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Evaluation of antibiotic prophylaxis use in a university dental clinic in the Lisbon area

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ABSTRACT

Introduction: Antibiotic prophylaxis (AP) in dentistry is recommended before dental procedures that involve manipulation of gingival tissue or periapical region, and perforation of oral mucosa in order to prevent a serious bacterial infection. The American Heart Association (AHA) Guideline recommends that the cardiac conditions with the highest risk of infective endocarditis (IE), for which AP is reasonable are: prosthetic cardiac valves, previous IE, congenital heart disease and cardiac transplantation with cardiac valvulopathy [1,2,3]. The aim of this study is to evaluate the use of AP in a University dental practice compared to AHA guidelines.

Materials and methods: An observational and descriptive study was conducted between June and August 2016 at Clínica Dentária Egas Moniz (CDEM), a University Dental Clinic in the greater Lisbon Area. A total of 4000 patient records were analysed. 60 records were selected according to predefined inclusion criteria: patients submitted to endodontics and/or periodontology and/or surgery appointments, patients with IE/prosthetic cardiac valves/cardiac bypass/cardiac valvular disease/rheumatic fever or hip/knee joint prosthesis and patients who required AP before an invasive dental procedure. Clinical processes analysis were authorised by the patients through a declaration of informed consent. This study was authorised by the Clinical Director of CDEM and approved by Egas Moniz Ethics Committee.

Results: Periodontology patients had AP indication in: congenital cardiac disease (4/16), cardiac valvular disease (5/13), rheumatic fever (3/7), and prosthetic cardiac valves (7/8). Surgery patients had AP indication in: IE (2/2), congenital cardiac disease (4/12), cardiac valvular disease (4/6), rheumatic fever (2/4) and prosthetic cardiac valves (6/8). Endodontic records were not enough to have significant results to compare.

Discussion and conclusions: There is some disparity between the AHA guideline and the attitudes of dentists towards AP indication [4]. The use of antibiotics in dental medicine is characterised by empirical prescription based on epidemiological and clinical factors, using broad spectrum antibiotics and for short periods of time. The abuse of unjustified antibiotics and the lack of knowledge about the application of AP ultimately encourages bacterial resistance and the increase in untreatable infections. Antimicrobial resistance is a current serious global threat accordingly to WHO. It is no longer a prediction for the future, as it is happening in all regions of the world and has the potential to reach anyone [5]. The knowledge and communication over this topic must be stressed, even more in newly graduated dentists, to encourage evidence based homogeneous prescription patterns that promote good and safe clinical practices.

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***In vivo* study on the performance of therapeutic intraocular lens loaded with an antibiotic and an anti-inflammatory**

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ABSTRACT

Introduction: Cataract treatment usually involves surgery for substitution of the opacified eye lens by an artificial intraocular lens (IOL). In the post-operative period, antibiotics and anti-inflammatories eye drops are prescribed to prevent endophthalmitis that may occur due to bacterial infection and results in serious complications [1,2]. This drug delivery method leads to a low bioavailability of the drugs due to the ocular clearance and absorption mechanisms. Furthermore, since it requires frequent administrations, it is uncomfortable for patients and it may lead to a low compliance. Drug-loaded intraocular lenses (IOL) have been explored as potential drug release vehicles due to their prolonged time of contact with the eye and constitute a promising alternative to eye drops [3]. The main goal of this work is to evaluate the *in vivo* performance of dual drug-loaded IOLs containing an antibiotic and an anti-inflammatory.

Materials and methods: An antibiotic, moxifloxacin (MXF), and an anti-inflammatory, ketorolac (KTL) were loaded in commercial acrylic IOLs by soaking in drug solution containing the two drugs (5 mg/mL each drug) at 60 °C for 2 weeks. The effect of the drug loading on lenses properties such as the swelling capacity, optical properties (transmittance) and mechanical properties (Young's modulus) was evaluated. After sterilisation, the drug loaded lenses were used for *in vitro* drug release tests, carried out in sink conditions (PBS, 3 mL, 36 °C, 180 rpm) and *in vivo* experiments with rabbits. A mathematical model was applied to the *in vitro* results to predict the *in vivo* concentrations. In the *in vivo* tests, the lenses were implanted into the right eye of 5 Japanese rabbits. No eye drops were administered in the post-operative period. To evaluate ocular inflammation, slit-lamp examinations were done on the days 1, 3, 7, 14 and 21. On the day 21 the animals were anaesthetised and killed humanely with air embolism. The eyes were enucleated for histological investigation, in particular the cornea and the iris were separated, sectioned with a cryostat and stained following the haematoxylin and eosin staining.

Results and discussion: It was found that the presence of drugs increases the swelling capacity of the lenses, slightly decreases the Young's modulus and does not affect the transmittance in the range 500–700 nm. *In vitro* tests show that the lenses are able to release both drugs in a sustained way. The mathematical model indicates that the *in vivo* concentration of MXF should be higher than the minimal inhibitory concentration (MIC) of *Staphylococcus aureus* and *Staphylococcus epidermidis* (two of the most common bacteria responsible for endophthalmitis), for at least 15 days and that the concentration of KTL stays above half maximal inhibitory concentration (IC50) of cyclooxygenase 1 (and cyclooxygenase 2 (2 enzymes responsible for inflammation) for 16 days. In the *in vivo* tests, the slit-lamp examinations demonstrated that after 7 days no inflammation was present on the eyes of the rabbits. The histological evaluation proved good biocompatibility of the double loaded lenses.

Conclusions: The double loaded lenses revealed to be promising devices for the post-cataract surgery prophylaxis, complying with both antibiotic and anti-inflammatory therapeutic needs.

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