

ANTIBIOTIC PROPHYLAXIS IN ORTHOPEDIC SURGICAL PROCEDURES IN DOGS

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ABSTRACT: The aim of this study was to survey the Brazilian literature on antibiotic prophylaxis during orthopedic surgeries in dogs. A search was conducted on Google scholar, and 12 articles containing descriptions of experimental orthopedic surgeries in dogs were retrieved. In two articles (2/12; 16.66%) prophylactic antibiotics were used only preoperatively; in five (5/12, 41.66%) only postoperatively; and in five (5/12; 41.66%) both preoperatively and postoperatively. There was no information about postoperative infections in two articles. Beta-lactam antibiotics, which are most commonly used in surgeries, were used in the majority of the studies. It was concluded that antibiotic prophylaxis in the studies analyzed did not have defined protocols; however, the most commonly used antibiotics were beta-lactams, which are the most appropriate. Periodic meetings are suggested to establish secure protocols to ensure reduction in the incidence of postoperative infections and microbial resistance.

KEYWORDS: Antibiotic, canine, microbial resistance, postoperative.

ANTIBIOTICOPROFILAXIA EM CIRURGIAS ORTOPÉDICAS DE CÃES

RESUMO: O objetivo deste estudo foi analisar a literatura brasileira sobre antibioticoprofilaxia durante cirurgias ortopédicas em cães. Foi realizada uma busca no Google acadêmico e recuperados 12 artigos contendo descrições de cirurgias ortopédicas experimentais em cães. Em dois artigos (2/12; 16,66%) foram utilizados antibióticos profiláticos apenas no pré-operatório; em cinco (5/12, 41,66%) apenas no pós-operatório; e em cinco (5/12; 41,66%) tanto no pré como no pós-operatório. Não houve informação sobre infecções pós-operatórias em dois artigos. Antibióticos beta-lactâmicos, mais utilizados em cirurgias, foram utilizados na maioria dos estudos. Concluiu-se que a antibioticoprofilaxia nos estudos analisados não possui protocolos definidos. Entretanto, os antibióticos mais utilizados foram os beta-lactâmicos, que são os mais indicados. Sugere-se reuniões periódicas para se estabelecer protocolos seguros para garantir a redução da incidência de infecções pós-operatórias e resistência microbiana.

PALAVRAS-CHAVE: Antibiótico, canino, resistência microbiana, pós-operatório.

PROFILAXIS ANTIBIÓTICA EN CIRUGÍA ORTOPÉDICA EN PERROS

RESÚMEN: El objetivo de este estudio fue relevar la literatura brasileña sobre profilaxis antibiótica durante cirugías ortopédicas en perros. Se realizó una búsqueda en Google Scholar y se recuperaron 12 artículos que contenían descripciones de cirugías ortopédicas experimentales en perros. En dos artículos (2/12; 16,66%) se utilizaron antibióticos profiláticos solo en el preoperatorio; en cinco (5/12, 41,66%) solo en el postoperatorio; y en cinco (5/12; 41,66%) tanto en el preoperatorio como en el postoperatorio. No hubo información sobre infecciones posoperatorias en dos artículos. En la mayoría de los estudios se utilizaron antibióticos betalactámicos, que son los más utilizados en cirugías. Se concluyó que la profilaxis antibiótica en los estudios analizados no contó con protocolos definidos; sin embargo, los antibióticos más utilizados fueron los betalactámicos, que son los más adecuados. Se sugieren reuniones periódicas para establecer protocolos seguros para asegurar la reducción en la incidencia de infecciones postoperatorias y resistencia microbiana.

PALABRAS CLAVE: Antibiótico, canino, resistencia microbiana, postoperatorio.

INTRODUCTION

In veterinary medicine, prophylactic administration of antimicrobial agents (antibiotic prophylaxis) during surgery is an acceptable practice as an important measure to reduce and control the incidence of infections at the surgical site¹. Surgical antimicrobial prophylaxis reduces the risk of surgical site infection by around 50%. The choice of antibiotic should be based on the pathogens that are frequently associated with surgical site infection in a specific surgery. A single administration is the rule for the vast majority of procedures². However, inappropriate use of antimicrobial agents has led to development of bacterial resistance³. In most of the orthopedic surgical procedures in animals, antimicrobials are administered prophylactically, but without defined protocols¹.

In Brazil, studies on the use of medicines are limited; however, such studies are warranted because drugs represent a good share of public expenditure on health and are not innocuous substances⁴.

The aim of this study was to survey the Brazilian literature on antimicrobial administration protocol in experimental orthopedic surgical procedures in dogs.

DEVELOPMENT

We searched the Google Scholar database, using two expressions: *cirurgia ortopédica experimental em cães* and experimental orthopedic surgery in dogs Brazil. The articles retrieved were published between 2011 and 2016, and contained descriptions of experimental orthopedic surgical procedures in dogs by Brazilian authors. The data on protocols used for prophylaxis of surgical infection and the presence or absence of such infections were obtained from these articles. Data analysis was descriptive, with preparation of frequency table.

Twelve articles were retrieved based on the search, wherein antibiotic prophylaxis was described; however, no defined protocol was followed. In two publications (2/12, 16.66%), prophylactic antimicrobial agents were used only in the preoperative period (Table 1) and in five (5/12, 41.66%) only in the postoperative period (Table 1). In five articles (5/12, 41.66%) antimicrobial prophylaxis was used in both preoperative and postoperative periods (Table 1).

Prophylactic antimicrobial agents must be present at the surgical site at the time of contamination to prevent the growth of pathogens¹. However, in the analyzed publications,

the use of prophylactic antimicrobial agents only in the preoperative period was the least followed protocol. Surgical antibiotic prophylaxis must follow standard principles and indications to achieve the desired results, and failure to do so may result in development of multiresistant pathogens¹.

Table 1 - Protocol of antimicrobial prophylaxis used during the preoperative period (n=2), postoperative (n=5), or both (n=5) in articles by Brazilian authors that describe experimental orthopedic surgical procedures in dogs from 2011-2016.

Authors and year	Antimicrobial/Dose/Via		Dosage	Postoperative infection
Minto et al., 2011 ⁹	Preoperative Cephalothin/ 22 mg/kg/IV ¹	Postoperative cephalexin/ 30 mg/kg/NI ² / TID ³	Seven days	Present
Coelho et al., 2012 ¹⁰		Penicillin/ 20.000 UI/kg/IM ⁴	Single dose	Absent
Dorea Neto et al., 2012 ¹¹		cephalexin/25 mg/kg/O ⁵ /BID ⁶	Ten days	Absent
Iamaguti et al., 2012 ¹²		Enrofloxacin/ 7 mg/kg/O/SID ⁷	Seven days	Absent
Messori et al., 2013 ¹³	Amoxycillin/1g/ VO	Amoxycillin/ 500 mg/O/BID	Seven days	Absent
Festugatto et al., 2013 ¹⁴	Cephalothin 30mg/kg/ IV			Absent
Rolim Filho et al. 2013 ¹⁵	Penicillin/ 40.000 UI/kg/SC ⁸	Penicillin/ 40.000 UI/kg/SC/três em três dias	Nine days	NI
Silva & Maniscalco, 2013 ¹⁶		Enrofloxacin/ SID/ 5 mg/Kg	Five days	Absent
Suaid et al., 2013 ¹⁷	Penicillin+ streptomycin/ 20.000 UI/kg/IM	Penicillin+ streptomycin/ 20.000 UI/kg/IM Metronidazole+ syringicillin/ 12.5 mg/kg+ 75.000 UI/kg/O	4/4days (total eight days) Ten days	Absent
Alves et al., 2015 ¹⁸	cephalexin 30 mg/kg/IV	cephalexin 30 mg/kg/ O, BID	Seven days	NI
Campos et al., 2015 ¹⁹		Penicillin/ 20.000 UI/kg/IM	Single dose	Absent
Valente et al., 2016 ²⁰	Cefazolin/20 mg/kg/ IV			Absent

¹IV: intravenous; ²NI: No information; ³TID: three times a day; ⁴IM: intramuscular; ⁵O: orally; ⁶BID: twice a day; ⁷SID: once a day; ⁸SC: subcutaneous. **Source: the authors**

Antibiotic prophylaxis in the postoperative period was the frequently followed protocol. However, the protocol most recommended in the literature is preoperative administration of antimicrobial agents followed by repetition every two hours of surgery in the transoperative. The administration of antimicrobial agents after the end of the surgery makes the antimicrobials totally devoid of value and raises the costs of the procedure⁵.

Regarding posology, only two studies reported that the antimicrobial dose was single (Table 1). In the other studies, the minimum duration of administration was five days and the maximum was ten days, with a mean of 5.3 days and a median of seven days (Table 1), thus demonstrating a large variation. The variations observed in the posology favor the emergence of resistant microorganisms¹ and increase the cost of surgical procedures⁵. The use of antimicrobials in the perioperative period is considered an adjuvant factor in the prevention of infections; however, administration after the surgery is considered inadequate⁵. Based on this assertion, in one of the articles where such protocol was used, infection was recorded (Table 1).

In the studies analyzed, the most commonly used antimicrobials belonged to the beta-lactam group (Table 1). Postoperative infection was recorded only in one study (1/12, 8.33%) (Table 1). Beta-lactam group antibiotics are still widely used because of their efficacy and safety⁶, and are indicated for antimicrobial prophylaxis in various surgical procedures^{5,7}. However, infection occurred in surgical procedures in which these antibiotics were used (Table 1). This fact may indicate that antibiotic prophylaxis alone is not the only determinant of the occurrence or non-occurrence of surgical site infections, and other factors should be investigated¹. Postoperative infection was recorded only in one study. This rate is similar in studies describing orthopedic surgical procedures of dogs¹.

The absence of a defined antimicrobial protocol has already been detected in other Brazilian studies addressing dog surgery^{1,8}. However, protocols are needed to reduce microbial resistance and infection⁴. In human patients data showed a large heterogeneity in the management of surgical antimicrobial prophylaxis antibiotic, suggesting the need for specific guidelines based on clinical trials².

FINAL CONSIDERATIONS

Antibiotic prophylaxis in experimental orthopedic surgical procedures performed by Brazilian authors has no defined protocols. The most commonly used antimicrobials were beta-lactams, which are the most indicated agents in antibiotic prophylaxis in this type of surgery. It may be suggested that Brazilian veterinary medical researchers and surgeons promote periodic meetings to discuss and establish antibiotic prophylaxis protocols, in order to ensure reduction in incidence of postoperative infections and microbial resistance.

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