Summary

During the summer of 1950 an explosive outbreak of infective hepatitis took place in one of the smaller Oxford colleges. The total number of cases was 52—49 occurred within a period of 20 days and comprised the main wave of the epidemic; and 3, occurring later, constituted a minor secondary wave.

Evidence was obtained from which it was reasonable to deduce that this was a food-borne epidemic, the vehicle of infection having been custard that was served at a dinner and a lunch on consecutive specified dates. No certain source of contamination of the custard was ever discovered.

The attack rate among those exposed to infection at the two meals was about 1 in 3; and the incubation period ranged between 23 and 42 days. A histogram constructed from the number of cases occurring each day shows an approximately symmetrical distribution about a single peak, and corresponds to a mean incubation period of $30\frac{1}{2}$ days with a standard deviation of $3\frac{1}{2}$ days.

The epidemic showed no unusual clinical features. In most cases the pre-icteric stage consisted of a well-marked febrile episode. No cases of hepatitis, without obvious bile-staining of the skin or urine, were detected with certainty. The icteric stage varied greatly in severity and duration. Convalescence was frequently prolonged. There was a relapse rate of 4%.

My thanks are due to Dr. J. F. Warin, Medical Officer of Health, City of Oxford, for his co-operation in the epidemiological investigation; and to Mr. R. E. Waller, of the Institute of Social Medicine, University of Oxford, for his help with the statistics.

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"The precipitating cause of many malpractice actions is found in the unwise comments or criticism of physicians regarding treatment given to patients by other physicians. Commonly, it is criticism by a succeeding physician of the work of his predecessor on the case. Various authorities have estimated that 50 to 80% of all the suits for malpractice would be eliminated if such destructive criticism could be stopped. It is profitless to attempt to determine why physicians are so likely to criticize destructively and unethically, but the results of it are deplorable. Legitimate criticism can rest only on full knowledge of the facts as gathered from the physician who treated the patient, as well as from the patient."—Louis J. Regan, M.D., LL.B., *New Eng. J. Med.*, 1954, **250**, 463.

MONDOR'S DISEASE (SUBCUTANEOUS PHLEBITIS OF THE BREAST REGION)

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We should like to draw attention to an unusual condition characterized by the development of a subcutaneous cord in the breast region, usually along a line from the epigastrium to the axilla. The nature of this cord has given rise to speculation, but it appears to be of vascular origin, and we believe it to be a phlebitis and more particularly a periphlebitis.

The condition seems to be uncommon in this country, but, since it is self-limiting, medical advice may not be sought. Perhaps it is seen more in general practice than in hospital; some experienced general surgeons whom we have questioned have never met with it. It seems to be more common in France, where it is known as "maladie de Mondor," after Henri Mondor, who described cases in 1939, and who referred to it as "string phlebitis of the chest wall." Subsequent papers by Leger (1947), Kapitanoff, Touzard, Darbon, and Sicard (1950), and Kapitanoff and Küss (1950), all refer to it eponymously. But, in fact, the same condition was described in France in 1922 by Fiessinger and Mathieu, in America by Williams (1931) and Daniels (1932), and in this country by Robinson (1935). Adair (1950), in an article on cancer of the breast, stated that he had seen about 26 such cases over a period of 30 years, although most of them appear to have developed the lesion after a breast operation. He referred to it as a condition "which I have not found heretofore described" and which "has been confused with cancer." It is to Hughes (1952) that we owe the most comprehensive account of the disease in English. He gave details of five patients, on four of whom a biopsy was performed.

We describe five cases.

Case 1

An unmarried woman aged 50 attended hospital in July, 1951, having noticed, three weeks before, a tender cord below the breast. Her general health was good and she had had no recent illness, nor had there been a discharge from the nipple.

She was found to have a subcutaneous cord, approximately $\frac{1}{4}$ in. (6 mm.) in diameter, passing from the lower inner quadrant of the left breast to the left side of the epigastrium. Elevation of the breast made the cord stand out like a bowstring. In the breast, at the upper end of the cord there was indefinite induration, but this was not present when she was admitted a week later. The other breast and the regional lymphatic areas were normal. The breasts were well developed. We wondered whether this was an instance of lymphatic permeation from an occult carcinoma. A small portion of the cord and overlying skin were removed for examination.

Pathology.—In the subcutaneous fat there was a fibrous cord near the centre of which was a ring of smooth muscle. Within this ring was organizing tissue containing a few red cells. Outside the muscle there was connective tissue composed of collagen and fibroblasts with scattered elastic fibrils. In this tissue and around its edge were numerous capillaries. There was no suggestion of an elastic lamina. The cord was a blood vessel, probably a vein, containing thrombus, with marked fibrosis of the adventitia. Serial sections were cut and the cord was seen to divide. No malignant cells were seen. One near-by vessel also showed fibrosis of the adventitia.

When the patient was seen five months later no trace of the cord could be found.

Case 2

A married woman aged 54 was admitted to hospital in February, 1950. For two years the left nipple had been retracted. There had been pain under the breast for two weeks, but no discharge from the nipple.

The left nipple was indrawn and a little blood-stained fluid could be expressed. Passing down from the lower outer quadrant towards the costal margin was a cord attached to the skin and in the shape of an inverted Y. The breast tissue itself felt normal. The other breast was granular and there was a small mobile node in the left axilla. The cord was excised.

Pathology.—In two blocks taken from the specimen, one contained two small thick-walled blood vessels and the other a single larger vessel of the same type. The former were radicles of the larger vessel, which in serial sections was seen to divide. All lay in the subcutis and had narrow blood-containing lumina surrounded by a layer of plain muscle which was enveloped by a thick zone of cellular fibrous tissue containing scattered elastic fibres. No elastic lamina was present. Midway between the divisions of the affected vessel was a dilated lymphatic vessel, about which there were active inflammatory changes. In the subjacent breast tissue there was sclerosing adenosis.

The patient has been seen at frequent intervals, the last occasion being in January, 1953; no further lesion has developed.

Case 3

Mrs. E. K. Dawson, of Edinburgh University, very kindly sent sections from a similar case, and added that, so far as she could recall, it was the only example she had seen. We

are indebted to her and to Mr. T. McW. Millar for details of the patient and for permission to record the case. We should add that we are responsible for the following interpretation of the sections.

A married woman aged 53 was seen by Mr. Millar in June, 1951. In the right breast there was a centrally placed carcinoma, with *peau d'orange* over the lower half of the breast. A firm

FIG. 1.—Case 3. Showing a thin muscle band surrounded by a wide zone of fibrous tissue. The lumen is almost occluded by granulation tissue.

cord-like band, slightly tender, extended from the lower and outer angle of the breast and ran down the chest wall to the costal margin. On lifting the breast the band stood out, and it was obviously close to, and possibly adherent

to, the skin. The lymph nodes in the right axilla and supraclavicular fossa were enlarged. A simple mastectomy was performed and a portion of the cord removed for examination. The patient subsequently received radiotherapy.

Pathology (Fig. 1).—The subcutaneous fat contained a single thick-walled blood vessel of similar type to those described in the other cases. Its lumen was reduced to a narrow crescentic slit by cellular and vascular granulation tissue which lay within a thin band of plain muscle. The main thickness of the vessel wall was, as in the other cases, due to a wide enveloping zone of compact cellular fibrous tissue in which there were irregularly scattered elastic fibres and a few capillary blood vessels.

Two months after operation the cord-like structure was very much less obvious.

Case 4

An unmarried woman aged 51 attended hospital in December, 1951. For two years she had had recurrent trouble from a small area in the left breast, which would come up like a boil and then subside without discharging. She felt unwell when the lesion was inflamed.

Examination showed a reddened indurated area about the size of a shilling in the skin and subcutaneous tissues over the lower inner quadrant of the left breast. A small bead of pus could be expressed. A thickening cord, thought to be a thrombosed vein, was felt running downwards and medially to the epigastrium. There were enlarged nodes in the axilla.

Subsequently the inflammatory area was excised. Histologically this was reported by Dr. R. H. Cowdell to be a subcutaneous giant-cell granuloma, probably of sebaceous origin. There was no biopsy of the cord in this case.

By the following month, the cord had subsided and there had been no recurrence when she was seen in July, 1953.

Case 5

One of us, through the kindness of Mr. Reginald C. B. Ledlie, was able to see this patient, a married woman of 57, who was found to have a tender subcutaneous cord which passed downwards and somewhat medially just lateral to the left breast. Five weeks later the cord was barely palpable, but she had developed a similar lesion in the right upper forearm. Some years ago she had had, in the left upper arm, a tender cord which resolved spontaneously.

Clinical Features

The essential lesion develops in the region of the breast, more commonly in the female. It is a subcutaneous cord which is often at first painful and tender, and which usually runs along a part or the whole of a line passing between the anterior axillary fold and the epigastrium. Usually, as in all these cases, it is below the nipple. Occasionally the cord divides into two or even three, and a case has been described in which a plexiform pattern existed. Earlier authors have described cases in which these cords were found elsewhere on the chest-wall, sometimes extending far down on to the abdomen. This is not surprising if the condition is to be regarded as a phlebitis, for the subcutaneous veins of the region (Fig. 2) have the same distribution as the cords.

Sometimes there is a history of recent local trauma or muscular strain, or of some pre-existing febrile episode or malaise, with or without an obvious local focus of infection, such as was present in Case 4. Case 3 was associated with a carcinoma of the breast, but there may be no symptoms or signs other than the presence of the cord.

The cord itself may be confused with cancer, as mentioned by Adair, and as happened in Case 1. It is possible for such a cord to be associated with an early carcinoma of the breast and for the patient for this reason mistakenly to be placed in an advanced stage and denied radical treatment.

FIG. 2.—The subcutaneous veins of the anterior body wall. (Modified from C. W. Braune by Spalteholz, 1896.)

Pathology

The earlier authors (Fiessinger and Mathieu, 1922; Williams, 1931; Daniels, 1932; Robinson, 1935) attributed the lesion to a superficial thrombophlebitis, although in none of their cases was a histological examination made. Mondor (1939) described the histology in one case and concluded that the cord was either a lymphatic vessel or a vein, and favoured the former as no red blood cells were seen. Sicard (Kapitanoff, Touzard, Darbon, and Sicard, 1950) found a thrombosed vein without phlebitis. Hughes (1952), however, prefers the term "angiitis," and considers the essential lesion to be gross sclerosis around the vessel.

In the present series the three specimens examined all contained red blood cells, so that a lymphatic origin can be discounted, although it is of interest to note that in Case 2 a neighbouring lymphatic vessel was affected by the inflammatory change.

The distinction between an arteritis and a phlebitis is difficult to make, and Hughes prefers the wider term of "angiitis." However, we consider that from the thinness of the muscle band and the paucity of elastic fibres it is much more likely to be of venous origin; furthermore, analogy with similar lesions elsewhere and the location of the cords (Fig. 2) support the view that it is a phlebitis. A striking feature of the lesion is the wide zone of fibrosis around the vessel, a point stressed by Hughes.

Moschcowitz (1933) gave details of six patients who presented a similar picture of a subcutaneous cord in the breast region. He examined the cord in one case and found an epithelial structure surrounded by leucocytes. He attributed the lesion to inflammation of a persistent mammary line and termed the condition "vestigial mastitis." We agree with Hughes that photomicrographs of the condition are difficult to interpret. In none of the other reported cases has such an epithelial structure been found.

No wholly satisfactory name has been found for the condition; among those suggested have been "string

phlebitis" and "phlébite en cordon," both of which are concise and describe the clinical features: Hughes favours "sclerosing peri-angiitis of the lateral thoracic wall," a term which describes the pathological features, but which is clumsy and leaves doubt about the type of vessel affected. Although Mondor was not the first to describe the condition, he was the first to study it in detail, and, as we have an affection for the eponymous, we have used the short term "Mondor's disease."

Aetiology

In three of our cases there was no apparent cause. In Case 4 it is difficult not to incriminate the infected sebaceous cyst, which was situated at one end of the cord. In Case 3 the connexion between the thrombosed vein and the breast carcinoma is not clear. Robinson (1935) attributed the lesion to muscular strain: one of his patients had been digging in the garden and the other moving heavy furniture. He compared it with the axillary "phlébite par effort." (It should, however, be mentioned that it is often the exercising of the arm that stretches the thrombosed vein and draws attention to its presence.) The French authors have also noticed the traumatic factor, and a pre-existing influenza-like illness in some cases. Adair (1950), noting the condition in post-operative cases, believes that in the majority it is "unquestionably due to too tight an application of the adhesive over the dressings, blocking the return circulation of the superficial breast veins to the axillary and subclavian veins." It is similarly possible for the breast support worn to impede the venous flow, especially when the breasts are well developed. The reason for the marked periphlebitis is not easy to determine. It is difficult not to postulate an infective agent, as was in fact present in the region in Case 4, and as was suggested by the spread of the inflammation to a lymphatic in Case 2. Clearly, many factors may be concerned in the production of phlebitis here as elsewhere in the body, and none of these factors may be obvious in a given case.

Progress and Treatment.—The lesion itself is self-limiting, and the "idiopathic" variety will resolve without treatment in a few weeks. There is no record of any case proceeding to suppuration. Any associated condition will naturally require the appropriate treatment.

Summary

Attention is drawn to the apparently little-known condition of Mondor's disease (subcutaneous phlebitis of the breast region), five cases of which are recorded.

The clinical features are described and the pathology and aetiology of the malady discussed.

The disease is in itself benign and self-limiting, and may be commoner than is supposed.

We are grateful to Sir James Paterson Ross for his help and encouragement, and for permission to publish Case 1; to Mr. C. E. Shattock for Case 2; to Mr. A. Elliot Smith for Case 4; and to Mrs. Dawson for her help. We should also like to thank Dr. J. W. Whittick and Dr. R. J. R. Cureton for considerable help with the histology.

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