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summary – review

The survival of hydroxyapatite-coated implants is questioned

Lee JJ, Rouhfar L, Beirne OR. Survival of hydroxyapatite-coated implants: a meta-analytic review. J Oral Maxil Surg 2000; 58: 1372–1379

Question: Do hydroxyapatite implants last as long as titanium implants?

Objective Identify and critically review human clinical trials that examined the survival of hydroxyapatite-coated implants.

Data sources Medline (1990–1999) was searched using the keywords 'hydroxyapatite' or 'hydroxylapatite'.

Study selection Papers were included that were written in English and met the criteria that they: included at least 10 patients; at least a 6-month follow-up; no more than 5% loss-from-study of patients; overall implant survival reported by overall percentage-survival or by life-table analysis; and no barrier membranes were used.

Data extraction Cumulative life-table survival curves were presented from the included studies. No attempts at synthesis or pooling the data were made.

Results Out of 45 papers identified, 34 were excluded due to various deficiencies. Eleven studies met the criteria, representing some 14 000 implants. Only one study was a randomised controlled trial (RCT). The estimated survival rates vary between 79% for IMZ* to 96% for Steri-Oss# at 8 years, 93% for Sterngold/Implamed¥ at 3 years and 98% for integral at 4 years.

Conclusion The authors suggest that the survival rates for the hydroxyapatite-coated implants are in the same range as the survival rates for titanium implants. More information is required, however, including better quality clinical studies and reporting.

*IMZ – Interpore International, Irvine CA
#Steri-Oss – Yorba Linda, CA
¥Sterngold/implamed – Attenboro, MA

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Commentary

The systematic review or, as it is called in the present paper 'meta-analytic review' process is retrospective research and therefore subject to bias. For this reason, a number of criteria for inclusion of papers have been developed in the past. One of them is to include (preferably) RCTs.

In fact, few RCTs are available in the study of clinical implants and, if they are available, they are often incomplete in reporting the methodology and trial conduct. This applies in the present review. The primary papers included in this systematic review are both RCTs as well as observational studies. In fact, although the word trial is often used in the paper, the requirements of an RCT are seldom met. It is important, therefore, to evaluate the extent to which data from the observational clinical studies included here can be used for inference. The value of reviews based on observational primary studies has been discussed comprehensively in the medical literature and it has been shown that they are as common as those of controlled clinical trials.[1]

In the light of this, the question arises as to what extent systematic reviews of observational studies provide evidence. A distinction must be made between two aims of systematic reviews. If a systematic review is conducted to find out differences in efficiency between therapies (eg, the question whether implant survival of hydroxyapatite-coated implants is better than the survival of non-coated implants), only RCTs should be included in the review. If uncontrolled studies are included, as in the present review, some research-questions cannot be answered adequately.

If the aim of a systematic review is to provide information on the clinical performance or potential benefits of a certain therapy (eg, to estimate the longevity of hydroxyapatite-coated implants), there is no need for only RCTs to be used for aggregation of data. Information yielded by this kind of review may be useful for practitioners in assessing their own performance and to inform patients about the prognoses of therapies if the quality of the primary studies is critically assessed.

Two important quality-control measurements have been suggested for use in systematic reviews:

1. a test on heterogeneity, and
2. a quality assessment of primary studies.

It is accepted that results of primary studies should not be combined when heterogeneity is present, because the overall mean would not be interpretable. On the other hand, the presence of heterogeneity of study results might indicate otherwise-undetectable influen-

cing factors. Careful investigation of sources of heterogeneity may provide second-level evidence that can be useful in suggesting directions of future research. For either reasoning, the sources of heterogeneity should be investigated as this adds substantially to the strength of the systematic review.[2] If homogeneity is difficult to demonstrate, there should be a clear quality assessment of the designs of the studies included. This provides valuable information about the primary studies and serves as an instrument to indicate the reliability of the data for the pooling process.[3] Unfortunately, the present review is lacking both basic quality control measurements. As a result it is impossible to validate the outcome of this review.

A second point of concern is the indistinct process of selecting and evaluating the primary papers, eg, would other observers have made the same selection and evaluation on the basis of the described inclusion criteria? This concern adds to the lack of quality control.

In conclusion it can be stated that the review is providing new summary knowledge. Before it can be recognised as evidence, however, this information needs to be validated by a second study.

1. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies. A proposal for reporting. J Am Med Assoc 2000; 283:2008–2012.
2. Thompson SG. Why sources of heterogeneity in meta-analysis should be investigated. BMJ 1994; 309:1351–1355.
3. Antczak AA, Tang J, Chalmers TC. Quality assessment of randomized control trials in dental research. (II) Results: periodontal research. J Periodont Res 1986; 21:315–321.

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