

Antibiotic prophylaxis for dental implant placement?

Abstracted from

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Question: Does an antibiotic prophylaxis regimen prior to implant placement have any effect on the prevention of implant failure rate and post-operative infection in a healthy patient?

Data sources Electronic searches without time or language restrictions were performed in PubMed, Web of Science and the Cochrane Oral Health Group trials Register. A vast manual search was done in many dental implant-related journals. Reference lists were scanned for possible additional studies. Ongoing clinical trials were also searched.

Study selection Titles and abstracts of the reports identified were read independently by the three authors. Disagreements were resolved by discussion. Rejected studies were recorded with the reasons for exclusion. The inclusion criteria included clinical human studies, either randomised or not, comparing the implant failure/survival rates in any group of patients receiving antibiotic prophylaxis versus not receiving antibiotics prior to implant placement. Case reports and non-human studies were excluded. Implant failure was considered as complete loss of the implant.

Data extraction and synthesis Data were extracted by the authors. Study risk of bias was assessed. Implant failure and post-operative infection were the outcomes measured, both dichotomous outcomes. Results were expressed using fixed – or a random effect model depending on the heterogeneity calculated using an I^2 statistical test. The estimate of relative effect was expressed in risk ratio (RR) with 95% confidence interval. Number needed to treat (NNT) was calculated and sensitivity analysis was performed to detect differences among the studies considered to have high a risk of bias.

Results Fourteen trials were included in the review and evaluated a total of 14,872 implants. Of the fourteen studies included in the review eight were randomised clinical trials, four were controlled clinical trials and two were retrospective studies. Seven studies had both patients and operators/outcome assessors blinded to the tested intervention. Nine studies had short follow-ups; six of them with a follow-up of four months, one of five months and two of six months.

The antibiotic regimen was variable: seven studies did not use post-op antibiotics in all patients. Seven studies used amoxicillin as the antibiotic of choice. Ten studies had patients rinse with antimicrobial solutions as well.

Among the fourteen studies, 8603 implants were placed in patients receiving antibiotics, 304 failures (3.53%) were recorded; 6269

implants were placed in patients not receiving antibiotics or receiving placebo, with 396 failures recorded (6.32%).

From eight articles that provided the information about post-operative infection there were 25 occurrences of infection in 1000 patients receiving antibiotics (2.5%) and 29 episodes in 770 patients not receiving antibiotics (3.8%).

Some studies involved grafting procedures and a portion of the patients (in nine studies) were smokers.

The test of overall effect for implant failure rate showed that the difference between the procedures with or without antibiotic is statistically significant: RR 0.55, 95% confidence interval (CI) 0.41 to 0.75, p value 0.0002, a relative risk reduction (RRR) of 45% and the number needed to treat (NNT) of 50 (95% CI 33-100).

For the post operative infection outcome, the results of the meta-analysis showed no statistically significant results; RR 0.84, 95% confidence interval 0.49-1.44, and a p value of 0.52.

The results did not differ in the sensitivity analysis when removing the high risk of bias studies. For the implant failure, the results were RR 0.37, 95% CI 0.19-0.72, p value 0.003, and for the 'post operative infection' outcome the results were RR 0.78, 95% CI 0.38-1.39. p value 0.33. The funnel plot to calculate publication bias showed asymmetry for the studies reporting implant failure, while the studies reporting post-operative infection the funnel plot did not show asymmetry.

Conclusions The evidence from the review suggests that a prophylactic antibiotic regimen reduces failure of dental implants placed under ordinary conditions. However, there are no apparent differences in the occurrence of post-operative infections in patients receiving or not receiving antibiotics.

The results have to be interpreted with caution due to the presence of several cofounding factors in the studies.

Commentary

The use of antibiotics in any form and dosage prior to or after dental implant placement to prevent implant failure and post-operative infection was the purpose of the systematic review and meta-analysis.

The therapy question search was not restricted to randomised clinical trials, as the authors included other research designs to answer the proposed clinical question. The pooled final data included all the studies first and then they performed a separate analysis excluding the high risk of bias studies to see if that was altering the results. However, after that the results did not change statistically and favoured the use of antibiotic prophylaxis for

prevention of implant failure, but the results were not statistically significant for prevention of post-operative infection.

They even calculated the number needed to treat (NNT) in order to prevent one implant failure which resulted in a NNT of 50, a double digit number fairly high for prevention of early implant failures, a complication that can be associated with several risk factors even in healthy patients. As the authors reported, the results should be interpreted with caution due to several cofounders in the studies.

The units of analysis in this review were the implants, not the patients. Patients can receive more than one implant and the failure could be independent of the use or not of antibiotics.

A similar topic was published at the Cochrane Library using patients as the unit of analysis and arrived at similar conclusions, statistically favouring the use of antibiotic prophylaxis prior to dental implant placement. The results for prevention of infection were also not statistically significant.¹ Despite the results of the review the data should be interpreted with caution. Practitioners should use their judgment and not jump to conclusions and prescribe antibiotics to prevent implant failures in healthy patients.²

Smoking and other risk factors should be taken into consideration. It is unclear how uncontrolled systemic conditions such as diabetes and osteoporosis may impact on the implant success, due to the variability of the studies as concluded in the review.³

It would be interesting to see the impact of antibiotic prophylaxis with regard to implant failure and post-operative infection in medically complex patients where the risk is increased.

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