locally, but wherever there is the slightest possibility of carcinoma, as suggested by the symptoms, by the test meal, or by the *x* rays, a partial gastrectomy has been performed. With certain large adherent ulcers not only is the danger of carcinoma greater, but a partial gastrectomy becomes the easier operation, and thus has been chosen as throwing a less severe strain upon a patient often enfeebled by prolonged and severe symptoms. The end-results of wedge resection with gastro-enterostomy and temporary occlusion of the pylorus is seen in Table II, A.

Of the total of 67 cases 51 were males and 16 females, a point of interest, as many observers have found this type of ulcer to be more common in females.

Mortality.—Two of the patients died as the direct result of the operation, giving a mortality of 2.9 per cent.

Gastro-jejunal Ulcer.—In only one unusual case did a gastro-jejunal ulcer develop. This patient, a male, had a high pre-operative acidity of 0.23 per cent., but there was no concomitant ulceration of the pylorus or duodenum. There was also one recurrence at the site of excision, a complication for which no explanation could be found. No silk suture was used, and there had been no post-operative haematemesis.

Carcinoma.—In no case in this series did carcinoma follow the operation, and therefore the statement that a wedge resection is unsatisfactory, in that an insufficient amount is removed to prevent the possibility of the after-development of carcinoma, is unsubstantiated.

Satisfactory Results.—Fifty-nine of the patients have remained well, being able to eat any food and to live a normal life. They form 88 per cent. of the total, or, if we exclude entirely from the series 3 cases that have not been traced, there are 92.18 per cent. of cures.

These figures and those for pyloric and duodenal ulcer compare very favourably with the results of medical treatment as published by Dr. Smith. Included with the 59 cases are 3 of the 4 deaths which occurred late after

operation, the death in these cases being due to an entirely separate lesion and the patients being quite free from all gastric symptoms at the time of their demise. It will be seen from Table II, B, that only one case in this series was treated by cautery excision, and the results are not satisfactory, the patient still suffering from some gastric symptoms. The results obtained by partial gastrectomy or gastro-enterostomy alone are shown in Table II, C and D.

HOURL-GLASS STOMACH.

The number of cases of hour-glass stomach treated in the short period 1920-24 are too small to lead in themselves to any accurate conclusion. It is generally realized, however, that all the older methods which aim simply at overcoming the deformity are unsatisfactory, as they leave untouched the active ulcer on the lesser curve. Treatment must always be aimed at curing this active ulcer, which is associated with the scarring and often with a second stenosing ulcer at the pylorus. Just as with a simple lesser curve ulcer, it has been my practice, wherever possible, to treat these cases by wedge resection, the wedge being made with a very wide base, so that when the opening is sutured the constriction is overcome. This is combined with gastro-enterostomy and temporary pyloric occlusion. In certain cases, however, where the isthmus is very narrow, this procedure is not possible, and a partial gastrectomy is then performed. The results of these procedures in the small groups falling into the time period are seen in Table III, there being 80 per cent. of satisfactory results.

REFERENCE.

¹ A Statistical Review of Gastric and Duodenal Ulcer, *British Medical Journal*, August 18th, 1928, p. 293.

GASTRIC AND DUODENAL ULCER:

AN ANALYSIS OF 200 CASES TREATED BY OPERATION.

BY

L. R. BROSTER, O.B.E., D.M., M.Ch.,
F.R.C.S.,

ASSISTANT SURGEON, CHARING CROSS HOSPITAL; SURGEON TO THE
QUEEN'S HOSPITAL FOR CHILDREN.

AROUND this subject a formidable literature is accumulating. Fortunately the acrimonious controversy which hitherto has raged is shifting from the barren grounds of invidious comparisons between surgical and medical treatment to a more stable statement of facts from both sides. Opinion is becoming more crystallized, and there is now a general agreement that immediate surgery, except for the complications of perforation and possibly haemorrhage, has no place in its treatment, and should only be resorted to after medical treatment has been given a fair but not too lasting trial. Surgery has an undisputed application to all those cases of mechanical defect from the contraction of ulcers, such as duodenal and pyloric stenosis and hour-glass deformity, and also to those cases of deep ulceration involving adherence or penetration of surrounding structures, and suspected early malignancy. In no less equivocal way should medical treatment be devoted to the cure of ulcer in its early stages. This unanimity of opinion, however, does not apply to a large number of cases, which fall into the following groups: (1) cases which have recurred after medical treatment; (2) cases in which there has been recurrent or dangerous haemorrhage after medical treatment. Finally, there is a group of cases in which treatment depends upon the habits and economic or social position of the patient. Some of these eschew operative intervention, others, who will not co-operate or find medical treatment irksome, demand it.

It would seem that any controversy on the subject should be concentrated on those unknown factors of this disease which inflict much suffering on, and severely handicap, a certain section of the community. So far there is a lack of finality on its etiology. Surgery has been foremost in placing our knowledge on its present foundations, chiefly because its results can be checked and analysed, and radio-

logy has earned no mean niche in the elucidation of the problem.

This paper represents an analysis of a series of some 200 cases, which have been treated in the ordinary routine way in the surgical wards of the Charing Cross Hospital. They include the results of a previous series published in this *Journal* in 1926 (vol. i, p. 936), and belong mainly to Mr. H. S. Clogg and myself. Statistics frequently have a doubtful value, especially if they have a definite case to establish, and vary in the manner of their compilation. They must, however, necessarily serve as the basis of a standard of comparison, and their intrinsic value belongs to the individual, in that they enable him to record his progress. Problems which present themselves in the daily routine of hospital work are apt to pass unnoticed, and can only be rectified and adjusted in their true perspective by the analysis of numerous cases. Unless a surgeon is content to review his work thus he is apt to sacrifice his sense of wider judgement.

There has been no selection of cases in this series; the patients have been operated upon and treated according to the facilities provided by a general hospital. The results do not quite reach the high standards which have been published by some authorities, but they do represent a fair estimate of hospital routine work. There is no doubt that they can be improved. Large draughty wards and the constant changing of assistants, sisters, and nurses—all necessary features of a teaching and training institution—do militate against that even flow of team work which is so necessary to the welfare of these patients.

ETIOLOGY.

The opinion has long been held that chronic infection is a direct cause of ulceration, and that it is necessary to eradicate any focal sepsis before attempting to deal with the ulcer, on the assumption that it provokes the periodic recrudescence of the symptoms which is so characteristic a feature of the clinical history. In some cases the infective agent reaches the stomach direct. It is therefore necessary to eliminate infective lesions of the gums, tonsils, and nasal accessory sinuses. Pannett considers, however, that ulceration is caused by some specific organism (not yet identified) which reaches the stomach by this route, and

not by the various pyrogenic organisms which have been from time to time cultivated from ulcers.

In other cases it is believed that infection reaches the stomach by way of the blood and lymphatic streams. It is assumed that bacterial emboli are carried to the region of the pylorus and lesser curve, and as a result of septic infarction cause devitalization of the stomach mucosa and render it a prey to gastric digestion. This theory receives support from the fact that chronic infective lesions are continually being found co-existing with ulceration. The more common of these are apical abscesses, lesions of the gall-bladder, appendix, Fallopian tube, and kidney. The Leeds school has pointed out that it is probable that infection is carried along the lymph channels from the right iliac fossa.

The feature of these ulcers is that they not only exist in an environment of gastric juice, but predominate in certain sites—for example, on either side of the pylorus and along the lesser curve. Traumatic and operative wounds of the stomach heal quite readily; the latter are normally healed in ten days. Therefore in the evolution of an ulcer there must be some factor at work which primarily delays healing, and this factor takes considerable time to act and may keep on acting. The pathologists tell us that histologically these ulcers are separate entities, and that they occur as the result of a true digestive process. The physiologists are still uncertain of the series of changes which regulate the acidity of the stomach and the action of the pyloric sphincter. Bolton and Goodhart have advanced the view that, "when the percentage of acidity of the digesting stomach content reaches a certain average height regurgitation of duodenal contents occurs, and brings down the acid curve by neutralization." This regurgitation is permitted by the relaxation of the pyloric sphincter. To what extent this takes place is not definitely established. Bile should be a common content of the test meal, but this has not been the case in this series. On this assumption it is possible to explain the peculiar selective origin of ulcers, that they occur in the zone of interaction between the hydrochloric acid-pepsin juice and the alkaline duodenal contents. When relaxation is active interaction takes place along the lesser curve, and where the pylorus is hypertonic mixing only occurs in the duodenum. The inception of the ulcerative process would take place where these two streams meet, and in a spot where the anti-bactericidal properties of the acid juice have been lessened. On these grounds it would be justifiable to surmise that this zone of interaction is not always a fixed one, and that the exacerbations of the ulcerative process only take place when the two synchronize. From the practical standpoint the only three cases of jejunal ulcer in my own personal series would tend to support this. In each case the ulcer was found at the left-hand corner of the anastomosis, which in a posterior gastro-enterostomy would correspond to the nearest point on the lesser curve where the acid and alkaline juices meet.

CLINICAL FEATURES.

Although focal sepsis is found to exist in a certain number of cases there are others in which no such cause can be detected. Certain characteristics are found in the majority of cases, but it cannot be said that they are so universal as to constitute an ulcer diathesis. The most typical case is that of an active middle-aged man, rather lean and tall, with strained expression, slight mental irritability, who tends to become grey prematurely. The predilection for the male sex is seen in the following figures.

	Male.	Female.
Duodenal ulcer	82%	18%
Pyloric ulcer	91%	9%
Gastric ulcer	75%	25%

This marked affinity for the male has been variously ascribed to differences in his habits—smoking, irregular and hasty meals, an increased consumption of alcohol and meat foods, all probably causing pyloric hypertension; 86 per cent. of these ulcers were on one or other side of the pylorus in males, whereas the incidence of gastric ulcer in females is appreciably higher. Spasticity of the pylorus prevents duodenal regurgitation and alkalization of the

stomach content, yet acid in the duodenum is necessary for the normal closing of the sphincter. Pyloric irritability, we are told, is increased by local disease (ulcer) and irritability of the central nervous system (often reflex), whereas spasm is excited by food irritation, either mechanical or chemical, or by hydrochloric acid. It seems that on this subject we are revolving round a vicious circle, and require further work to clear up a confusing situation.

Tyrrell Gray has drawn attention to the causal relationship between smoking and ulceration. It would seem that the habitual empty-stomach smoker would be more likely to be affected, and if this is so, we ought to expect in the future an increased incidence of ulcer in women.

With regard to age incidence, the majority of ulcers have been operated upon in the third and fourth decades, with an appreciable increase into the fifth decade for women.

SYMPTOMATOLOGY.

It is the experience of all of us to find difficulty in interpreting the symptoms on purely clinical grounds. Although we are wont to associate a standard syndrome with certain types of case its application is by no means universal. The diagnosis of ulcer is based upon pain, vomiting, and haemorrhage. Of these the most important is pain, which is characterized by its periodicity; 99 per cent. have complained of it in this series, and it was absent in only three cases—one duodenal ulcer, and two gastric ulcers. Bouts of pain lasting for days or weeks are followed by periods of complete freedom which may continue for months. This intermittency has occurred in over 75 per cent. of the cases. In under 10 per cent. has the pain been constant; in a smaller percentage the pain has been intermittent at first and constant later. In the cases of pyloric ulcer this late constant pain has run *pari passu* with the decrease in the intermittency.

In the majority of cases pain bears a definite relationship to food. Seldom coming on before half an hour after food, it may appear any time during the interval before the next meal. As a general rule the more distal the ulcer is from the cardia the later the pain appears. The average onset in this series has been as follows:

Duodenal ulcers	Between 2 and 3 hours.
Gastric ulcers	" 1 and 2 "
Pyloric ulcers	" 1 and 3 "

In only a small percentage of cases has the pain been unrelated to food, and in a smaller percentage has it occurred within half an hour after food. For the relief of pain patients often devise different methods. The majority of duodenal ulcers are relieved by taking more food, whereas the gastric and pyloric ulcers obtain most relief after vomiting.

Vomiting is only of importance from its association with pain. It usually occurs when the pain is at its height, and brings with it relief. A relative idea of its frequency is seen in the following table.

Duodenal ulcer	50%
Gastric ulcer	88%
Pyloric ulcer	70%

Its diagnostic value increases in such conditions as pyloric stenosis and hour-glass stomach by its time of onset, amount, and content.

Haemorrhage, whether in the form of haematemesis, melaena, or both, always adds risk to the patient, responsibility to the practitioner, and a higher mortality rate to the surgeon. Its grosser forms are shown in the following table.

	Haematemesis.	Melaena.	Haemorrhage and Melaena.
	Per cent.	Per cent.	Per cent.
Duodenal ulcer	6	26	11
Gastric ulcer	24	7	14
Pyloric ulcer	7	21	7

No systematic investigations were undertaken for occult blood. These cases have been treated medically at the time of the haemorrhage, and operation, with an occasional transfusion, has been undertaken during quiescent

intervals. Of the fourteen immediate deaths eight had suffered from haemorrhage, and there is no doubt that it is an indication for earlier operation.

DIAGNOSIS.

Although a dependable diagnosis can be made in a large number of cases on the history alone, we now have in radiology a most reliable source of information. In atypical cases it should never be neglected. It has been my practice to pursue this form of investigation in all cases of dyspepsia which recur or do not respond to medical treatment, and in all cases of ulcer. In the latter it often fortifies the surgeon with the knowledge of a co-existing ulcer, and with a preconceived plan of operation. To obtain the best results it is essential to collaborate with the radiologist, and in this respect I have been particularly fortunate in receiving much help and co-operation from my colleagues Dr. Russell Reynolds and Dr. S. Cochran Shanks. Since the installation of a new x-ray plant in the hospital the results have been most gratifying. The following table shows the x-ray report checked by the operative findings.

	No. of Cases.	Correct.	Wrong.	Misplaced Ulcers.
Duodenal ulcer	39	30	6	3
Gastric ulcer... ..	23	17	2	8
Pyloric ulcer... ..	20	1	1	—

Under the heading of misplaced ulcers I have classified those reports in which, although an organic lesion was indicated, the lesion did not correspond to the actual site of the ulcer.

The notable difficulty seems to be the differentiation of lesser curve from duodenal ulcers. In the duodenal ulcers two were reported as lesser curve ulcers, and one as a gastric ulcer with delay. Of the eight in the gastric series, five lesser curve ulcers were reported as pyloric ulcers, one as a duodenal ulcer, one as a seven-hour delay, and one ulcer on the posterior pyloric wall as a carcinoma. The one wrong report of the pyloric series was masked by the presence of gall-stones.

It is interesting to find that the point raised in a previous communication on this subject, that the posterior ulcer is difficult to identify, has not obtained in this series.

Unusual features were present as follows:

Among the duodenal ulcers a lesser curve ulcer developed three years after gastro-enterostomy.

Among the gastric ulcers a lesser curve ulcer was coexisting with a duodenal ulcer, and a case of lesser curve ulcer subsequently developed a duodenal ulcer.

Multiple ulcers were distributed as follows:

Double duodenal ulcer	1 case
Double pyloric ulcer	1 "
Multiple gastric ulcers	2 cases
Antero-posterior lesser curve ulcers	2 "
A lesser curve and a greater curve ulcer	1 case
Antero-posterior pyloric ulcer	1 "

Test Meals.

Although test meals have not been given as a routine in these cases, they nevertheless have a definite value. From the diagnostic point of view they have been disappointing, especially in cases of gastric ulcer, and the results have shown a wide variation.

In cases of duodenal ulcer the tests performed by Mr. Jocelyn Patterson have been extraordinarily accurate, and when other evidence is conflicting a sustained hyperchlorhydria often indicates the true diagnosis. In cases of carcinoma the low acid content is of great help.

The chief aid rendered by the test meal is that of guidance for treatment. Cases of the penetrating type of duodenal ulcer associated with surrounding oedema, and with an abnormally high and sustained acid curve, are regarded with suspicion. There is a strong impression that these cases are unsuitable for gastro-enterostomy alone owing to the fact that they are liable to develop jejunal ulcers.

OPERATIVE PROCEDURES.

Without being wedded to any particular type of operation, and with an open and inquiring mind as to which type of operation is best suited for individual cases, the following operations have been performed in this series, in the main by Mr. H. S. Clogg and myself. The average duration of symptoms has been six and a half years; some have been poor operative risks, others have had complications dealt with at the same time, and others have been re-operated upon.

Type of Ulcer.	No. of Cases.	Posterior Gastro-enterostomy.	Posterior Gastro-enterostomy plus—				Partial Gastrectomy.	Sleeve Resection.	Anterior Gastro-enterostomy.	Gastro-jejunostomy.
			Ulcer Infolded.	Ulcer Excised.	Appendicectomy.	Cholecystectomy.				
Duodenal	87	Total 79	16	2	27	3	4	—	4	—
Gastric	76	33	4	8	13	2	17	6	2	2
Pyloric	44	36	4	1*	15	2	7	—	—	—
Totals	207	154	24	11	55	7	33	6	6	2

* Excision only.

The immediate mortality was 14, or 6.7 per cent.

Duodenal ulcer 4, or 4.6 "

Gastric ulcer 6, or 8.0 "

Pyloric ulcer 4, or 8.8 "

Of these 14 cases 8 had had haemorrhage either as haematemesis or melaena.

The later mortality shows that 2 patients died from carcinoma, 1 from lymphatic leukaemia, and 3 as a result of re-operation.

Of the deaths in hospital, 6 were due to chest complications, 7 were not stated, 1 was from weakness and anaemia after haemorrhage; 5 were cases of partial gastrectomy, 7 were posterior gastro-enterostomy cases, 1 sleeve resection, and 1 anterior gastro-enterostomy.

RESULTS.

All these patients have been written to, and replies have been received from 121. The oldest cases range from seven years, and no case under one year is included.

The following method of assessing the results has been followed; it is based upon the replies from patients or their doctors.

Very Good: Patients showing very marked improvement; have no pain; have gained weight; are at work, and able to eat anything.

Good: Patients who have improved; have no pain; have gained weight; are at work, and able to eat anything, but show a distaste for one or two items of food.

Very Fair: Patients who have improved, but get occasional pain, fullness, and flatulence when over-indulgent with regard to their diet. Their weight is constant, and they are at work.

Fair: Patients with subsequent attacks of pain or haemorrhage which have necessitated medical treatment. Some are at work or doing light work.

Poor: Patients in whom operation has been of no benefit and are not able to work. Recurrence or gastro-jejunal ulceration obtained in some of them.

Type of Ulcer.	No. of Cases.	Very Good.	Good.	Very Fair.	Fair.	Poor.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Duodenal	58	30	44	8.6	8.6	8.6
Gastric	39	28	54	12.5	2.5	2.5
Pyloric	24	33	41.7	7.9	12.5	4.0
Total	121	30	47	10	7.8	5

A further analysis of the very good and good cases shows that the total average cure without a relapse for the whole series is 3.3 years, and the average for the gastric and duodenal ulcers separately is the same figure. It would appear from these figures that once a satisfactory result from operation is obtained there is no tendency to recurrence.

From the above it will be seen that about 80 per cent. may be regarded as cured, about 10 per cent. as improved, and about 12 per cent. as receiving little or no relief. It is interesting to compare these results with those from individual operations.

	Very Good.	Good.	Very Fair.	Fair.	Poor.
Partial gastrectomy	3	9	1	1	1
Excision with posterior gastro- enterostomy	3	—	2*	1	1
Sleeve resection	3	—	—	—	—
Posterior gastro-enterostomy—					
For gastric and pyloric ulcer ...	13	18	—	4	—
For duodenal ulcer	15	25†	5*	3	4
Total (112 cases)	37	52	8	9	6
Percentage	33	46.4	7	8	5

* One with gall-stones. † Two with gall-stones.

The good results from partial gastrectomy amount to 80 per cent.; from posterior gastro-enterostomy in gastric ulcer to 89 per cent.; in duodenal ulcer to 77 per cent.; the combined average from posterior gastro-enterostomy works out much the same as that for partial gastrectomy—that is, 80 per cent.

In this series there have been 6 cases of jejunal ulcer, which agrees with the percentage published by many other observers.

These results, if they suffer by comparison with the results published by other surgeons, are a fair criterion of the treatment which can be expected by the patients from a general hospital, in which it is impossible to cater for individual cases. Measures of improvement are easier to discern than to carry out. Patients are apt to regard operation as a panacea for their ills and a happy release from the toils of medical treatment. Being wage-earners they often have not the time to attend hospital for further advice, and the dietary indiscretions, in spite of instruction, are often alarming. An inquiry into this subject shows in a general way that pork, beef, and pastry are the main items of disagreement, and it is interesting to note that pastry and carbohydrates upset the duodenal ulcers, whereas the proteins (pork, beef, mutton, bacon, veal) disagree with the gastric ulcers. Fried and recooked foods, fruits, vegetables, condiments, cheese, eggs, cream, milk, and alcohol all appear on the list, with a slight bias against the duodenal ulcers.

I am extremely indebted to Mr. H. S. Clogg for his kindness in allowing me to publish his cases, and for his very helpful criticisms and guidance.

A CASE OF EXTENSIVE PULMONARY EMBOLISM FOLLOWING FRACTURE.

BY

V. COTTON-CORNWALL, M.B., CH.B. LIVERP.,
M.R.C.S., L.R.C.P.,

AND

C. W. PONDER, M.A., M.D., D.P.H.,
M.R.C.S., L.R.C.P.,

ASSISTANT COUNTY MEDICAL OFFICER, KENT, AND COUNTY PATHOLOGIST.

With a Note by

W. HOWEL EVANS, M.B., B.Sc.,
LECTURER IN PATHOLOGY, UNIVERSITY OF LIVERPOOL.

THE following case appears worth recording:

Mrs. M., aged 43, was seen by one of us (V. C.-C.) suffering from a fractured left tibia and fibula (*flute en bec*), and sent into hospital, when the limb was fixed in plaster-of-Paris. She was discharged two weeks later, and the district nurse (who is not a trained masseuse) attended to massage the limb, but a doctor was not called in.

Six weeks after the accident one of us (V. C.-C.) was asked to examine the limb. Union appeared perfect and there was no shortening of the leg; there was a moderate

amount of oedema of ankle and leg to the knee, but no varicosity of the superficial veins. The ankle and knee, which were very stiff, were forcibly moved through a few degrees, and the nurse was instructed how to massage and move the limb; the patient was given permission to walk on crutches. She stated that she was being sick, but there was no discoverable cause, and she did not look ill. A sedative alkaline mixture was given, and it was reported that the sickness ceased the same day, and that the patient ate normally afterwards until the time of her death two days later.

At midday on the day of death she asked her companion not to leave her, and requested to be helped out of bed. Almost immediately afterwards she wanted to return, and had hardly been helped back when she gave a slight groan and rolled on to her right side. She then gave another groan, rolled on to her back, and expired. When seen about two hours later she was lying on her back with mouth slightly open and a peaceful expression on her face.

Post-mortem Examination.

Externally nothing abnormal was found except that the neck appeared unduly movable.

Internal examination: Cervical vertebrae normal and no fracture of cranial bones; brain and abdominal viscera normal; diaphragm contracted; lungs appeared normal, but did not fill the thorax; the heart was contracted and appeared normal.

The heart and lungs were removed and dissected out (C. W. P.). On opening the right ventricle and pulmonary artery a long clot of about the size of the

Diagram to show position of the large embolus when pulmonary artery had been opened.

lumen of the internal iliac vein was found. This had evidently folded itself so that two ends were passing into the right branch of the pulmonary artery, and two into the left, thus preventing the blood flow to the lungs and producing sudden death; the clot could not be extracted by traction. There was also a free end pointing to the pulmonary valve. The clot as it originally reached the heart must have been several inches long.

Pathological Report.

The specimen was sent to Professor Ernest Glynn for further examination, and in his absence Dr. Howel Evans has kindly commented as follows:

Sections have been cut from the clot in the right ventricle and from clots found in the branches of the pulmonary artery near the periphery of the lungs.

Dissection of the main branches of the pulmonary artery traced into each pulmonary lobe showed firm clot in many of these, particularly in the lower lobe.

1. Clot from ventricle shows distinct lamination and very marked pigmentation. It is obviously *ante mortem*, and the appearances suggest that it is a few weeks old.

2. Clot from pulmonary artery, left base, shows an appearance almost identical with right. The lung is somewhat collapsed and the bronchial cartilages show slight staining with blood pigment.

3. The clot in this branch of the pulmonary artery is more recent and not laminated, but shows well-marked pigmentation. The suggestion arising from these three sections is that Nos. 1 and 2 are of some weeks' duration, but No. 3 perhaps only a few days.

The specimen raises the question of pulmonary thrombosis or pulmonary embolism. As you know, Professor Glynn has for years urged that many cases arose from primary thrombosis in the lung itself. The best evidence of embolism is to find, as may sometimes be done, a thrombus in a systemic vein which might have given off the embolus. My personal opinion is that the whole process is due to a change in the blood, and we have evidence that the most important demonstrable change is the increase in the blood platelets which occurs after operation or after fractures. This means to say that the blood might clot at any given point, and I suspect that frequently there is a contemporaneous clotting both in the lung and in a systemic