

TEAT HOLES*

S. LEVIN, M.B. (RAND), M.R.C.P. (EDIN.), D.C.H., *Johannesburg*

Thou shalt even drink and suck it out — *Ezekiel 23:34*.

Teats are important objects, though they have been given little consideration in the literature.¹⁻⁹ The most important part of the teat is its terminal hole, an orifice which has been completely ignored. Orifices are generally interesting structures; can teat holes be interesting?

Holes are of 2 types; circular orifices and slits. The former are usually burnt with a heated needle but can also be produced by means of external or (rarely) internal metal punches, resulting in slightly conical orifices facing out or (rarely) in. The end-result matters little. Slits are also called cross-cuts and feature 4 limbs. They can be made by using a razor to cut down onto a length of teat presented on a pin. They are also available ready made from the Evenflo and Mead Johnson companies. For many years I have used a simple metal punch, made for me by a local engineering firm, which cuts 3 slits into a teat, rather in the shape of a Y, each limb being some 2 mm. long.

Five un-holed 'cherry' teats were obtained from a local rubber company. Three had holes burnt or punched out, while 2 had slits made, 1 a cross-cut and the other a Y-cut. How did these 2 varieties affect the nature of milk flow when attached to a narrow-necked bottle? When a full bottle was inverted, several drops of milk leaked out of the holes until such time as the internal vacuum equalized the hydrostatic pressure of the milk. The same procedure with slitted teats, the edges remaining in apposition, revealed that these do not leak. Bottles with holed teats, left in the cot, leak into the bedclothes, especially if there be a vacuum-relieving mechanism as with the Evenflo-type bottle. Bottles with slitted teats do not leak, because the

slits open and close, whereas the teats with holes remain permanently open.

EXPERIMENTAL RESULTS

It is not possible to duplicate with instruments the mechanism by which a baby sucks on a teat, but it is possible to simulate the conditions and, even if lacking in mathematical accuracy, such simulated experiments can still supply a rough estimate of what issues from a teat orifice during sucking.

I fashioned an artificial palate, about the size of that of a newborn baby, from a hardening putty and fixed this to one arm of a geometrical divider. On the other arm I made a lower jaw, upper and lower jaws meeting when the divider was closed and opening to receive a teat against the palate. The dividing arms with upper and lower jaws could therefore be closed, thus trapping some milk within the teat.

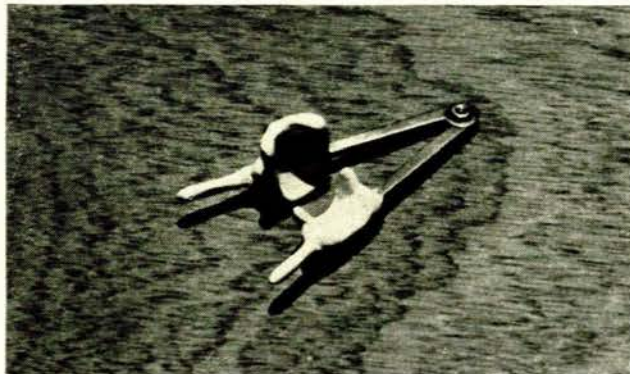


Fig. 1. See text.

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An infant does this and thereafter extends the tongue tip from the lower jaw along the teat, pressing it against the palate. The teat is thereby partially emptied and such draws are made repeatedly. Very likely the jaws are momentarily relaxed to allow more milk into the partially emptied teat before the tongue is drawn along it once again.

The opening and closing of the jaws, together with the refilling of the teat, could be duplicated with the arms of the dividers, while the flat, rounded end of a tablespoon-handle was used as a tongue. With the jaws closed by my left hand, my right momentarily pressed the spoon-tongue along the teat and squeezed some milk from the orifice into a convenient pot where it was drawn up by a syringe and measured to the nearest millilitre. After some practice I became quite adept at squeezing uniformly both gently and firmly as the investigation required.

A hundred gentle strokes, simulating sucks or draws by small, frail or tired infants, elicited an egress of 5-8 ml. of milk irrespective of whether holed or slitted teats were used. Each teat was tested 5 times, with 100 strokes each time.

As happens with older, stronger babies, firm strokes of the spoon were made against the teat held within the jaws of clay, each teat being tested 5 times, with 100 firm strokes each time. The holed teats delivered about 20-25 ml. of milk per 100 strokes, the internally punched teat (with the wider diameter of the funnel or cone internally) delivering the larger quantities. Much greater quantities, however—some 27-37 ml.—issued from the slitted teats, which clearly have a much wider range of serviceability. Perhaps the Y-cut opens just a little more than the cross-cut which, ostensibly with 4 limbs, has really only 2, one of these closing as a consequence of the infant's suck while the other opens. With Y-cut slits, 1 closes to the pressure of the tongue while 2 open to permit egress of milk.

Slitted teats are more versatile than holed ones, but manufacturers prefer holes because it is cheaper to burn holes or even to punch holes rather than slits. Slitted holes become larger the stronger the suck, something which cannot happen with circular orifices. Clinical experience confirms that at the age of 4-5 months, babies are seldom satisfied with the rate of flow from holed teats which have functioned adequately until then. Holes must be enlarged to cope with a stronger suck.

It is sometimes thought that cross-cut teats are useful only when giving thickened feeds, and in their advertising of teats, the Evenflo Company make this point. But this is a mistake. Spock¹⁰ writes correctly that the milk from cross-cuts does not flow too rapidly, because the edges are in apposition, and the disposable Beniflex nursers² (Mead Johnson) have cross-cut teats.

TEAT TROUBLES

For some strange reason nearly all commercially available teats have minute holes, against which even the youngest babies, with the smallest demands per suck, often struggle in vain. There is a curious view, widely prevalent, that such tiny teat holes are desirable because babies require prolonged sucking; it is supposed to be gratifying for their psyches. This is nonsense.¹¹ Small holes only make babies exhausted. The bigger the hole the better. There is much truth in Meyer's statement: 'the author has never seen the nipple hole that was large enough as it was obtained from the manufacturer'.⁴

True enough, many infants splutter and choke when presented with a large-holed teat (especially when drinking water or fruit juice), but they learn to cope and the problem is minimized if the bottle is held horizontally so that only the teat is filled with milk, there being no hydrostatic pressure immediately above. If infants need sucking for their psyches, dummies will do admirably.

Small holes tend to get smaller, for several reasons: repeated boiling swells rubber (latex is hygroscopic); the salts of hard water precipitate out on the interior of the teat and orifice, as does milk protein coagulated as a result of cleaning teats with hot rather than cold water; and cereal within the bottle tends to block even an enlarged hole, while tiny particles of milk powder, which have not gone into suspension, are also caught up within the hole. A teat hole, initially adequate for a young baby, may not be adequate after a week or two.

In one respect holes are superior to slits in teats. Holes permit air to enter after milk is withdrawn. Slits remain closed; if milk is withdrawn, air re-enters only with difficulty. Slitted teats must therefore only be used where some alternative provision is made for the relief of the vacuum, as with Evenflo, Playtex or the very useful, but unhappily seldom available, boat-shaped bottles.

SUMMARY

Orifices in teats are of 2 kinds, holes and slits. The characteristics of the different types of orifices have been investigated by means of artificial jaws, by which an infant's sucking action could be approximately simulated.

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