

## Use of Antibiotics in the Management of Pediatric Dental Conditions – A Retrospective Study

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### Abstract

**Objectives:** In order to evaluate the need of antibiotic use in children for a variety of dental procedures, a retrospective study was undertaken.

**Material and Methods:** Children as dental patients, a study The records of 100 children between age 2-10 years visiting a pediatric dental clinic for various pulpal and periapical conditions were evaluated. A total of 364 procedures (pulp therapies such as pulpotomy and pulpectomy, and extractions) were carried out in the children for different pulpal and periapical pathologies (irreversible pulpitis, pulp necrosis and periradicular abscess). Timing of the antibiotic cover (preop, intraop and post op), duration of the antibiotic, and type of the antibiotic or a combination was recorded.

**Results:** Only 19.5% procedures required antibiotic prescriptions. On most occasions, an antibiotic cover given prior to commencement of the treatment was sufficient to prevent the possible advancement of the infection and promote the post-operative healing.

**Conclusion:** Antibiotics are often not a necessity for the treatment of dental conditions in children. However, a larger sample size and multicentric study would be necessary to establish this finding.

**Key Words:** Antibiotics, Amoxicillin, Clavulanic acid, Metronidazole, Children, Pulp therapy, Extractions

### Introduction

Since the introduction of antimicrobial agents, there has been an association between the antibiotic use and the development of antimicrobial resistance. Antibiotic therapy eradicates not only pathogenic organisms but also the protective normal flora. This so-called "selective pressure" results in colonization of bacteria that are resistant to the original therapy.<sup>1</sup>

To diminish the rate at which the resistance is increasing, health care providers must be prudent in the use of antibiotics.<sup>2</sup>

Bacteria can gain access to the pulpal tissue through caries, exposed pulp or dentinal tubules, cracks into the dentin, and defective restorations. If a child presents with acute symptoms of pulpitis, treatment (i.e., pulpotomy, pulpectomy, or extraction) should be

rendered. Antibiotic therapy usually is not indicated if the dental infection is contained within the pulpal tissue or the immediately surrounding tissue unless the child has systemic signs of an infection (i.e., no fever and no facial swelling).<sup>3</sup>

Why the practitioners prescribe antibiotics inappropriately is not known. However, some explanations can be put forward. Firstly, the practitioners may have a poor understanding of the pathological processes involved in pulp and periapical diseases. Furthermore, there could be a lack of knowledge of the indications for effective antibiotic use.<sup>4</sup>

A child presenting with a facial swelling secondary to a dental infection should receive immediate dental attention. Depending on clinical findings, treatment may consist of treating or extracting the tooth/teeth in question with antibiotic coverage or prescribing antibiotics for several days to contain the spread of infection and then treating the involved tooth/teeth.<sup>3</sup>

In order to evaluate the need of antibiotic use in children as dental patients, a study was undertaken with following

### Aims and Objectives

1. To assess the preoperative, intraoperative and postoperative need of antibiotics in Pediatric Dental Procedures such as pulp therapies and extractions

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2. To ascertain the preoperative, intraoperative and postoperative need of antibiotics in Pediatric Dental Conditions based upon the diagnosis
3. To evaluate the type or combination of antibiotic/s for the management of Pediatric Dental Conditions based upon the diagnosis

**Material and Methods**

The records of 100 children between age 2-10 years visiting a pediatric dental clinic for various pulpal and periapical conditions were evaluated. A total of 364 procedures (pulp therapies such as pulpotomy and pulpectomy, and extractions) were carried out in the children for different pulpal and periapical pathologies (irreversible pulpitis, pulp necrosis and periradicular abscess). Timing of the antibiotic cover

(preop, intraop and post op), duration of the antibiotic, type of the antibiotic or a combination prescribed, whether the same was complemented with any analgesic was documented. Antibiotics were prescribed only after ascertaining known allergies for a minimum duration of 5 days with a loading dose. Syrups were preferred to tablets or capsules. Vitamin B complex-lactobacilli-zinc supplementation was added to a longer course (more than 5 days). The Table I below shows the prescribed dosages.

Often, a diagnosis was not established and a differential diagnosis was considered at the initial examination before carrying out the actual treatment. Thus, the antibiotic/combination was used to cover or prevent the possible advancement of the infection until a definitive treatment was carried out.

**Table I: Drug dosages prescribed**

Drug	Dosage	Frequency
Amoxicillin	50mg/kg/day in divided doses	TID
Amoxicillin + Clavulanic acid	50mg/kg/day in divided doses	BID
Metronidazole	30mg/kg/day in divided doses	TID
Cephadroxil 125mg/5ml	30mg/kg/day in divided doses	BID

Often the patients were already receiving an antibiotic either satisfactorily or unsatisfactorily. Hence, the timing, frequency, duration and dosage of the previously prescribed drug and its effectiveness were evaluated before prescribing a new antibiotic or a combination. All chronic intraoral lesions (sinuses, abscesses) were treated with topical

Metronidazole. All children were prescribed an analgesic for symptomatic relief (Ibuprofen and/ or Paracetamol).

The results of the study are presented below.

**Results**

Table II summarizes the diagnoses of the conditions

**Table II: Timing of Antibiotic-use based upon the Pulpal Diagnosis**

Diagnosis	No.of Teeth Involved	Preop	Intraop	Postop	Total
Irreversible Pulpitis	147	9	-	4	13
Pulp Necrosis	3	1	1	-	2
Periradicular Abscess	31	26	-	3	29
Total	181	36	1	7	44

**Table III: Antibiotic/Combination Used based on the Pulpal Diagnosis**

Antibiotics	Irreversible Pulpitis	Pulp Necrosis	Periradicular Abscess	Others	Total
Amoxicillin	2	7	7	-	16
Amoxicillin+Clavulanic Acid	4	4	11	-	19
Amoxicillin+Metronidazole	1	-	5*	-	6*
Amoxicillin+Clavulanic Acid+Metronidazole	2	2	6	-	10
Topical Metronidazole	5	4	10	-	20
Total	14	17	39*	-	71

for which an antibiotic or a combination was prescribed and timing of the prescription. Out of 181 conditions, only 44 conditions were treated with antibiotic/s; out of which 29 were diagnosed as periradicular abscesses, 13 as irreversible pulpitis and 2 as pulpal necrosis. On 36 occasions, the antibiotics were prescribed preoperatively for a condition, once intraoperatively (for a two visit pulpectomy) and on 7 occasions for a post-treatment condition such as swelling.

Table III depicts the type of antibiotic used for the infection based on the diagnosis of pulpal and periapical pathology. It can be seen that the patients with periradicular abscess required the antibiotic/combination more often than the condition diagnosed as pulp necrosis and irreversible pulpitis. Amoxicillin + Clavulanic acid was the most preferred combination, followed by plain Amoxicillin. The patients who had been receiving Amoxicillin unsatisfactorily were given additional Metronidazole or a combination of Amoxicillin + Clavulanic acid and Metronidazole. All chronic intraoral lesions (sinuses, abscesses) were treated with topical Metronidazole. Only in one case, a patient had been receiving Cephadroxil with Metronidazole satisfactorily, and the same was continued.

Table IV, V and VI report the use of antibiotics in pulpectomy, extractions and in all procedures,

respectively. Most often, the antibiotic cover has been provided preoperatively to prevent the possible advancement of the infection until a definitive treatment was carried out. Only once, antibiotic was prescribed intraoperatively for a two visit pulpectomy due to a developed acute apical periodontitis. In the children undergoing pulpectomy in a single visit (out of 181 total cases), only 7 required a post-operative antibiotic for a similar condition. Out of total 183 extractions, only two required post-operative antibiotics for infected wounds and twenty five patients were prescribed provided preoperatively to prevent the possible complication of the infection.

**Discussion**

The justification of indecisive use of antibiotics on the part of clinicians is a mystery worthy of attention.

It is reported that oral administration of antimicrobial drugs alone produce little or no pain relief within 24 hours and anti-inflammatory analgesics offer poor pain control in pain due to the ravages of dental caries of periodontal disease.<sup>5</sup> In the present study, pain was not considered as a sole criterion while prescribing an antibiotic. Rather all the children were prescribed an analgesic for symptomatic relief (Ibuprofen and/ or Paracetamol) and an antibiotic was prescribed only in some conditions to possible advancement of the infection and in a few cases to treat development of infections,

**Table IV: Antibiotic-use in Pulpectomy**

Pulpectomy	No. of Teeth Involved	Preoperative	Intraoperative	Postoperative	Total
Irreversible Pulpitis	147	9*	-	4	13
Pulp Necrosis	3	1	1	-	2
Periradicular Abscess	31	26	-	3	29
Total	181	36*	1	7	44

\*Cephadroxil with Metronidazole combination in one case

**Table V: Antibiotic-use In Extractions**

Diagnosis	No. of Teeth Involved	Pre-op	Intra-op	Post-op	Total
Pulpal/ Periapical Pathology	179	25	-	2	27
Other Causes	4	-	-	-	-
Total	183	25	-	2	27

**Table VI: Antibiotic-use in all procedures**

No. of Extractions	No. of Pulpectomies	Total No. Teeth (Prescribed)
183	181	71 (out of 364) 19.5%

postoperatively. It is evident from the present study that the actual dental treatments accounted for the cure of a condition on most occasions.

D W Thomas, J Satterthwaite, E G Absi, M A Lewis & J P Shepherd reported that antibiotics were frequently prescribed without generally accepted criteria and there was wide variation in prescribing. Many patients with dental pain may seek treatment from medical practitioners, prior to, or in place of, definitive dental treatment. Rationalization of antibiotic prescription and the provision of emergency dental treatment is needed.<sup>6</sup> In the present study, only three antibiotics: Amoxicillin, Amoxicillin + Clavulanic acid and Metronidazole were used either solely, or in combination. All chronic intraoral lesions (sinuses, abscesses) were treated with topical Metronidazole. Only in one case, a patient had been receiving Cephadroxil with Metronidazole satisfactorily, and the same was continued. However, the present study does not try to establish any standards for antibiotic use in children.

R W Matthews, J D Peak & C Scully reported that the majority of patients attending the emergency dental clinics had pain, with a large proportion having localized infections either as pulpitis or localized dental abscess. Three quarters of these patients had no surgical intervention and were inappropriately prescribed antibiotics.<sup>5</sup> This is in agreement with the authors of this study that the surgical treatment is the most needed measure to resolve an infectious condition and not the antibiotics alone.

Sweeney LC, Dave J, Chambers PA, Heritage J concluded that better use of diagnostic services, surveillance and improvements in dental education are required now to lessen the impact of antibiotic resistance in the future.<sup>7</sup> The authors of this study endorse this view, too, in order to minimize the antibiotic use in dental conditions in children.

## Conclusion

Following are the conclusions of the study:

1. The need of antibiotics in pediatric dental procedures such as pulp therapies and extractions is rare in children (only 19.5% dental procedures required antibiotic cover).

2. Often only a preoperative cover is sufficient to treat a condition. A perioperative cover is not warranted all the time and the need of postoperative antibiotics should base upon development of post-treatment symptoms (swelling).
3. Teeth with advanced periapical pathology such as periradicular abscess require to be treated with antibiotics. Rarely, other conditions such as pulp necrosis and irreversible pulpitis (which was not established definitively at the beginning) were treated with antibiotics.
4. The combination of Amoxicillin + Clavulanic acid was preferred in most conditions followed by Amoxicillin alone. Addition of Metronidazole was considered effective due to widened spectrum in case of periradicular abscesses.

From this study, we can conclude that antibiotics are often not a necessity for the treatment of dental conditions in children. An antibiotic cover given prior to commencement of the treatment was sufficient to prevent the possible advancement of the infection and promote the post-operative healing. However, a larger sample size and multicentric study would be able to establish this finding.

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