Ampicillin and Amoxicillin

Ampicillin and amoxicillin are broad spectrum penicillin antibiotics that work by inhibiting enzymes that are key in bacterial cell wall synthesis, eventually leading to cell lysis or rupture. Unlike other penicillins, these medications are effective against both gram positive and some gram negative bacteria. Despite their broad spectrum; however, these medications are ineffective against Staphylococcus aureus, unless combined with a beta lactamase inhibitor. Side effects of ampicillin and amoxicillin can include rash and diarrhea.



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Mechanism

Aminopenicillin
A-mean-ol'-pencil
Penicillins primarily inhibit transpeptidases, also known as penicillin-binding proteins (PBPs), which are essential for bacterial cell wall synthesis. Disruption of this process weakens the bacterial cell wall, allowing water to enter the cell, eventually causing cell lysis or rupture. For this reason, penicillins are considered bactericidal.

Indications

Broad Spectrum Penicillin
Broad Spectrum-of-colors Pencil-villain
Ampicillin and amoxicillin are considered broad-spectrum penicillins, due to their effectiveness against both gram-positive and some gram-negative bacteria. Despite their broad spectrum, these medications are ineffective against Staphylococcus aureus. Methicillin-sensitive Staphylococcus aureus (MSSA) can sometimes be treated with these drugs if combined with beta-lactamase inhibitors.

Gram-Positive and Some Gram-Negative Infections
Graham-cracker Positive-angel with Partial Graham-cracker Negative-devil
Ampicillin and amoxicillin are indicated in the treatment of infections caused by gram-positive bacteria including Streptococcus pneumoniae, and Clostridium tetani, and some gram-negative bacteria such as Haemophilus influenza, E. coli, Salmonella, and Shigella.

Side Effects

Rash
Rash
Patients may develop a rash when taking these medications. This can be a sign of an allergic reaction. The rash is typically maculopapular, spreading to various parts of the body, and appears as a delayed reaction to the medications. the patient should seek medical attention, or contact their healthcare provider immediately.

Ampicillin Rash in EBV
Amp-pencil Rash Einstein-Barr Virus
An ampicillin rash in Epstein-Barr Virus is a non-allergic rash that commonly occurs when ampicillin or amoxicillin is administered to patients with EBV infection, particularly infectious mononucleosis. The rash is typically maculopapular and develops several days after starting the antibiotic. Ampicillin rash in EBV infections is not typically pruritic and resolves without intervention, as this is a distinguishing feature from allergic rashes.

Diarrhea
Toilet
Diarrhea is a common side effect associated with these medications; however, amoxicillin produces less diarrhea in patients than ampicillin. Patients should be encouraged to eat food products containing probiotics, such as yogurt to decrease the incidence of diarrhea while taking antibiotics.

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Pseudomembranous Colitis

Sumo-man-bra Colon

Pseudomembranous Colitis is caused by an overgrowth of Clostridioides difficile (C. difficile), typically after antibiotic use. Aminopenicillins disrupt normal gut flora, creating an environment where C. difficile can proliferate and produce toxins.

Allergic Reaction

Allergy-alligator Reaction

An allergic reaction from ampicillin or amoxicillin can range from a rash to anaphylaxis. Anaphylactic reactions are often immediate and occur within 2-30 minutes following the administration of the medication. If the patient has a history of allergy to these medications, they should be prescribed an alternate antibacterial drug.

Considerations

No Effect Against Staph Aureus

NOFX Staff of Oreos

Ampicillin and amoxicillin are ineffective against methicillin-resistant Staphylococcus aureus (MRSA) because they are susceptible to beta-lactamase secreted by S.aureus so they can be effective against methicillin-sensitive Staphylococcus aureus (MSSA) when combined with beta-lactamase inhibitors.

Often Combined with Beta-Lactamase Inhibitor

Combined with Black-mace Beta-fish with Inhibiting-chains

Amoxicillin and ampicillin can be combined with a beta-lactamase inhibitor, such as clavulanic acid, to create a treatment that is effective against Staphylococcus aureus infections. When combined, clavulanic acid and amoxicillin are marketed as Augmentin, while the combination of ampicillin and sulbactam is called Unasyn.

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