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OVERUSE OF ANTIBIOTICS IN DENTISTRY. A CRITICAL REVIEW

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Abstract

Antimicrobial resistance (AMR) has been on the rise worldwide because of excessive and inappropriate use of antibiotics in healthcare. Dentists account for 10% of all antibiotic prescriptions, primarily used to treat oral infections and prevent postsurgical problems. Recent research and clinical assessments emphasize new therapy strategies that involve decreasing antibiotic dosages and prescriptions. Prioritizing precise diagnosis and enhancing oral health before dental procedures and in patients' everyday routines is essential. This article identifies and summarizes the most frequent clinical and operative scenarios in dental practice, including endodontics, acute alveolar abscess management, extractive oral surgery, periodontology, and implantology. It suggests potential guidelines to decrease antibiotic prescription and usage while maintaining high success rates and low complication rates. The patient categories that need antibiotics for existing conditions are also summarized. Establishing particular standards for antibiotic therapy is crucial in reducing the potential of antimicrobial resistance. Recent evaluations show that in dentistry, lowering antibiotic use by carefully evaluating patient conditions and interventions might enhance efficacy, decrease unwanted effects, and promote individualized treatment.

Keywords: Antibiotics, Oral infections, Antimicrobial resistance, Dental medicine.

Introduction

Antibiotic resistance occurs when a microorganism can grow or survive in the presence of an antibiotic concentration that is typically effective in inhibiting or killing organisms of the same species. Antibiotic resistance is a likely outcome of antibiotic use, however inappropriate use of antibiotics significantly contributes to the global rise of resistance. Antibiotics are easily accessible without a prescription in several locations, such as over-the-counter or online, giving non-

prescribers unrestricted access to these medications. Resistance emergence enables the spread of resistant strains through selection pressure from continued antibiotic use, lack of adherence to infection control measures, and inadequate hygiene practices, both in healthcare facilities and other environments.

In recent decades, medical professions, including dentistry, have seen a significant and sudden rise in the usage of antibiotics for treating various illnesses. This progress has led to the emergence and dissemination of antibiotic-resistant bacteria in humans and their surroundings [1]. The impact of dentistry on the emergence of antimicrobial resistance is not widely recognized. Antibiotic prescriptions in dentistry are mainly used for prophylaxis against life-threatening disorders and to avoid postoperative infections. There may be disagreement on the use of antibiotic prophylaxis for healthy individuals, but it is a crucial factor for medically compromised patients from a medicolegal perspective.The advantages of antibiotic prophylaxis must be assessed in light of the potential drawbacks such as allergic responses, side effects, and increasing issues with antimicrobial resistance[2,3]. Despite the publication of numerous guidelines for the sensible use of antibiotics, recommendations frequently contradict one other [4]. It is unsurprising that additional studies have discovered indications of over use of antibiotic prophylaxis by general dental practitioners when viewed from this standpoint[5,6].

Aim

This article aims to address antibiotic misuse in dental practice, its role in antibiotic resistance, and the necessary steps to prevent antibiotic misuse in dentistry.

Materials and method

Research was conducted on Medline, a web-based platform, using the search terms "journal article" and "Review" in English language dental journals published over the last 20 years. The search terms used on MedLine were "Antibiotics," "Antibiotic resistance," "Antibiotic prophylaxis dental," "Antibiotic prescribing pattern," "Antibiotics abuse," "Antibiotics and dentists," and "Antibiotics over prescription." Furthermore, significant cross-reference papers were examined. Among 120 articles that were reviewed, 30 relevant articles were selected for the research.

Discussion

Types of Antibiotics and Administration Protocols

Antibiotics can be used for therapy or prevention. Antibiotic therapy (AT) is based on the assumption of a bacterial infection and requires continued treatment even if there are no clinical signs or symptoms of infection. Antibiotic prophylaxis (AP) is typically advised when there is no illness present to prevent the occurrence of a local or widespread infection. Disseminated infections can result from germs entering the bloodstream through cuts or wounds, leading to an infection in a remote organ or sepsis. Certain patient categories are more prone to this outcome, and antipsychotic medication is strongly advised for them. Antimicrobial prophylaxis (AP) or antimicrobial therapy (AT) procedures may involve administering antibiotics before, during, and after surgery, following particular treatment plans tailored to the patient's overall health condition

and the type of surgery being performed. Surgical techniques can be categorized based on the risk of infections into clean surgery, clean-contaminated surgery, contaminated surgery, and infected surgery. Oro-maxillofacial surgery is classified as clean-contaminated because to the absence of inflammation and contamination, while the risk of infection from bacteria often found in these tissues must be taken into account. Perioperative antiseptic prophylaxis shows a genuine efficacy in preventing transitory bacteremia. Antibiotic prophylaxis (AP) should be explored as a feasible option for a particular case and patient to regulate bacterial levels, reduce inflammation, and encourage a gentle surgical approach. However, the management of pus-forming infections in the mouth and face should be considered as septic operations. In these conditions, the use of antibiotics as adjunct therapy should be decreased and adjusted based on individual clinical circumstances [7]. Short-term antibiotic prophylaxis protocols are used to achieve antibiotic concentrations during surgery that are 3-4 times higher than the minimal inhibitory concentrations (MICs). This is done to prevent and combat bacteremia or local bacterial contaminations. These protocols are typically not linked to an increased risk of postoperative antimicrobial resistance (AMR) infections. Surveys conducted in Europe indicate that amoxicillin is the most commonly utilized antibiotic in preoperative protocols when antiseptic prophylaxis is implemented to decrease bacteremia. This preference is attributed to its effectiveness, superior absorption rate, and reduced likelihood of adverse reactions. Antibiotic use in dentistry often relies on empirical therapy and is considered the primary treatment option. Antibiotics commonly used in dentistry are typically broad-spectrum compounds like betalactams (amoxicillin alone or in combination with clavulanate, cephalosporins) and semisynthetic macrolides (clarithromycin and azithromycin). Amoxicillin is often the primary choice for treating acute pancreatitis because of its moderate range, good bioavailability, high plasma concentrations when given orally, and little side effects. Amoxicillin's β-lactam ring binds to and deactivates penicillin-binding protein (PBP) 1A, an enzyme crucial for bacterial cell wall formation, leading to cell breakdown and demise. The addition of clavulanate broadens the range of effectiveness to encompass all bacteria that produce beta-lactamase, as well as alpha-hemolytic oral viridans, Streptococcus, and Staphylococcus aureus. Clavulanic acid, despite containing a β-lactam ring, is not effective as an antibiotic. It functions as a "suicide inhibitor" by irreversibly attaching to a serine residue in the active site of beta-lactamase, thus inhibiting the enzymatic breakdown of amoxicillin and other penicillins. The amoxicillin–clavulanic acid combination is frequently utilized in a 7:1 ratio (875 mg amoxicillin/125 mg clavulanic acid) to prevent clavulanic acid-related toxicity, such as diarrhea and gastrointestinal side effects. Cephalosporins including ceftriaxone, cefotaxime, ceftazidime, and cefepime are suitable as an alternative option for treating severe infections. Administering ceftriaxone via intramuscular injection can be beneficial for people experiencing vomiting or gastrointestinal problems. Macrolides are efficient against a wide range of aerobic and anaerobic Gram-positive and Gram-negative bacteria, commonly used in individuals with a history of beta-lactam allergy. Azithromycin and clarithromycin can lengthen QT intervals, raising the risk of abrupt cardiac

death from torsades de pointes. Aziythromycin offers benefits such as lower daily dosage and shorter treatment duration (500 mg once daily for 3 days) in comparison to clarithromycin (500 mg twice daily for 7 days) [8].
Clindamycin is an alternative antibiotic for those with allergies to betalactams. It is efficient against a wide range of Gram-positive and Gram-negative bacteria, both aerobic and anaerobic, with a uniform distribution in various body tissues and a bone concentration similar to that in the blood. Clindamycin should be used cautiously in patients with a history of enteritis due to its gastrointestinal adverse effects. The recommended adult oral dosage is 300 mg every 6 hours. Metronidazole is a commonly used antibiotic for treating periodontal illnesses because of its effectiveness against anaerobic bacteria and its ability to achieve high concentrations in saliva and tissues. The recommended adult oral dosage is 500 mg three times a day for 3 to 7 days. Metronidazole can be used either independently as a substitute for betalactams or in conjunction with betalactams [9]. The combination of 500 mg amoxicillin and 500 mg metronidazole taken three times daily for 3 to 7 days was first suggested for nonsurgical treatment of aggressive and refractory periodontitis. It has also been used to treat patients with or at risk of developing medical-related osteonecrosis of the jaws following invasive dental procedures.

Antibiotics in Endodontics

Several investigationshave demonstrated the improper use of antibiotics for treating endodontic infections like irreversible pulpitis, pulp necrosis, and periapical periodontitis [10,11]. In these situations, the absence of blood flow in the pulp hinders the delivery of antibiotics to the endodontic and periapical areas, making endodontic therapy or tooth extraction the only viable treatment options. Severe caries leads to bacterial invasion of the pulp tissue, causing inflammation that can progress to pulpitis, which is marked by intense spontaneous pain. Following total pulpal necrosis, bacteria inhabit the apical root area and their byproducts lead to persistent inflammation in the bone surrounding the apex, triggering an immune response characterized by pain upon percussion or biting and the detection of periapical radiolucency on X-rays (periapical periodontitis). Topical antibiotics have been suggested as medicaments during endodontic operations to address the lack of blood circulation in the root canal. However, there is no scientific data to support this practice. Moreover, the application of topical antibiotics might lead to changes in the color of dentin [12]. Sodium hypochlorite, chlorhexidine, and ethylene diamine tetraacetic acid (EDTA) are suggested as chemical adjuvants in root canal treatment. Calcium hydroxide or meta-cresil-acetate might be utilized as interim medicaments between appointments due to their antiseptic qualities [13].
Pulp capping can be used to preserve pulpal vitality in teeth with borderline pulpal exposure, perhaps preventing the need for endodontic therapy. In these situations, there is little data supporting the effectiveness of topical antibiotics. Instead, materials like mineral trioxide aggregate, calcium hydroxide, and adhesive systems are typically favored. The treatment of traumatic tooth damage is associated with endodontics and conservative dentistry. Traumatic accidents can result in fractures, dislocations, or avulsion of a tooth as potential injuries. Tooth fractures can be treated with reconstructive techniques and endodontic therapy without the need

for systemic antibiotics, as mentioned earlier [14]. Antimicrobial therapy is essential for repositioning or replanting a tooth with mechanical blockage during the healing phase of the root on the alveolar bone in cases of luxations and avulsions. During the healing process, bacterial contamination can negatively impact the outcome by causing inflammatory root resorption. Applying antibiotics like tetracyclines directly on the root surface can be beneficial for periodontal and pulpal healing, especially in the replantation of avulsed teeth. Current viewpoints in conservative dentistry and endodontics specify a limited number of disorders and treatments where systemic or topical antibiotic therapy is advised, including as acute infective diseases include alveolar acute abscesses and postsurgical infections.

Postsurgical infection can be assessed by indicators such as suppuration occurring 72 hours after surgery, persistent pain and swelling after 48 hours, lymphadenopathy, tissue tension, temperature above 38°C, malaise, and trismus. Clinical attention should be directed towards pain or swelling that may result from surgical trauma rather than infection. Treating orofacial infections and swellings with antibiotics without a confirmed infection diagnosis is ineffective and perhaps hazardous. An example is pericoronitis, an inflammation of the soft tissues around the crown of an impacted tooth, particularly in mandibular third molars. Pain, swelling, and trismus are typical symptoms that can be treated with anti-inflammatory and antiseptic treatments. Tooth extraction and antibiotics should only be recommended if there are particular infectious problems present. An abscess is a newly created cavity filled with pus that develops after an infection. Clinical signs often include a swollen area that feels soft and fluctuates in size, along with spontaneous pain. Acute abscesses can originate from endodontic difficulties, beginning with profound decay leading to bacterial invasion of the pulp chamber and spreading to the surrounding bone and soft tissues. Abscesses can develop from a deep and closed-off periodontal pocket where pus cannot drain on its own [15].
The primary approach in treating acute abscesses is removing the underlying cause (such as endodontic infection, deep pocket, impacted tooth) by conservative treatment or tooth extraction rather than antibiotics. This may be enough in isolated forms, such as fluctuant swelling delimited in alveolar mucosa. When infections spread extensively between fascial spaces such as the submandibular space, cheek space, and neck fascial space, drainage to remove the pus may be required. Drainage facilitates the quick and extensive elimination of harmful substances, decompression of fascial spaces, and improved penetration of potential AT into tissues. Antibiotic therapy may be required in rapidly progressing infections with onset in less than 24 hours, especially when it is not possible to drain or eliminate the causative factors such as phlegmon or trismus. It is essential to consider drainage in alveolar abscesses with systemic symptoms and in immunocompromised patients.
Several writers emphasize the significance of eliminating causative factors and implementing drainage. They note that all kinds of antibiotics given post these treatments are equally effective [16].

Antibiotics in Periodontology

The primary treatment for periodontal disorders involves removing bacterial biofilms on the tooth surface using mechanical means and enhancing oral hygiene with proper brushing procedures. AT can only be used for severe sorts of periodontal illnesses like necrotizing forms, early onset periodontitis, periodontal abscesses, and nonresponsive forms. Combining AT with scaling and root planing resulted in a slight additional reduction in probing pocket depth (PPD) compared to using scaling and root planing alone. Meta-analyses indicated that only doxycycline and the combination of amoxicillin with metronidazole led to a notable reduction in pocket depth. Scientific societies recommend systemic antibiotic therapy using metronidazole plus amoxicillin or tetracycline (250 mg four times daily for 2 weeks) as a widely accepted treatment approach[17]. Another treatment approach, in addition to mechanical cleaning, involves applying topical antibiotics to periodontal pockets. Recent comprehensive review indicates that local antimicrobials are successful in decreasing probing pocket depth (PPD) and enhancing the clinical attachment level (CAL) in diabetic patients. Tetracyclines, including tetracycline hydrochloride, doxycycline, and minocycline, are extensively researched medications known for their ability to inhibit collagenases, metalloproteinases, and interleukins. Topical tetracyclines are delivered into periodontal pockets using ethylene vinyl acetate fibers or in gel form. Additionally, using topical antibiotics such as tetracyclines along with non-surgical periodontal therapies improves reduction in probing pocket depth compared to solely relying on mechanical biofilm clearance [18]. Metronidazole can also be utilized in a gel form with a 25% concentration. Metronidazole gel does not appear to provide substantial advantages compared to nonsurgical therapies alone [19]. Antibiotics should be reserved for specific and severe types of periodontal diseases, such as necrotizing forms, early-onset periodontitis, periodontal abscesses, and nonresponsive forms. They should only be used in conjunction with periodontal treatments to disrupt and eliminate bacterial biofilms, due to the risks associated with developing antimicrobial resistance and the conflicting evidence regarding the actual clinical benefits of combined antibiotic therapy. Systemic antibiotic therapy can be used for severe periodontitis with several deep periodontal pockets that do not improve with mechanical treatment and in cases of acute periodontal abscesses. Treating periodontal abscesses with systemic antibiotic therapy should be combined with addressing the underlying cause and drainage. The primary antibiotic for treating periodontal abscesses is metronidazole. It can be administered either on its own (500 mg of metronidazole three times a day for 3-7 days) or in conjunction with betalactams (500 mg of amoxicillin + 500 mg of metronidazole three times a day for 3-7 days) [21]. Topical antibiotic therapy can be chosen for specific localized areas with a small number of periodontal pockets to enhance antibiotic levels at the site.

Antibiotics in Oral Surgery

There are multiple potential postoperative issues that might arise from dental extractions. Aside from hemorrhagic and neurological consequences, which are usually linked to patients' illnesses or technical challenges, the most frequent infectious complication is dry socket (alveolar osteitis). Dry socket (DS) is sometimes mistakenly thought of as an infection, however it is actually a

delayed healing process with a potential infectious component. Postsurgical pain and edema in patients with DS may not be directly linked to postsurgical infection, but could suggest a heightened postsurgical inflammatory reaction. If postoperative pain and swelling persist after 48 hours following surgery and are accompanied by suppuration 72 hours after the procedure, lymphadenopathy, local tissue tension, fever exceeding 38 °C, malaise, and trismus, it may indicate a postsurgical infection requiring antibiotic therapy. Teeth extractions can vary in technical difficulty based on factors such as tooth position in the dental arch, root structure (long or curved), the requirement for surgical flaps, osteotomy, and odontotomy. Elevated levels of difficulty are associated with longer surgery duration and surgical trauma, resulting in an increased inflammatory response [20,21]. Aside from technical challenges, predicting odds ratios for potential consequences requires taking into account the patient's age, systemic diseases, and bacterial load. Prescribing antibiotics systematically for all sorts of extractions can be considered a treatment without therapeutic rationale, putting patients at risk of harmful effects and contributing to antimicrobial resistance (AMR). Pain and swelling seem to be more associated with surgical stress, such as elevation of surgical flaps, osteotomy, and traumatic extraction, along with prolonged surgery time and patient age, rather than antibiotic use.
Local infections and DS are closely linked to the bacterial quantity before and after the intervention. Extractions of teeth with periodontal infections had a significant likelihood of developing dry socket due to bacteria growing in the socket bone, with an odds ratio of 7.5 [22]. Smoking can also lead to a significant incidence of postsurgical local infections. Proper preoperative disinfection of the operating area, removal of bacterial biofilms and tartar, and maintaining low bacterial levels during postoperative healing can help decrease the likelihood of an inflammatory response and local infections, thus preventing AT [23].
Dry socket is caused by heightened fibrinolytic activity that breaks down blood clots due to the activation of the plasminogen pathway. Chemical mediators released by surgical trauma or secreted by microorganisms, such as streptokinases, can do this. The primary risk factors to consider are surgical trauma, surgical duration, and bacterial load. Severe bone surgical trauma can lead to damage to the bone lining of the socket and clotting in the veins below, causing a slow healing process and increasing the likelihood of infection. Prolonged surgical procedures can also raise the chances of bacterial contamination and bone exposure. Haraji and Rakhshan noted that the incidence of DS increases with age, perhaps because of slowed metabolism, diminished tissue quality, and a weakened immune system [24]. Teeth that have recurring infections are more likely to acquire DS. Enhancing oral hygiene and removing dental biofilms before surgery might help reduce the occurrence of dry socket. Antiseptic medications like chlorhexidine rinse or gel, when used before and after tooth extraction, can help lower the bacterial count and potentially decrease the likelihood of dry socket. Using a preprocedural mouth rinse of 1% povidone or 1% hydrogen peroxide can help lower bacterial levels.
To reduce the incidence of dry socket, proper socket management involves cold irrigation of the post-extraction socket to eliminate germs and debris, as well as thorough scraping of alveolar bone plates to remove granulation tissue and bacteria while promoting osseous bleeding. For patients

with coagulation dysfunction leading to increased susceptibility of blood clots to fibrinolysis, utilizing sutures and absorbable collagen sponges to enhance blood clot stabilization, along with platelet-rich plasma to accelerate healing, shows promise. Some authors propose the use of antipersonnel (AP) to decrease bacterial streptokinase production, but no randomized studies have been conducted [25]. Prescribing antibiotics in all available regimens is not highly beneficial in avoiding dry socket. Preoperative antibiotic prophylaxis is associated with a modest decrease in the occurrence of dry socket following third molar surgery, perhaps preventing one case of dry socket in every 13 patients when antibiotics are prescribed. One might assess the risk/benefit ratio meticulously to enhance the antimicrobial resistance (AMR) and avoid problems [26]. It is advisable to prioritize the proper control of bacterial levels with full-mouth cleaning and a gentle surgical approach. Antibiotics are ineffective for treating dry socket. The recommended methods include irrigations with saline solution to eliminate germs and necrotic debris, as well as surgical curettage of alveolar bone plates to stimulate fresh bone bleeding and the creation of a new blood clot. Most experts advise against using antibiotics in standard dental extractions for healthy persons that do not include osteotomy or surgical flaps. There was no statistically significant difference in postoperative complications, such as pain, fever, edema, infection, and DS, between groups that received antibiotics in various therapy schemes (preoperatively and/or postoperatively) and the control group [27]. On the other hand, difficult extractions that received antibiotics showed a decrease in postsurgical infections (such as suppuration, discomfort, edema, trismus, dry socket, pyrexia, trismus, heat) from 16% to 2.7%. Accurate preoperative planning is essential for anticipating challenging tooth extractions and evaluating the associated risk of infection. Key choice considerations to consider include the necessity of osteotomy and associated bone exposure, as well as the surgical damage to the bone and the extended time of operation with prolonged bone exposure. These factors can promote bacterial contamination.
Elevating surgical flaps can lead to soft tissue trauma, particularly with excessive force or poor suture placement, increasing the risk of infection or other problems. Preoperative AP is recommended for extractions with projected extended lengths, while postoperative AP is unnecessary for osteotomy. Antibiotics decrease the chance of infection in these circumstances, but have little impact on other symptoms associated with surgical trauma such as pain, edema, and trismus. These symptoms may indicate an inflammatory reaction to surgical trauma or could be caused by trauma and simultaneous infection.
There is limited evidence that using antibiotics for third molar extraction surgery in healthy young adults can lower the risk of infection and dry socket. The odds ratio is around one person benefiting for every 12 to 17 patients who receive antibiotic prophylaxis. When administering antibiotics, there is a probability of one adverse event occurring for every 21 individuals treated, along with the potential for establishing antibiotic resistance. No notable distinctions were seen between antibiotics and placebo regarding fever, edema, trismus, and pain [28]. It is uncertain if preoperative prophylaxis is as helpful as prolonged postoperative antibiotic prophylaxis. For periodontal surgery involving osteotomy, it is recommended to use prolonged antibiotic prophylaxis. However, for mucogingival surgery, antibiotic prophylaxis is only advised for

patients with compromised health conditions. The main focus should be on maintaining periodontal health, ensuring a preoperative environment with minimal bacterial presence, and managing soft tissues effectively to minimize surgical trauma.

Antibiotics in Implantology and Regenerative Techniques

Bacterial contamination can influence the colonization of bone substitutes, bone grafts, and barrier membranes employed in regenerative procedures or surface implants. Because they lack blood arteries, these biomaterials offer a secure surface for bacterial colonies, impeding their removal and causing prolonged inflammation [29]. A healthy inflammation is essential for starting the repair process in tissue healing. However, a prolonged inflammatory response hinders the healing and regeneration of soft and hard tissues. An infected area disrupts bone formation in certain inflammatory systemic conditions like uncontrolled diabetes or rheumatoid arthritis, which are marked by an excessive and prolonged inflammatory reaction that hinders the healing of both soft and hard tissues. Historically, these surgeries have been linked to extended antibiotic treatments, typically beginning before the operation and lasting several days after, in order to enhance success rates, promote bone integration, and lower the risk of infections following surgery. Implant failure is characterized by a loose implant and may not be directly linked to past or current infections. Failures can be categorized as early failures, which happen before prosthetic restoration due to biological factors like bacterial contamination, low osteointegration, and healing disorders, or late failures after prosthesis placement where mechanical factors such as occlusal overload may coincide with biological factors like peri-implantitis [30]. Postoperative infections following implant placement may manifest as suppuration, sinus tracts, spontaneous discomfort, swelling, local tension, soft tissue pain, and mucosal erythema. These symptoms typically persist for up to 8 weeks after surgery but may not automatically result in implant failure. The use of antibiotics to prevent implant failure or postsurgical infection in dental implants is currently a highly debated topic. Postoperative medicines do not appear to have a significant impact on the success rate of implants. Antibiotic prophylaxis (AP) is suggested for high-risk patients in implant surgery to prevent infection and infective endocarditis. For other patients, a single preoperative dose of 1, 2, or 3 g of oral amoxicillin 1 hour before implant placement may help prevent dental implant failures, but it did not show significant effects on postoperative infections. An alternative antibiotic regimen for implant and bone regenerating treatments involves administering a single 2 g dosage of amoxicillin one hour before the procedure, followed by 500 mg of amoxicillin three times a day for 1 to 3 days.

Conclusion

Current guidelines suggest using antibiotics for treating suppurative orofacial infections only when causative factors removal and drainage are not effective, or for systemic involvement, considering antibiotics as supplementary treatment. Antibiotics in endodontics should only be used as prophylaxis for certain individuals to prevent the danger of bacteremia, with no impact on the success rate of treatments or improvement of clinical signs/symptoms. In oral surgery, routine tooth extractions in healthy patients can be handled without antibiotics following the same

procedures. Antibiotic prophylaxis can be chosen for patients with compromised health conditions such as immunocompromised individuals, those at high risk of endocarditis, and those at high risk of osteonecrosis and for complex extractions like lower wisdom teeth, allowing for a preoperative regimen or extending treatment for a few days post-intervention. Key checkpoints include the surgery time and the necessity for osteotomy, typically associated with bacterial infection and surgical stress. When performing implantology and regenerative operations, dentist should focus on reducing bacterial load and doing atraumatic surgery to minimize the chances of contamination and failures. Patients with good periodontal health and low levels of bacteria may benefit from a brief antibiotic prophylaxis prior to implant and/or regenerative therapies. Antiseptic medicines like chlorhexidine can effectively lower bacterial levels when used for brief periods and with proper instructions. The recommendations emphasize the importance of decreasing antibiotic use while maintaining clinical effectiveness to combat antimicrobial resistance and its severe consequences. They also promote personalized medicine in dentistry, which involves customized treatment based on individual patient needs to enhance therapy effectiveness and minimize side effects.

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