The perished rubber sign in gastroenteritis

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SUMMARY. The abdominal skin and underlying fatty tissues of babies developing severe gastroenteritis occasionally feel somewhat like a piece of perished rubber. Evidence for this being an important sign indicating a seriously ill baby is given; attention is drawn to the possible value of corticosteroids in the treatment of cases where this sign persists after satisfactory dehydration has been carried out.

Introduction

Gastroenteritis is such a common and often serious disease in developing countries that all doctors and nurses should be highly skilled in its recognition and management.

Description of the sign

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The sign is present if the skin and underlying fatty tissue loose their normal silky smoothness and feel like a piece of perished rubber. It has the following characteristics:

(1) There is loss of skin elasticity as in simple dehydration,

(2) The skin and subcutaneous tissue is felt to fold in an unnatural way, like folding a piece of thin cardboard,

(3) Small ridges can be felt in the fatty subcutaneous tissue, as when feeling perished rubber,

(4) Small, oval, seed-like bodies can be felt just below the surface of the skin in the fatty tissues,

(5) Eliciting the sign will often cause the baby to cry in pain, whereas this seldom happens in normal or in thin dehydrated babies,

(6) When the sign is well marked in a really fat baby, the dimples covering the ridges and seed-like bodies described above can be seen.

All these features are not necessarily present; the first and second characteristics are the earliest manifestations of the sign.

Importance of the sign

If the perished rubber sign develops in babies with severe gastroenteritis, it shows that intravenous electrolyte solutions are needed at once.

Observing the sign

The sign is elicited by gently pinching and palpating between finger and thumb a fold of abdominal skin with the underlying fatty tissue, as when testing for dehydration. If the tissue reaction is well-marked in a fat baby, the ridging and dimpling of the skin may be seen as well as felt.

Naming the sign

Many paediatricians will be familiar with this sign, but as far as I am aware no previous description of it has been published, nor has a name been given to it. The naming of the sign is necessary to bring it into clinical prominence so that its significance can be assessed. The observation that the skin of fat babies with gastroenteritis may feel like a piece of soft, disintegrating rubber has prompted the name, perished rubber sign. Describing a sensation of feel is as difficult as describing a sound or a smell; one can only make comparisons and in this case perished rubber seems to be best.

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Duration

It may last under 24 hours or up to ten days. How long it lasts seems to depend upon:

(a) How marked it is,

(b) How quickly treatment of the whole condition is started,

(c) How quickly dehydration and electrolyte imbalance are corrected.

The sign may recur if the gastroenteritis relapses.

Accompaniments

The sign may be accompanied by signs of:

(i) *Dehydration.* I have observed that this is always present when the sign appears, but it may be absent later on.

(ii) *Shock.* There is often evidence of tissue under-perfusion and indeed one child developed gangrene of the fingers and toes.

(iii) *Infection.* Acute tonsillitis, acute otitis media, or pneumonia are examples.

(iv) *Acidosis.* This is indicated clinically by deep sighing respirations.

Cause

The sign appears to have two main causes which are closely connected; dehydration and sodium/potassium imbalance. If these are brought promptly back to normal, the sign often disappears. It does not, however, always do so and on a number of occasions I have seen it persist in spite of inadvertent overhydration.

This must mean either that dehydration is not the sole cause or that it starts off a subcutaneous fatty tissue reaction which rehydration cannot rectify. Whichever of the two be true, the resulting tissue reaction could be fat necrosis, because I have observed in those babies who survive a marked loss of abdominal fat.

Significance of the sign

This sign is a warning that the baby is dangerously ill. In a group of 30 cases of severe gastroenteritis in "fat" babies admitted to St. Lucy's Hospital ending fatally, perished rubber sign was recorded as being positive in 93 per cent (table 1).

TABLE 1

BABIES OVER THIRD BOSTON PERCENTILE DYING OF GASTROENTERITIS

Number of cases	*Perished rubber sign positive*	*Perished rubber sign negative*	*Percentage positive*
30	28	2	*93*

It is easy to underestimate the severity of the dehydration in these babies and to try to rehydrate them orally; a scalp vein drip using suitable intravenous electrolyte solutions appears essential. Often when putting up the drip, the degree of shock present is surprising, amounting to almost complete peripheral shut-down. Babies with the perished rubber sign present require immediate skilled paediatric care, preferably where facilities for electrolyte estimation are available.

When the sign persists after satisfactory rehydration has been carried out, treatment with corticosteroids in full dosage appears to be life-saving (usually prednisone 25mg twice daily intramuscularly). Since adding this measure to the standard gastroenteritis regimen at St. Lucy's Hospital, there has been a lowering of the mortality of fat babies to half that of thin babies. Before this was done, the mortality rate was above that of thin babies (table 2). The relatively well-nourished baby with gastroenteritis ought to have a better chance of survival than one who is poorly nourished; if this is not so an explanation must be sought, and fat necrosis and its effects may provide the answer. It is emphasised, however, that corticosteroids do *not* appear to be indicated in gastroenteritis unless the perished rubber sign persists after adequate rehydration; indeed if given to malnourished babies their use could be dangerous.

Evaluating the sign

I have found that babies over the third percentile in weight (Boston standards: Nelson's textbook of paediatrics) now seem to survive much better than those under it; there appeared to be little difference in mortality before corticosteroids were used (table 2).

TABLE 2
CASES OF GASTROENTERITIS ADMITTED TO ST. LUCY'S HOSPITAL
PERIOD 1961 to 1966
(*Before* prednisone treatment was used for cases with the perished rubber sign)

	Cases	*Deaths*	*Percentage*
Fat	189	74	*39*
Thin	225	90	*35*

PERIOD 1967 to 1972
(*After* prednisone treatment was used for most of the cases with the perished rubber sign)

	Cases	*Deaths*	*Percentage*
Fat	312	37	*12*
Thin	429	105	*24*

To find out whether this difference is real and to test whether the sign is as useful, as it seems to be, requires proper scientific evaluation. More sophisticated tests of nutritional status and of statistical significance need to be applied. Perhaps those who treat gastroenteritis with the luxury of good laboratory facilities will take up the task, so that the full significance of this sign may be known and its apparent value confirmed.

The high mortality is undoubtedly due to several factors since many of these babies are moribund on admission and tuberculosis is a common complication; only the most severely affected can be admitted to the overcrowded and understaffed wards of St Lucy's Hospital.

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