

urine, observed by Cohen *et al.* (1957). But the simple mechanical effect of tubular blockage is obviously not ruled out, and the solution of the problem must await further observation on similar cases, if possible with renal biopsy at the height of the hypercalcaemia.

The reason for the mental confusion and the E.E.G. changes is not clear. Mental changes, in the shape of confusion and hallucinations, have been occasionally described in hypercalcaemic states, but they are decidedly uncommon. Fitz and Hallman (1952) have given a particularly clear description of two cases of hyperparathyroidism in which mental abnormalities were present. Mental changes are common, however, in the combination of alkalosis and hypercalcaemia which may complicate the medical treatment of peptic ulcer (Wenger, Kirsner, and Palmer, 1957). Alkalosis alone causes no mental change (van Goidsenhoven, Gray, Price, and Sanderson, 1954). The present patient, besides hypercalcaemia, had a mild alkalosis, and it is possible that it is the combination of these two factors which is capable of causing mental abnormalities.

### Summary

A case of carcinoma of the breast with secondary deposits in bone, in which the condition was made worse by testosterone therapy, is described. Hypercalcaemia, mental confusion, and uraemia developed; the abnormalities of renal function were studied in some detail.

I am grateful to Sir Arthur Porritt for permission to publish this case, and to Mr. J. Fawcett for help with the  $Tm_{H_2O}$  determinations.

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The Research Defence Society, which was founded in 1908 to "make known the facts about experimental research involving the use of animals . . . and to defend research workers in the medical, veterinary and biological sciences, against attacks by anti-vivisectionists . . ." has published "Surgery of the Heart and Circulation" in its Conquest Pamphlet Series (No. 7, price 6d.).

## BREAST ABSCESS AS A THREAT TO SURGICAL UNITS IN A GENERAL HOSPITAL

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Breast abscess is most often a post-partum condition. If confinement takes place in a maternity hospital the organism responsible, *Staphylococcus aureus*, will most often be one of the antibiotic-resistant types prevalent there. Disease does not, however, usually supervene until some weeks after the patient's discharge from the unit. Thus the harvest of disease is reaped in hospitals far removed from that in which it was sown and by different medical hands. With the prime purpose of finding out which maternity hospitals were producing what kinds of staphylococci and reporting the findings back to their origin, a survey was made of the cases of breast abscess admitted for surgical treatment to the Western Infirmary, Glasgow, during 1958.

### Material Studied

From pus obtained at operation on 75 patients, 75 strains of *Staph. aureus* were isolated, duplicate specimens being excluded. The antibiotic sensitivity to penicillin, streptomycin, chloramphenicol, the tetracyclines, and erythromycin was tested with Evans's "sentests." Phage-typing (Williams and Rippon, 1952) was carried out on 70 of the 75 strains. From 46 of the 75 cases I learned as much as I could by direct questions to the patient—for example, whether puerperal or not, the hospital of confinement, and drug therapy before admission ("known history group"). In non-puerperal cases, only those abscesses arising *de novo* were included.

### Findings: Antibiotic Sensitivity Patterns

Crude data on antibiotic sensitivity of all 75 strains of staphylococci are given in Table I. Only 11 (15%) were sensitive to all antibiotics. Forty-six of the strains came from patients with a known history, and 8 (17%) of them were sensitive to all antibiotics. The similarities of sensitivity pattern between staphylococci from patients with known and those with unknown history permit the assumption that the 29 cases of unknown history belong to the same statistical population as the other 46.

The "known history" group has been divided into puerperal and non-puerperal cases. All the puerperal patients had been confined in maternity units. Of the eight non-puerperal strains, 6 (75%) were sensitive to all antibiotics and 2 (25%) were resistant to penicillin alone. Of the 38 puerperal strains, however, only 2 (5%) were completely sensitive and 22 (58%) were resistant to penicillin alone. The polyantibiotic-resistant nature of the latter strains is striking. The difference between the number of strains sensitive to penicillin in the two above groups of women is highly significant ( $t=4.46$ ;  $P<0.001$ ) and supports the idea of a fundamental difference in origin of their staphylococci.

### Phage Types

The phage type in 70 of the 75 strains, together with the sensitivity reaction, is given in Table II. A great

TABLE I.—Antibiotic Sensitivity of Strains of *Staph. aureus* from Breast Abscesses During 1958

	Sensitive		Resistant						Total Strains
	PSCTE	P	PS	PST	PT	PSCT	PSTE	PE	
Crude intake, 1958 .. ..	11 (15%)	39 (52%)	5 (7%)	8 (11%)	8 (11%)	1 (1%)	2 (3%)	1 (1%)	75
"  "  known history .. ..	8 (17%)	24 (52%)	3 (7%)	2 (4%)	5 (11%)	1 (2%)	2 (4%)	1 (2%)	46
Puerperal .. ..	2 (5%)	22 (58%)	3 (8%)	2 (5%)	5 (13%)	1 (3%)	2 (5%)	1 (3%)	38
Non-puerperal .. ..	6 (75%)	2 (25%)	0	0	0	0	0	0	8

Note that in the "Resistant" columns omission of a drug indicates sensitivity to it. P=Penicillin. S=Streptomycin. C=Chloramphenicol. T=Tetracycline. E=Erythromycin.

diversity of lytic pattern is seen, no doubt due to the number of different maternity units (at least 10) from which the staphylococcal strains were derived. However, the arresting feature is the occurrence of 27 (39%) type 80 and 52/52A/80 strains amongst the 44 of phage-group I. It will be seen that the majority of the polyantibiotic-resistant staphylococci belong to these two phage types. Of the 27 strains, 6 (22%) were sensitive to chloramphenicol and erythromycin only; 8 (30%) were sensitive to streptomycin, chloramphenicol,

TABLE II.—Phage Type and Sensitivity of Staphylococci Obtained from Breast Abscesses in 1958

	No. of Strains	Sensitive		Resistant				
		PSCTE	P	PS	PST	PT	PSTE	PE
Total group I	44	—	—	—	—	—	—	—
80	11	—	3	2	1	3	2	—
52/52A/80	16	—	4	2	5	5	—	—
Others	17	4	12	1	—	—	—	—
Total group II	3	2	1	—	—	—	—	—
III	7	1	6	—	—	—	—	—
Unclassified ..	4	1	3	—	—	—	—	—
Mixed groups	4	1	1	—	2	—	—	—
N.T. strains ..	8	2	5	—	—	—	—	1
Total ..	70	11	35	5	8	8	2	1

and erythromycin; 2 (7%) were sensitive only to chloramphenicol and none was resistant to this drug. These strains came from six (or more) widely separated maternity units and did not represent the result of a single epidemic in one. It may be noted that the liability to become resistant to a number of antibiotics, which is a well-known property of phage-group III staphylococci, was not demonstrated in the present series of seven strains.

The close association of types 80 and 52/52A/80 in the matter of antibiotic resistance does not seem to be a coincidence, for occasional variation appears to occur from one phage type to the other. For instance, two specimens were obtained from a single abscess in one patient at a seven-day interval; the first strain was type 52/52A/80, the second was type 80 alone; both strains had identical antibiograms. Cross-infection is unlikely, since, so far as is known, there was no other type-80 case in the ward at the time. Furthermore, in observations (unpublished) on nasal carriers of type 80, a change to type 52/52A/80 has sometimes been seen. Although this kind of evidence is open to more than one interpretation, it is felt that both these phage types should be regarded as having similar potential properties and that even if type 52/52A/80 is not itself as virulent as type 80, as the data of Williams (1959) suggest, the possibility of its changing to the more virulent type should be taken into account in epidemiological work.

#### Drug Therapy

In 25 cases the patient's history was thought to be reliable enough to determine therapy before hospital

admission. Of these 25, 16 (64%) had had penicillin for periods ranging from two days to two weeks. From one non-puerperal case the organism was sensitive to penicillin, but the patient did not think that the drug had any effect, nor did it obviate the need for surgery. This patient had a history of infection for three days before penicillin therapy. Many of the patients whose staphylococci were subsequently found to be resistant stated that temporary relief was occasioned by penicillin.

Five patients were treated with one of the tetracyclines and in four the organisms were sensitive. In two of the latter cases tetracycline was given for one or two days only. Again, despite sensitivity of the staphylococcus to this drug, in two cases it failed to cure although an adequate dosage was given.

Four patients had no antibiotics, but from 10 (40%) a history of stilboestrol medication was obtained. The rationale of the latter in two cases appeared to be cracked nipples (which may predispose to infection). The other eight women did not wish to continue breast-feeding.

#### Discussion

A number of important points arise from these simple facts. Firstly, the maternity hospital medical staffs are largely unaware of the size of the problem, for patients do not return to them for surgical treatment, nor is there any mechanism for notification of disease of this sort stemming from the maternity unit. There would appear, therefore, to be a strong case for statutory notification of post-partum infections occurring within, say, six to eight weeks of confinement.

Secondly, the problem may not seem grave to any one surgeon in a general hospital because he sees relatively few of the total hospital intake. If he discovers the maternity unit of origin the surgeon may not be impressed owing to the wide scatter of patients from such units. In the present series, confinements took place in 10 entirely separate units, and this figure might well have been greater. Therefore the collected cases represent an unknown proportion of the total cases occurring from any one maternity hospital. There are here five large and many smaller hospitals to which patients with breast abscesses could be admitted, and so it is quite possible that in this area several hundred breast abscesses come to surgery each year.

A third point concerns the intake of breast abscess cases into general hospital wards. Their potential danger to other patients and to the hospital staff cannot be overemphasized (see Duthie, 1957). Thus a case of breast abscess may be found lying in the bed adjacent to a patient who is to undergo thoracotomy. The surgeon in whom a type-80 strain becomes entrenched may become the subject of recurrent boils; he is then an undoubted danger to his patients (McDonald and Timbury,

1957) or a loss to his profession, a latter-day leper to his family, and a misery to himself. Especially with the polyantibiotic-resistant type-80 strains, we have both virulence and resistance to therapy, which Rountree and Beard (1958) postulate as a reason for their pandemic spread. The question of isolation of these cases has been raised, but isolation, in this and many other hospitals, is almost impossible and a grave burden to the nursing staff if it is to be effective.

During the past decade or two the fever or isolation hospitals have fallen increasingly into disuse. It would seem sensible to transfer cases of ex-maternity hospital breast abscess to "fever" units rather than admit them to general wards. It is here the established practice to rush a case of meningococcal or pneumococcal meningitis off to isolation hospital—yet these conditions are infectious to a very limited degree, the causative bacteria respond to chemotherapy, and the patient requires urgent treatment which is quite unnecessarily delayed. Our thinking and regulations must move with the times if they are not to be the mere appendages of medieval folklore.

The treatment of breast abscess with antibiotics must also be considered. In the cases reviewed 16 out of 25 had received penicillin. It may be argued that these were "failed cases" selected out of a large group which never came to surgery, that they were fortuitously due to resistant staphylococci, and that failure of therapy was thus inevitable. The non-puerperal patients, however, constitute a small control group from whom the staphylococci were predominantly penicillin-sensitive; and one of these was known to have been given penicillin without effect. There is a common complaint among surgeons—for example, Mills (1953), Stammers (1953), Donald (1956), and De Jode (1957)—that penicillin therapy results in a surgically difficult and deplorable condition which mimics lactational cancer—the "penicillinoma."

Furthermore, it is apparent from the present observations and from maternity hospital studies (Duncan and Walker, 1942; Colbeck, 1949; Ludlam, 1953; Barber and Burston, 1955; Rountree *et al.*, 1956; Hutchison and Bowman, 1957; Monro and Markham, 1958) that the chance of a post-partum breast abscess being due to a penicillin-sensitive organism is very small, in contradistinction to the non-puerperal abscess. If, therefore, it is decided to give an antibiotic, then penicillin should *not* be amongst the drugs of choice. Indeed, it may be doubted whether the use of any antibiotic does any good at all, since it fails to cure once a mass has formed (Sawyer and Walker, 1954; Monro and Markham, 1958), and this seemed to happen within 24 to 48 hours of the initial symptoms in many of the present cases. Is it not also, apart from consideration of the patient, a waste of drugs and of public money to give antibiotics in inadequate dosage or for the inadequate period of one or two days? When patients with breast abscesses are discharged from hospital the general practitioner should be given the sensitivity of the organism isolated. This practice is by no means as universal as it should be, but it is very important in the case of recurrent disease in the patient or her child.

Finally, it may be noted that in the present cases, as in those of Mills (1953) and De Jode (1957), the temporary symptomatic relief of the patient under penicillin therapy cannot be taken as necessarily indicating sensitivity of the responsible organism.

### Summary

Data are given on 75 cases of breast abscess admitted to a large general hospital during 1958. These data included sensitivity to antibiotics, phage type of staphylococci isolated, and the patient's history before admission.

The majority of strains came from women confined in hospital. Only 5% of these were fully sensitive to the antibiotics. Many of these strains were resistant to two or more antibiotics, and the phage types of the latter strains were predominantly types 80 and 52/52A/80. Conversely, in the non-puerperal group the majority of strains were fully sensitive and no strain was resistant to two or more antibiotics.

It is suggested that cases of puerperal breast abscess from maternity hospitals should be removed to an infectious disease hospital rather than be nursed in general surgical wards. A plea for notification of post-partum infections is made.

The apparent use of penicillin as the first line of defence in these cases is deprecated.

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QUEEN ELIZABETH, the Queen Mother, patron of the Queen's Institute of District Nursing, reviewed about 3,400 district nurses in the grounds of Buckingham Palace on July 1. The nurses had come from all parts of the United Kingdom and Eire, from Bermuda, Canada, Jamaica, Malta, South Africa, Tanganyika, and America to celebrate the centenary of their organization. The oldest nurse present was Miss AGNES DE FROISSARD, who is 92, and who attended a garden party and inspection by Queen Victoria at Windsor 63 years ago. Her Majesty presented a Gold Badge, the Institute's highest award, to Miss N. M. DIXON, deputy general superintendent of the Institute, "in recognition of her distinguished career as a Queen's Nurse for 32 years . . ." and in her address referred to the district nurse as a familiar and well-loved figure, saying, "In a time when so much of our lives seems to be ruled by the telephone and the printed form you restore the personal touch."