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Effect of Erythromycin and Amoxycillin on Bordetella pertussis in the Nasopharynx

Summary: The effectiveness of oral erythromycin and amoxycillin in eradicating *Bordetella pertussis* from the nasopharynx was compared. Erythromycin in a dosage of 40–50 mg/kg/day was significantly more effective than amoxycillin in a dosage of 25–30 mg/kg/day. The organism did not disappear in three cases receiving a lower dosage of erythromycin. As antibiotic treatment does not affect the clinical course of fully-developed whooping cough, erythromycin is indicated primarily when particularly susceptible individuals are threatened by exposure. In such cases erythromycin should be given as soon as whooping cough is suspected.

Zusammenfassung: Wirkung von Erythromycin und Amoxycillin auf Bordetella pertussis im Nasenrachenraum. Es wurde ein Vergleich der Wirksamkeit von oral verabreichtem Erythromycin und Amoxycillin in der Ausrottung von *Bordetella pertussis* aus dem Nasenrachenraum vorgenommen. In einer Dosierung von 40–50 mg/kg/Tag erwies sich Erythromycin signifikant wirksamer als Amoxycillin in einer Dosierung von 25–30 mg/kg/Tag. Bei drei Patienten mit niedriger Erythromycindosierung verschwand der Erreger nicht. Da eine antibiotische Behandlung keinen Einfluß auf den klinischen Verlauf des voll entwickelten Keuchhustens hat, ist Erythromycin dann primär indiziert, wenn besonders anfällige Personen durch Exposition bedroht werden. In solchen Fällen sollte Erythromycin gegeben werden, sobald Verdacht auf Keuchhusten besteht.

Introduction

It is generally agreed that antibiotics have little or no effect on the clinical course of whooping-cough (1, 2, 3, 4). Only if treatment is started early in the catarrhal stage of the disease may the clinical course be somewhat modified (5, 6). Thus, the principal aim of antibiotic treatment of uncomplicated pertussis is to reduce contagiousness.

Bordetella pertussis is sensitive in vitro to erythromycin with a minimal inhibitory concentration (MIC) of 0.02–2 mcg/ml and a minimal bactericidal concentration (MBC) 0.04–8 mcg/ml (7, 8). A dosage of 50 mg/kg/day for seven to eight days is effective in eradicating *B. pertussis* from the nasopharynx (2, 3).

In vitro *B. pertussis* is also rather sensitive to ampicillin. The MIC has been reported as 0.063–8 mcg/ml and the MBC as 0.5–32 mcg/ml (7, 8). However, it has been shown that therapy with ampicillin in a dosage of 100 mg/kg/day does not eradicate the organisms from the nasopharynx (2, 3). A possible explanation is that ampicillin is poorly secreted in the bronchopulmonary secretions, where concentrations of less than 10% of serum concentrations are achieved (9, 10).

Amoxycillin is a new compound, chemically closely related to ampicillin, with a similar antibacterial spectrum and level of activity (11, 12). The MIC for *B. pertussis* has been reported as 0.5 mcg/ml (12). As amoxycillin reaches higher concentrations in bronchial secretions than ampicillin (13), this study was undertaken to compare its effect with that of erythromycin on *B. pertussis* in the nasopharynx.

Patients and Methods

Study 1: Patients attending the Department of Infectious Diseases with clinical signs of whooping cough or catarrhal symptoms after known exposure to pertussis were included in the study. Patients with symptoms for more than three weeks were excluded. Every second patient was given erythromycin 40–50 mg/kg/day orally. The rest of the patients were given amoxycillin 25–35 mg/kg/day orally. Both antibiotics were prescribed in three divided doses for ten days. Nasopharyngeal cultures were obtained on Days 0, 7 and 14–17, counted from the start of treatment. The parents (or the patients themselves) were asked about side-effects related to medication, signs of secondary infections and whether the drug had been taken as prescribed.

Study 2: This study was performed at three different pediatric out-patient departments to gain further information on the effectiveness of erythromycin. Drug administration and follow-up were performed as described above, but all patients were given erythromycin.

In Study 1, 70 patients came for follow-up at least once. In 31 of these pertussis was verified by a positive culture before or during therapy. Four of the other patients, all in the erythromycin-treated group most probably did have pertussis judged from the clinical picture and the fact that they had siblings with pertussis verified by culture. In the second study 20 out of 37 patients had pertussis verified by culture.

Of the total of 51 patients with verified pertussis, five were below one year of age, 28 between 1 and 5 years, 16 between 5 and 12 years and two patients 30 and 32 years respectively (mothers of children with pertussis). About two thirds of the patients had been immunized against pertussis with a vaccine used in Sweden with a disappointingly low efficacy. Two patients had not been immunized. The status of immunization of the remaining patients was not known. Table 1 shows the

Table 1: *Duration of symptoms of patients with culture verified pertussis before the first culture*

	Duration of symptoms		
	< 1 week	1–2 weeks	2–3 weeks
Study 1 Amoxycillin	4	8	4
Erythromycin	3	10	2
Study 2 Erythromycin	9	8	3

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