conjunction with the low number of admissions during the last two months, suggests that the rate of spread of the disease was not closely correlated with the rate of change of the maternity unit population. Some patients were probably infected from convalescent cases about to be discharged, and others from previous overt or possibly mild atypical cases in the same ward. Carriers among the staff must be regarded as a possibility because most of the staff had the disease, and in view of the data given on the duration of infectivity a few probably remained infectious for some time. This possibility is supported by the fact that cases occurred in the families of staff who were convalescent from the disease.

Lastly, though the significance of the sick infants is undecided and needs further investigation, the possibility of spread between mothers in different wards via their infants infected in a common nursery must be considered.

In this outbreak the association of sick mothers and infants and the time relation of their signs suggests that a reciprocal spread of infection may have occurred. On the other hand, if such a route of infection was important it might be expected that the sick mothers would more often be associated with a sick infant whose onset of illness preceded theirs than would be expected from the ratio of sick infants to healthy mothers; thus of the 88 sick mothers, 22 (25%) had an infant with signs starting before theirs, while of 66 entirely healthy mothers 10 (15%) had sick infants. Differences of this order would be frequently observed by chance alone. We feel that, although conclusive proof of the nursery spread is lacking, owing possibly to the difficulty of detecting "infective" infants on clinical grounds alone, it is a route that cannot be ignored. It is of interest that the data in Brown, Crawford, and Stent's paper,² not commented on by these authors, show that the babies were the first to become ill in the maternity wards, that illness in mother and infant was often associated, and, further, that in this group the babies, with one exception, became ill before their mothers, the average interval between them being 4.4 days.

Summary

An outbreak of gastro-enteritis among mothers, staff, and babies in a maternity unit is described.

The disease was characterized in adults by diarrhoea, slight fever, a watery stool of light yellow colour, and, in some patients, by neutropenia.

The babies had milder symptoms consisting of loose green stools sometimes accompanied by excoriated buttocks.

Salmonellae, Shigellae, paracolon bacilli, and protozoa were not found to be responsible for the disease.

The incubation period in adults was one to three days. The period of infectivity appeared in a few adult patients to be as long as 26 days from the onset of diarrhoea.

A "follow-up" of the discharged maternity patients revealed that 26% developed gastro-enteritis after discharge and that 15 to 24% of the families of returning sick maternity patients became infected.

Epidemiological investigations indicate that new admissions could have been infected from overt, atypical, or convalescent cases of gastro-enteritis or from carriers of the disease in the staff. It is also suggested that infection of infants in a common nursery might account for the occurrence of sporadic cases among mothers in different wards in the unit.

The outbreak appears to be an example of a common and widespread disease in the special circumstances of a maternity unit which had apparently facilitated its spread.

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SUPPURATIVE ARTHRITIS OF HIP-JOINT TREATED WITH PENICILLIN

REPORT OF FOUR CASES

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Acute staphylococcal suppurative arthritis of the hip-joint is luckily of comparative rarity. Four cases in close succession have recently been under treatment with penicillin in Suva, Fiji, and the good final results obtained may be worthy of record.

Case 1

A male Fijian aged 6 was admitted to hospital with four days' history of pain in the right hip. Acute suppurative arthritis of the hip-joint was suggested by clinical examination, pyrexia, high leucocytosis, and absence of radiographic abnormality. Several septic skin spots were present. Exploratory aspiration of the joint yielded a very small amount of thick pus, which showed pure *Staphylococcus aureus* on culture.

Penicillin, 10,000 units in 5 ml., was injected into the joint, aspiration and a similar injection being repeated twice on alternate days. Systemic penicillin, 20,000 units three-hourly, was administered for seven days. Extension was applied on Thomas's splint for ten days, followed by a hip spica plaster which was maintained for six weeks, the patient being allowed up during the last two weeks. He remained in hospital for a further five weeks, and on discharge (three months from onset of the disease) had a full range of movements to the hip-joint with complete absence of symptoms. Skiagrams after removal of the plaster showed definite evidence of localized bony infection of the upper acetabular rim: probably this primarily was osteomyelitis of the area with early infection of the joint. When seen five months later he was quite fit, with full movements of the joint.

Case 2

A European girl aged 10 came with two days' history of pain in the right hip. Acute suppurative arthritis of the hip-joint was diagnosed. A septic spot was present on the right knee.

The temperature was 104° F. (40° C.) and the pulse 120; her general condition was good. Exploratory aspiration of the joint yielded 2 ml. of thick pus containing pure *Staph. aureus*.

Penicillin, 9,000 units in 3 ml., was injected into the joint, and was repeated after re-aspiration in 48 hours. Systemic penicillin, 30,000 units, was given three-hourly for five days; then 60,000 units six-hourly on the 11th to 14th days for slight recurrence of pyrexia. Extension on Thomas's splint was applied. Plaster was not used, though originally intended, owing to development of a distressing urticaria (? late penicillin effect). Thomas's splint was maintained for four weeks, and for the next two weeks she remained in bed without splinting. She was then allowed up, already having full movements to the hip-joint, and no pain or limp. Skiagrams throughout showed no evidence of bony involvement. The patient was discharged after 8½ weeks' stay in hospital, and 3½ months later she was fit, with full movements.

Case 3

An Indian boy aged 11 was admitted with one day's history of pain in the left hip. Clinical examination suggested suppurative arthritis of the hip-joint with severe toxæmia. Temperature 104° F. (40° C.), pulse 106; high delirium. Exploratory aspiration yielded much thick pus containing *Staph. aureus* on culture. Penicillin, 15,000 units in 5 ml., was injected into the joint; this dose was repeated after aspiration on three subsequent occasions on alternate days. Systemic penicillin, 30,000 units three-hourly, was given for seven days. Delirium and high pyrexia continued for 48 hours, then marked improvement, but some pyrexia continued for ten days. Extension on Thomas's splint was applied for 17 days, followed by a hip spica plaster, which was removed after four weeks. The patient was discharged one week later, having been eight weeks in hospital; there was then slight limitation of flexion and rotation. Three weeks later full hip movements were present. Skiagrams throughout showed no evidence of bony involvement. Three months later he remained fit, with full movements.

Case 4

This patient, a Fijian girl aged 16, gave a six-days history of increasing pain in the left hip. A low-grade paronychia of the finger had been incised seven days previously. Clinically, there was typical acute arthritis of the hip, with severe local symptoms but good general condition. Temperature 100.4° F. (38° C.), pulse 100.

Aspiration yielded 6 ml. of thin pus containing *Staph. aureus*. Penicillin, 30,000 units in 6 ml., was injected into the joint and 70,000 units intramuscularly, followed by 30,000 units intramuscularly three-hourly for seven days. Two days later re-aspiration yielded 4 ml. of pus, and 20,000 units in 4 ml. was injected into the joint. On the 14th day a secondary rise of temperature without symptoms occurred, and 30,000 units of penicillin was given three-hourly for three days. (This pyrexia was probably from mild influenza, which was travelling through the wards.) Extension on Thomas's splint was maintained for four weeks, and for the next two weeks the patient rested in bed; by this time movements of the joint were full and painless and she was allowed up. One week later (seven weeks from admission) she was discharged cured. Skiagrams showed no evidence of bony involvement. One month later she was fit, with full movements.

Discussion

All four cases arose presumably from septic skin lesions by blood-stream infection. Blood cultures were not carried out. Cases 2, 3, and 4, which showed no radiographic changes throughout, were primary joint infections, whereas Case 1 was presumably a primary acetabular osteomyelitis with rapid spread to joint.

The cases varied considerably in virulence, Case 3 being severely toxic, Case 4 remarkably low-grade, Cases 1 and 2 intermediate. All were treated by repeated aspirations of the hip-joint with instillation of penicillin on alternate days, and by systemic penicillin; the average treatment was three local injections, after aspiration, of 13,000 units of penicillin each time, and 1,785,000 units systemically. The

anterior approach to the joint was adopted in all cases and no difficulty was experienced, "pentothal" or inhalation anaesthesia being used.

The relative values of the local and general penicillin are difficult to estimate. Systemic application is obviously indicated to combat the bacteraemia, and it is probable that aspiration and local penicillin reduce the degree of cartilage destruction and joint damage. It is probable that time is the most urgent factor, and that any suggestive case should be aspirated and penicillin injected into the joint immediately, this being the major element in obtaining full final movements.

Two cases were immobilized in plaster when acute symptoms subsided; two cases were confined to bed for a similar period without plaster. These last showed the earliest return of full movement, and suggest that plaster is perhaps unnecessary. The times of immobilization were probably longer than necessary, but (in children at least) it appeared safer to err on the side of discretion.

Treatment.—There was no standardization of treatment in these four cases, but the following would appear to give a reasonable line of procedure: (1) Immediate exploratory aspiration by the anterior route under pentothal anaesthesia; as much pus as possible to be removed, and replacement by an equal volume of penicillin solution (3,000 units per ml.). (2) Intramuscular penicillin, 30,000 units per ml., to be given three-hourly for a week. (3) Re-aspiration on alternate days with replacement by penicillin until there is local freedom from pain and examination of pus shows absence of degenerate forms only of staphylococci. One to three repetitions may be needed. (4) Immobilization with extension from the start, strapping extension with a Spanish windlass on Thomas's splint (applied under the first anaesthetic) being a simple method; this to be maintained until the patient is symptom-free and afebrile. (5) Rest in bed to be maintained until the end of the fourth week; active movements of joint then to be encouraged. The patient should be allowed up at six weeks, when there should be a full range of movements and absence of symptoms. (6) The primary skin lesion should be treated as required, but it will probably regress under the influence of penicillin.

Summary

Four cases of suppurative staphylococcal arthritis of the hip-joint which were treated by combined systemic and local penicillin are described.

All the cases were cured, having full final movements of the affected joints.

Some points in treatment are discussed.

I am indebted to Dr. J. C. R. Buchanan, Inspector-General, South Pacific Health Service, for permission to publish this report.

In the latest report of the Institute of Medical and Veterinary Science of South Australia three Adelaide workers recount an investigation they have been making over a period of four years into the connexion between rubella and congenital malformations. The total number of cases studied of rubella occurring in pregnancy was 120. Out of 20 in which the infection occurred in the first month of pregnancy it was followed by some congenital abnormality in 19; out of 42 in the second month a congenital abnormality appeared in 40; out of 23 in the third month it appeared in 21. The most frequent of the defects was microcephaly (62 cases), and the next most frequent were heart disease (52) and deaf-mutism (48). In the latest series of cases, numbering 25, the mother had contracted rubella during pregnancy in 17, and 15 of the babies born exhibited congenital defects, including cataract, deaf-mutism, heart disease, umbilical hernia, mental deficiency, epilepsy, and speech defect. In the remaining 8 cases the infectious diseases contracted during pregnancy comprised 3 of morbilli (one of the babies was born defective), 2 of mumps (both infants had abnormalities), 1 of scarlet fever (the baby was normal), 1 of "rheumatic influenza" (the infant was malformed), and 1 of pustular rash (the baby was defective).