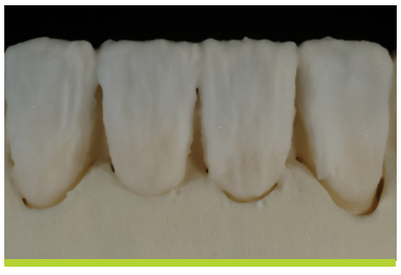

Fig. 22

Dr. Guerino Paolantoni

Degree in Dentistry and Dental Prosthetics from the University Federico II of Naples/ Italy. From 2005 to 2010, Visiting Professor in Oral Surgery at the Maxillofacial Unit of the University of Naples. Private practice limited to periodontology, prosthetics and implantology in Naples. Member of the ITI and active member of the Italian Society of Periodontology (SIDP).

buglipaolantoni@libero.it

www.guerinopaolantoni.it

Attilio Sommella

Co-founder of Dental Creation SNC in Naples/Italy. Author and coauthor (together with Dr. Paolantoni) of professional literature on prosthetic topics.

somenic@fastwebnet.it

www.dentalcreationsnc.com

for the dental lab: (1) The digital data can be controlled, is foreseeable and available at any time, thus providing the dental technician with enormous procedural advantages. Standardized precision can be achieved, without the variations produced when traditional procedures are employed. (2) The fabrication process is also tremendously simplified and, in fact, fully digital: the lab can import the digital impression taken into the Straumann® CARES® CADCAM system for further processing (restoration, design and fabrication).

Conclusion

Digital impressions carried out with iTero™ assure the dental team of high quality and precision through controlled processes. Moreover, the dentist and dental technician will be able to remarkably improve their performance in their respective disciplines.

Fig. 23

Fig. 24