Fetal arrhythmia caused by excessive intake of caffeine by pregnant women

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Br Med J 1989;**298**:568

We report three cases of fetal arrhythmia resulting from excessive intake of caffeine by the mother during pregnancy.

Case reports

Case 1—The patient was a 26 year old woman (gravida 5, para 2). From 34 to 36 weeks of gestation preterm labour was successfully suppressed with fenoterol. Ten days later, when labour began spontaneously, the fetal heart rhythm was totally irregular; it had previously been regular. She gave birth to a boy who weighed 3100 g; his Apgar score at 5 minutes was 8. Electrocardiography showed frequent blocked extrasystoles resulting in bradycardia. After three days the extrasystoles stopped without medical intervention. Chest radiography, echocardiography, and laboratory tests yielded normal results. The only remarkable finding was that the woman had drunk 10 cups of coffee (1500 ml) during the last hours before delivery. The baby's urine contained caffeine.

Case 2—A 23 year old woman was admitted to this hospital at 40 weeks' gestation to deliver her first baby. The fetal heart beat was irregular, although three weeks previously it had been regular as measured by cardiotocography. Echocardiography of the fetal heart did not show any abnormalities. The woman told us that she had drunk 1·5 litres of cola a day during the past two weeks because of the hot weather. She delivered a girl who weighed 2680 g; the Apgar score at 5 minutes was 9. During and after delivery the fetal heart beat remained irregular. Postpartum electrocardiography showed frequent supraventricular extrasystoles. Laboratory tests yielded normal results. Over three days the arrhythmia gradually resolved. The baby's urine was not tested for caffeine.

Case 3—A 22 year old woman (gravida 1) was admitted to this hospital at 23 weeks' gestation because of fetal arrhythmia. Echocardiography of the fetal heart did not show any structural abnormalities; the heart beat was totally irregular. Results of laboratory tests were normal. The woman told us that she drank more than 1·5 litres of cola, two cups of coffee, and one cup of cocoa a day. She was told not to drink anything that contained caffeine. One week later the arrhythmias had stopped, and her pregnancy continued without problems.

Comment

Caffeine is a major pharmacological component of several popular beverages including coffee, tea, colas, and chocolate. Excessive intake of caffeine can cause tachycardia, extrasystoles, and arrhythmia.[1] Fetal arrhythmia, however, as a result of caffeine abuse by the mother has not been described before. Positive chronotropic and inotropic effects on fetal hearts, which depended on the caffeine concentration, have been shown in vitro.[2-4] As caffeine can readily cross the placenta and enter the fetal circulation it can probably also have adverse effects on the fetal heart in vivo.

Peak blood caffeine concentrations occur within 30 minutes after a subject drinks a cup of coffee, and caffeine has a metabolic half life of 2·5-4·5 hours. In babies, however, the enzyme or enzymes necessary to metabolise caffeine are absent until several days after birth.[5] Therefore, disturbances in the baby's heart rate caused by an excessive intake of caffeine by the mother should stop several days after birth.

These three cases show the importance of considering caffeine abuse by the pregnant woman if fetal arrhythmia of unknown origin occurs.

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(Accepted 25 November 1988)

Nosocomial outbreak of group C meningococcal disease

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Br Med J 1989;**298**:568-9

We report three cases of group C:2a meningococcal disease occurring within a month in the same hospital department. A carrier study among patients and staff showed that the infections were due to the spread of the strain inside the hospital.

Patients, methods, and results

On day 1 a nasopharyngeal swab was taken and a tracheal suction performed on a 60 year old man with chronic lymphatic leukaemia, chronic bronchitis, and, possibly, pneumonia. Meningococci of group C:2a were cultured from both specimens; serogrouping and serotyping and subtyping of *Neisseria meningitidis* were based on conventional methods.[1,2] He was transferred five days later to the intensive care unit with pneumonia.

On day 21 a 71 year old woman with myelomatosis died of septicaemia due to meningococci group C:2a. She had been in the same room as the index case. On day 25 a nurse who had cared for both these patients was admitted to the department of infectious diseases with meningococcal meningitis due to group C:2a. She died four days later of incarceration of the brain despite being treated with benzylpenicillin.

Swabs were taken from the staff and patients in the haematology department, and they were offered vaccination and chemoprophylaxis. For comparison we examined swabs taken from the staff of the infectious diseases and rheumatology departments. All staff who were found to be carriers of meningococci were offered prophylaxis with rifampicin, as were members of their households. These precautions were carried out on days 27 to 29, and no further cases of meningococcal disease occurred.

Five of the 183 staff in the haematology department were found to be carriers of group C meningococci (of which four were group C:2a), whereas none of the 247 staff in the departments of infectious diseases and rheumatology were found to be group C carriers ($p<0·05$, χ^2 test) (table). All the C:2a strains among the isolates were resistant to sulphonamide. Swabs that

Carriers of meningococci among staff from department in which meningococcal disease was present and from control departments

	No of staff	No (%) of carriers	Groups of meningococci		
			C	B	Other
Haematology department:					
Bedside contact with index case	68	11 (16)	5	3	3
No contact	115	9 (8)	0	4	5
Infectious diseases and rheumatology departments	247	20 (8)	0	10	10
Total	430	40 (9)	5	17	18

were taken from all carriers three days after the end of treatment with rifampicin showed that meningococci were no longer carried.

Comment

Strains of meningococci carried in the general population usually belong to non-virulent serological groups and types, even during an epidemic, and hence the ratio of attacks to carriers is low[3]; in Denmark in 1987 it was 1:17 000 (297 cases in a population of 5·1 million). If the secondary attack rate among household contacts of an index case of meningococcal disease is 500-800 times that in the general population[4] then the estimated risk is 2·9-4·8%. Three of seven carriers identified in our study developed the disease, giving an attack rate of 43% (95% confidence interval 7% to 82%); consequently we gave chemoprophylaxis to household contacts of carriers.

Patients with lower respiratory tract infection from whom *N meningitidis* is isolated most commonly suffer from chronic pulmonary disease.[5] The relative risk of secondary meningococcal disease among people in their vicinity is unknown. We therefore suggest that until more evidence has accumulated chemoprophylaxis should be considered for patients in the same room as a patient with respiratory tract infection caused by virulent meningococci of serogroup C:2a and for staff in contact with such patients.

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(Accepted 21 December 1988)

Does eradication of meningococcal carriage in household contacts prevent secondary cases of meningococcal disease?

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Br Med J 1989;**298**:569-70

From 1 October 1981 to 31 March 1988, 109 cases of meningococcal disease, mainly due to group B type 15 subtype 16 strains resistant to sulphonamide, were recorded in Gloucester Health District, six of them occurring among 309 household contacts of index patients. Two cases occurred 12 and 36 hours after admission of the index patient and before chemoprophylaxis was given. The four others occurred 28, 107, 147, and 156 days after the index cases. All household contacts and three of the four index patients had received rifampicin for two days as currently recommended,[1] and postnasal swabs were negative after treatment.

Effectiveness in eradicating nasopharyngeal carriage of meningococci is considered an appropriate criterion for selecting chemoprophylactic agents for meningococcal disease.[2] As most previous studies have examined short term effectiveness[3] and as four secondary cases in this outbreak occurred up to five months after prophylaxis we examined whether carriage of outbreak strains was persistently reduced after rifampicin was given.

Subjects, methods, and results

During a community survey of 6234 people in November 1986,[4] 79 nasopharyngeal carriers of outbreak strains were identified. In December after a second postnasal swab 50 carriers received rifampicin (600 mg twice daily for adults, 10 mg/kg twice daily for children) for two days, and 29 declined treatment. Thirty three (66%) in the treated and 18 (62%) in the untreated groups were still carrying outbreak strains (table).

In January 1987 only one of the treated group had a positive postnasal swab compared with 13 of the untreated group (table). If the natural rate of loss (28%) had applied to the treated group then the expected number of carriers would have been 24. Thus the effectiveness of rifampicin in eradicating carriage was 96% (23/24, 95% confidence interval 88 to 100%). In May and November two more patients in the treated group had positive postnasal swabs, and rates of carriage continued to fall slowly in the untreated group.

Numbers (percentages) of people with nasopharyngeal swabs positive for outbreak strains of meningococci among treated and untreated carriers

Treatment	Time when swab taken			
	At time of treatment (December 1986)	After one month	After five months	After 11 months
Rifampicin	33/33 (100)	1*/33 (3)	2/32 (6)	2/30 (7)
None	18/18 (100)	13/18 (72)	10/17 (59)	5/15 (33)

*Patient received second course of rifampicin and swab was subsequently negative.

Comment

Support for the practice of prescribing antibiotics such as rifampicin to household contacts of patients with meningococcal disease[1,2] comes from a retrospective study of rates of secondary attack with limited follow up.[2] Unlike the policy of mass prophylaxis in military communities,[3] it has never been evaluated by controlled trial.

Our study showed that persistent eradication of nasopharyngeal carriage of meningococci can be achieved by giving rifampicin for two days. Despite the apparently low rate of reacquisition four cases occurred one to five months after prophylaxis and the rate of