

Certain principles concerning the training of troops were again emphasised by the Malta experience. The use of deep shelters, "shelteritis" as the troops called it, is to be deprecated among fighting troops. Besides learning how to make open slit trenches they should be constantly drilled in dispersal and lying flat. There were very few casualties among the troops working on the air-fields who adopted the latter procedure, despite constant exposure to heavy raiding. From the standpoint of morale, frequent raids at irregular intervals, with the heavy attacks indiscriminately interspersed among nuisance raids, are more deleterious than heavy raiding at regular and longer intervals.

There is no evidence to show that bombing introduced any new factor in the production of psychiatric casualties; rather it aggravated or precipitated existing psychoneurotic dysfunction, although in certain exceptional cases it may be capable of precipitating an acute anxiety state in a previously balanced individual.

The detection and primary treatment of the minor psychiatric disorders should be the responsibility of the regimental medical officer. Any effective treatment undertaken by the medical specialist or psychiatrist is of limited value without their understanding coöperation. In view of the high proportion of psychiatric disorders in medical outpatients, should all these cases be referred to a psychiatrist if available? The answer is definitely in the negative. The border-line in physical and psychiatric medicine is difficult, and the frequent superimposing of the psychomatic disorders upon physical disease requires that the medical specialist must be prepared to diagnose and treat the minor psychoneurotic disorders. He may do untold harm to a patient by referring the case back to the regimental medical officer with a curt note, "no organic disease," "obviously functional," without first attempting to explain matters to the patient, time-consuming though this may be. On the other hand, he must realise which cases are beyond his experience to treat and refer them back to the psychiatrist without delay.

SUMMARY

Primary psychiatric diagnoses constituted over 40% of the medical outpatient consultations in Malta during the period September, 1941, to June, 1943.

Conditions in Malta were not exceptional save for the intensity of recognised environmental aetiological factors, due to the constant exposure to bombing.

Evidence is submitted that during the height of the blitz period 25% of the garrison showed a pathological reaction to bombing, but that the general quality of the garrison troops was in no way inferior.

I wish to express my thanks to all the medical colleagues, besides the medical specialists named, who served in Malta during the period under review, to Brigadier J. R. Rees, consulting psychiatrist to the Army, and to Brigadier R. F. Barbour, recently consulting psychiatrist, MEF, for their help and encouragement; and to Brigadier W. K. Morrison, DSO, DDMS Malta, for permission to publish this paper and for his personal interest in the problems raised and in the welfare of the men.

SCOTTISH COUNCIL FOR HEALTH EDUCATION.—Reporting to the Council on his tour of the rural and Highland areas of Scotland, Dr. J. N. Greene Nolan said that, accompanied by a Ministry of Information mobile film unit and operator, he has so far visited 20 counties, addressing 222 meetings in schools, factories, and public halls, with an aggregate attendance of nearly 29,000 persons, of whom 18,000 were senior-school pupils. Remarking that "queues grow longer, food scarcer, and new clothes harder to come by," he expressed surprise that he had had large and appreciative audiences almost everywhere he went. There could be no doubt that there was a stirring of public interest in health problems, and it was the Council's duty to respond to the desire for information, discussion, and advice. Mr. Henry Ellis, the secretary, reported that nearly a million leaflets on health matters had been distributed in Scotland during the past 16 months. The Council's summer school at St. Andrews in August had proved a remarkable success, 70% of the students being school-teachers. It was hoped to repeat the school several times in the coming year.

SORE NIPPLES CAUSES AND PREVENTION

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Sore nipples are often the underlying cause of failure of breast-feeding. They may make the mother unwilling or unable to endure the child going to the breast; or they may lead to a great reduction in the rate of secretion of milk indirectly by necessitating an interval of a day or more in suckling in the first few days of lactation. The resulting engorgement coming when removal of the milk by manual expression or pump is difficult or painful reduces, sometimes irretrievably, the secretion of milk. Sore nipples are very common, estimated by DeLee (1938) to affect more than half of all lactating women. They are intensely painful and may bleed, causing blood-stained vomitus and gastro-intestinal upset in the baby, and are believed by many to be the forerunners of breast abscesses.

The innumerable articles and textbook pages dealing with sore nipples speak of cracks, fissures, rhagades, abrasions, excoriations, erosions, ulcerations, chaps, and blisters. For the most part, where distinction has been made, cracks and rhagades have been used as inclusive terms; abrasions, excoriations, and erosions have indicated a loss of surface; and fissure has been reserved for the lesion at the depth of the crevices of the skin.

Trauma from rubbing or biting is the most popular explanation of soreness (Mauriceau 1755, Ramsbotham 1855, Bedford 1868, Hirst 1889, Wright 1908, Bumm 1912, Moll 1922, Smith 1929, Sacco Ferraro 1933, Leinzinger 1938, DeLee 1938, and Berkeley, Bonney, and MacLeod 1938). Others emphasise the thinness or soddenness of the epithelium (Norris 1895, Jellet 1910, Ten Teachers 1938). This interpretation underlies the recommendation so often made to harden the epithelium before delivery; nine specimens of this advice are given

TABLE I—INCIDENCE OF FIRST PETECHIÆ AMONG 114 WOMEN AND FIRST OCCURRENCE OF FISSURES AMONG 176 WOMEN ON DAYS OF PUERPERIUM

Day ..	1	2	3	4	5	6	7	8	9	10	11	Total
No. of cases Petechial	1	7	13	5	8	3	1	2	0	0	0	40
Ulcerative	0	0	0	0	1	2	2	4	0	0	1	10

and deplored in the Ministry of Health report on the breast feeding of infants (1943). The part played by suction was well described by Deluze (1850) and has also been referred to by Bumm (1912) and Russell (1924). Other suggested causes are local insufficiency of vitamin A (Balachovski 1934, Kunz 1936), the detachment of crusts (Tarnier and Chantreuil 1888), and the fullness of the breasts (Meigs 1852, Waller 1943). Thrush of the nipple has been recognised at least since Mauriceau's time and has been found by Kisiya (1941) relatively late in lactation. This one paper by Kisiya is the only account found of experimental work relating to causes of soreness of the nipple.

Investigation

The following investigation consisted of a preliminary observation of some 400 women and a more detailed study of 114. It has become evident that there are two common kinds of lesion differing in nature, position, and time of incidence: the erosive or petechial (fig. 1) and the ulcerative or fissure (fig. 2). The erosive or petechial lesion manifested itself most simply as swelling of the papillæ, usually at the centre of the nipple. Sometimes soreness was present without visible alteration; in other cases there were small almost translucent oedematous areas and later petechiæ. In some instances the petechiæ appeared without preceding oedema. In their most extensive form the petechiæ merged to form a red crescent transversely across the nipple (fig. 1). Sometimes the superficial layers of epithelium were eroded as a ruptured blister. Pain at the time of

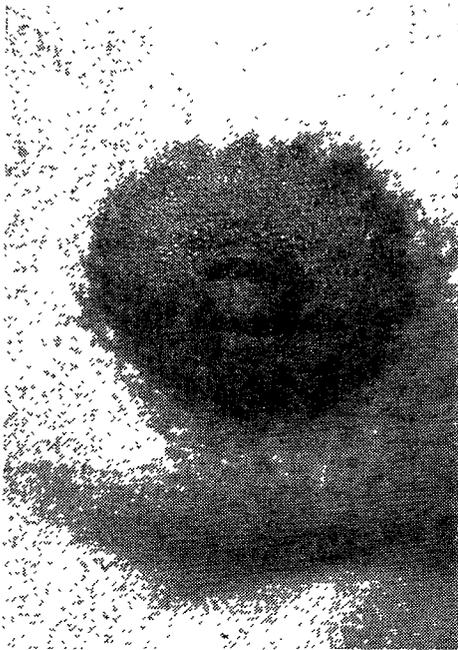


Fig. 1—Petechial lesion of nipple.

nursing was common to all stages, which, because they frequently succeeded one another, were considered to be parts of one process. The lesion was commonly bilateral. This type was found most often during the first days of nursing and seldom started after the first week (table I). The position of the line of merged petechiæ across the nipple was remarkably constant, and, since the women under observation all nursed while lying down, bore a constant relation to the baby's mouth to



Fig. 2—Fissure of nipple.

To find out whether soreness was produced by rubbing or suction a finger was put into some babies' mouths. One could feel the rhythmical action of the jaws and cheeks, the tongue lashing the underside of the finger strongly and frequently, and the area of maximal suction in the crescent-shaped space between the tongue and the palate. There could be little doubt that the petechial area on the nipple corresponded to this area of maximal suction. If repeated frictional trauma were the cause, the lesion would presumably be in that part of the nipple worked on by the tongue and gums. No evidence was found of biting causing the soreness. It is known that the pain is felt most often and intensely in the first moments after the child has been put to the breast and gives the subjective impression that the nipple has been bitten. This fact is commonly mentioned by patients. They also recognise that the sensation of being bitten is felt only on the affected side, although the baby apparently takes each side with equal vigour. The pain is sometimes experienced in an affected nipple during a "draught" sensation felt apart from suckling. It seems probable that, although suckling and therefore presumably its mechanical effects are necessary for the development of sore nipples, actual aggressive biting in early infancy is not an essential factor, if it occurs at all.

MEASUREMENT OF SUCTION

The next step was to investigate the pressure-changes within babies' mouths during suckling. This was done by direct measurement with a mercury manometer recording by its float on a smoked drum and connected by a hypodermic needle to a no. 14 soft catheter, which was passed beside the nipple into the baby's mouth. The hypodermic needle served both to lengthen the connexion without noticeably increasing capacity and to damp the swing of the mercury column. The momentum of the moving mercury column exaggerated the excursion when suction and swallowing produced quick large oscillations, but this exaggeration did not modify

the reading when the negative pressure was steadily maintained. The catheter was apt to cause an air-leak between lip and breast or to interrupt the child's hold; hence recording was only possible where the areola was soft enough to accommodate the catheter, where the mother was not put off by the apparatus, and where the child took a good hold.

As might be expected, the occurrence or non-occurrence of swallowing determined the type of record. When the child could be heard swallowing milk or air, a characteristic tracing was obtained like that illustrated (fig. 3), which was made on her eleventh day by a vigorous baby girl, who weighed at birth 7 lb. 1 oz. She was taking leisurely from a full breast and obtained 1 oz. of milk from that breast at that feeding. The negative pressure was rhythmically produced and released with each act of swallowing, but a moderate negative pressure existed momentarily before the next jaw action.

When, however, a hungry child was obtaining no milk and there was no air-leak between lip and areola, a negative pressure was liable to be produced, and to be continuously maintained at a high level even for minutes within the mouth until the nipple was withdrawn. Fig. 4 shows a record made the day after birth from a second child, a boy, who weighed at birth 7 lb. There was a period of vigorous sucking interrupted by a rest; then, between the arrows, the baby could be heard to swallow. After that, swallowing could not be heard and the baby was almost asleep, with occasional movements of the jaws. The ready response of the mercury to small nibbling movements showed that the catheter was open during this period. After a period of less suction a negative pressure was held for 2½ min. at approximately 70 mm. Hg. Greater negative pressures were recorded in other instances, and one two-day-old baby exerted a suction of 200 mm. Hg for 2 min. until she was removed from the breast. The outward appearance of the baby gave no indication of the strength of negative pressure obtaining; indeed the contrast was striking

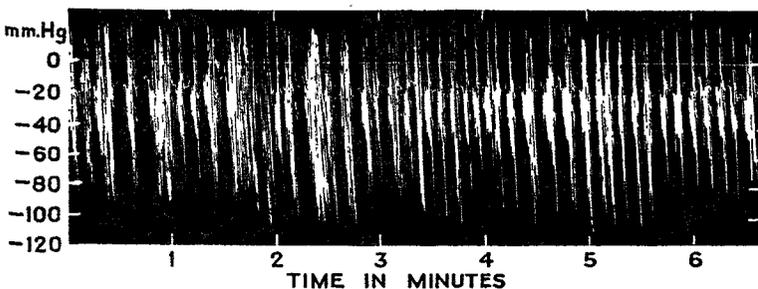


Fig. 3—Record of negative pressure in a baby's mouth while taking easily from a full breast.

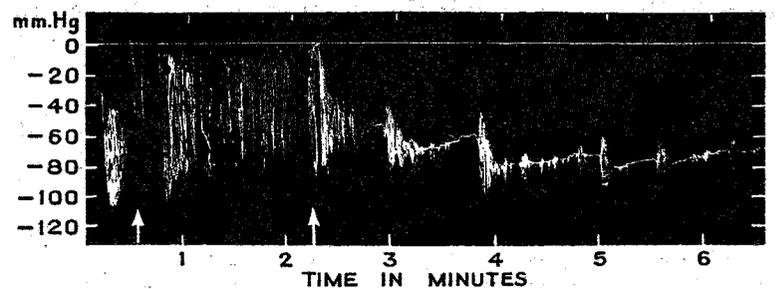


Fig. 4—Record of negative pressure in a baby's mouth while taking the scanty secretion and later while on the empty breast.

between the peaceful child apparently at rest on the breast and the high level of negative pressure recorded by the instrument. An increase of negative pressure was repeatedly observed when the baby felt the nipple going from him.

The easiest way to understand the meaning of these figures—70 mm. Hg for 2½ min. and 200 mm. Hg for 2 min.—is to measure one's own suction capacity. A suction-pressure of 100 mm. Hg is an ordinary maximal reading to produce by inspiration alone but can only be held with the breath. By mouth action and swallowing some adults can exert a suction-pressure of 350 mm. Hg, and a few a considerably higher pressure (Auerbach 1888). Mouth-action suction can be maintained for some minutes, although to exert a pressure of even 200 mm. Hg demands a great effort and soon produces oedematous flushed areas on the buccal mucosa, much resembling the soggy early nipple. This experiment might well be included in the students' obstetric or pædiatric training.

CAPILLARY RESISTANCE AND VITAMIN-C SUPPLEMENT

The strength and duration of suction revealed by these records being sufficient by itself to produce petechiæ in the skin of the arms of some healthy persons, the questions arose whether sore nipples were in part due to reduced capillary resistance in the mothers and, if so, whether the resistance could be restored. Preliminary tests made by applying negative pressure to the skin of the arm showed that, on an average, petechiæ were more readily produced in newly delivered women than in other women. Thus a survey was undertaken to determine if lowered capillary resistance were related to the incidence of sore nipples; it also served to record the frequency and time-incidence of the types of soreness. Despite the weight of evidence against the correlation of vitamin-C intake and capillary resistance, it seemed possible that the decreased resistance of the mothers might be attributable to the probably large demands on vitamin C during labour and the establishment of lactation, periods which coincide with small intake of food and often with virtual vitamin-C starvation. This possibility was also tested.

All women admitted in a two-month period were included in the survey except those who did not nurse their babies in the first five days and those whose colour or infectious condition made the capillary-resistance test impossible. The total number observed was 114; they were observed for eleven days after delivery; every third patient admitted to the labour ward was prescribed 100 mg. of ascorbic acid from the time of admission until the fourth day after delivery. Each woman was interrogated and both nipples were inspected on six days a week. The double process was found necessary because many women would only admit soreness when they saw an examination was going to be made.

Four grades of soreness were distinguished: soreness but no visible change, oedema of papillæ visible, separate petechiæ established, and petechiæ merged to form a transverse crescent. For correlation the severest stage reached was taken. How far the soreness developed depended partly on the time when treatment was started. This introduced a large experimental error which could not be avoided. The care of the breasts was controlled by other members of the medical staff, and the observer gave no guidance. The routine instruction on nursing given to the mothers was that the babies were to be nursed for 5 min. on each breast every 8 hours for the first 48 hours and after that for 10 min. at 4-hour intervals.

The capillary resistance was measured by application of a negative pressure of 200 mm. Hg to the skin of the forearm for 1 min., and the number of petechiæ were counted. The suction was applied with a flanged glass tube with a lumen diameter of 1 cm. In one patient only one reading was obtained, but in nearly all the others three or more were made on different days and the mean value was taken. No consistent difference was observed between the mean of the readings on successive days of the puerperium.

From the series of observations partial regression coefficients were calculated to test the possible relation of capillary resistance and vitamin-C supplement to the incidence of soreness. The weight of the baby and the parity of the mother were also taken into account (table II).

Findings

Of the 114 mothers, 71 (62.3%) had the erosive type of sore nipples and 5 (4.4%) the ulcerative; of these, 3 had both types, making the total incidence 64%.

No significant correlation was found between the incidence of soreness and capillary resistance, ascorbic-acid supplement, and parity. The weight of the baby, on the other hand, varied with soreness beyond the standards conventionally attributed to chance. It seems probable that the relation is due to greater suction being exerted by bigger babies; care was taken to exclude from the series mothers whose babies were unable to take the breast during the first days; all babies weighing less than 5 lb. and most under 6 lb. were therefore not in the series.

The absence of correlation between mean capillary resistance and incidence of soreness has several possible explanations. The test of resistance by counting petechiæ in the skin of the arm may not have been an adequate measure of the critical negative pressure at which the capillaries would leak, or it may not have been related to capillary resistance in nipples. Or the capillary resistance of the nipple may have been such as to allow formation of petechiæ in all or almost all the women if the baby exerted a strong and long suction, especially if venous obstruction were also present. This last explanation is thought to be true. A suction similar to that exerted by some babies, 100 mm. Hg for 2 min., produced petechiæ on the arms of 38 out of 59 mothers tested. Since petechiæ can also be produced by venous obstruction alone, it seems likely that venous obstruction caused by

TABLE II—RELATION OF VARIOUS FACTORS TO SORE NIPPLES

	Mean	Standard deviation	Partial regression coefficient	<i>t</i>
Soreness ..	1.614	1.530
Parity ..	2.447	2.102	- 0.089,703	- 0.960,419
Resistance	8.563	8.179	- 0.161,260	- 1.734,916
Weight ..	7.383	0.945	+ 0.193,502	+ 2.037,936
Vitamin C	0.315	0.467	+ 0.145,162	+ 1.515,423

Values of *t* greater than ± 1.96 may be considered significant: P = 0.05.

the baby's grasp and the milking action of the tongue might, in conjunction with strong suction, raise the tension beyond the leak point in nearly all women. It is interesting that petechiæ in the babies' tongues were only observed twice and then were at the margin; venous obstruction as well as suction presumably assisted in causing them here and may have done so on the nipple.

Judging by the rough-and-ready method of manual compression, obstruction is less likely if the constriction is made well on the areola rather than at the base of the nipple. This is a very practical point. To reduce the risk of the petechial type of soreness, one should ensure that the baby takes a hold of the nipple and as much of the areola as possible. This not only reduces venous obstruction but also helps to avoid the increase in negative pressure when the child's hold is insecure. Further, this position is the best for the milking action of the jaws and tongue, as Waller (1938) has emphasised. Freedom from venous obstruction may explain the fact that the mothers on whom the records of strong suction were made developed soreness and oedema but no immediate petechiæ; recording was possible only if the baby took a good hold of the areola.

The number of women given ascorbic-acid supplement was unfortunately small. Even so the absence of significant correlation between the receipt of supplement and soreness shows that it was here no specific remedy. The regression coefficients confirm the uselessness of the capillary-resistance test as a measure of ascorbic-acid level in women.

Contrary to the findings of other workers there was no relation between parity and soreness in the survey. This finding was unexpected, since the interval between delivery and the secretion of milk is longer on average in primiparæ than in multiparæ, the longer interval

increasing the risk of exposure to strong negative pressure. This would be offset if the inexperienced mother were less often successful in getting the child to take the breast in the first days. The greater incidence in primiparæ found by others may have been due to the recording of the rate of complaint rather than the incidence found on close examination. Multiparæ are rather apt to take soreness for granted.

In table I the day of first occurrence of petechiæ is set out as an indication of the time-incidence of the erosive lesion, this measure being taken as the most definite sign available. It has been argued that the lesions are caused by the strong suction exerted before the milk secretion is free, and yet in 6 cases petechiæ first developed, and in another 3 fresh ones appeared, after the fifth day. In 5 of these 9 there was no obvious explanation, but in 4 the baby had been withheld from the breast because of soreness, but the milk had not been withdrawn and secretion had become scanty.

ULCERATIVE OR FISSURE TYPE OF LESION

Of the women in the survey 5 had fissure of the nipple, and, extending the series, there were 10 cases in 176 women. The lesion (fig. 2) is an ulcer, a break in the epithelium in the depth of the lines of the skin, usually at the side of the nipple. It appears to be commoner among well-formed nipples. It was not seen before the fifth day. Since it does not resemble, have the same time-incidence as, or necessarily succeed the erosive lesion it is thought to be distinct. It is suggested that the ulcerative lesion is the result of mechanical trauma acting on sexual skin at a period when the body has experienced a sudden withdrawal of œstrogen. Allen (1927), Allen et al. (1937), Chamberlin et al. (1941), and Aberle (1934) have shown that the thickness of the nipple epithelium in monkeys and other mammals is increased by œstrogens. Hain (1940) and Wenner (1941) have shown that there is a great decrease in urinary œstrogens after delivery. In collaboration with Dr. A. W. Ham, who drew my attention to the œstrogen control of nipple epithelium, human placenta was given orally to spayed and immature rats. These experiments showed increase in nipple size and, the most conspicuous effect, the development of the invaginations of epithelium which appear to correspond to the furrows of the human skin. It is possible, then, that the human placenta during pregnancy causes elaboration of the furrows, and that these bear the brunt of the lesion with the decrease of œstrogens at delivery. As œstrogenic substances are widely distributed in nature (Butenandt and Jacobi 1933, Skarzynski 1933, Zondek and Bergmann 1938), and as they are active when applied locally in alcoholic solution (Jadassohn et al. 1937, Gardner and Chamberlin 1941), it seemed possible that the traditional use of tinct. benzoin. co. BP might be because of œstrogenic substances. Tests made by Mrs. M. O. Barrie Sweeten by three daily injections of 0.5 c.cm. into spayed rats showed, however, complete absence of œstrogenic effect.

PREVENTION OF SORE NIPPLES

The records of strong suction indicate that the time for which a baby is left on the breast before the milk comes in should be short, a fact which has long been recognised empirically. Soreness was almost entirely avoided when the baby was only allowed about 2 min. at a feeding-time until he was heard to be getting milk. The taking of the areola as well as the nipple has already been mentioned. On theoretical grounds, greasy ointments would be expected to be of little value. In the untreated breast the strong negative pressure is often relieved by air-leak between lip and areola, but this protective accident is less likely after the application of grease.

The question arises whether the child should be put to the breast at all until the milk is readily accessible. It appears that the efficient removal of milk regularly from the time of the first copious secretion is, in most women, the most important factor in establishing breast-feeding. Apart from psychological considerations so ably presented by Middlemore (1941), the purpose which directs the management in the first days is to enable the child to take milk well at that stage. Here conditioning plays a very large part, and the child which goes first to the breast at the time of great engorgement is often too inexperienced to be successful.

Summary

Two common types of sore nipple have been distinguished: the erosive or petechial and the ulcerative or fissure.

The position of the petechial lesion and the strong sustained suction found to be exerted by the baby are taken to indicate that suction unrelieved by swallowing is the main cause of the petechial type. Venous congestion and lower capillary resistance may contribute to their causation.

To prevent the petechial type the child should not be left on the breast for more than 2 min. when it is obtaining nothing. The child should take as much of the areola as possible into its mouth.

Ascorbic-acid supplement was without effect on soreness and capillary resistance.

It is suggested that fissure of the nipple is due to reduction of œstrogen level after delivery.

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