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Implants and/or teeth: consensus statements and recommendations

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SUMMARY **In August 23–25, 2007, the Scandinavian Society for Prosthetic Dentistry in collaboration with the Danish Society of Oral Implantology arranged a consensus conference on the topic 'Implants and/or teeth'. It was preceded by a workshop in which eight focused questions were raised and answered in eight review articles using a systematic approach. Twenty-eight academicians and clinicians discussed the eight review papers with the purpose to reach consensus on questions relevant for the topic. At the conference the consensus statements were presented as well as lectures based on the review articles. In this article the methods used at the consensus workshop are briefly described followed by the statements with comments.**

KEYWORDS: **implants, teeth, consensus, statements, guidlines**

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Introduction

The number of publications within implant dentistry is rapidly increasing. However, when clinical questions are raised in daily practice, it is frequently difficult to find unambiguous answers in the literature. The Scandinavian Society for Prosthetic Dentistry (SSPD) has a long tradition of presenting reports on various issues relative to the field of prosthodontics to assist dentists in their everyday clinical practice. This has been accomplished by identifying what has been written about particular clinical situations, advise how the available evidence should be interpreted and suggest recommendations for practice.

The objective for the workshop was to create Scandinavian consensus statements and recommendations based on scientific evidence within implant dentistry, focusing on clinical situations where the scientific evidence is not strong or the conclusions clear cut. The aim of this introductory paper is to present the SSPD consensus workshop process and its results.

Material and methods

Eight focused questions were raised and reviews (1–8) using a systematic approach were written and submitted 2½ months before the workshop. The reviews were sent to the workshop group participants, who reviewed the manuscripts. During the workshop the eight manuscripts were further reviewed and discussed in four workshop groups, each reviewing two papers. The final papers are presented in the Supplement (1–8). It must be emphasized that the contents of the reviews, of which some include suggestions for interpretation of

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the literature, are the opinions of the individual authors and do not necessarily represent the views of the working group. Nor do they represent any official view of the SSPD.

In an attempt to develop clinical guidelines, four to seven questions were formed in each group based on the two manuscripts. The answers to the questions were prepared as statements and recommendations to the clinicians. All statements and recommendations were discussed and agreed on in plenum sessions. The guideline recommendations were ranked into four grades to differentiate between those based on strong evidence and those based on weaker evidence levels according to the Scottish Intercollegiate Guidelines Network SIGN 50 (9), (http://www.sign.ac.uk/guidelines/fulltext/50/index.html). Thus a direct link was established between the statements/recommendations and the levels of evidence identified in the review papers (Table 1).

The organizing committee consisted of: Asbjørn Jokstad (Can/N), Gunnar E Carlsson (S) and Klaus Gotfredsen (DK) and the participants in the four working groups are listed below:

Working group 1

Stig Karlsson (N/S), chair
Morten Berge (N)
Mia Hofgren (S)
Timo Närhi (Fin)
Bengt Öwall (S, DK)
Søren Schou (DK)
Christiano Tomasi (S).

Working group 1.

Table 1. Levels of evidence and grades of recommendation according to the Scottish Intercollegiate Guidelines Network

Sign grading system	Levels of evidence
1^{++}	High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1^{+}	Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1^{-}	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2^{++}	High-quality systematic reviews of case–control or cohort studies. High-quality case–control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal
2^{+}	Well-conducted case–control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
2^{-}	Case–control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion
Grades of recommendation	
A	At least one meta-analysis, systematic review, or RCT rated as 1^{++}, and directly applicable to the target population; or A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1^{+}, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2^{++}, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1^{++} or 1^{+}
C	A body of evidence including studies rated as 2^{+}, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2^{++}
D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2^{+}

Working group 2

Margareta Molin (S), chair
Johan Gunne (S)
Flemming Isidor (DK)
Tomas Lindh (S)
Erik Saxegaard (N)
Rie Stokholm (DK).

Working group 2.

Working group 3

Kristina Arvidson Fyrberg (N), chair
Birgitta Bergendal (S)
Tom Bergendal (S)
Betty Holm (DK)
Marit Midtbø (N)
Birgit Thilander (S).

Working group 3.

Working group 4

Krister Nilner (S), chair
Jan-Eirik Ellingsen (N)
Niklaus P. Lang (CH)
Esa Klemetti (N)

Working group 4.

Bjarni Pjetursson (IS)
Ann Wennerberg (S).
Asbjörn Jokstad
Gunnar E. Carlsson

Results
Consensus statements and recommendations

Working group 1

Question 1

Should implants be inserted in periodontitis-susceptible patients?

Statement

Implant treatment in periodontitis-susceptible patients is not contraindicated after completed periodontal treatment (1).
(Recommendation level: C).

Comments

Infection control is mandatory.
High incidence of peri-implantitis may jeopardize the longevity of the implant-supported prostheses.

Question 2

Are periodontitis-susceptible patients associated with a higher risk of peri-implantitis?

Statement

The incidence of peri-implantitis is higher in individuals with a history of periodontitis than in those with tooth loss because of other reasons (1).
(Recommendation level: C).

Comments

The term *peri-implantitis* has not been adequately defined.
A follow-up regime with more frequent controls than usual is recommended for these patients.

Question 3

Have implants a better prognosis than teeth with reduced marginal bone support?

Statement

The survival rates of teeth in periodontal well-maintained patients are in general higher than that of implants (2).

(Recommendation level: B).

Comments

This statement is based on few studies. However, the dentist should counsel the patients to retain their teeth.

Question 4

Can early extraction of teeth preserve bone for later implant placement?

Statement

There is no evidence available to support such an aggressive approach (2).

(Recommendation level: D).

Comments

Untreatable compromised teeth (e.g. long-axis root fracture) should be extracted in order to preserve bone.

Working group 2

Question 1

Is implant survival rate affected by timing of implant placement relative to tooth extraction?

Statement

Survival rates are similar for immediate/early and late placed implants (3).

(Recommendation level: B).

Comments

The dentist can therefore use sound clinical judgment when deciding when to place an implant following extraction.

The statement is based on RCTs with small sample sizes and short observation periods but supported by several reviews.

Question 2

Does infection at the extraction site affect the outcome of immediate implant placement?

Statement

Available knowledge suggests that immediate implant placement in sites with chronic periapical lesions may be successful (3).

(Recommendation level: B).

Comments

The patient should be told that this procedure may entail a higher risk of unpredictable outcome.

Thorough debridement of the alveolus should be made. This statement is based on one RCT with short observation period and one animal study.

Question 3

Does a gap between the implant and the socket wall affect the outcome of immediate implant placement?

Statement

Three-wall defects (critical jumping distance 1·5 mm) have a high potential for spontaneous healing for both early (10 days) and late (3 months) placed implants (3). Bone dehiscences should be covered with bone graft and/or membrane as there is only a low potential for bone formation (3).

(Recommendation level: B).

Comments

This statement is based on one RCT with small sample sizes and short observation period.

Question 4

Should we extract teeth to avoid implant–tooth combinations in the premolar region of the mandible?

Statement

Teeth in the mandibular premolar region should not be extracted to avoid implant–tooth combinations (4).

(Recommendation level: A).

Comments

Treatment with implant–tooth-supported prostheses in the mandibular premolar region is indicated when only one implant can be placed because of limited bone volume and

- a single implant gives too little occlusal support;
- to avoid nerve transposition;
- when the risk for complications from bone augmentation procedures is evident;
- When alternative treatments are not acceptable.

However, vitality, periodontal status, biomechanical risks and caries activity must be considered.

Question 5

Should we extract teeth to avoid implant–tooth combinations in other regions of the maxilla and mandible?

Statement

Teeth should not be extracted to avoid implant-tooth combinations, irrespective of jaw or intraoral region (4).

(Recommendation level: B).

Comments

The evidence is weaker for this statement than for the previous one.

Vitality, periodontal status, biomechanical risks and caries activity must be considered.

Working group 3

Question 1

When and how can agenesis of teeth be diagnosed?

Statement

The diagnosis of tooth agenesis should ideally be set as early as possible (8–10 years) (5).

(Recommendation level: A).

Comments

Clinical signs as asymmetric eruption and deviant sequence of eruption should initiate radiographic examination.

Question 2

How should the clinical management be organized?

Statement

Early treatment planning and a multidisciplinary team approach are advocated (5, 6).

(Recommendation level: C).

Comments

Many advantages have been reported working in a multidisciplinary team.

Question 3

Which factors have to be evaluated in the treatment planning?

Statement

A comprehensive view of dental and skeletal maturation, occlusion, number and location of existing teeth, facial and dental aesthetics are important factors for decisions on space closure or replacement (6).

(Recommendation level: B).

Question 4

When should deciduous teeth without successors be extracted?

Statement

Severely infra-occluded teeth should be removed because of risk of marginal bone loss and tipping of adjacent teeth.

Deciduous teeth should in general be kept as long as possible (5, 6).

(Recommendation level: B).

Comments

Deciduous teeth preserve alveolar bone.

Deciduous teeth may be extracted to promote guided eruption of permanent teeth.

Question 5

How early in life can dental implants be placed?

Statement

Dental implants should not be placed before the dental and skeletal maturation has finished (5, 6).

(Recommendation level: B).

Comments

Even when growth is finished, slight continuous eruption of the adjacent teeth, especially in the maxillary incisor region, may result in infraocclusion of the implant-supported crown.

Question 6

How can orthodontic treatment contribute to improve implant sites?

Statement

Pre-implant orthodontic treatment aims to create sufficient space in the implant area, and upright and parallel the adjacent teeth using non-intruding forces (6).

(Recommendation level: C).

Comments

Bone volume can be gained in implant sites by orthodontic tooth movement.

Question 7

Which are the long-term results of implants placed in young adults?

Statement

A high implant survival rate has been reported (6).

(Recommendation level: C).

Comments

Side effects have been found; increasing infraocclusion of the implant-supported crown, marginal bone loss, recession and discolouring of the labial mucosa.

Thus, establishment of quality registries or databases for long-term evaluation as well as clinical follow-up studies are strongly advocated.

Working group 4

Question 1

What is the evidence to apply a concept of combined tooth–implant-supported fixed dental prostheses?

Statement

Combined tooth–implant-supported FDPs (Fixed Dental Prosthesis) have estimated survival rates of 95·5% after 5 years and 77·8% after 10 years (7).

(Recommendation level: B).

Comments

A combined tooth–implant-supported FDP represents a second treatment option given the anatomical structures do not allow for a solely implant-supported reconstruction.

Because of the fact that the 10-year survival rate is based on only 72 reconstructions, the long-term prognosis of this treatment modality so far is to be judged with caution!

Question 2

What is the evidence to apply a concept of solely implant-supported fixed dental prostheses?

Statement

Solely implant-supported FDPs have estimated survival rates of 95·2% after 5 years and 86·7% after 10 years (7).

(Recommendation level: B).

Comments

When inserting implant-supported reconstructions, the solely implant-supported FDP is the treatment option of first choice.

After 5 years, conventional tooth-supported FDPs, solely implant-supported FDPs and combined tooth–implant-supported FDPs all exhibit comparable – 94% or higher – survival rates. After 10 years, however, a more favourable survival rate was reported for conventional tooth-supported FDPs and solely implant-supported FDPs compared with that of combined tooth–implant-supported FDPs.

Question 3

Do two implants in the mandible and the maxilla, respectively, sufficiently retain and support an overdenture in the patient perspective?

Statement

Patient satisfaction was achieved utilizing two implants for an overdenture in the maxilla (8).

(Recommendation level: C).

In the mandible overdentures retained by two implants demonstrated excellent patient satisfaction. Patient satisfaction was not affected by an increased number of implants (8).

(Recommendation level: A).

Comments

Two-implant supported overdentures in the maxilla yielded after 5 years an implant survival rate of only 75% compared with 100% in the mandible.

Question 4

Do two implants in the mandible and the maxilla, respectively, sufficiently retain and support an overdenture from a functional point of view?

Statement

From a functional point of view there is no evidence to support the concept of overdentures supported by two implants in the maxilla (8).

(Recommendation level: D).

There is evidence to support the concept of overdentures supported by two implants in the mandible (8).

(Recommendation level: A).

Comments

There are no studies evaluating the functional aspects of overdentures retained by two implants in the maxilla.

Several studies have established a functional superiority of implant-supported mandibular overdentures compared with complete dentures.

Question 5

How many implants/teeth should support an overdenture?

Statement

For the maxilla there are no studies available that explicitly address this question.

Concerning the mandible, however, it can not be concluded that patient satisfaction, dentures function or implant survival improve by increasing the number of implants (8).

(Recommendation level: A).

Comments

There are studies indicating that a mandibular overdenture with only one implant could increase patient satisfaction.

Discussion

The authors of the eight review articles found in general a great number of papers related to the topic of their reviews in their electronic search using Medline/PubMed as the major bibliographic database. However, very few of the identified studies were designed as randomized controlled trials (RCTs) or long-term prospective studies, which are considered to provide the strongest scientific evidence for effectiveness of interventions or estimates of prognosis. As shown in the presentation of the consensus statements, only a few have been classified as A, i.e. reflecting the highest level of scientific evidence. Much work during the workshop was devoted to discussing the interpretation and assessment of studies not fulfilling the highest evidence level. In the absence of research of highest quality there is a necessity to accept evidence on a lower level to be able to draw any relevant conclusions. These considerations were done with the aim to come up with statements and recommendations based on the current best available evidence. This signifies that the statements and recommendations set forth in this article should be regarded as transitory and will require modifications or amendments when new research results appear. Still, it is the opinion of the authors that the reviews

and the consensus statements should represent valuable information to be used by researchers and clinicians until new results will change our knowledge basis.

Conflicts of Interest

All authors declare no conflicts of interest.

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