

## Consensus Report Oral Rehabilitation

# International academy for oral and facial rehabilitation— Consensus Report

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The report of the aims, history and activities of the International Research Group on Reconstructive Preprosthetic Surgery (IRGRPS) appeared in the Journal in 1996<sup>1</sup>. The Consensus Statement that had evolved over the years of the existence of the IRGRPS was also published at that time and updated in 2000<sup>2</sup>. Since those publications, three more meetings have been held—Kiel (2001), Palm Springs (2003) and Noordwijk (2005).

At these meetings, the Consensus Document was amended in view of the new developments and findings that had occurred in the interim. In addition, questions that were raised by the Group were also addressed. Answers to these questions have been formulated based on the consensus opinion and, where possible, supported by evidence-based data.

The Group also was of the opinion that the title (IRGRPS) needed to be changed in view of the impact that endosteal implants have had on preprosthetic surgery which, at present, mainly consists of pre-implant surgery.

The Group also agreed that the focus of the research should include the rehabilitation of the patient with cranio- and maxillofacial defects, be they congenital or acquired, whilst the aesthetic component

of reconstruction was found to be of equal importance to the functional result. To reflect this evolution the name International Academy for Oral and Facial Rehabilitation (IAOFR) was chosen.

This Consensus Statement is offered to the readership of the journal as a guideline for their practice. It entails recommendations in the field of preprosthetic and pre-implant surgery and also cranio-maxillofacial rehabilitation using prosthetic means.

The Consensus reflects the common thoughts of a group of clinicians (surgeons and prosthodontists supported by scientists) who have dedicated, for a large part, their professional lives to this important branch of oral and maxillofacial surgery and prosthodontics.

The following clinicians have contributed to this document:

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1. The overall goals of oral and facial rehabilitation are to restore function and aesthetics, preserve the associated structures and contribute to the patient's perception of improved quality of life (QOL).
2. Defects of the craniofacial structures may be congenital or acquired, involve hard and soft tissues either alone or more commonly in combination and may exhibit varying degrees of motor and sensory deficits. The osseous defect may be combined with defects in or lack of contiguous soft tissue structures. Distinction in the location of defects must be made between the maxilla, mandible and the other cra-

niofacial regions involving the orbit, midface and zygoma. Defects of the jaws may be described as continuity defects or discontinuity defects. Defects in vertical height may resemble atrophic changes in the jaws. Many classification systems are in use for describing both acquired and developmental defects.

3. Cooperation should exist between the health care providers during the diagnostic procedures, be maintained through the various stages of treatment planning and treatment, and prevail through the follow-up care of the patient. Each health care provider should be aware of the objectives and possible limitations of the treatment one can provide, to ensure optimal care for the patient.

#### **General principles applicable to maxilla and mandible**

4. It is recognized that bone loss in edentulous and partially dentate jaws is related to a variety of systemic and local factors, including periodontal disease. Systemic factors include the genetic and morphological make-up of the individual as well as disease states causing metabolic disturbances. While overall bone loss in edentulous and partially dentate jaws presents a rather consistent pattern, there is a wide variation in the rate of bone loss and resultant ridge form (see 6), which is also influenced by the period of tooth loss.
5. The consequences of advanced bone loss in the edentulous and partially dentate jaw differ in the maxilla and in the mandible. This difference is manifested both quantitatively and qualitatively. It further changes the maxillo-mandibular relationship in all dimensions. It is also associated with changes in some muscle attachments which, when combined with impaired function and ageing, lead to changes in facial form and aesthetics.
6. At present, the classification based on the research of Cawood and Howell offers the most practical description of the variation in ridge resorption.

Class I: dentate

Class II: postextraction

Class III: convex ridge form, adequate height and width of alveolar process

Class IV: knife edge form, adequate height but inadequate width of alveolar process

Class V: flat ridge form with loss of alveolar process

Class VI: loss of basal bone that may be extensive but follows no predictable pattern

In partially dentate cases the same classification is applicable. The index is intended for use on a sextant basis.

7. Comprehensive treatment planning may involve preventive, periodontal, orthodontic, surgical and restorative care.

#### **Surgical principles applicable to maxilla and mandible**

8. Data published in refereed journals indicate that the goals of oral and maxillofacial rehabilitation can be achieved by insertion of endosteal implants, correction of the maxillo-mandibular relationship, improvement of alveolar ridge form by bone and soft tissue grafting procedures, including repositioning of muscle and mucosal attachments, or a combination of these techniques. Studies have shown that augmentation procedures using onlay, inlay and interpositional free bone grafts in combination with endosteal implants inserted at a secondary stage are satisfactory. Onlay, inlay and interpositional bone grafts in conjunction with immediate implant insertion may behave less predictably but in selected cases are an alternative. Distraction has proven to be valuable in selected cases; it enhances the bony environment and associated soft tissues. The net result of all surgical interventions should, if possible, contribute to a reduction of further bone loss in both arches as well as a reduction of adverse soft tissue changes associated with wearing a prosthesis.
9. Barrier membranes may be used for containment and prevention of resorption of grafts. Further data to fully support these claims are, however, lacking.
10. When considering vestibuloplasty, keratinized mucosal grafts are to be preferred. Reconstruction of jaws may, however, necessitate split thickness grafts of skin for intraoral coverage. Clinical experience and reported cases indicate an occasional incidence of persistent hyperplasia of the soft tissue around endosteal implants. When considering replacement of diseased peri-implant tissue, keratinized

mucosal grafts are recommended. Whilst there is no scientific support for the opinion that the presence of attached keratinized mucosa around the implants is a prerequisite for long-term implant survival, it is recognized that this is desirable.

11. Bone grafts can be harvested locally from the mandible and maxilla or from distant sites including the skull, posterior and anterior iliac crest and other sites. The choice of the donor site is influenced by the quantity of bone required, type of graft, i.e. block or particulate, and associated morbidity.
12. Selection of the type of bone graft for reconstruction of large defects of the maxilla and mandible may be influenced by
  - size, location and complexity of the defect
  - vascularity of the recipient bed
  - patient age, health and concurrent diseases
  - the effects of radiotherapy and/or chemotherapy
  - requirements for insertion of endosteal implants
  - type and design of prosthetic restoration if required
13. Osteoconductive, bone substitution materials may be used as expanders for autogenous bone grafts and for contour corrections.
14. Free vascularized bone grafts are used for the reconstruction of large defects of the maxilla and continuity defects of the mandible but they lack precision in that the contour of the jaw may be difficult to mimic with these techniques. As a result implant insertion may be compromised, giving rise to difficulties when fabricating the prosthetic device. Donor sites include, but are not limited to, radius, scapula, iliac crest and fibula. All these grafts have advantages and disadvantages. Free block grafts and free particulate bone grafts compressed in preshaped scaffolds may offer an alternative, provided the vascularity and the soft tissue environment are favourable. Further research is needed in both areas to determine the best possible solution.

#### **The maxilla**

15. Procedures that improve prosthetic function and oral and facial aesthetics include soft and hard tissue corrections, bone grafting, distraction and the use of implants. In certain circum-

stances an osteotomy is indicated to improve the inter-arch relationship.

16. In the Class IV and V edentulous or partially dentate maxillae, implants can be combined with augmentation using onlay grafts, inlay grafts and/or interpositional bone grafts. In the Class V maxilla bony augmentation is obligatory when utilizing endosteal implants. In the Class VI maxilla, in addition to bone augmentation an osteotomy may also be required to improve the inter-arch relationship. In specific situations, zygomatic implants may contribute to the retention and stability of the prosthesis.

#### The mandible

17. Procedures that improve prosthetic function and oral and facial aesthetics include soft and hard tissue corrections, bone grafting, distraction and the use of implants. In certain circumstances an osteotomy is indicated to improve the inter-arch relationship.
18. In the anterior Class IV mandible, augmentation or reduction of the residual alveolar ridge will be influenced by the prosthetic requirements. In the anterior Class V and VI edentulous mandibles, implants may be inserted without the need for adjunctive surgery, although this may be indicated for correction of inter-arch relationship and esthetic reasons. In the Class VI edentulous mandible, adjunctive soft tissue and bony augmentation may become mandatory. In the partially dentate Class V and VI mandibles bone augmentation and soft tissue procedures may also be required.
19. The patient should be informed that manipulation of the inferior alveolar nerve may lead to long-lasting or permanent neurosensory disturbances.

#### Prosthetic and biomechanical principles

20. Osseointegrated endosteal implants tend to retard or prevent bone resorption. It is not yet clear what the effects are of an implant-supported or an implant-mucosa-supported prosthesis on the bone in the loaded edentulous area. In any situation the use of implants or any other preprosthetic surgical procedure should not preclude the achievement of acceptable functional and esthetic results.
21. The selection of either an implant-supported or an implant-mucosa-sup-

ported prosthesis, as appropriate treatment, is influenced by many factors.

These factors include

- psychological burden of edentulous or partially dentate state
  - existing anatomy in terms of potential implant sites and restorative requirements
  - psycho-physiological conditions, including gagging, xerostomia and burning mouth
  - patient preference
  - denture-bearing regions
  - oral and facial aesthetics
  - physical and psychological health status
  - patient's manual dexterity
  - compliance with oral hygiene and regular maintenance visits
  - economic considerations and access for care
22. Biomechanical factors that appear to affect the success of implant treatment include
- primary stability and timing of implant loading
  - passive fit of the framework
  - direction and magnitude of force as well as strain history
  - static and dynamic occlusal inter-relationship, maxillo-mandibular relationships and nature of the opposing dentition
  - remodelling and modelling capacity of the surrounding bone to the implant surface

As a result, emphasis should be placed on

- optimal position, geometry and number of implants
  - minimizing moments wherever possible
  - eliminating excessive axial occlusal loads and occlusal interferences by narrowing buccal-lingual width, mesial-distal length, flattened cuspal inclinations and centring occlusal contacts over the implants
23. There are several viable treatment alternatives for the partially dentate jaw.
- These include
- individual endosteal implants supporting individual crowns
  - implants supporting a fixed partial denture
  - implant-mucosa-supported removable partial denture
- Factors to consider are
- the bone density
  - the soft tissue conditions
  - three-dimensional relationship of the implant to the restoration

- adjacent natural abutment teeth
- bounded and distal extension conditions
- the crown-implant length ratio
- static and dynamic occlusal inter-relationships
- maxillo-mandibular relationships
- nature of the opposing dentition
- general condition of the remaining dentition

#### The craniofacial area

24. Craniofacial implants, used to support and retain a facial prosthesis, provide an accepted mode of treatment where autogenous reconstruction of facial or auricular structures is contraindicated, delayed or not desired. The application of endosteal implants in the temporal and parietal bone is predictable. Their use in the nasal, orbital and zygomatic bones is less predictable, but provides unique advantages over traditional prosthetic treatment approaches.
- The use of endosteal implants requires thin and immobile adjacent soft tissue.
  - Remote anchorage methods, i.e. carrier plate, are an alternative.
  - Implant insertion should not interfere with future surgical, reconstructive procedures.

#### General risks

25. Endosteal implants behave like ankylosed teeth and, therefore, should be used with caution in a growing individual as part of a long-term treatment plan.
26. The risk of adverse loading of an opposing edentulous arch may occur by natural teeth or implant prostheses. Minimising this risk requires optimal planning, treatment, maintenance and patient cooperation. The patient should be informed of the possible need for surgical and prosthetic treatment in the future in the same or opposing jaw.
27. There is little evidence that parafunction (bruxism and clenching) alone adversely affects long-term implant stability after initial integration but is a concern for future complications.
28. The literature has addressed a variety of systemic factors that may influence long-term results of implant integration. Uncontrolled diabetes mellitus is one systemic factor that may contribute to a higher failure rate or compromise treatment otherwise.

29. Smoking increases the risk of implant failure. The effect of the decrease in or cessation of smoking has not been quantified.
30. Current data suggest that osseointegration is impaired in irradiated bone. Success rates of endosteal implants are reduced as compared with non-irradiated sites, particularly the frontal bone. Animal studies indicate that the bone-implant interface may be significantly compromised, making the implant less able to tolerate functional loads.
31. Patients with a functioning implant prosthesis should be carefully evaluated for possible complications associated with radiotherapy, including dose delivery and backscatter effects. Removal of the implant prosthesis may be indicated. Diagnostic imaging may be compromised by an implant prosthesis.
32. There is no evidence that individuals who received chemotherapy in the past cannot be treated with endosteal implants, provided their haematological parameters are within normal limits.
  - Caution should be exercised when considering endosteal implants in patients undergoing chemotherapy.
  - Those patients with functional implants should be treated in a similar way as those with a natural dentition. Any local disease must be treated and controlled. If this is not possible, the implant should be buried or removed.
  - Biphosphonate therapy may cause bone necrosis which may also include areas where implants are inserted.

### Emerging technologies

33. Immediate loading of implants can be successful in the anterior mandible. For the maxilla and for the partially dentate jaw, evidence is accumulating to consider immediate loading.
34. In oral and facial rehabilitation, growth factors are used to enhance tissue regeneration by affecting cellular activity. There is experimental evidence that bone morphogenetic proteins have promising potential for osteoinduction. Determination of dose of growth factors will be species-specific, patient-specific and site-specific. The ideal carrier material for osteogenic growth factors has not yet been determined.
35. The role of tissue engineering is not clearly defined in oral and facial rehabilitation.
36. Technological developments in facial prosthetics are digital treatment planning, computerized colour formulations and advanced manufacturing technologies. The modulation of skin-abutment interface, biomechanics and active robotic prostheses are areas that are receiving research attention.
37. Rapidly emerging focused methods of head and neck radiation therapy result in radiation dose distributions that are non-homogenous and unique to an individual patient. The clinical challenge with these new forms of radiation therapy is obtaining the information on, and interpreting the consequences of, the unique non-homogenous dose distributions for an individual patient. Understanding this dose distribution unique to a

patient is important for treatment planning and risk management of surgical and dental procedures including osseointegrated implant care.

38. Quality of life in oral and facial rehabilitation is largely unresearched. Prospective studies that quantify QOL related to surgical measures are lacking. There is an apparent need to develop and employ specific instruments for the assessment of QOL in oral and facial rehabilitation and to apply them in prospective trials. Health-related QOL measurements in this respect need a specific questionnaire with appropriate sensitivity and responsiveness. This is supposed to be in addition to existing validated questionnaires tapping broader concepts, e.g. head- and neck-specific questionnaires.

### References

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