Pharmacokinetics of amoxicillin after oral administration in recently weaned piglets with experimentally induced Escherichia coli subtype O149: F4 diarrhea

Objective

To measure the effect of Escherichia coli subtype 0149:F4-induced diarrhea on the pharmacokinetics of orally administered amoxicillin in affected piglets relative to that of uninfected piglets.

Animals

22 healthy 4-week-old recently weaned Danish crossbred piglets. Procedure-12 piglets were orally inoculated through gastric intubation with 10(9) CFUs of an E coli 0149:F4 strain and responded by developing diarrhea 12 to 16 hours later. Piglets were dosed with amoxicillin trihydrate solution (20 mg/kg) by gastric intubation. A control group of 10 age-matched piglets without signs of diarrhea was dosed similarly. Blood samples were obtained before amoxicillin administration and at 0.5, 1, 1.5, 2, 3, 6, 12, and 24 hours after amoxicillin administration. The plasma concentration of amoxicillin was analyzed by high-performance liquid chromatography. Results-A significant 39% decrease in the area under the plasma concentration versus time curve of amoxicillin was observed in piglets with diarrhea relative to that of control piglets. The maximum plasma concentration (C-max) was significantly (52%) lower in piglets with diarrhea, compared with control piglets, while the elimination rate constant, time to reach C-max, and elimination half-life were unchanged.

Conclusions and Clinical Relevance

Escherichia coli-induced diarrhea may decrease systemic bioavailability of amoxicillin. Escherichia coli bacteria attach to the intestinal epithelial cells. Because it is assumed that the concentration of the antimicrobial at the site of infection reflects the systemic concentration, higher doses of amoxicillin in the treatment of piglets with E coli 0149:F4-induced diarrhea may be appropriate.

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