On 30 January 1974 when eight weeks pregnant by dates, the pregnancy was terminated by vacuum extraction. She was given anti-D globulin as a routine prophylactic procedure. On 19 February she was fitted with a Dalkon shield, an intrauterine contraceptive device, but became pregnant again. She had a positive Prognosticon test on 17 May, suggesting an expected date of confinement around January 1975. During this pregnancy her blood was tested for autoimmune antibodies on 17 May 1974 when six weeks by dates, and on 22 November at 33 weeks: none were found.

A few days before her expected date of confinement she went into spontaneous labour. Within two hours the intrauterine device was extruded spontaneously, there being little if any associated bleeding. Shortly before delivery the membranes were artificially ruptured, routine delivery following within 15 minutes. The total duration of labour had been four-and-a-half hours. The baby weighed 3350 g. Routine postnatal cord and maternal blood samples were submitted for investigation.

On spontaneous delivery of the placenta a thin layer of adherent retro-placental clot extended segmentally from the placental margin to its centre. The intrauterine device, which was extruded prior to membrane rupture, and without blood loss, must have lain adjacent to the placental edge and been responsible for the retroplacental bleeding.

Examination of the maternal delivery sample of blood showed "an immune antibody, very much like anti-D." It was present in only a weak titre which it was thought could well have formed in the time available between the sample submitted in November and the delivery one. A subsequent sample was noted 10 weeks after delivery to have an identical titre of anti-D by automated quantitative testing. Cord sampling at delivery suggested the infant's blood group to be O Rhesus positive.

Conclusion

Intrauterine contraceptive devices, and in particular the Dalkon shield, have been associated with a number of other complications of pregnancy.⁵ In this case it is possible that the intrauterine contraceptive device, causing retroplacental damage in late pregnancy, was responsible for sufficient fetomaternal haemorrhage to cause maternal rhesus sensitization.

I am indebted to Dr. W. Wagstaff, Director of the Sheffield Regional Transfusion Centre, for his opinion and advice.

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Pseudomonas Infection Associated with Contamination of Wick-type Air Freshener

The importance of *Pseudomonas aeruginosa* in the neonatal nursery is well recognized.^{1,4} During a routine bacteriological survey in a maternity hospital four babies in a special-care neonatal unit were carrying a strain (pyocine type 5)⁵ that had not been isolated previously in the hospital (see table). The wick-type air freshener was suspected when an attendant was seen to change a baby's napkin and immediately raise the wick of the bottle before washing her hands. Subsequently another person lowered the wick before handling the infant. Strains of the same pyocine type were isolated from air-freshener bottles in the infected babies' cubicles. All strains were of the same phage type (31/44/68/F8/109/119X/1214) and serotype (6). Several bottles in the nursery yielded Gram-negative organisms other than *Ps. aeruginosa*.

The air freshener was intended as a deodorant and not as a disinfectant. It contained 0.1% formaldehyde to maintain sterility. When the wick was permanently raised the fluid normally evaporated completely in about four weeks. Empty bottles were replenished from a stock bottle of the proprietary fluid. Possibly, as the fluid vaporized, the strength of the residual formaldehyde solution would fall to a level which was no longer bactericidal. If a partially empty bottle was

Babies Colonized by *Ps. aeruginosa* in Intensive Care Nursery

Case No.	<i>Pseudomonas</i> first Isolated	Diagnosis in Patient Colonized	Sites Colonized
1	25/7/73	Apnoeic attacks, pneumonia	Nose, throat, urine, rectum
2	3/8/73	Respiratory distress syndrome	Nose, throat, rectum
3	13/8/73	Respiratory distress syndrome	Nose, faeces
4	20/8/73	Birth asphyxia after breech delivery	Nose, throat, umbilicus, rectum

then refilled from stock the fluid would contain less than 0.1% formaldehyde.

Studies on Air Fresheners

The bactericidal activity of both aqueous formaldehyde solution and unused air-freshener fluid was determined against the organisms isolated from the ward bottles and a standard strain of *Ps. aeruginosa* NCTC 10490. Organisms were inoculated into doubling dilution series prepared in nutrient broth, and after overnight incubation subcultures were made to agar plates. Surprisingly, though the standard strain was killed by a formaldehyde concentration of 0.009% it required a concentration of 0.037% to kill the air-freshener strains even after these had been repeatedly subcultured. Whereas the standard organism was killed by the air-freshener fluid at 1/16 concentration, a concentration of 1/4 was needed to kill the air-freshener strains, equivalent to 0.025% formaldehyde content.

Eight bottles of air freshener from a specially prepared batch without colouring agent were placed in a warm room with the wicks fully extended, and the volumes and formaldehyde concentrations measured weekly. Formaldehyde concentrations were determined by adding Schiff's leucobasic fuchsin to the fluid and measuring the colour developed in an E.E.L. densitometer. The average formaldehyde concentration fell to the critical level of 0.025% after three weeks. Organisms inoculated directly into the residual fluid after four weeks' exposure could still be recovered on subculture but organisms inoculated on to the top of the wick were not recovered from the fluid, possibly because the wick was too dry.

Our findings prompted a further survey in a general hospital. *Ps. aeruginosa* was isolated from several air fresheners from a respiratory unit where many patients were colonized by this organism. In a later survey *Ps. aeruginosa* together with other Gram-negative bacilli were isolated from three out of 35 bottles located in wards throughout the hospital, mainly in sluices and toilets.

Comment

Though unproved, the bottles may have been directly implicated in cross-infection and they should not be used in intensive care units and similar places. The practice of topping-up existing bottles from a stock solution should be discouraged since the resulting weakened mixture may eventually support the growth of organisms. Since an increase in the formaldehyde concentration proved irritant we recommend the use of safe non-volatile disinfectants. The possibility that organisms may develop resistance to formaldehyde solutions was not further investigated.

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