INTERNATIONAL DENTAL JOURNAL 000 (2022) 1–2

Letter to the Editor

Static Computer-Aided Implant Surgery: An Ally Against Bacterial Antimicrobial Resistance?

Oral antibiotics are some of the most used drugs in dentistry. Since the beginning of implant dentistry, preventive antibiotic therapy[1] (PAT) has been incorporated into dental implant procedures due to the presence of approximately 500 to 700 bacteria species in the oral cavity[2] and the consequent risk of contamination and infection of the surgical site.

The use of these medications in the mentioned procedures is questioned due to its associated side effects and potential complications (ie, toxicity in target organs) leading to a lack of agreement regarding the advantages and disadvantages of the prescription of PAT in dental implant procedures.[3] Besides what has been mentioned, the development of bacterial antimicrobial resistance (AMR) against most types of known antibiotics is a significant worldwide problem. AMR is related to increased hospital stays, treatment costs, and patient mortality and has become a major public health issue.[4] It is estimated that in the next few years, 390,000 people will die due to AMR in Europe,[5] and in the United States, there are more than 23,000 annual deaths associated with AMR.[6] Therefore, it is of utmost importance to review the prescription protocols of these medications, because if behavioral features of the problem does not change, dental procedures will contribute to it.[4]

Thus, many studies have been published trying to rationalise the prescription of PAT in implant dentistry.[7] Currently, the recommended trend is to prescribe 2 to 3 g of amoxicillin 1 hour before the procedure in ordinary dental implants, that is, those procedures with anatomic constraints,[8] in guided bone regeneration with the placement of dental implants in 1 or 2 stages,[9] and in second-stage or periimplant plastic surgery procedures lasting more than 2 hours and/or where soft tissue grafts are used extensively.[9] Meanwhile, for other dental implant procedures, such as immediate implants, sinus lift procedures, and multiple implant placements, PAT is indicated during the preoperative phase and antibiotic therapy is given during the postoperative phase.[7,10,11]

In this regard, the above-mentioned surgical procedures are related to larger mucoperiosteal flaps, which are commonly associated with longer surgical time and major surgical trauma that increases the risk of contamination and surgical wound infection; both are related to early implant failure.[12] In fact, the placement of multiple implants has a higher prevalence of failure compared to single-unit implants (3.12[13] to 4.00[14] times), for this reason, it seems normal for clinicians to use higher doses of PAT in these procedures.

In this way, the use of virtual planning technologies in implant dentistry allows the combination of radiographic, prosthetic, surgical, and laboratory aspects, allowing complete virtual treatment planning and computer-aided clinical execution. The incorporation of the mentioned technologies is expanding the possibilities to perform innovative treatment modalities, making the processes more accurate, faster, less invasive, and less expensive.[15]

Static computer-aided implant surgery (S-CAIS) offers the possibility of inserting multiple implants in an optimal tridimensional position with a lower surgical time compared to a conventional procedure. When the clinical situation allows S-CAIS to be performed under a flapless approach, the postoperative infection rate as well as the patient's inflammatory response are also decreased. Moreover, the computer-assisted procedure permits placing implants in limited anatomic regions, avoiding ridge augmentation procedures in many cases.[16,17]

As mentioned above, digital planning and S-CAIS seem to contribute to performing less invasive interventions, helping clinicians to modify the usage of PAT and therefore favor the prevention of increasing AMR.

Nevertheless, it is necessary to perform studies to analyse the prevalence of secondary infections in digitally assisted fully guided implant placement vs conventional implant placement regarding the PAT protocol used.

Declaration of Competing Interest

None disclosed.

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https://doi.org/10.1016/j.identj.2022.12.004