

Measles

Measles, also known as rubeola, is a highly contagious viral infection primarily affecting children. It is a self-limiting disease that manifests with a characteristic prodromal phase and rash. Although the introduction of the live attenuated measles vaccine has significantly reduced the global incidence of the disease, measles remains a significant health concern in areas with suboptimal vaccination coverage. The disease predominantly occurs in temperate climates during the winter and spring months, with peak incidences reported between March and April.

Etiology and Transmission

Measles is caused by the measles virus, a single-stranded RNA virus belonging to the *Paramyxoviridae* family, genus *Morbillivirus*. The virus is transmitted primarily via respiratory droplets, and it can remain infectious in the air for up to two hours after an infected individual has left the area. Measles has an incubation period of approximately 9 to 12 days, during which individuals may not exhibit symptoms but are still contagious. The virus initially targets the upper respiratory tract, before spreading systemically to various tissues.

Clinical Features and Phases

Measles typically progresses through three distinct phases:

- **Incubation Period:** The initial phase lasts between 9 to 12 days following exposure, during which the individual is asymptomatic but still contagious.
- **Prodromal Phase:** This phase begins approximately 2 to 4 days before the rash appears and is marked by nonspecific symptoms such as fever, malaise, conjunctivitis, cough, nasal discharge, and sneezing. These symptoms often mimic those of upper respiratory infections, making diagnosis challenging in the early stages. Koplik's spots, which are small white or blue-gray lesions on a red base, are considered pathognomonic of measles and typically appear on the buccal mucosa 24 to 48 hours prior to the onset of the rash.
- **Exanthematous Phase:** The classic measles rash begins around the second to third day of the prodromal phase, typically behind the ears and on the scalp, and then spreads down the neck, trunk, and limbs. By the third day, the rash often covers the entire body. The rash evolves from maculopapular to confluent and may be accompanied by fever. The rash resolves after 6 to 7 days, with the fever subsiding concomitantly.

Diagnosis

The diagnosis of measles is primarily clinical, based on the characteristic symptoms and rash. However, given the nonspecific nature of the prodromal symptoms, the diagnosis is often delayed until the rash appears. Laboratory confirmation can be achieved through serological tests for measles-specific IgM antibodies, viral RNA detection through PCR (polymerase chain reaction) testing, or viral culture from throat or nasopharyngeal swabs, although the latter is less commonly performed due to the difficulty in culturing the virus.

Complications

Measles can lead to several complications, particularly in young children, immunocompromised individuals, and pregnant women. Some common complications include:

- **Otitis Media:** The most frequent bacterial complication, occurring in up to 10% of measles cases.
- **Pneumonia:** Both viral and secondary bacterial pneumonia can develop, leading to severe illness.
- **Diarrhea:** Gastrointestinal symptoms such as diarrhea may be present in approximately 8% of cases.
- **Encephalitis:** A rare but severe complication, occurring in about 1 in every 1,000 measles cases. It can result in neurological sequelae such as seizures and developmental delays.
- **Thrombocytopenic Purpura:** A rare bleeding disorder that occurs in a small percentage of cases.

Additionally, infection during pregnancy can lead to fetal death or preterm birth, especially if the mother contracts the disease during the first trimester.

Treatment

There is no specific antiviral treatment for measles. Management is generally supportive, with the goal of alleviating symptoms. Bed rest, analgesics (for fever and body aches), and antipyretics are commonly used to manage the symptoms. In hospitalized children, studies have shown that the administration of vitamin A can reduce morbidity and mortality, particularly in those with severe cases. High doses of vitamin A are recommended by the World Health Organization for all children with measles, as it improves immune function and reduces the risk of complications such as pneumonia and diarrhea.

Prevention

Vaccination remains the most effective means of preventing measles. The measles vaccine, typically administered as part of the measles, mumps, and rubella (MMR) vaccine, contains a live attenuated strain of the virus and is highly effective in preventing the disease. The recommended

vaccination schedule includes an initial dose at 12-15 months of age, followed by a second dose at 4-6 years of age. A second dose is particularly important because approximately 5% of children fail to respond to the first dose, and a second dose significantly improves immunity.

Post-exposure vaccination can also prevent the onset of measles if administered within 72 hours of exposure. In some cases, measles immune globulin may be given as a preventive measure for individuals who are at high risk of severe disease, such as pregnant women or immunocompromised individuals.

Epidemiology and Global Impact

Before the widespread introduction of the measles vaccine, the incidence of measles was high, with over 500 deaths annually in the United States alone. Since the introduction of the vaccine, reported cases have decreased by more than 99% in countries with high vaccination coverage. However, measles remains a major cause of morbidity and mortality in many parts of the world, especially in low-income countries with limited access to vaccines.

Conclusion

Measles is a highly contagious viral infection that can cause significant morbidity and mortality, particularly in unvaccinated individuals and vulnerable populations. Although the disease is generally self-limiting, complications such as pneumonia, encephalitis, and diarrhea can lead to severe outcomes. Vaccination is the most effective measure for preventing measles, and continued efforts to increase vaccination coverage globally are crucial to eliminating this preventable disease.

References

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