symptoms." The use of this high standard of health has been necessary in the present series, because a considerable number of our patients suffered perforation (or re-perforation) after having had only slight occasional indigestion.

In the presentation of our results we have followed the method by which the series is treated as a whole, and the follow-up records are tabulated for each period of 12 months. In reporting the progress of a disease such as peptic ulcer, which is prone to remissions and recurrences, this seems to us to be the best method of giving an accurate picture.

Although, as we have said, the published studies of peptic ulceration follow no standard pattern, one finding is common to all—namely, the longer the follow-up period the greater the number of relapses—and the impression grows that what is being shown is not so much the result of treatment as the natural history of the disorder.

Some observers believe that the prognosis as regards future health is better in cases of perforation than in any other form of peptic ulcer. This opinion can be supported by considerations of pathology. It is the ulcer on the anterior wall of the duodenum which commonly perforates, and consequently these ulcers can penetrate only to a shallow depth before being treated surgically. On the other hand, ulcers on the posterior duodenal wall can penetrate deeply into the substance of the pancreas, creating conditions which make healing difficult, if not impossible. However, our findings provide little support for the view that the peptic ulcer which perforates runs a satisfactory course. It is possible that the non-perforating ulcer has an even worse record as regards health, but until we have completed the study of a group of non-perforating ulcers we are not prepared to say much about this, apart from observing that, since in the present series of patients the incidence rate of major complications within five years of perforation was 20%, the standard of health set by the perforating ulcer is not high.

It is noteworthy that in the great majority of cases acute perforation of an ulcer is followed by a remission of symptoms for, at any rate, a period of months. It is commonly averred that "perforation cures an ulcer"—by which it is implied that healing is due to the actual rupture, associated as it is with sloughing and removal of the fibrous bed of the crater. It seems more probable that the remission of symptoms is due to the rest in bed, the careful diet, the prolonged convalescence, and perhaps the alteration of mental outlook induced as a result of the operation.

The influence of the duration of ulceration before perforation (as judged by the history) on subsequent health is interesting. The longer the ulcer has been present before perforation the poorer the health in the post-operative years. In all probability this is accounted for by the structural changes accompanying chronic ulceration, but proof of this would depend on obtaining an adequate view of the ulcer at the time of operation, and for technical reasons this is not possible.

It is more difficult to suggest a reason why those who perforate in later life should have a better record of health after recovery from the operation than the younger men. The difference is not due to an excessive proportion of chronic ulcers in the younger age groups. It is possible that the difference may be related to factors connected with occupation, psychology, or dietary habits, or to a greater readiness on the part of older patients to submit to a more ordered regimen of life. The question certainly deserves further study.

It is a common belief that the treatment of peptic ulcer gives more satisfactory results in private than in hospital practice, and this is thought to be related to economic factors. The Registrar-General's classification of the population into five social grades corresponds roughly to income levels and provides a way of studying the influence of economic factors on disease. As has been shown, we have been unable to detect any difference in the morbidity between the various social grades in our series. This finding is surprising, and clearly merits further study. However, it should be noted that the period of follow-up coincides largely with the rationing of foodstuffs, and there can be no doubt that dietary differences between the various income groups have been greatly lessened during wartime. Furthermore, as we have noted, most patients were taking advantage of the extra allowance of milk and eggs granted in

cases of peptic ulcer, and this should mean considerable uniformity in diet in the different social grades. The increased earnings of the lower social grades in wartime may also have played a part in improving their conditions—although the greater number of hours worked is to be set against this. We have already suggested that working overtime may have been partly responsible for the great increase in the number of cases of perforated peptic ulcer occurring in the West of Scotland in 1941 (Illingworth *et al.*, 1944).

Summary

A follow-up study of 733 patients who had survived perforation of a peptic ulcer is reported, and the following findings are discussed:

- (1) Remission of ulcer symptoms after perforation was seldom of long duration. Within one year 40% of patients had relapsed (symptoms were mild in 20% and severe in 20%). After five years 70% had relapsed (symptoms were mild in 20% and severe in 50%).
- (2) The incidence rate of major complications (re-perforation, haemorrhage, symptoms requiring elective operation) was 20% within five years of perforation.
- (3) The mortality rate among survivors from perforation was somewhat higher than the standard mortality rate. The excess might be accounted for by deaths due to complications of ulcer.
- (4) Progress among survivors was best in the old and worst in the young.
- (5) Progress was best in patients with a short history of dyspepsia before perforation, and the longer the antecedent history the worse was the progress.
- (6) Progress was not modified by the patients' social status.

We are indebted to our surgical colleagues at the Western Infirmary, who have given us full access to their case records and every facility for following up their patients. It is literally true that without their helpful co-operation this paper could not have been written. We have pleasure in acknowledging our debt to Mr. W. Lundie, C.A., F.F.A., who at the suggestion of Mr. J. G. Kyd, Registrar-General for Scotland, has submitted our mortality rate to an examination from the actuarial standpoint. Our thanks are due also to Miss Wood, our social worker, for her help in tracing many patients and securing their attendance for the follow-up; and to Miss Good for her tireless attention to the secretarial work involved in the collection of records.

REFERENCE

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ONE HUNDRED CASES OF PERFORATED PEPTIC ULCER

WITH AN ANALYSIS OF IMMEDIATE AND REMOTE RESULTS OF SIMPLE CLOSURE

BY

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Perforated peptic ulcer is a subject with a vast and steadily growing literature. Formerly this was concerned mainly with problems of diagnosis, choice of operation, and immediate post-operative results.

Compared with most abdominal emergencies, the diagnosis of perforated gastric and duodenal ulcers now presents few difficulties. Their treatment likewise admits of no division of opinion so far as the need for closure of the perforation at the earliest possible moment is concerned. Fashions in abdominal surgery have, however, been reflected in the periodical shift of opinion as to what other operative procedures might with advantage be used as a supplement to simple closure of the perforation. Whilst one school of thought has persistently held that so grave an emergency called for the performance of the simplest life-saving operation, others have seen fit to employ gastro-enterostomy and, more recently, partial gastrectomy in the initial treatment of perforations. Less popular devices such as local excision of the ulcer and pyloroplasty have similarly had their advocates as and when each became current in the treatment of non-perforated ulcers.

It may be suspected that the advocacy of these various measures has not been wholly free from a tendency to rationalization. Thus, for instance, the enthusiasts for gastro-enterostomy convinced themselves that the suture of an ulcer

in the vicinity of the pylorus involved a high incidence of pyloric stenosis and obstruction, which justified the performance of a gastro-enterostomy for its prevention as part of the initial operation for a perforation. Similarly, the more recent adoption of partial gastrectomy as the operation of choice in the treatment of gastric and duodenal ulcers has been followed by a wave of popularity for the view that ulcers which have previously perforated frequently remain active or break down again, and that the immediate performance of a partial gastrectomy is justified as the surest means of protecting the patient from this hazard.

Considering the comparatively small amount of evidence that has hitherto been published concerning the later progress of patients who have survived the perforation of a peptic ulcer, it would seem that these views, no less than the widely held opinion that suture of a perforation commonly leads to the permanent cure of the ulcer, are largely based on vague impressions rather than upon factual knowledge derived from the prolonged and close observation of the results of simple closure. Patients discharged from hospital after suture of a perforation have not, on the whole, been followed up with the same care and persistence as have those who have received medical or surgical treatment for unperforated ulcers.

Latterly, publications on this subject have increasingly recorded the results of following up the cases over considerable periods. The present investigation is reported as a contribution to the more exact knowledge of long-term prognosis which is being gained as a result of such inquiries.

Material and Method of Investigation.—The material of this paper consists of 100 consecutive cases of perforated gastric and duodenal ulcers on which I operated at Redhill County Hospital, Edgware, during the five years 1938–43; 88 occurred in men and 12 in women. The patients who survived were re-examined at intervals of six weeks, three months, and six months after discharge from hospital, and thereafter every six months. Clinical examination was supplemented by x-ray investigation approximately once a year, whether there was a recurrence of symptoms or not, and more often when there were special indications.

Operative Procedure and Immediate Post-operative Results

Operation was undertaken at the earliest possible moment after admission to hospital. Glucose-saline was administered by rectal drip as a routine for the first 24 hours after operation. Fluids were then allowed by mouth and the diet was gradually increased.

Anaesthesia.—A general anaesthetic was administered in the majority of cases, using gas-oxygen and ether.

Incision.—The usual method employed was to open the abdomen through a right paramedian incision, either splitting the rectus muscle or displacing it laterally. Displacement of the rectus gave appreciably stronger scars than did splitting the muscle, and the latter has now practically been abandoned. There was no greater tendency to wound sepsis after displacement of the rectus muscle, and the time that can be saved by splitting it is quite negligible.

Intra-abdominal Procedure.—In all cases but one, simple closure of the perforation, with or without drainage of the peritoneal cavity, was carried out. A single chromic catgut stitch was passed through all layers to approximate the edges of the perforation. Occasionally, when the perforation was very large or the tissues were unusually friable, a second such stitch was introduced at right angles to the first. The ulcer was then invaginated by a row of three interrupted Lembert stitches passed in the long axis of the stomach and duodenum, the ends being left long to tie over and secure any available piece of omentum as a patch. A toilet of the peritoneal cavity was next carried out, excess of fluid being removed by means of moistened gauze mops. A sufficiently large abdominal incision was made to allow of a hand being freely introduced for this purpose, and the areas receiving routine attention were: (1) the space between the right lobe of the liver and the diaphragm, whence a considerable quantity of locked-up fluid can generally be released; (2) Morison's pouch between the under surface of the liver and the hepatic flexure of the colon; (3) the pelvis and the right paracolic gutter; (4) the space between the splenic flexure and the diaphragm, where fluid

particularly collects in perforations of a gastric ulcer. I have repeatedly noted the localization of the bulk of the fluid to one or other of these compartments, and I believe that a systematic toilet of the abdomen in this manner is of considerable importance in minimizing the incidence of post-operative peritonitis and of subphrenic and pelvic abscesses. The use of a sucker introduced through a small abdominal incision is not an adequate substitute for gauze swabs carried by a hand to each of the areas mentioned above.

Drainage of the peritoneal cavity was carried out in 54 cases. In 47 of these the drain was introduced to the bottom of the pelvis, a suprapubic "stab" wound being employed in 41 cases; in the remaining 6 cases a right gridiron incision which had been made for exploration in suspected appendicitis was used. In 7 cases with long-standing perforation and a perigastric abscess a local drain to the site of the ulcer was brought through the paramedian incision. The remaining 46 cases were closed without any drainage.

Post-operative Complications

Some infection of the wound occurred in 14 cases, of which 10 had been drained suprapubically and 4 had been closed without drainage. Two of these patients died—one on the 20th post-operative day with an empyema, and the other from spreading gangrene of the skin 5 months after operation. Pulmonary complications occurred in 39 cases, but were mild and recovered quickly in all but 7 cases of severe bronchopneumonia, which accounted for 5 deaths. Two empyemas occurred, with one death. Two subphrenic abscesses formed, with one death. Seven patients complained of digestive symptoms while still in hospital and one had a haematemesis. In 41 cases post-operative recovery was completely uneventful.

Deaths

Seventeen deaths occurred in the series. These are analysed in Tables I and II.

TABLE I.—*Causes of Death*

Cause of Death:	Broncho-pneumonia	Toxaemia and Shock	Cardiac Failure	Wound Sepsis	Sub-phrenic Abscess	Empyema	Total
No. of cases	5	6	3	1	1	1	17

TABLE II.—*Cases and Deaths in Each Decade of Life*

Decade:	1st	2nd	3rd	4th	5th	6th	7th	8th
Total No. of cases ..	0	3	12	28	27	9	18	3
No. of deaths ..	0	0	0	1	6	1	6	3

Table II shows the relative total number of cases and of deaths in each decade of life. Under the age of 40 there were 43 cases, with one death; over the age of 40 there were 57 cases, with 16 deaths. There were 12 deaths among the men and 5 among the women. Thus whilst the cases occurring in women were 12% of the total, 29% of the deaths were among the women.

Anatomical Site of Perforation

The term "juxtapyloric" has been used to describe those of the ulcers which were in very close relation to the pylorus and about whose classification as either gastric or duodenal differences of interpretation might arise. In my opinion the majority of these were on the duodenal side of the pylorus. This view is supported by the post-operative x-ray appearances. Deformities due to scarring or to persistent ulcers, when present, were almost always found to be in the duodenum. Adopting this terminology, the distribution of the perforations was as follows: gastric, 12; juxtapyloric, 58; duodenal, 30. Five of the 17 deaths in the whole series occurred amongst the gastric ulcers. Five of the 12 gastric perforations occurred in women, with 3 deaths.

From these figures it appears that much the highest mortality was associated with the gastric perforations—42%, as compared with 15.5% for the juxtapyloric and 10% for the duodenal cases. Furthermore, the higher incidence of gastric perforations among women largely explains why there were proportionately so many more deaths in women than in men.

Attendance at Follow-up Clinic

Of the 83 patients who left hospital alive after operation, 13 were lost sight of immediately and 70 attended in the follow-up clinic for varying periods. Table III shows an analysis of these attendances.

TABLE III

Duration of Attendance:	1 Year or Less	Up to 2 Years	Up to 3 Years	Up to 4 Years	5 Years and Over	Total
No. of cases	25	16	6	13	10	70

That only 10 of the 70 patients should have continued to attend for as long as five years might be considered to be somewhat disappointing. It should be noted, however, that the period covered by this investigation coincided with the war years, when evacuation, call-up to the Forces, and transfers of industrial labour took an exceptionally heavy toll of attendances. This disadvantage is to some extent offset by the fact that the observation of these patients with peptic ulcer histories was carried out at a time when dietetic, living, and working conditions were particularly adverse for people suffering from digestive disorders.

Recurrence of Symptoms

During the time of their attendance in the follow-up clinic 38 patients had a recurrence of digestive symptoms. These were classified as "slight" (13 cases), with a complaint of occasional discomfort after eating, heartburn, or flatulence; "moderate" (11 cases), whose indigestion involved periods of absence from work but which responded to domiciliary treatment; and "severe" (14 cases), which required readmission to hospital for medical treatment or for the performance of a secondary operation.

The time which elapsed between operation and the first onset of a recurrence of digestive symptoms is shown in Table IV.

TABLE IV

Year after Operation:	1st	2nd	3rd	4th	5th
No. of recurrences	25	3	3	5	2

In Table V the number of recurrences of symptoms is related to the age groups in which they occurred.

TABLE V

Decade of Life:	2nd	3rd	4th	5th	6th	7th
Total No. of perforations	3	12	28	27	9	18
Total No. of recurrences of symptoms	1	6	10	9	3	3
No. of severe and moderate recurrences	1	1	7	6	2	3

Table VI shows the relation of the duration of ulcer symptoms before perforation to the rate of incidence of post-operative recurrence of indigestion.

TABLE VI

Length of Past History:	3 Years or Less	3 to 5 Years	5 to 10 Years	10 to 20 Years
No. of cases	47	12	19	10
No. of post-op. recurrences	8	3	6	4
Recurrence rate	17%	25%	32%	40%

The following inferences may be drawn from the evidence summarized in Tables IV, V, and VI.

1. A high rate of recurrence during the first year after perforation is followed by a sharp drop during the second year, a fairly constant low level of recurrence being then maintained during succeeding years (Table IV). The numerous recurrences during the first year are probably evidence that suture of the perforation failed to heal the original ulcer in those cases, whilst the recurrences of symptoms during the second and later years were almost certainly due to re-ulceration of a previously healed ulcer or to the formation of completely new ulcers. A striking example of this was a man who had a perforation of a duodenal ulcer and then remained completely free from digestive symptoms for four years. During the fifth year after perforation he developed symptoms of a gastric ulcer, with

pain immediately after food. Skiagrams showed a large crater at the middle of the lesser curvature. A partial gastrectomy was performed, and the ulcer was found to be perforating into the pancreas.

2. The rate of recurrence of ulcer symptoms for each decade of life runs roughly parallel with the total incidence of perforations in the series for the corresponding age groups, each being maximal during the fourth and fifth decades.

3. The longer the patient has suffered from an ulcer before he perforates the more likely will he be to have a recurrence afterwards.

In general, it may be surmised that suturing the perforation in itself has little influence on the natural history of the ulcer, and that the immunity from further symptoms enjoyed by 32 of the patients among those observed in the present series was mainly due to the three weeks of complete rest and strict dietetic regime enforced during convalescence in hospital, combined with their ready observance of the instructions which they received on discharge, lest the price of carelessness should be a repetition of their recent ordeal. Those who have had a perforation have been warned, and they are not likely to forget. But the long-standing chronic ulcer is no more susceptible of cure by purely medical means after perforation than it was before, and it is in this group of cases that radical surgery after perforation finds its chief justification.

X-Ray Examination

At the follow-up clinic 130 x-ray examinations of the stomach and duodenum were made on the 70 patients who attended—54 during the first year after perforation, 32 during the second year, 18 during the third year, 16 during the fourth year, 9 during the fifth year, and 1 during the sixth year. The significant results of these examinations are given in Table VII.

TABLE VII

Year After Perf.	Normal	Irritability and Hypersecretion	Pyloric Spasm	Duodenal Ulcer	Gastric Ulcer	Pyloric Obstruction	Doubtful
1st	14	7	6	13	2	2	1
2nd	7	4	2	8	2	1	3
3rd	5	2	0	6	0	0	2
4th	4	1	0	4	1	1	1
5th	0	0	0	5	1	1	1
6th	0	0	0	1	0	0	0
Total	30	14	8	37	6	5	8

The striking feature of these records is that in the course of 130 x-ray examinations pyloric obstruction was encountered only five times, whilst the appearances of an active ulcer crater were present on no fewer than 43 occasions. The performance of a gastro-enterostomy as part of the initial operation for a perforated peptic ulcer is therefore quite unjustified in view of the very low incidence of pyloric obstruction as a remote complication after simple suture of the perforation.

The 43 occasions on which the niche or crater of an ulcer was seen occurred in the course of the x-ray examination of 31 different patients. Of these, 24 suffered from recurrent symptoms of indigestion. In the case of the remaining 7 patients the x-ray appearances were probably due to the effects of the scarring of healed ulcers.

Secondary Operations

Secondary operations were performed on 10 patients. One of these was an emergency operation necessitated by a second perforation of a duodenal ulcer after an interval of 4 years and 3 months. During this interval the patient, a man aged 66 at the time of his first perforation, had remained completely free from symptoms until a fortnight before the second perforation, when he had a recurrence of indigestion. Skiagrams then showed slight deformity of the duodenal cap, thought to be due to scarring of the old ulcer. At the second operation a large juxtapyloric perforation was found. When last seen, 18 months after the second operation, he had again remained free from symptoms, and was in good health at the age of 72. A further skiagram at this time showed deformity of the first part of the duodenum. The stomach emptied rapidly and there was no pyloric stenosis.

The remaining 9 secondary operations were performed because of symptoms which persisted in spite of medical treatment or on patients whose livelihood depended upon an

occupation incompatible with adherence to a gastric regime adequate to keep them free from symptoms. The latter circumstance occurs commonly among hospital patients in an industrial district, and is a factor which, when duly taken into account, must be regarded as a strong indication for advising partial gastrectomy more frequently than would be justifiable in more sheltered sections of the community. The secondary operations performed are analysed in Table VIII.

TABLE VIII

Case No.	Condition	Secondary Operative Procedure	Interval After Perforation	Result
6	Pyloric obstruction	Gastro-enterostomy	6 months	Remained symptomless
9	Duodenal ulcer	Partial gastrectomy	4½ years	Died
26	D.U. and pyloric obstruction	Gastro-enterostomy	4 years	"
33	Pyloric obstruction	"	1 year	Remained symptomless
42	Gastric ulcer	Partial gastrectomy	5 years	"
44	Duodenal ulcer	"	1 year 3 months	"
45	Hour-glass stomach	Gastro-gastrostomy	2 years	"
62	D.U. and pyloric obstruction	Gastro-enterostomy	6 months	"
88	Duodenal ulcer	Partial gastrectomy	9 months	"

Two post-operative deaths occurred among the 9 patients who were submitted to an elective secondary operation. One was that of a man of 69 on whom a gastro-enterostomy was performed, and occurred from progressive heart failure five days after operation. The other occurred from acute haemorrhagic cystitis and bronchopneumonia five days after the performance of a partial gastrectomy on a woman aged 44. One woman aged 37 was completely relieved of digestive symptoms by a gastro-enterostomy, but died six months later of a carcinoma of the ovary (Case 6). Of the remainder, two patients who had a gastro-enterostomy performed for pyloric obstruction are alive and well, and have remained entirely free from symptoms four years and nine months and five years after operation respectively (Cases 62 and 33).

Three patients are alive and well seven months, three years, and four and a half years after performance of a partial gastrectomy, and have been completely relieved from digestive symptoms. Two of these operations were necessitated by renewed activity of a duodenal ulcer (Cases 44 and 88), and the third by a lesser-curve ulcer of the stomach which developed five years after perforation of a duodenal ulcer (Case 42).

One patient remains well and has had no recurrence of symptoms three years after a gastro-gastrostomy. This operation was performed for an hour-glass contraction of the stomach opposite a lesser-curve ulcer which had perforated two years previously. The patient was a man, aged 52, who was considered to be unfit to stand a partial gastrectomy. He made an entirely uncomplicated recovery from the gastro-gastrostomy, with immediate relief of the severe pain from which he had suffered for six months. He has now remained free from symptoms for three years and nine months (Case 45).

Summary and Conclusions

A series of 100 cases of perforated peptic ulcer were treated by simple suture of the perforation, with 17 deaths. The death rate was highest among the gastric ulcers, and the incidence of these was higher in women than in men.

The after-history of 70 of the 83 surviving patients was studied in a follow-up clinic for periods up to five years.

A recurrence of digestive symptoms occurred in 38 cases, in 14 of which they were severe enough to require readmission to hospital. The rate of recurrence of symptoms was highest in those patients who had suffered longest from their ulcer before perforation occurred.

On the 70 patients attending the follow-up clinic 130 x-ray examinations of the stomach and duodenum were made. Evidence of a persistent or recurrent ulcer was found on 43 occasions. Pyloric obstruction was found on only 5 occasions.

Ten secondary operations were performed, with 2 deaths: suture of a second perforation (1 case), gastro-gastrostomy for hour-glass stomach (1 case), gastro-enterostomy for pyloric obstruction (4 cases), partial gastrectomy for recurrent ulcers (4 cases). There has been no return of digestive symptoms after any of these operations.

The evidence of this investigation provides no justification for supplementing suture of a perforation by either gastro-enterostomy or partial gastrectomy as an initial procedure. The proportion of cases eventually requiring secondary operations is in the region of 10 to 15%. Periodical re-examination will reveal the need for these when it arises, and the operations can then be performed with good results.

THE PROGNOSIS OF IMMATURITY

BY

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There are two questions to be answered in any case of immaturity: (1) Is the child likely to survive?; and (2) If he survives, will he develop into a normal person or is he likely to be mentally or physically handicapped? In other words, both the immediate and the ultimate prognosis need to be considered. The study reported below deals mainly with ultimate prognosis, but two aspects of immediate prognosis were considered—namely, the effect of birth weight and of sex on survival.

Immediate Prognosis: Method and Scope of Examination

The investigation was carried out at the Duchess of York Babies' Hospital, Manchester, in 1938 and 1939; the case sheets of all children who had been admitted between 1926 and 1938 on account of immaturity, and who had weighed 5½ lb. (2.5 kg.) or less at birth, were examined.

TABLE I.—Mortality and Result of Follow-up of Children Admitted to the Duchess of York Babies' Hospital on Account of Prematurity, 1926-38

Birth Weight in lb. (kg.)	Males			Females			Both Sexes	Follow-up			
	No. Admitted	No. Dying	Percentage Surviving	No. Admitted	No. Dying	Percentage Surviving	Percentage Surviving	Cases	Alive	Dead	Untraced
1-2 (0.45-0.9)	4	4	0	6	4	33	20	2	1*	0	1
2- (0.9-)	11	10	10	10	7	30	20	4	2†	0	2
2½- (1.23-)	19	14	27	34	19	45	38	20	9	1	10
3- (1.36-)	35	21	40	37	14	63	52	37	17	1	19
3½- (1.6-)	52	31	41	37	15	60	49	43	11	4	28
4- (1.8-)	32	10	60	25	10	60	65	37	5	2	30
4½- (2.0-)	28	14	50	24	6	75	62	32	11	0	21
5-5½ (2.26-2.5)	23	6	74	20	7	65	67	30	2	0	28
Total	204	110		193	82			205	58	8	139

* This child was not seen, but was reported as normal by parents.

† These two children were examined. One was seen at the age of 1 year; its mental development was average, but it was under weight. The other child was near the average weight for its age (4 years), but it had Little's disease and a marked degree of mental deficiency (I.Q. 67%).

Chart showing survival rates of immature babies.

Proportion surviving the first month: —, Duchess of York Babies' Hospital, Manchester, 1926-38. ---, City of Birmingham Maternity Home, 1931-43.

Proportion surviving the first year: x-x-x-x, Duchess of York Babies' Hospital, Manchester, 1926-38., Warwickshire, 1942 and 1943.

Birth weights are given in metric terms in Table I.