Sterile Abscess Formation Following Plague Vaccination

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SUMMARY: As part of the immunisation programme of servicemen on OP Granby, deployed in the Gulf, plague vaccine was recommended as a prophylaxis. Out of a total of 524 vaccinations at our location, one sterile abscess formation was noted. The case report is described.

Clinical Details

A fit 22 year old male, received a 1.0ml dose of plague vaccine USP, intra muscularly, into his right deltoid muscle. 3 weeks later he sought medical attention, because of a painful progressively enlarging swelling at the site of inoculation. Over the right deltoid there was a non erythematous, smooth, fluctuant, ovoid swelling measuring 6 x 4 cm lying sub cutaneously and not fixed to muscle. There was no lymphadenopathy. The swelling was made prominent by active abduction of the right shoulder. He felt well in himself, and was troubled by the local discomfort only. He was afebrile. The rest of the examination was normal.

The haematological tests available showed:- Haematocrit 44, White Cell Count 6.3, Differential Neutrophils 58%, Lymphocytes 36%, Eosinophils 6%.

Under a general anaesthetic the swelling was incised and a sub cutaneous abscess was opened. 20mls of Seropurulent fluid was drained from a well-encapsulated unilocular site. A wound swab was taken for culture and sensitivity. The cavity was irrigated with dilute hydrogen peroxide. A dry gauze wick was packed into the wound.

Laboratory Findings

Microscopy - Negative for *Yersinia pestis*. No organisms seen on direct smear. Culture and Sensitivity - No growth after 4 days of aerobic and anaerobic incubation.

Discussion

Plague vaccine is used to promote active immunity in individuals considered at high risk of infection. Plague is caused by the bacterium *Yersinia pestis* which occurs

naturally in rodents and their ecto-parasites. Plague may develop in humans, following handling of wild rodents or exposure to their fleas. Less commonly with other wild animals. Transmission of plague from rodents to humans is generally mediated by the bite of an infected flea. This may result in bubonic plague with an incubation period of 2-8 days. However, bubonic plague may rarely progress to Pneumonic Plague by haematogenous spread to the lungs. The pneumonic form is highly infectious and can be spread between individuals via droplet inhalation, without insect vectors. In addition, pneumonic plague may be caused by the direct inhalation of the organism if used as an agent of biological warfare.

Plague vaccine consist of inactivated whole bacilli, and induces a protective immune response that reduces the severity of infection in vaccinated individuals. The vaccination programme of high risk individuals consists of an intra muscular administration of an initial 1.0ml dose followed by a second dose of 0.2mls at one to three months (1). This will produce adequate protection in the vast majority of patients. As the titre increases further following administration of a third dose of 0.2mls three to six months after the second, this is recommended. This results in protection for 6-12 months. However, in a study of 29 male volunteers (2), 7% of the individuals failed to produce antibodies even after the second booster dose.

It is generally believed that the use of plague vaccine, increases the chance of recovery in those vaccinated individuals, who develop the bubonic form of the disease (3). However, the degree of protection against the pneumonic form is not yet established (4). For this reason vaccinated patients exposed to the pneumonic form should

have the added protection of 7-10 days of appropriate antibiotic cover.

Adverse reactions are common after primary immunisation but may occur with more frequency and severity following repeated doses. Local side effects include erythema and induration at the site of injection in about 10% of patients, and usually persists for a few days. Rarer reactions include arthralgia, myalgia, leucocytosis, nausea and vomiting (5).

The location of the abscess in this case was clearly subcutaneous and extraneous to the fascia of the deltoid. This suggests a subcutaneous rather than an intramuscular injection.

In any immunisation programme using attenuated organisms, the vaccination can result in the formation of a sterile abscess. Surgical intervention is to be used only if a collection can be clinically detected. Indurated sites should not be incised. The management of a sterile abscess is surgical. This consists of incision and drainage with the contents sent for microscopy, culture and sensitivity. The

wound should be allowed to heal by secondary intention, with a wick to enhance drainage.

In the Gulf Plague Vaccination Programme, a total of 32 abscesses were detected.

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