Discuss the pathogenesis of measles virus infection under the following subheadin...

Health & Medicine, Disease

Introduction:

Although the measles virus remains less of a threat in the today's western world, it still posses a significant challenge in the under developed countries with an estimated 30 million illnesses and 770, 000 deaths being reported in the year 2000. (6)

Following a survey of 32 European Countries, the European Centre for Disease Control has reported a staggering 12, 000 measles cases in the first quarter of 2010.

Although Bulgaria topping the poll, it is somewhat concerning how Ireland with a relatively low population, lies a close second in incidence rates to date. (2)

With what has been depicted as a preventable disease, it is therefore essential to understand the concept and fundamentals on the risks of infection, likelihood of spread, associated symptoms and furthermore the importance of appropriate vaccination in a timely manner.

Symptoms:

Derived from the air, Measles is an acute viral illness originating from the paramyxovirus

Familythat is commonly spread from person to person through tiny aerosol droplets. Common signs include fever, cough, sneezing, runny nose and conjunctivitis. (1) Initial replication of the illness occurs in the upper/lower respiratory tract through blood vessels. This prodromal stage infecting

epithelial cells is assisted by the potential development of Koplik spots on the mucous membranes of the mouth and In addition the appearance of a rash on the skin. The rash is due to the Immune reactions to the virus in the endothelial cells of dermal capillaries (Mims et al. Medical Microbiology, 1993) and at this stage can be considered as a mode of diagnosis , as both IgM and IgG antibodies are produced during the on set of rash development, therefore by using sensitive ELISA IgM early detetction can be achieved. (7)

The incubation period is approx ten days (ranging between 7 and 18 days) (Chin, 2000). The term incubation period lies very closely with that of the symptoms. As summarised from the Worldhealthorganisation, After 2-3 days of r e p l i c a t i o n , the virema escalates to the reticuloendothelial system. Further expansion of this virema for 5-7 days post infection may result in infection in organs, including the spleen, thymus, lung, liver, and kidney. The viraemia climaxes at day 11-14 days after infection and eventual declines rapidly (4)

The most common complications of measles infection are otitis media due to increased growth in epithelia of the nasopharynx making it more susceptible (7 to 9% of cases), pneumonia due to an impaired cell-mediated immune response occuring when the F protein facilitating cell fusion at a given pH (1 to 6%), diarrhoea (8%) and convulsions (one in 200).

Infection and spread:

A number of concepts regarding the measles virus pathogenesis, including the theory of dentric cells and lymphocyte cells expressing CD150 as the

official facilitator for MV infection (http://www. ncbi. nlm. nih. gov/pubmed/18820585? dopt= AbstractPlus) to others focusing more on the ethical origin linking interaction of malnutrition, proliferation and immune mechanisms as a culpret. Therories behind increase intake of Vitamin A to reduce infection and mortality rate have also sparked thoughts of remediation (http://www. ncbi. nlm. nih. gov/pmc/articles/PMC1586282/? page= 2) . As it has been scientifically proven when vitamin A (which can be sourced in the skin) is administrated in megadoses (200, 000 international units on each day for two days) has significantly lowered the mortality rate in hospitalised children ranging from ages 2-5 cited from the cochrane report. Published by (Yang HM, Mao M, Wan C. 2009.) (http://www2. cochrane. org/reviews/en/ab001479. html)

The most obvious mode of infection or spread is that of direct contact with nasal or throat secretions. Measles is highly contagious and is known to affect 90% of susceptible individuals. In developing countries . This susceptibility is heightened by the overcrowding circiumstances and therefore increasing the exposure rate of high viral loads [Tu l chinsky, T. H. , e ta l . , Me a s l e scontrolin developing and developed

countries: the case for a two-dose policy. Bull World Health Organ, 1993. 71(1): p. 93-103).

Vaccination:

Following the introduction of measles, mumps and rubella (MMR) vaccine in

October 1988 mortality due to measles has significantly declined.

Although, Infection and spread has been controlled for several decades, public fears linking the MMR vaccine with autism has significantly reduced the immunisation rate resulting in the concern of serious outbreak of the measles virus occurring.

The publication of this mis-conception has been quashed by medical experts who continue to recommend two doses of the MMR vaccine for maximum protection normally given at age 12 months and age four or five years. This has been widely illustrated for example Researchers from the Cochrane Vaccines Field reviewed 139 studies assessing the effects MMR vaccine in preventing measles, mumps and rubella (MMR) in children. It was found that MMR vaccine protects children against infections of the upper respiratory tract and is unlikely to cause milder forms of measles, mumps and rubella. No plausible association with either autism or Crohn’s disease was also determined. Demicheli V, Jefferson T, Rivetti A, Price D. Vaccines for measles, mumps and rubella in children. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD004407. DOI: 10. 1002/14651858. CD004407. pub2

Although the vaccination rate is once again steadily inclining, following a global helath response for not only developed countries, the fourth Millennium Development Goal (MDG 4) is aiming to reduce the viral rate of measles to two thirds by 2015 (6)

Sub acute sclerosing panencephalitis:

Subacute sclerosing panencephalitis (SSPE) is a brain disorder due to adverse immune response to measles or, possibly, mutations of the virus leading to brain inflammation. SSPE usually occurs in later years post infection of measles and have common Symptoms that includedementia, Gradual behavioral changes, Myoclonic jerking (quick muscle jerking or spasms) and seizures. (6)(7)

The incidence of SSPE has decreased since vaccination against measles was initiated. As SSPE is associated with defective forms of the virus in the brain and has been proven to be difficult to isolate infectious virus. Certain viral proteins such as the M protein are commonly deficient. Currently, there is no Vaccine for SSPE. Clinical trials of antiviral (isoprinosine and ribavirin) and immunomodulatory (interferon alpha) drugs have suggested that these types of remediation can assist in delaying the prognosis of the desease but the long term outcomes are still undefined. (6)

Upon diagnosis, Most individuals with SSPE will die within the first three years. Others where the disease progresses rapidly, death maybe within three months. (6)

With sufficient grants, research been carrued out by The National Institute of Neurological Disorders and Stroke (NINDS) and other institutes at the National Institutes of Health conduct research will continue to focus on finding efficient ways in treating such onsets of measles in particular SSPE (7)

References;

http://www. ncbi. nlm. nih. gov/pubmedhealth/PMH0002536/

http://www. irishtimes. com/newspaper/ireland/2010/0607/1224272004407. html

http://www. ncbi. nlm. nih. gov/pubmed/18820585? dopt= AbstractPlus

http://www. immunizationinfo. org/vaccines/measles

http://www. ncbi. nlm. nih. gov/pubmed/20561004? dopt= AbstractPlu

http://pathmicro. med. sc. edu/mhunt/mump meas. htmhttp://www. who. int/vaccine_research/diseases/measles/en/

http://www. ninds. nih. gov/disorders/subacute_panencephalitis/subacute_panencephalitis. htm