the epigastrium. It lay slightly obliquely across the abdomen, the left side being lower than the right, but the axis was horizontal rather than vertical. Below, it reached to the level of the umbilicus, but was not palpable in the loin or left renal angle. No notch was felt. Its lower edge was well defined, and it was agreed that the cyst could be moved slightly up and down but not from side to side. It was dull to percussion, silent on auscultation, and displaced the gut downwards. The liver was not enlarged and no other abnormal physical signs were detected. A plain skiagram showed the shadow of a large soft-tissue swelling, and a barium swallow demonstrated that the stomach was pushed away to the right and also compressed backwards. Blood count and urine examinations were normal.

A diagnosis of pseudo-pancreatic cyst was made, with a minority report in favour of splenic cyst as previously mentioned. It was considered that a renal origin for this swelling could be safely excluded.

Operation (Aug. 10, 1945; Air Vice-Marshal Stanford Cade).—It was decided to explore through a left paramedian incision, cutting across the rectus muscle to gain extra space if necessary. On opening the peritoneum a shining rounded tumour of a beautiful duck-egg blue was seen, and it was thought that the first diagnosis was correct. But further exploration showed this to be a large round area of fibrous cyst wall, the remainder of the tumour being typically plum-coloured splenic tissue, thinned out over the cyst and forming a margin of grossly normal spleen to the right and below and including the notch. The latter had not been palpable clinically because it lay beneath the right costal margin, so far did the spleen extend across the midline.

An incision was made through this thin fibrous area and about 3½ litres of fluid removed by sucker. This fluid was brownish, opalescent, and of the consistency of dish-water. The cyst collapsed and, with the division of a few adhesions and the pedicle, was easily removed through the original incision. The peritoneal cavity was mopped dry and the wound closed without drainage. Convalescence was uneventful. Six weeks later a barium meal showed a stomach of normal size, shape, and position. The patient was symptomless and had returned to duty.

The Specimen.—The cyst, together with the fluid removed, weighed approximately 13 lb. (5.85 kg.). The wall was leathery, and it was easily distended again for the purpose of fixation, though not to its original size. The photograph indicates the present size, the cir-

cumference being 24 in. (60 cm.) in its long and 21½ in. (54 cm.) in its shorter axis. The fluid contained red blood cells and polymorphs, some degenerate but mostly recognizable. Numerous cholesterol crystals were seen and culture was sterile. In places the wall was purely fibrous and translucent: in others a layer of spleen about 1 cm. thick was stretched over it. The interior of this single cavity showed massive trabeculation and a considerable quantity of necrotic fibrous tissue adherent to the walls.

On section the "sandwich" effect of a layer of spleen enclosed between a thick fibrous capsule on the outer side and a less thick fibrous lining on the inner side was well seen. The latter was not limited by any specialized epithelial or endothelial cells. A section through "normal" splenic tissue taken from the anterior margin of the cyst showed increased fibrosis but no other abnormal change.

Summary

A case of false splenic cyst of considerable size in a young woman is described.

The size of the cyst was out of all proportion to the symptoms.

A pre-operative diagnosis was made and the condition was successfully treated by splenectomy.

Skiagrams taken before operation showed compression and displacement of the stomach, which state of affairs had righted itself six weeks later.

The literature is reviewed and differential diagnosis considered.

The specimen has been accepted by the Royal College of Surgeons.

[NOTE.—Since going to press further sections have been cut and show that in places the cyst was lined by flattened endothelium. Patchy calcification was seen here and there. It is considered that these appearances are not inconsistent with the description of the cyst as "false."]

REFERENCES

- Arce, J. (1941). *Arch. Surg.*, **43**, 789.
 Denneen, E. V. (1942). *Ann. Surg.*, **116**, 103.
 Dew, Harold R. (1928). *Hydatid Disease*, Sydney.
 Elkeles, A., and James, J. I. P. (1943). *Brit. J. Radiol.*, **16**, 59.
 Fowler, R. H. (1940). *Int. Abstr. Surg.*, **70**, 213.
 Gallagher, P., and Mossberger, J. I. (1942). *Ann. Surg.*, **116**, 933.
 McClure, R. D., and Altemeier, W. A. (1942). *Ibid.*, **116**, 98.
 Paul, Milroy (1943). *Brit. J. Surg.*, **30**, 336.
 Roberson, F. (1940). *Ann. Surg.*, **111**, 848.
 Shawan, H. K. (1933). *Arch. Surg.*, **27**, 63.
 Snoke, P. O. (1943). *Amer. J. med. Sci.*, **206**, 726.
 Sweet, R. H. (1943). *New Engl. J. Med.*, **228**, 705.

SIGNIFICANCE OF THE PREMENSTRUAL FEVER IN PULMONARY TUBERCULOSIS

BY

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In recent years pulmonary tuberculosis has been diagnosed by radiography, to a greater extent than ever before, at a stage when no abnormal physical signs are present. Once the diagnosis is made, the next step is to determine whether the disease is active or not. In many cases admitted to sanatoria investigation shows only healed scars. Serial skiagrams, however, reveal definitely whether the lesion is active or not, but these changes take some time to declare themselves. In 1921 Sir James Kingston Fowler wrote that "the temperature is the guide to the activity of the disease." But many cases which on admission to sanatoria appear to be afebrile, in that their temperature never rises above 98.4° F., prove later to have a natural maximum temperature of only 98° F. or even 97.8° F., so that the early readings really represent a mild degree of pyrexia.

The Present Investigation

In this connexion there arises a question of great importance—namely, the significance of the premenstrual temperature in women. If the temperature increases, does the increase indicate tuberculous activity, or can it be disregarded in considering increases in patients' exercise? In an attempt to elucidate this problem 15 normal healthy young women were persuaded to take their temperature as controls, both morning and evening, for ten minutes in the mouth, as is done in recording the patients' temperatures in this sanatorium. This was done for at least one whole menstrual cycle. Van de Velde (1904, 1929) first showed that in the normal woman the body temperature is relatively low during the first and relatively high during the second half of the menstrual cycle. Barton and Wiesner (1945) have confirmed, by taking the waking temperature, that a relatively high temperature is characteristic of the premenstrual phase, and that it persists after conception. Such a diphasic change was found in 13 of the 15 normal women studied, and the temperature reached a steady maximum beginning a few days before menstruation was due. The reactions were of three types. First, a rise in both the morning and the evening temperatures; secondly, a diminution in the daily variation, usually caused by a rise in the morning temperature; and, thirdly, a combination of these two changes—i.e., a rise in temperature as well as a diminution in the daily variation. The changes fell with almost equal incidence into these three groups. The average duration of this premenstrual change in the temperature was 5 days. The highest temperature reached was in no case above 99° F., and this occurred in only one instance. In 75% of cases the premenstrual temperature showed no readings above 98.4° F.

Of 50 women of child-bearing age with pulmonary tuberculosis premenstrual changes occurred in 43. The reactions were of the same three types as occurred in the controls, and the incidence of each type was the same. The average duration of these changes, however, was 9 days instead of 5, and in 53% the temperature reached was 99° F. or over. As soon as the menstrual flow started the temperature reverted to its previous character.

In 6 of these patients the characteristic changes were absent when a temporary increase of tuberculous activity occurred. During this exacerbation, shown either by a higher temperature recording or by a bigger variation in the morning and evening temperatures, the premenstrual phase invariably disappeared. When the toxæmia decreased the phase reappeared. Table I

TABLE I.—Showing Effects of Variation of Toxaemia (indicated by Periods grouped a, b, c) on the Premenstrual Phase

Case	Daily Intermenstrual Temperature Variation (° F.)		Duration of Premenstrual Change in Days	Temperature Variation during Premenstruum (° F.)	
	a.m.	p.m.		a.m.	p.m.
I	(a) 98.4	100.0	Nil	98.4	100.0
	(b) 97.4	98.2	9	98.0	98.4
	(c) 97.6	98.8	12	98.4	100.8
II	(a) 98.0	99.8	Nil	98.0	99.8
	(b) 98.0	99.4	4	98.4	101.0
	(c) 98.0	99.0	Nil	98.0	99.0
III	(a) 98.0	98.6	10	98.4	99.0
	(b) 98.0	98.6	2	98.6	99.2
	(c) 98.0	98.4	3	98.8	101.0
IV	(a) 97.0	99.4	Nil	97.0	99.4
	(b) 97.8	99.0	Nil	97.8	99.0
	(c) 97.2	98.2	11	98.0	99.0
V	(a) 98.0	99.0	Nil	98.0	99.0
	(b) 97.4	98.4	7	98.0	98.8
	(c) 97.4	98.4			

records the daily variations in temperature and the premenstrual changes in these 6 cases, and shows how, at times when the temperature variations were greater owing to increased toxæmia, the premenstrual change disappeared. Martin (1943) has shown, by examining endometrial biopsies, that absence of a premenstrual variation in temperature is due to ovulation not having occurred. Tuberculosis is recognized as a cause of amenorrhoea, and it would appear that in the 6 tuberculous cases which did not show a premenstrual temperature change, once the toxæmia reached a certain level, there was a tendency to swamping of the endocrine changes, but without actual amenorrhoea ensuing.

Another of the 43 patients possessed charts, extending over a period of five years, showing an original premenstrual rise in temperature lasting for 14 days; now, when the degree of activity of the disease is much less, the rise lasts for only 5 days. In another patient there has been a gradual diminution in the duration of the premenstrual change and in the maximum temperature reached, until finally it has vanished completely.

Seven of the 50 patients showed no premenstrual change at any time. In one of these cases, with a temperature variation of 99 to 100.6° F., there was amenorrhoea. In the other 6 toxæmia was present but the temperature range was comparable to that of 5 patients who did show a reaction (Table II).

TABLE II.—Showing the Similarity in Temperature Range in Patients with, and without, a Premenstrual Variation

Case	Patients showing no Premenstrual Change		Patients with Similar Temperature Swing but showing Premenstrual Change				
	Daily Temperature Swing (° F.)		Daily Temperature Swing (° F.)		Duration of Change (days)	Premenstrual Temperature (° F.)	
	a.m.	p.m.	a.m.	p.m.		a.m.	p.m.
1	97.8	99.2	98.0	99.0	5	98.4	99.2
2	98.0	99.2	98.4	99.2	8	99.0	99.6
3	97.0	99.0	98.0	99.0	12	98.4	99.4
4	98.0	99.0	99.0	100.0	5	98.4	101.0
5	98.0	99.0	98.2	99.2	8	99.2	100.2

One woman had had amenorrhoea for five years. In spite of this a regular change in her temperature occurred every 28 days, lasting for 10 days. After spinal analgesia for an

appendicectomy she had one period lasting 2 days. This occurred on the day that her temperature was due to come down, and did so, just as it does in those women having a premenstrual change. A dilatation and curettage had been done four years previously, but unfortunately no microscopy was carried out at that time. Sharman (1944) investigated 883 cases of primary sterility and found that 5.3% had tuberculous endometritis; so it appears that subclinical tuberculosis of the female genital tract is a not uncommon cause of sterility. It would seem that in this case the endocrine changes associated with menstruation occurred, but it is surmised that the endometrium could not react to the hormonal stimulation.

The elucidation of the premenstrual change is not easy. Occasionally it is accompanied by some increase in the number of rales and crepitations which can be heard in the chest, and this would point to there being an increase in the activity of the disease. In 4 patients the day preceding menstruation was marked by a sudden extreme rise in temperature, the evening maximum being 1.6 to 2.6° higher than usual. This reaction bears a strong resemblance to a tuberculin reaction, and it would appear that in these patients there had been a sudden flooding of the blood stream with tubercle toxin.

The symptoms of which many women complain during the few days preceding menstruation are very similar to those of over-activity of the thyroid gland—e.g., irritability, sweating, tremor, and nausea. It appeared, therefore, as if the thyroid might be in some way implicated in this change. In an attempt to settle this point thiouracil was administered in 6 cases chosen from the above series as showing a reasonably constant monthly cycle. Thiouracil inhibits over-activity of the thyroid by preventing conversion of available iodine into the thyroid gland hormone (Franklin *et al.*, 1944; Rawson *et al.*, 1944). Thiouracil had been previously tried in the treatment of tuberculosis and found to have no effect. This was not unexpected, since estimations of basal metabolism in tuberculous patients generally show a normal standard figure independent of activity, extent, or type of lesion (Kayne *et al.*, 1939), but it was thought that the reduction in cardiac output brought about by thiouracil might be beneficial. The drug was given in a dosage of 0.6 g. daily, starting on the first day of temperature change. No noticeable change was produced, but it is known that in thyrotoxicosis there is a lag period before the drug exerts its action. When the administration of the drug was started two days before the expected premenstrual rise in temperature, the temperature change was eliminated and the usual concomitant symptoms were also absent. From this it appears that the premenstrual temperature change is brought about in the final stage by over-activity of the thyroid gland.

Conclusions

In the majority of women there is some modification of the temperature chart during the days immediately preceding menstruation. This change occurs in pulmonary tuberculosis in early, as well as in advanced, cases. In patients with pulmonary tuberculosis it tends to be more pronounced and of longer duration than in normal subjects. This premenstrual phase gradually diminishes in conjunction with decreasing tuberculous activity. As an indication of activity it can be regarded in the same light as a persistently raised erythrocyte sedimentation rate, and may be ignored in deciding increases of exercise. The change is probably brought about through the agency of the thyroid gland, and can be abolished by the use of thiouracil.

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REFERENCES

- Barton, M., and Wiesner, B. P. (1945). *Lancet*, 2, 663.
 Fowler, J. K. (1921). *Pulmonary Tuberculosis*, p. 186. London.
 Franklin, A. L., Lerner, S. R., and Chaikoff, I. L. (1944). *Endocrinology*, 34, 265.
 Kayne, G. G., Pagel, W., and O'Shaughnessy, L. (1939). *Pulmonary Tuberculosis*, London.
 Rawson, R. W., *et al.* (1944). *J. clin. Endocrin.*, 4, 1.
 Martin, P. L. (1943). *Amer. J. Obstet. Gynec.*, 46, 53.
 Sharman, A. (1944). *J. Obstet. Gynaec. Brit. Emp.*, 51, 85.
 Van de Velde, T. H. (1904). *Ueber den Zusammenhang zwischen Ovarialfunktion, Haarleem.*
 — (1929). *Ideal Marriage*, London.