been vaccinated before, and had a mild but typical primary reaction. She was ill for two days one week after the vaccination, but made an eventful recovery with no further illness.

She was admitted to the City of London Maternity Hospital as an emergency, threatening to abort at what was, according to her dates, approximately 22 weeks. Examination showed the uterus to be the size of a 34 weeks' pregnancy; vaginally the cervix was soft and three fingers dilated with a bulging bag of membranes. A provisional diagnosis of twins with inevitable abortion was made. Two hours after admission she delivered the first twin followed by two placentae, and then the second twin. The twins, both males, showed evidence of generalized vaccinia, as illustrated on the Special Plate. The larger twin weighed 1 lb. 2¼ oz. (530 g.) and was the more severely affected. There were discrete vaccinal lesions on the neck, and most of the body was covered with confluent lesions. At birth the purple-brown colour suggested maceration (but movements of the limbs were observed, though no respiratory movements occurred). The smaller twin weighed only 11 oz. (312 g.) and appeared to have fewer though larger lesions, as shown by the one round the eye (see Special Plate). There was another large lesion on the top of the head. This twin was of normal colour and had a definite but weak heart-beat, though again no respiratory movements occurred. The infants did not survive. No post-mortem examination was performed.

Scrapings were taken from the lesions of both twins, and were reported on as follows from the Virus Reference Laboratory at Colindale: "Gel-diffusion test positive for variola-vaccinia group; egg culture positive for vaccinia." Blood taken from the mother showed antivaccinal haemagglutination inhibition positive to a titre of 1:64, consistent with recent successful vaccination.

COMMENT

An interesting feature of this case is the exceptionally long interval between vaccination and abortion. Though the exact date of vaccination is unknown, the interval must have been at least nine weeks.

Apparently it has been generally accepted that pregnancy is not affected by vaccination (Greenberg *et al.*, 1949; Bellows *et al.*, 1949). The present case, however, confirms the observations of MacArthur (1952) that vaccination during the first trimester of pregnancy may lead to fatal generalized vaccinia in the foetus. In order to avoid possible virus infection of the foetus at this vital stage of development it would appear prudent not to perform primary vaccination of the pregnant mother in the first trimester unless there has been direct exposure to smallpox (Dixon, 1962).

Thanks are due to Mr. I. A. Donaldson for permission to publish this case, and to Dr. A. Melvin Ramsay for his kind help and advice.

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Prenatal Infection with Vaccinia Virus : Report of a Case

[WITH SPECIAL PLATE]

It has been stated in a recent authoritative article on smallpox vaccination that "although there is a viraemia during vaccination the *foetus* does not appear to be affected as in rubella" (Dixon, 1962). It was suggested, however, that there may be some risk to the foetus if vaccination of the mother is carried out in the first trimester of pregnancy, and it should thus on general principles be avoided at this stage.

The case to be reported, that of a foetus with generalized vaccinia following vaccination at the 19th week of pregnancy, suggests that vaccination is not without danger at any stage of pregnancy.

CASE REPORT

The patient was a healthy primigravida aged 22 years. The early part of the pregnancy (last menstrual period October 25, 1961) was uneventful and she had remained well until March 9, 1962 (the 19th week), when a primary vaccination was carried out at a public health clinic. This produced a "normal take," but she felt unwell eight days later, spending two days in bed with a pyrexia. She did not call in her general practitioner. At about this time she first felt foetal movements.

She recovered completely, but at the beginning of April, four weeks after the vaccination (23 weeks pregnant), she became aware that foetal movements had ceased. On April 28 vaginal bleeding, followed by painful contractions, developed, and she was admitted to hospital the next day. On arrival she was having strong contractions every minute. She was normotensive (130/70 mm. Hg) and apyrexial (98.6° F. or 37° C.), her urine was free from albumin, and she was not anaemic (haemoglobin 12.7 g. per 100 ml.). The uterus was enlarged to three fingerbreadths above the umbilicus. The foetal heart could not be heard. Vaginal examination revealed tense, bulging membranes, and on bursting these the foetus and placenta were expelled with minimum loss of blood. Involution was not satisfactory, portions of membrane being passed during the following three days.

The foetus, a female weighing 410 g. and measuring 25 cm. in length, was about 24 weeks mature, well formed, but moderately severely macerated with partial epidermal loss. All over the trunk, but especially on the back, upper arms, thighs, and neck, there were large, raised, congested umbilicated skin lesions up to 8 mm. in diameter (Special Plate, Fig. 1). One papular lesion, 3 mm. in diameter, was present on the sole of the right foot.

Internally all organs showed maceration, but small (up to 2 mm. in diameter) raised, pale, slightly umbilicated lesions were easily recognized on the kidneys (Special Plate, Fig. 2), liver, and lungs. Larger pale, irregular, firm areas were present in the right lower lobe of the lung and in the right lobe of the liver.

The placenta weighed 262 g.; it was circular in outline, measuring about 12 cm. in diameter and 2.5 cm. thick, and was poorly divided into cotyledons. The placental tissue was firm and showed numerous yellowish, irregular, firm necrotic areas throughout, clearly visible on the maternal and foetal surface, many of which had become confluent, with relatively normal tissue intervening (Special Plate, Fig. 3). The membranes were ragged, congested, and opaque, but did not show lesions visible to the naked eye.

Histological examination of the skin and internal organs showed areas of necrosis, but maceration had proceeded too far for any specific cellular changes to be discerned. The zone surrounding the areas of necrosis of varying size in the placenta (Special Plate, Fig. 4) showed numerous cells

with typical large eosinophilic cytoplasmic inclusions, while the intervening placental tissue was normal.

Scrapings from one of the skin lesions, when cultured on the allantoic membrane of developing chick embryos, grew vaccinia virus.

COMMENT

The appearance of the foetus and its weight suggest that death had probably occurred rather later than the date of cessation of movements would indicate.

While nobody would dispute the overriding need for protection against smallpox in all contacts, this case demonstrates that the foetus is at risk from maternal vaccinia in mid-term. It is not an isolated example, for similar cases have been reported by Wielenga *et al.* (1961), Lynch (1932), MacDonald and MacArthur (1955), and Wiersum (1956). There are probably others that have not been recorded.

Thanks are due to Professor A. S. Duncan for permission to publish this case, to Mr. T. J. Cooke for the illustrations, and to Dr. A. Evans for the isolation of the vaccinia virus.

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"Painless" Intussusception

Although the diagnosis of intussusception in infants is frequently straightforward, cases do occur which present considerable difficulty. The serious results of delay in starting treatment are universally appreciated, hence early correct diagnosis is of particular importance. Virtually all authorities quote dramatic abdominal pain as the outstanding symptom of the disease, and the absence of this may well lead to dangerous temporizing unless such a possibility is kept in mind. Two such cases have recently been encountered.

CASE 1

A male infant aged 5 months was admitted to hospital at midday on February 14, 1961. Two days previously he had appeared listless and had a slight cough. He had refused his feeds and had passed a loose stool, neither blood nor mucus being obvious in it. About 5.30 p.m. on the day before admission he had produced a projectile vomit amounting to approximately a cupful, and he continued to vomit smaller amounts every half-hour up to 10 p.m. During this period he had one further loose motion, again without blood or mucus. Throughout the night he regurgitated mouthfuls of fluid at two-hourly intervals. Shortly after 9 p.m. there was further projectile vomit consisting of 2-3 oz. (60-90 ml.) of bilious fluid. There was nothing to suggest that he was suffering any pain apart from a tendency to whimper when he was being sick.

On examination he was fretful and somewhat dehydrated. The abdomen was normal in appearance, but a definite tumour was palpable in the right hypochondrium and the caecum could not be felt in the right iliac fossa. There was no guarding or suggestion of tenderness. Rectal examination revealed frank blood and mucus on the examining finger. A diagnosis of intussusception was made

and operation immediately undertaken. This confirmed the presence of an ileo-colic intussusception with the head extending to the middle of the transverse colon. It was reduced fairly easily, but gross thickening of the terminal 2 in. (5 cm.) of the ileum was noted. The post-operative convalescence was uneventful and he went home one week after operation.

CASE 2

A female infant just under 8 weeks old was admitted to hospital on May 7, 1961, after examination at home. She had begun to vomit the previous evening, and on the day of admission had brought up all feeds. Nevertheless she had appeared cheerful, and nothing was volunteered by her mother to suggest that she had been in obvious pain. Four stools of the typical "red-currant jelly" type were passed during the course of the illness.

On examination the child appeared rather pale, but there was no evidence of dehydration. The right iliac fossa was "empty" on palpation and in the right hypochondrium there was a vague sensation of a mass; the child seemed to resent pressure in this area. Blood and mucus were noted on the finger after rectal examination. An intussusception was diagnosed, and this was confirmed at operation. As in Case 1 this was of ileo-colic type, the intussusception having advanced as far as the hepatic flexure. Reduction proved extremely difficult, the serous coat of the ascending colon splitting at two or three points during this procedure. After reduction was completed these areas were repaired and the abdomen was closed. The post-operative course was free of complications and the child was discharged on May 14.

COMMENT

The traditional teaching of the symptoms of intussusception has always stressed the dramatic onset, featured chiefly by colicky abdominal pain resulting in the child crying and drawing up its knees at regular intervals (Ladd and Gross, 1941; Eckhoff, 1955). It is obvious from the description of the above cases that reliance on signs of acute pain can be very misleading and might well lead to serious delay in diagnosis. Eckhoff mentions the fact that vomiting is usually one of the later symptoms of the disease, but Smith (1954) holds that early vomiting is extremely common. In both Cases 1 and 2 vomiting was a predominating feature, but, apart from this, neither child appeared unduly upset at any stage of the illness. In Case 2 the passage of blood and mucus in the stool was suggestive of the nature of the condition, but diagnosis from gastro-enteritis was rendered more complicated by the unusually early age at which symptoms occurred: Ladd and Gross quoted 484 cases in which only one child was under 2 months old. It might be postulated that the degree of pain is proportional to the tightness of the intussusception. This, however, does not seem to be the case, as the impaction in Case 2 was sufficient to make reduction extremely difficult and hazardous. It is obvious, therefore, that the practitioner or surgeon must consider the diagnosis of intussusception in all cases of vomiting in infancy, irrespective of whether pain is evident: such children merit particularly careful assessment of the abdominal signs and should always be submitted to rectal examination.

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D. M. ENTWISTLE *ET AL.* : PRENATAL INFECTION WITH VACCINIA VIRUS

FIG. 1.—View of foetus to show large umbilicated, congested skin lesions.

FIG. 3.—Maternal (top) and cut surface of placenta showing numerous yellowish, firm necrotic lesions, many of which have become confluent.

FIG. 2.—Superior surface of left kidney to show several pale, slightly umbilicated lesions.

FIG. 4.—Photomicrograph of placenta showing a necrotic focus. (Haematoxylin and eosin. $\times 105$.)