

Effect on children of women with breast implants (including breast feeding). Information supplementary to the report of the Independent Review Group.

Background

There have been a number of anecdotal reports that children born to mothers with a silicone gel breast implant (SBI) have developed swallowing difficulties, irritability, non-specific skin rashes, fatigue and a constellation of symptoms similar to those occurring in women with a SBI. Patient self help groups have collected information from women phoning in with their own concerns and who have been questioned about health problems in their children.

There has also been a considerable media interest in the potential harmful effects of SBIs on children's health.

Published papers

Most of the papers are descriptions of case reports and there are no epidemiological cohort or case control studies comparing children born to SBI mothers with children of non-SBI women.

Oesophageal effects

A small number of published reports suggest that children breast fed by SBI mothers have developed abdominal pain and oesophageal dysmotility. Levine and Ilowite published (1) a small study of 11 children of SBI mothers referred to a paediatric gastroenterology clinic with abdominal pain and compared them with 17 children with abdominal pain who had not been exposed to silicone. Eight of the 11 children had been breast-fed. The children in the two groups were studied using oesophageal manometry and had an auto-antibody screen. Six of the SBI children had an abnormal manometry in the distal 2/3rds of the oesophagus but there were no abnormalities in the auto-antibody profiles between the two groups.

Comment

There are a number of problems with this study. The patient group was a small subgroup of a cohort of 67 children referred by support groups or physicians because of parental concern related to possible second generation effects. This may have introduced a degree of selection bias. Eight of the SBI children were from four families and two of the children were born to a mother with scleroderma and oesophageal dysmotility. Genetic factors cannot therefore be ruled out. Sedation of the children at the time of the examination may have affected the oesophageal pressures.

Oesophageal effects and urinary neopterin

A second paper was published by the same group (2) which investigated macrophage activation by measuring urinary excretion of nitric oxide (NO) metabolites and neopterin concentrations in urine in 38 children who had been breast fed by SBI mothers. Controls were 30 children born to mothers without SBI but the control group of children consisted of 10 who were healthy, 10 who had gastrointestinal symptoms, and seven who had benign urinary abnormalities. There was also a small group of children, three in number, who had joint symptoms similar to those children born to mothers with implants. The authors went on to attempt to correlate oesophageal abnormalities as measured by oesophageal wave propagation against urinary neopterin levels.

Comment

There are several problems with this study in that measurement of urinary neopterin levels is difficult and the values obtained are dependent on the time of day in which urine was sampled. Measurement of urinary nitrite levels is dependent on dietary

intake of nitrate. Neither of these considerations appears to have been taken into account by Levine and his co-workers. It is therefore difficult to assess the value of these measurements and it would be helpful to repeat them under strictly defined control conditions.

Oesophageal effects - long term follow up

A third paper, again published from the same group (3), is a long-term follow-up of oesophageal dysmotility in children breast-fed by SBI mothers. In this particular study, urinary neopterin levels were again measured but no control group was included. The numbers tested were small and consisted of 11 children, including eight in Levine's initial report. The mean follow-up was 2.1 years and it was noted that five of the children had improved clinically in terms of abdominal pain and swallowing difficulties. The investigations reveal that there was no change in urinary nitrate and neopterin levels in the breast-fed children compared with those at the initial determination and the oesophageal manometry was essentially unchanged despite clinical improvement. Again, the number of patients involved in this study is very small and there is no data on the first degree relatives of these children in relationship to oesophageal dysmotility so that genetic factors cannot be ruled out.

Autoantibodies in children of SBI mothers

A paper published in 1996 again by Levine's group (4) looked at 303 children born to SBI mothers and measured a range of autoantibodies to extractable nuclear antigen, thyroid autoantibody, antibodies to cardiolipin, and antibodies to native and denatured human types I and II collagen. Complement levels (C3 and C4) and IgM rheumatoid factor were also measured as well as antinuclear antibody and a range of other autoantibodies. The control group consisted of 42 children born to mothers without silicone breast implants but who had been attending the Division of Gastroenterology, Nutrition and Rheumatology, for a variety of complaints. There was no significant difference in the prevalence of autoantibody production between the SBI children and the control group. In particular, there was no correlation between clinical symptomatology and autoantibody levels. The authors concluded that the failure to find any association between clinical symptoms and humoral antibody expression in the SBI group of children may lead to the conclusion that symptoms in these children were unrelated to the mothers' silicone implants. A case report (5) of an infant with an erythematous rash born to an SBI mother describes the presence of a positive test for anti-Ro antibodies in the infant. However, the mother was also anti-nuclear antibody positive and had clinical features of SLE. This case may merely therefore represent the transplacental passage of maternal antibodies to the infant, a situation which has previously been described in infants born to mothers with SLE.

T cell responses

Smalley et al (6) have investigated T cell proliferative responses to silicone dioxide (silica) in 24 children born to SBI mothers. The authors claim that T cells were significantly stimulated by silicone dioxide. A second part of their study consisted of the investigation of 11 children, four born pre-SBI implantation, and seven born post-SBI implantation. None of the pre-implant offspring showed T cell responses to silica while five of the seven post-implant children were positive in this test.

The interpretation of this data is problematic in that insufficient data is given relating to the control population study and also as to whether controls were tested simultaneously with the patients in the T cell proliferation assay. Historical controls are not appropriate for this type of study and yet no information is provided relating to whether historical controls were used or not. The authors point out that not all the children they tested were breast-fed and they suggest there may be transplacental passage of immunogens such as silicone oligomers.

To date there have been no studies published investigating the possibility of transplacental or transglandular transmission of silicone. It is certainly true that transplacental sensitisation to food antigens and helminthic antigens has been described (7,8,9) but there is no evidence so far that the same mechanisms occur with silicone from breast implants.

Animal studies

The possibility that oesophageal lesions may be caused by the presence of silicone in breast milk was investigated by Rascoe et al (10) who investigated this possibility in rats, given an intramammary injection of silicone gel, as well as a group who received silicone gel injected into the nape of the neck in addition to the intramammary injection. These treated rats were compared with a control group which did not receive silicone injections. No oesophageal abnormalities could be detected in either the treated or the control group of rats, despite the high levels of exposure of the treated animals to silicone.

Silicone in breast milk

It has been proposed that high levels of silicone are found in the breast milk of SBI women compared with controls. However, a recent study by Lugowski et al (11) presented at the 5th World Biomaterials Congress in Toronto, Canada, in 1996, demonstrated that there was no statistical difference between the levels of silicone in women with silicone breast implants and those without silicone breast implants. Silicone is also used as a food additive and is present in common medicines and cosmetics. It is also a component of Simethacone which is used as drops for infants and children (12). Evidence of silicone migration from intravenous fluid tubing has also been found in children who require pump-assisted i.v. infusions (13).

General comments

The published literature to date does not substantiate the claims that there are significant clinically apparent second generation effects in children born to SBI mothers. Immunological abnormalities have been reported in children of SBI mothers but the methodological problems associated with the assays used makes interpretation of these data problematic. The exposure of infants of SBI mothers to silicone in breast milk is, on the current data available, no greater than that to which they are exposed from other sources of silicone in the diet and in the environment. Further strictly controlled studies are required to be done to determine whether T cell and macrophage activation does in fact occur in children of SBI mothers when compared to controls.

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