the haemorrhage had a pelvic origin, the shock was less profound, and the patient recovered.

• My case naturally falls into the same category as the first five cases. The site of the haemorrhage is of interest because the tear in the peritoneum of the floor of the lesser sac lay directly over the course of the splenic artery, just distal to the bifurcation of the coeliac artery. The actual origin of the haemorrhage could not be determined because of the friability of the various tissues of the area, but, judging from the speed with which the patient bled to death, the vessel concerned must certainly have been of fairly large calibre, and the pressure behind the blood must have been sufficient to rupture the peritoneal floor of the lesser sac. This catastrophe's occurrence in close proximity to the coeliac plexus no doubt further aggravated the shock. The retroperitoneal haemorrhage which caused the death of the patient occurred on the fourth day after caesarean section for accidental haemorrhage, and it would be of interest to correlate, if possible, the condition of retroperitoneal haemorrhage with toxæmia of pregnancy. One of the outstanding features of the pathology of eclampsia is capillary thrombosis followed by extravasation of red blood cells, and I wonder whether or not a similar occurrence might happen in vessels of larger calibre in isolated instances. Certainly in two of the previously reported cases a condition of toxæmia of pregnancy was present.

Summary

A case of eclampsia complicated by an accidental haemorrhage is described.

Conservative management of the haemorrhage had to be abandoned in favour of classical caesarean section owing to the fact that the uterus remained obstinately tense, and a sudden increase in the retroplacental haemorrhage made immediate operative intervention imperative.

The patient made a smooth recovery until the fourth post-operative day, when she developed a massive retroperitoneal haemorrhage which seemed to originate in the region of the junction of the body and neck of the pancreas. The haemorrhage burst through the peritoneum of the lesser sac, and from 4 to 5 pints (2.27 to 2.84 litres) of blood passed through the aditus of the lesser sac into the general peritoneal cavity, causing death from internal haemorrhage.

A review of the literature to date is given, and an attempt is made to correlate a possible connexion between the toxæmias of pregnancy and retroperitoneal haemorrhage occurring during pregnancy.

My thanks are due to Dr. J. Seed, Medical Superintendent, Driffield County Hospital, East Yorks, for permission to publish the case, and to Dr. Barnard, County Pathologist to the East Riding of Yorkshire, who carried out the pathological investigations.

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• The Foreign Office announces the publication and distribution of the first volumes of the *Fiat Review of German Science*, compiled by German experts under the direction of the British, American, and French Field Intelligence Agencies (Technical). The review is written in German and covers fundamental research in pure science during the years 1939-46. The first printing is a restricted edition for official distribution between the three Allies and Unesco. The British share of about 250 sets will be issued to Governmental and other bodies within the Commonwealth, to universities and medical schools, and to the libraries of certain learned and professional societies. It is hoped that the edition will be completed within the next six months.

CLINICAL VALUE OF SOME METHODS OF ESTIMATING ERYTHROCYTE SEDIMENTATION RATE

BY

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Many papers have been published on the rate of sedimentation of red corpuscles since Westergren (1921) recorded his original observations on the significance of an increased rate of fall in tuberculous male patients. Several techniques have been devised, including the use of heparin (Rourke and Ernstene, 1930) and oxalate (Wintrobe and Landsberg, 1935) as anticoagulants. Variations in the bore and length of the measuring tube have been advised (Cutler, 1926; Wintrobe, 1936), and a micromethod is used in some sanatoria (King Edward VII Sanatorium Annual Report, 1933-4). Investigation has been made into the physical and chemical factors involved, and varying importance ascribed to the size of the tube used (Ham and Curtis, 1938), to variations in temperature during recordings (Weingarten, 1945), to the presence of anaemia (Wintrobe, 1936), and to deficiency of plasma fibrinogen (Ham and Curtis, 1938). Various factors may be allowed for in "correction charts," of which the most popular allow for degrees of anaemia evidenced by variations in the volume of packed red corpuscles (Wintrobe, 1936; Whitby and Hynes, 1938).

The sedimentation rate is now generally accepted as a useful index of activity in tuberculosis and rheumatism, but it was felt that a comparison between methods from a clinical standpoint might be interesting. This paper describes the findings of such a comparison—between the clinical course of some tuberculous patients and the trend of their sedimentation rates as estimated by the methods of Westergren (1921), Wintrobe (1936), and Whitby and Hynes (1938), the last two methods involving corrections for anaemia.

Methods of Investigation

Sedimentation rates were estimated on all patients admitted to the tuberculosis wards of the London Hospital Annexe. Four ml. of blood was aspirated from an ante-cubital vein—2 ml. being mixed with 0.5 ml. of 3.8% sodium citrate solution and the remaining 2 ml. placed in a test-tube in which a drop of a mixture of ammonium citrate (6%) and sodium oxalate (4%) had been dried. The citrated blood was drawn up into 200-mm. Westergren tubes and the oxalated blood placed in Wintrobe tubes of 100 mm. length. The length of clear plasma in the upper part of the tubes was read at the end of one hour, and in the case of the Wintrobe tubes the volume of packed corpuscles was read after 24 hours. The investigation was carried out at laboratory temperatures varying from about 12 to 25° C. Subsequent estimations were made at intervals ranging from two to six weeks.

At the end of a year it was possible to collect the records of 61 patients who had remained continuously under observation for periods ranging from six weeks to six months (average 3.3 months) and who had had sedimentation rates estimated by both methods on from four to ten separate occasions (average 5.6).

To the readings made using 100-mm. tubes were applied two corrections: (1) Wintrobe's correction for anaemia, and (2) Whitby and Hynes's correction, which includes a classification of the rates observed into normal and doubtfully, slightly, moderately, or severely raised.

Clinical Material.—No special selection of cases was attempted. They had all been referred for hospital observa-

tion or treatment by tuberculosis officers; and sanatorium vacancies, home conditions, and suitability for active treatment determined their length of stay. The patients were all females (and therefore more liable to physiological variation in sedimentation rates), with age ranges from 14 to 46 years, two-thirds being between 18 and 30. Tubercle bacilli were demonstrated in the sputum of 53 patients, in the gastric juice of another, and, in the remaining 7, x-ray changes in films taken before admission showed the presence of an active lesion. The disease was bilateral in 34 cases and unilateral in 27.

Results

The range of sedimentation rates on admission and discharge is indicated in Table I. By the Westergren technique

TABLE I.—Distribution of Patients in Various Ranges of Sedimentation Rate

Westergren			Wintrobe			Whitby and Hynes		
Range	On Admission	On Discharge	Range	On Admission	On Discharge	Range	On Admission	On Discharge
(mm.)			(mm.)			(mm.)		
0-5	1	5	0-5	5	4	0-9 (normal)	5	9
6-15	7	16	6-10	5	4	10-13 (doubtful inc.)	13	14
			11-20	11	17	14-20 (slight inc.)	15	13
16-45	44	31	21-30	21	18	21-29 (moderate inc.)	13	11
46	9	9	Above 30	19	18	Above 30 (severe inc.)	15	14

53 patients (87%) had rates above 15 mm., 7 ranged from 6 to 15 mm. per hour, and only 1 was healthily low. The Wintrobe correction showed 40 cases (65.5%) with abnormal rates, 16 with rates suggestive of possible activity of the disease, and 5 with low rates. The correction devised by Whitby and Hynes gave a distribution of 43 cases (70%) with raised, 13 with doubtfully raised, and 5 with normal rates.

The decision of whether after a period of treatment the disease in a tuberculous patient is increasingly active, is decreasing in activity though still active, or is to be regarded as quiescent is important from the point of view of prognosis, disposal, and commencement of graduated exercise. The sedimentation rate is often adduced as evidence towards the formulation of such opinions. Table II shows the

TABLE II.—Condition of Patients on Discharge, Classified

	Clinical	Westergren	Wintrobe	Whitby and Hynes
Active disease {				
Deterioration ..	17	24	17	14
No change ..	8	3	9	14
Improvement ..	26	13	13	10
Improvement {				
Doubtful activity ..	5	16	12	14
Quiescent ..	5	4	5	3
Inactive disease ..	0	1	5	6

numbers of patients in categories of clinical interest, their placing being based on clinical and radiological considerations, and also the trends in serial sedimentation rates during the period of observation. The Westergren figures show trends of deterioration not found clinically or by either of the other two methods, but the total numbers of patients in the "deterioration" and "no change" categories are approximately the same in all groups. Similar totals are found in the "improvement" category, but their distribution varies, for clinical opinion may regard cases as

still "active" and unfit for exercise even when the sedimentation rate has fallen.

Finally, the trend of the sedimentation rate in individual cases was noted and compared with the patient's clinical course. As this part of the investigation was particularly liable to personal error, inquiries were made of the sanatoria to which 10 patients were sent, to find out their subsequent progress. Reports kindly furnished by the medical superintendents concerned seemed to confirm the validity of our estimates of clinical progress.

Table III gives observations on individual cases, and Table IV summarizes the findings of the comprehensive comparison. It will be seen that the trends of the Westergren estimations appear to conform to the clinical course in 77% of cases, against 59% in the Whitby and Hynes and 54% in the Wintrobe series. The Westergren method is in agreement with the clinical in 15 cases where the other two rates were inconsistent or contradictory, while in five cases

TABLE III.—Rates on Admission and Discharge

Case No.	Clinical Trend	Westergren		Wintrobe		Whitby and Hynes		Conformity with Clinical Course
		Adm.	Dis.	Adm.	Dis.	Adm.	Dis.	
1	Deterioration	60	40	41	30	30	21	0
2	No change	36	24	26	13	14	10	We
3	Deterioration	37	52	32	41	21	30	We and Wh
4	"	46	49	22	42	21	30	Wi and Wh
5	Improvement	45	29	16	23	10	14	=
6	"	27	14	22	15	21	10	We
7	Deterioration	8	13	6	15	1	10	=
8	"	28	40	15	24	10	14	=
9	Improvement	17	10	19	6	14	9	=
10	Deterioration	41	54	14	28	10	30	=
11	No change	32	33	33	34	21	21	=
12	Improvement	23	31	10	22	14	14	=
13	"	42	20	24	12	14	10	=
14	Deterioration	31	38	22	32	14	21	=
15	Improvement	25	32	23	14	14	10	0
16	"	45	3	36	3	30	3	=
17	No change	40	50	45	49	30	30	Wi and Wh
18	"	20	13	32	19	21	14	=
19	Deterioration	26	32	15	12	10	10	We
20	Improvement	25	13	30	8	30	7	=
21	Deterioration	20	38	33	45	21	30	=
22	"	73	74	43	32	30	21	We
23	Improvement	30	22	46	30	30	21	=
24	"	33	12	25	15	14	10	=
25	"	49	20	24	30	14	21	We
26	"	7	4	1	4	5	4	=
27	"	65	23	38	38	30	33	We
28	"	15	5	5	12	10	9	We and Wh
29	No change	28	21	32	21	21	14	=
30	Improvement	30	15	21	12	14	10	=
31	No change	5	10	1	1	1	1	=
32	Improvement	30	25	15	26	14	14	0
33	"	16	12	18	14	10	10	=
34	"	20	29	22	15	14	10	Wh
35	"	68	31	26	26	21	21	We
36	"	44	26	45	22	30	14	We and Wh
37	"	76	36	36	34	30	30	We
38	Deterioration	32	13	21	12	14	10	0
39	No change	32	48	41	32	30	21	0
40	Deterioration	70	100	24	55	14	30	=
41	Improvement	11	3	8	0	10	2	=
42	"	55	12	44	24	30	14	=
43	Deterioration	34	45	39	43	30	30	We and Wh
44	"	22	41	31	33	21	21	We
45	Improvement	35	5	30	17	21	14	We
46	No change	20	32	21	38	10	30	0
47	Improvement	14	10	2	11	8	8	We and Wh
48	"	11	60	14	41	10	30	0
49	"	47	41	26	26	21	21	=
50	No change	17	13	12	6	10	7	=
51	Improvement	18	40	6	40	8	30	=
52	"	28	28	28	42	21	30	We
53	"	37	20	32	24	30	14	=
54	"	32	26	14	14	10	10	We
55	"	50	15	38	23	30	14	We
56	Deterioration	19	52	22	22	14	14	We
57	Improvement	44	16	40	8	30	10	We
58	No change	32	23	19	26	14	14	Wi and Wh
59	Deterioration	21	12	25	26	21	21	Wi and Wh
60	Improvement	12	34	17	36	10	30	0
61	"	32	10	4	17	10	10	We

We = Westergren. Wi = Wintrobe. Wh = Whitby and Hynes.

TABLE IV.—Agreement between Sedimentation Trends and Clinical Course

	Westergren	Wintrobe	Whitby and Hynes	Agreement with Clinical Course
	..	..	..	47 .. (77%)
	..	..	..	33 .. (54%)
	..	..	..	36 .. (59%)
No agreement with the clinical course	8 cases (13%)			by any method in

corrected by the Whitby and Hynes method and in four cases corrected by the Wintrobe method readings were obtained agreeing better with the clinical course than those obtained by the Westergren technique.

Discussion

It has already been noted by Whitby and Hynes (1938) that the Wintrobe correction for sedimentation rates contains certain fallacies—i.e., that above certain figures the corrected rate is higher than the volume of packed cells, and that below certain volumes of packed cells sedimentation rates cannot be abnormal. Their own correction curve, like that of Wintrobe, is derived from estimations of rates in certain abnormal cases in which the blood was subsequently manipulated to conform to normal haematocrit readings, the final figures being controlled by a group of rates observed in an equivalent number of healthy students. It appears, however, from this investigation that these corrections rob the estimation of the sedimentation rate of its value. The corrected figures in the Wintrobe series often produced a series of readings which was so variable that in nearly half the cases the figures did not appear to conform to any pattern at all. The correction devised by Whitby and Hynes so levelled out the unevenness commonly found in sedimentation readings, and the estimations included so many readings in the "doubtfully" or "slightly" raised categories, that again no pattern suggesting improvement or deterioration could be detected.

Beaumont and Maycock (1935) made a plea for the increased employment of the Westergren method as being superior to two other methods then in use, and stressed the point that useful information could be obtained only by adopting the same method in serial readings. Bailey (1941) compared the Wintrobe method with the Westergren in a series of 131 cases, and reached the conclusion that the corrected rate was of little use in classifying the patient's clinical status and was misleading in a considerable proportion of cases. Davis (1946) in a general review of the clinical use of sedimentation-rate estimations advocates the Westergren technique. My findings support the opinion that the Westergren method, as generally used, gives figures for the sedimentation rate that agree better with the course of the patient's illness, estimated by prolonged clinical observation, than do the present methods that employ corrections.

Summary

A study of the erythrocyte sedimentation rates of 61 female patients suffering from pulmonary tuberculosis is reported. A comparison was made between the clinical course of the illness on the one hand and the sedimentation rates as estimated by the methods of Westergren, Wintrobe, and Whitby and Hynes on the other. The Westergren method appeared to be the most useful both in estimating the degree of activity of the disease and in indicating the direction of its progress.

My thanks are due to Dr. R. R. Bomford, Dr. K. M. A. Perry, and Dr. H. B. May for their encouragement and advice in the preparation of this article; to the medical superintendents of Pine-wood, Grove Park, and the Grosvenor Sanatoria, and of Eversfield Hospital and the Royal National Hospital, Ventnor, for their reports on cases; and to Messrs. Telfer and Sait and Miss Carey for invaluable technical assistance.

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ERYTHROCYTE SEDIMENTATION RATE THE EFFECT OF ALCOHOL AS CONTAMINANT

BY

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Schött (1928) described the effect of alcohol on the erythrocyte sedimentation rate (E.S.R.). Very small additions of alcohol in the form of drops of different dilutions in ether usually caused an increase in the one-hour sedimentation reading, while larger additions reversed the tendency and resulted finally in very reduced values. The alcohol present in venepuncture needles which had been stored in spirit was sufficient to cause large discrepancies in the results of E.S.R. determinations.

Famulari and Colacresi (1935) studied the effect of intragastrically administered alcohol on the E.S.R. They found a great diminution in the E.S.R. following the administration, but they did not examine the effects obtained by the addition to blood *in vitro* of similar proportions of alcohol to those obtained *in vivo*.

Schött's observations seem to have escaped general notice, and the purpose of this note is to draw attention to the phenomenon and its technical implications.

The Test

Sedimentation-rate determinations were performed on blood from patients with and without the addition of various proportions of industrial methylated spirit *B.P.*, hereinafter referred to as "spirit." The blood was heparinized, 5 to 6 ml. of blood being added to 0.05 ml. of heparin solution (50 international units). One-millilitre samples of the heparinized blood were taken into test-tubes and each was mixed with 0.25 ml. of 3.8% sodium citrate solution. To the mixtures were then added 0.01, 0.02, 0.03, and 0.04 ml. of spirit respectively, a control tube having no spirit added. It will be noted that this procedure does not exactly reproduce the conditions of practice, where the blood would be contaminated with spirit before the citration. One-hour sedimentation values of the mixtures were determined in Westergren pipettes, care being taken to obtain thorough mixing and to ensure that the pipettes were clean, vertical, and not exposed to direct sunlight or draughts. The determinations for each patient were started together, and always within three hours of taking the blood.

A progressive diminution in sedimentation, preceded in some cases by a slight increase, was observed in the presence of increasing amounts of spirit. The results in 30 cases are shown in the Table. With the exception of Cases 29 and 30 (investigated at 19° and 17° C. respectively), corrections of the E.S.R. for the temperatures of the determinations have been made from an empirical chart (*Laboratory Digest*, January, 1946). Slight haemolysis was observed with Cases 4, 5, and 10 in the mixtures containing the higher concentrations of spirit.

Whether the depressant effect of spirit can constitute a considerable source of unreliability in E.S.R. determinations depends on the possible degree of contamination of blood samples. The "residual contents" of Record-type syringes of various capacities, complete with needles, were estimated as follows, detaching the needles only during expulsion of liquids.

Aqueous dye solution (T 1824) was drawn into the syringe to capacity and expelled. After sucking in and expelling air one