Aminoglycoside Side Effects

Aminoglycosides are medications used against a variety of gram-negative infections. These drugs are well known for having severe side effects in the form of ototoxicity, nephrotoxicity, and respiratory paralysis during neuromuscular blockade; therefore, their use should be monitored with peak and trough levels. Additionally, these drugs are teratogens, making them contraindicated for use in pregnant women.

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Side Effects

Ototoxicity

Ear with Toxic-green-glow

Aminoglycosides can cause transient or irreversible injury to sensory cells of the inner ear, resulting in hearing loss and disturbed balance. Tinnitus is often the first sign, but high-frequency hearing loss can also precede. Tinnitus is due to the damage of the 8th cranial nerve. Patients should be educated on the signs and symptoms of tinnitus or balance problems and should notify their healthcare provider immediately if they experience any. The side effect of ototoxicity increases when aminoglycosides are used concurrently with loop diuretics.

Nephrotoxicity

Kidney with Toxic-green-glow

The use of aminoglycosides, especially when used in combination with other nephrotoxic drugs like cephalosporins, can cause kidney damage. Therefore, this drug combination should be avoided when possible, and kidney function should be monitored. Caution should be used in patients with existing renal disease.

Respiratory Paralysis

Lungs in Wheelchair

This drug class can lead to dose-related muscular weakness, or neuromuscular blockade, which can progress to respiratory paralysis on rare occasions. This can be troublesome in patients receiving general anesthetics and neuromuscular blocking agents or in patients with neuromuscular diseases such as myasthenia gravis.

Contraindications

Pregnancy

Pregnant-woman

Aminoglycosides are known teratogens and are in pregnancy category D, meaning there is positive evidence of human fetal risk; therefore, they should not be used in pregnant women. Teratogens are agents that cause a defect or malformation in the development of the embryo or fetus. Aminoglycosides are especially associated with causing hearing deficits.

Considerations

Peak and Trough

Peak and Trough

The therapeutic window for aminoglycosides is narrow. The same aminoglycoside dose can produce different plasma levels in different patients; therefore, a peak and trough must be done while patients are receiving this medication. Peak levels must be high enough to cause bacterial death, while trough levels must be low enough to minimize toxicity.

Never Mix with Penicillin in Same IV

No A-mean-ol'-gliders in Pencil-villain's IV

High concentrations of penicillins can inactivate aminoglycosides; therefore, the two should never be mixed in the same IV solution. It is happening due to penicillins inactivating aminoglycosides in vitro, but when used sequentially, they are actually synergistic in killing bacteria Thus, they should be administered separately.