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DIPHTHERIA

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But, by far the commonest sources of infection are (1) the nose or (2) the throat of a case or carrier.

Phage types

There are three types of C diphtheria, mitis, intermedius and gravis. Mitis means mild, and mitis infections are often mild but they can be severe. Mitis is often the organism in laryngeal cases Mitis is often the endemic type, in an area where cases keep on occurring from time to time but when the disease becomes epidemic, the type changes to intermedius or gravis In spite of the names there is very little difference clinically between intermedius and gravis infections. When the disease begins to die out in a community the type may change again to mitis These findings are true of Europe they may or may not be true elsewhere.

The three types can be further subdivided in to 19 phage types Types I to III are mitis, types IV to VI are intermedius, type VII an avirulent gravis, and types VIII to XIX are virulent gravis strains. This phage typing is not of much practical importance. Occasionally it has been used to trace connections between outbreaks (Phage typing of S typhi may be very important in typhoid outbreaks)

The virulence of an organism depends on its ability to produce diphtheria toxin The three types produce the same toxin A mitis strain may produce as much toxin as a gravis strain in the laboratory The ability to grow rapid'y and so produce more toxin in the human body may explain why gravis and intermedius are more likely to produce serious disease than mitis strains there may as well be a spreading factor which is produced more by gravis and intermedius strains than by mitis strains.

Clinical aspects

The germs of diphtheria, C. diphtheria, does not invade the body. They settle on some site, most often the tonsils, and multiply there They produce toxin, and this toxin enters the bloodstream and may damage any organ of the body

The two important organs are the heart and the nervous system. Severe tonsillar diphtheria can cause heart failure in the first two to three weeks, or paralysis in the fifth to seventh weeks. The serious paralyses are those of the swallowing muscles, and the muscles of respiration and sometimes the nerves to the heart are affected, causing changes in rhythm and rate and late heart failure.

In severe tonsillar cases the membrane often spreads to the hard and soft palate, and there is much swelling of the glands of the neck, the bull-neck of diphtheria in such cases the diphtheria germs may be present in the neck glands.

Anterior nasal diphtheria is common. There is some membrane in the nostril Very little toxin is absorbed from the nose, so nasal diphtheria is not dangerous to the patient. it is, however, very infectious to other children. Caution a child with nasal diphtheria may also have tonsillar diphtheria.

In laryngeal diphtheria there is membrane on the larynx and upper trachea and the child has difficulty in breathing. Breathing is noisy, with stridor or croup. The danger to the child is from respiratory failure due to obstruction. If the obstruction is relieved, by tracheostomy or intubation, the outlook for the child is good not much toxin is absorbed from the larynx and trachea. Very often in laryngeal cases there is no membrane seen on the tonsils or throat.

Skin diphtheria is important because it is not easy to diagnose. It is infectious and may cause tonsillar diphtheria in other children. More often it causes more skin diphtheria and helps to immunize the population. It is commonest in the tropics. Skin diphtheria sometimes causes paralysis of a limb in the child usually it causes only a skin sore which is slow to heal.

Effect of immunization

With good coverage immunization can lead to virtual disappearance of the disease in a community. It does not lead to an increase in carriers. Man is its only host and it seems C. diphtheria must be able to harm man, i.e. must cause disease, if it is to survive In the U.K. before 1942, the annual number of cases was about 50 000, with 4 000 deaths by 1950 the number had fallen to 962 with 49 deaths, and by 1965 to 25 cases with no deaths Since then diphtheria has become a rare disease and most middle-aged doctors in the U.K have never seen a case But nowhere has the disease been eradicated if immunization rates fall, outbreaks can still occur In many countries diphtheria remains one of the chief killing disease of childhood.

Diphtheria vaccine

The symptoms of the disease are caused by the toxin of C. diphtheria, not by the whole germs So the vaccine consists only of toxin, not the germs themselves. The germs are grown in culture fluid, and, as they grow, they produce toxin which passes into the fluid. The fluid is separated from the germs and is treated with formaldehyde. This chemical changes the toxin into toxoid This toxoid is no longer a poisonous substance it cannot cause any damage if injected into a child but it does cause the body to produce antitoxin, and this antitoxin protects the child against diphtheria. Diphtheria toxoid is usually mixed with tetanus toxoid (DT vaccine) or with tetanus toxoid and pertussis vaccine (DTP or triple vaccine). These vaccines must be stored in the refrigerator, but not frozen (EPI Manual, Book III, Annex 1, page 4).

The first dose of diphtheria toxoid is usually given to a child at age 3 months the second dose at 5 months the third dose at 7 or 8 months. Thes should always be at least one month, better six weeks, between these three doses These three

doses are the primary immunization course. A booster is given at age 18 months and another at school entry. The first four doses are usually given combined with tetanus toxoid and pertussis vaccine (DTP). The dose at school entry is given with only tetanus toxoid (DT), because whooping cough is no longer a danger at this age.

There is usually very little reaction to diphtheria toxoid· perhaps a sore arm for a short time