Results OF A SERIES OF GASTRIC AND DUODENAL OPERATIONS.*

BY
F. J. STRONG HEANEY, M.D., F.R.C.S.I.,
LECTURER IN CLINICAL SURGERY, UNIVERSITY OF LIVERPOOL.

In spite of the work which has been done and the volume of literature which has accumulated during the last twenty-five years there are many points still unsettled in the surgery of gastric and duodenal ulceration, and every surgeon is in duty bound to review his cases in the light of current literature and to bring his experiences, great or small, into the common stock. This must be my apology for recording the end-results in a comparatively small series of cases.

Excluding malignant disease, I have notes on 183 consecutive cases operated on by myself, mostly within the past four years, and I have endeavoured, with the assistance of my friend Dr. Aiden, to follow up every case. We have succeeded in obtaining the end-results in about 90 per cent. of them. Pathologically the cases may be classified as follows.

1. Acute perforations	...	...	...	...	33
2. Chronic duodenal ulcer	...	...	...	...	65
3. Chronic gastric ulcer	...	...	...	...	85
Total	...	...	...	...	183

I shall take the different categories in the order set forth.

ACUTE PERFORATIONS.

I have had 33 cases, 15 gastric and 18 duodenal; the procedure followed was to repair the perforation, insert a pelvic drain, and, if the patient's condition permitted, perform a gastro-enterostomy. Gastro-enterostomy was in fact performed in 31 out of the 33 cases. Of the 33 cases 7 died in hospital, but I cannot discuss the immediate mortality in relation to the number of hours which elapsed between perforation and operation as my notes are incomplete on this point. A summary of the results is as follows:

Died in hospital	...	...	...	...	7
Good end-results	...	...	...	...	17
Good but recent (under one year)	...	...	...	...	4
Unsatisfactory	...	...	...	...	2
Untraced	...	...	...	...	3
Total	...	...	...	...	33

Of the cases in which gastro-enterostomy was performed I have been able to obtain the end-results over one year in 19 cases. In all cases save one the result was good. In that one the stoma became inadequate and symptoms recurred. At a second operation the stoma was enlarged, and thereafter the course of the case was satisfactory.

In two cases gastro-enterostomy was not performed because of the patients' condition—one a duodenal and the other a gastric case. In the duodenal case I learnt at the follow-up that he was admitted later into another hospital for duodenal symptoms, which were relieved by gastro-enterostomy. In the stomach case the perforation which I was called on to treat was a second perforation; the first occurred five years previously, and had been treated elsewhere without gastro-enterostomy. On opening the abdomen the viscera were matted together by adhesions and the patient's condition was so serious that I did not subject him to the strain of a gastro-enterostomy, an addition which would have involved the separation of many adhesions. This case is, of course, liable to a further repetition of ulceration and perforation. I do not know whether in the duodenal perforation which was repaired without gastro-enterostomy, and which required a gastro-enterostomy later at another hospital, the operation was embarrassed by similar adhesions. Of the two unsatisfactory end-results, therefore, one had no gastro-enterostomy, the other an inadequate gastro-enterostomy.

I shall not repeat all the arguments for and against gastro-enterostomy, but will merely say that in so far as my own experience goes I find myself in agreement with

* A paper read before a joint meeting of the Manchester Medical Society and the Liverpool Medical Institution on March 7th, 1928.

those who believe in taking the risk of the extra fifteen minutes required for a gastro-enterostomy unless there are definite contraindications.

CHRONIC DUODENAL ULCER.

I shall next refer to the cases of chronic duodenal ulcers. There are three schools of thought as to the manner in which this condition should be treated. (1) Those who follow what I believe is the practice of the great majority of surgeons—performing gastro-enterostomy and removing any septic focus, such as the appendix. (2) Those who, accepting Lewisohn's figures as to the high incidence of gastro-jejunal ulcer, and the failure of gastro-enterostomy to neutralize or diminish hyperchlorhydria, believe in and practise an extensive gastrectomy. In this country Moynihan's practice, I believe, is an approach to the position of this school. (3) Those who accept Lewisohn's figures but regard gastro-enterostomy as an unjustifiably severe routine remedy for duodenal ulcer, and who have therefore abandoned surgical treatment altogether. Lahy of Baltimore takes this extreme view, and no one can doubt his sincerity. His well-known clinic is organized for surgery, but he passes all his cases of chronic duodenal ulcer on to a "gastrologist"—an expert in the practical application of the Sippey diet as combined with alkalis. With increased experience of this procedure he seems to have become more convinced of its soundness.

In all my cases I have followed the more usual line of treatment—namely, gastro-enterostomy. At first I only removed the appendix when it was definitely pathological; now I remove it when there is the slightest suspicion of past or present inflammation, and where the patient's condition permits. The results may be summarized as follows:

Good end-results	...	...	...	...	24
Good but recent (under one year)	...	...	...	...	29
Unsatisfactory	...	...	...	...	6
Untraced	...	...	...	...	4
Died in hospital	...	...	...	...	2
Total	...	...	...	...	65

The details of the six unsatisfactory end-results were as follows:

In one (37) a gastro-jejunal ulcer formed after an interval of four years. It was cured by partial gastrectomy (anterior Polya).

In one (65a) a gastro-jejunal ulcer formed after an interval of three months. It was cured by partial gastrectomy (anterior Polya).

In one (74) the stoma was found to be functioning unsatisfactorily. It has not yet been explored.

In one (43) there is definite chronic appendicitis.

In two others (41 and 29x) the complaints made were slight but suggested chronic appendix trouble. The patients have not yet presented themselves for further investigation.

In none of the six cases had appendicectomy been carried out at the original operation.

It will be noted that in the previous group—the acute perforations—there were no late symptoms of appendix trouble, although in none of them had appendicectomy been performed.

Various writers have figured the x-ray appearances in gastro-jejunal ulcer, but as the condition is not always radiographically demonstrable it may be of interest to show two x-ray photographs (Figs. 1 and 2 in one of the above-mentioned cases—No. 65a).

In the discussion of the causation of gastro-jejunal ulcer after gastro-enterostomy the technique of the original operation and the post-operative medical treatment have so often been held responsible for the subsequent complication that the technique employed in this series may be mentioned. A vertical or nearly vertical stoma running into the greater curvature at its lowest point is aimed at. No mucosa is removed and only absorbable sutures are used. In hospital cases, which constitute the majority of those noted and amongst which the two gastro-jejunal ulcers arose, a prolonged post-operative dietary and medication is found impracticable.

The percentage incidence of gastro-jejunal ulcer in this series of gastro-enterostomies for duodenal ulcer works out at 3.3. While dealing with this group I would like to allude to the condition of acute duodenitis and gastritis which sometimes arises as a complication of chronic duodenal ulcer, and to cite three cases of this kind encountered within the past few months. The condition has

been alluded to by Judd in one of his contributions to the literature. One of my patients, a stout man with a long history of recurring duodenal symptoms, had, when I first saw him, continuous pain and vomiting. The pain was in the epigastrium, and he vomited large quantities of clear brown fluid although only taking sips of water. At operation the duodenum was red, oedematous, and adherent to the liver. The redness extended beyond the duodenum over the lower half of the stomach. The main feature of the case was the incessant vomiting, a picture not unlike the acute alcoholic gastritis one saw before alcoholism became a rarer vice. In spite of the duodenum becoming detached from the liver and its lumen being exposed in the course of the gastro-enterostomy he made a good recovery.

FIG. 1.

FIG. 1.—Drawing from x-ray photograph in Case No. 65A. Showing retraction of outline of greater curvature at site of stoma and projection of gastro-jejunal ulcer beyond the line of the greater curvature.

FIG. 2.

FIG. 2.—Drawing from x-ray photograph of same case as Fig. 1. Showing residue six hours after barium meal and projection of the gastro-jejunal ulcer.

My other two cases were somewhat similar in clinical features and pathological findings. In one of them the vomiting was so severe as to cause a secondary acetonuria, and operation had to be delayed some days while the patient was treated with glucose rectally. In this case the slight traction employed in bringing up the stomach for gastro-enterostomy caused the rupture of an abscess and a flow of pus from the point where the falciform ligament, the liver, and the inflamed duodenum came together. Drainage was required, but the patient made a good recovery.

In all three cases there had been a long-standing duodenal history and the acute condition had supervened rather suddenly. One patient, x-rayed at the end of November, showed no radiological evidence of duodenal trouble; nevertheless in the three or four days following Christmas he rapidly developed the acute symptoms described. It is well recognized that a duodenal ulcer can evolve from the quiescent stage to perforation. It can with even greater rapidity develop an acute duodenitis and gastritis. Pyloric spasm doubtless plays a part in the incessant vomiting.

The only other point on the subject of duodenal ulcer to which I will allude is the unsatisfactory nature of x-ray diagnosis in minor degrees of the condition; it is fortunate that the clinical history and symptoms are as a rule more characteristic. In not a few cases, however, where the clinical symptoms and the x-ray appearances suggested duodenal ulcer I have opened the abdomen and found a doubtfully pathological appendix or mid-line ptosis. I have come to distrust slight irregularities in form and behaviour of the duodenal cap, and, as is well known, a six-hour remainder in the stomach of the opaque meal does not mean organic disease, especially in the presence of mid-line ptosis. Frequently the patient has to be told that both appendix and duodenum should be inspected, but that probably the operation will resolve itself in an appendicectomy. Owing to the indeterminateness of the ordinary antero-posterior x-ray picture and screen examination one must ask more frequently for side-to-side and oblique views.

The etiology of gastro-jejunal as well as of duodenal ulcer has been established on a surer foundation by the experiments of Mann and Williamson, resulting in the production of duodenal ulcers by abstraction of the bile and pancreatic fluid, and still more by the fact that Morton, applying Mann and Williamson's findings, in fresh experiments, succeeded by duodenal drainage in producing gastro-jejunal ulcers in 100 per cent. of cases.

The clinician still seeks to know what it is in particular clinical cases of gastro-jejunal ulcer which corresponds to experimental duodenal drainage—what it is in the clinical case which excludes or overwhelms the normal duodenal effect. If it is a hyperchlorhydria, what is the cause of the hyperchlorhydria? On this point we have still to fall back on theories of nervous and neuro-muscular influences, blood changes, and so forth.

CHRONIC GASTRIC ULCER.

I have notes on eighty-five cases of chronic gastric ulcer during the period I have taken. In this group the clinical picture and the pathological findings at operation vary so much from case to case that if the end-results are to be compared with any degree of usefulness some further subdivision is necessary. I have roughly divided the eighty-five cases into complicated and uncomplicated.

In the complicated group I have included the larger ulcers of the posterior wall, cases of chronic perforation with erosion of pancreas or other neighbouring structure, cases of multiple ulcer situated high on the stomach, cases complicated by ptosis, cholecystitis, and hour-glass contraction. For the purpose of this subdivision I have not regarded a chronic appendix as a complication.

Uncomplicated Gastric Ulcer.

I will take the uncomplicated cases first. In every case save one gastro-enterostomy was performed. This was combined in some cases with excision of the ulcer, in others with appendicectomy, in others with both excision and appendicectomy. In my earlier cases I did not excise small ulcers; I now excise in every case where the general condition of the patient seems to warrant the more prolonged procedure. In one case excision alone was done because a physician thought that with the aid of medical treatment gastro-enterostomy might be obviated. The result in this case was not satisfactory. The patient continued to have symptoms until she died of phthisis a year later.

Of the fifty-four uncomplicated cases operated on the following is the summary:

Died in hospital	...	...	...	...	...	2
Left hospital in good condition	...	...	...	...	...	52
Traced (less than one year had elapsed in 20)	...	...	...	...	...	50

Results in all traced cases were good, there being no difference in the result whether the ulcer was excised or not. It is to be noted, however, (1) that they were all simple uncomplicated cases, and (2) that some of them are still recent and liable to develop late complications. The immediate mortality was in each case due to post-operative pneumonia.

Complicated Gastric Ulcers.

In this group of thirty are roughly included all except the single small ulcer. The complicating factors here are varied and the number in any group too small to speak in percentages. I have therefore set forth the list of cases in detail (see accompanying analysis of cases). Glancing rapidly through it one sees:

Group 1.—Each of the first two cases showed a pyloric tumour suspiciously like malignant disease. On microscopic examination both proved to be non-malignant. One died of post-operative pneumonia, and the other shows no sign of further trouble although four years have elapsed.

Group 2.—The next group consists of ten large ulcers with adhesions and erosion of neighbouring organs. In six a partial gastrectomy was performed (anterior Polya). In the others the ulcer was excised and gastro-enterostomy performed. In one of these latter the ulcer recurred nine months after excision, and I was obliged to do an anterior Polya operation, with satisfactory result. In this group there was one death from post-operative pneumonia; apart from this death and the case of recurring ulcer the results were good. Figures 3, 4, 5, and 6 show the history of the recurrent ulcer.

Group 3.—The next is a case of a large ulcer high on the lesser curvature; the ulcer was excised and a gastro-enterostomy performed at the lowest point of the greater curvature. The end-result was satisfactory.

Group 4.—These are three cases of multiple ulcers. In the first case a high gastro-enterostomy was performed without excision; the result was unsatisfactory. In the second case there was an active ulcer and a quiescent one; the active ulcer was excised and gastro-enterostomy performed at the lowest point of the great curvature; result satisfactory. In the third case partial gastrectomy was performed with satisfactory end-result.

Group 5.—In these two cases mid-line ptosis existed in an

extreme degree. In the first the ulcer lay high; gastro-enterostomy was performed at a higher level than usual with the idea of neutralizing the region of the stomach concerned. The appendix was so obviously diseased that it was hoped to effect a cure by gastro-enterostomy and appendicectomy. The patient was a bad surgical risk, and excision was not performed. The result was unsatisfactory. In the second case the ulcer was not excised, but in addition to gastro-enterostomy a Coffey's gastro-colopexy with elevation of the falciform ligament of the liver was done. Although according to many authorities the treatment was unorthodox the result was satisfactory.

Group 6.—This group consists of two cases complicated by cholecystitis; the end-results were good.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 3.—Drawing of x-ray photograph in Case No. 68. An ulcer which recurred after excision and gastro-enterostomy.

FIG. 4.—Drawing from x-ray photograph of same case as Fig. 3. Showing condition three months after excision and high gastro-enterostomy. About this time symptoms began to recur.

FIG. 5.—Drawing from x-ray photograph of same case as Fig. 3. Showing ulcer re-formed nine months after excision and gastro-enterostomy.

FIG. 6.—Drawing from x-ray photograph of same case as Fig. 3. Showing end-result after partial gastrectomy performed nine months after original operation. No further symptoms to date.

Group 7.—This consists of ten cases of non-malignant hour-glass stomach. The immediate results, it will be seen, include three deaths. Although the cases were poor surgical risks the results are disappointing. In the first fatal case I had no opportunity of seeing the patient after operation, but was informed that she suddenly collapsed on the third day. In the second fatal case the patient died of pneumonia. In the third case there was persistent vomiting in spite of repeated lavage of the stomach and elevation of the bed, and when I had decided to reopen the abdomen the patient unexpectedly collapsed and died. The operation was an anterior Polya. Rightly or wrongly, death was attributed to acute gastric dilatation. Rendle Short records cases where the opposite sides of the stoma stick or grow together, and thinks it worth while to hang a rubber dam between them before completing the anterior layer of stitching. This is the only case I can recall having lost in this way, and I hardly think a rubber dam would have saved the situation.

Looking at the complicated cases as a whole it will be seen:

(1) The immediate mortality is disappointing: 3 patients died from pulmonary complications, 1 from acute dilatation of the stomach, and 1 from collapse.

(2) The end-results after a year of those that survived were as follows: All gastrectomy operations—good. All gastro-enterostomies and excisions—good, save one where the ulcer recurred, necessitating gastrectomy. Two cases of high gastro-enterostomy alone—unsatisfactory. Whether it was the high position of the stoma or the non-excision of the ulcer that was responsible for failure in the last-mentioned cases is not quite clear; I hope to have a further opportunity of investigating them. At present complaint is made of pain and flatulence, but there is some degree of improvement, and the patients are for the moment reluctant to have any further x-ray examination or treatment.

Analysis of 30 Cases of Complicated Gastric Ulcers.

	Record No.	Condition.	Operation.	Result.
Group 1	10	Ulcer with pyloric tumour	Billroth II	Good.
	135	Ulcer with pyloric tumour	Polya	Died (pulmonary).
Group 2	27a	Large ulcer, lesser curvature	Polya	Good.
	68	Large saddle ulcer	High G.E. and excision	Recurred—Figs. 3, 4, 5, and 6.
	78	Perforating ulcer (spleen and pancreas)	G.E. and excision	Good.
	92	Perforating ulcer (pancreas)	G.E. and excision	Good.
	97	Perforating ulcer	G.E. and excision	Died (pneumonia).
	120	Large pyloric ulcer	Polya	Good.
	120a	Large saddle ulcer	Polya	Good.
	126	Ulcer, adhesions lesser sac	Polya	Good.
	137	Large ulcer, perforating meso-colon	Polya	Good but recent (slides).
	150	Large saddle ulcer	Polya	Good but recent.
Group 3	29	Ulcer high up	G.E., excision of ulcer, appendicectomy	Good.
Group 4	47	Multiple ulcers	High G.E.	Unsatisfactory.
	86	Two ulcers (one quiescent)	G.E. and excision	Good.
	107	Two ulcers	Polya	Good.
Group 5	49	Ulcer and ptosis	High G.E., appendicectomy	Unsatisfactory.
	114	Ulcer and ptosis	G.E. and Coffey's operation	Good.
Group 6	81	Ulcer, adhesions and gall-stones	G.E., cholecystectomy	Good.
	110	Ulcer and gall-stones	G.E., cholecystectomy	Good.
Group 7	38	Non-malignant hour-glass with gall-stones	Polya; cholecystectomy; appendicectomy	Good.
	39	Non-malignant hour-glass	Polya; appendicectomy	Good.
	62	Non-malignant hour-glass	G.E.	Good.
	71	Non-malignant hour-glass	Excision, gastroplasty, and anterior G.E.	Good.
	88	Non-malignant hour-glass with large ulcer	Polya	Good.
	100	Non-malignant hour-glass	Polya	Died (collapse).
	16x	Non-malignant hour-glass	Polya	Died (pneumonia).
	17x	Non-malignant hour-glass	Polya	Died (? acute dilatation).
	42x	Non-malignant hour-glass	G.E.	Good.
	45x	Non-malignant hour-glass	Polya	Good.

G.E.=gastro-enterostomy.

In gastric ulcer, as in duodenal and gastro-jejunal ulcer, Morton's experiments have brought us appreciably nearer to an accurate understanding of the etiology, but have not brought us quite to the central point of the problem. He has for the first time succeeded in transforming an acute gastric lesion into a typically chronic ulcer. Again, the method employed is duodenal drainage, and again the clinician is left with the question as to what in the clinical case of gastric ulcer corresponds to duodenal drainage in the experiment; and what is it in the clinical case which corresponds to the experimental acute gastric lesion which duodenal drainage transforms into the typical chronic ulcer?

In speaking in Manchester on the subject of gastric ulcer I cannot refrain from allusion to the discussion in which Manchester bore so important a part. In spite of the findings of the Manchester Committee and of the modified form in which Charles Mayo recently stated the doctrine of the origin of cancer in benign ulcer, I see from the Mayo staff proceedings in January, 1928, that McCarty reiterates his conviction that nearly all ulcers of a diameter of 2.5 cm. and over are malignant, and that in 12 per cent. of apparently benign ulcers a cytoplasia of cancerous nature—not to be recognized in sections stained by ordinary means, but recognizable by special histological methods—is present. The only aspect of the question on which I can from my own cases express any opinion is the clinical one.

In none of the ulcers on which I have operated by simple gastro-enterostomy have we found anything in the "follow-up" to suggest the subsequent development of cancer. Further, as will be seen from the tables, all large ulcers and many of the smaller have been excised—sometimes by themselves, at other times as part of the stomach removed in partial gastrectomy. I have not kept all measurements, but in a good proportion of the cases the ulcer was the size of a five-shilling piece or half-crown (see Fig. 7), without any

FIG. 7.—Drawing from x-ray photograph in Case No. 137. An example of a large-sized non-malignant ulcer of the posterior wall, eroding pancreas, and transverse mesocolon.

histological evidence of malignancy and without subsequent recurrence. On the other hand, all malignant ulcers which I have encountered have been of the size of a five-shilling piece and upwards.

In no case of ulcer, large or small, has cancer subsequently developed where the histological findings on the specimen removed at operation were non-malignant.

The immediate mortality in the various groups is almost entirely due to pulmonary complications. To what extent are these pulmonary complications the result of the anaesthetic? The matter has been debated many

times. Personally I think the anaesthetic is usually responsible. I have not had an opportunity of using ethylene, which American surgeons find such a help. The danger of pushing anaesthesia to the point of complete relaxation, and the consequent difficulty in closing an incompletely relaxed abdomen, have been held responsible for many of the ventral hernias in the upper abdomen. Inasmuch as this complication is common to all abdominal operations I have not included cases of post-operative hernia as unsatisfactory results in the figures above given.

In the choice of a site for the abdominal incision which will avoid ventral hernia surgical opinion is swinging back to the mid-line, where the interlacing fibres give a secure grip to the sutures. Personally I like to reinforce the continuous catgut in the essential layer with "figure of 8" silkworm-gut sutures held taut on a frame. Since adopting this method I have so far had no ventral hernia in any gastric or duodenal case, although many times the condition of the patient did not warrant pushing the anaesthetic to complete relaxation, and in some cases, especially in perforation, the wound did not heal without some suppuration.

TUMOURS OF THE FRONTAL LOBE OF THE BRAIN.

BY

J. PURDON MARTIN, M.A., M.D., M.R.C.P.,
ASSISTANT PHYSICIAN TO THE NATIONAL HOSPITAL FOR NERVOUS
DISEASES, QUEEN SQUARE; PHYSICIAN TO THE SEAMEN'S AND
BOLINGBROKE HOSPITALS.

TUMOURS of the frontal lobes of the brain anterior to the pre-central gyrus are notoriously difficult to diagnose. The following three cases in which the necropsies were performed within a period of less than three months seem to be worth recording because they form a group in which there was considerable similarity, and they indicate the chief lines of a general clinical picture.

CASE I.

An engineer, admitted to the National Hospital, Queen Square, had felt perfectly well up till March, 1926; one morning in that month, after walking a few yards from his house, he ran back, mounted the stairs two at a time, stooped to pick up a book, and fell unconscious. When his wife reached the room a few moments later he was still unconscious, was foaming at the mouth, and had bitten his tongue; his face and jaw were twitching, but not his limbs, and there was no incontinence. It is said that the attack lasted ten to fifteen minutes; the patient did not then recover consciousness, but appeared to pass into a sleep, from which he could not be roused. After several hours of sleep he had another fit, described as "most violent," in which he "struggled" with all his limbs. After a few hours' more sleep he recovered consciousness and complained of severe headache, but nothing abnormal was noticed about him; his mental condition was that of a patient who had had a severe illness, and he was content to commit himself unreservedly to the care of others. Subjectively the patient recovered considerably in a few days, but his mental state of docility

persisted more or less. He returned to his work and seems to have performed it normally for three months; at the end of that period he had another fit. This, like the former, was a generalized seizure with unconsciousness; after this he did not return to work. For the next six months he was free from gross symptoms, but there was some slight mental deterioration; he lost his initiative, relied increasingly on his wife, and became so forgetful and absent-minded that he could not be trusted to go out alone. He does not seem to have been troubled with headaches during this period. On Christmas Day, 1926, he had a severe headache; this persisted throughout the next day and led up to another fit in the afternoon of December 27th. My first examination was made about ten days after this third seizure. The patient then had had continuous headache, not, however, of any great intensity, since the occurrence of the last fit.

This examination in January, except for a certain abnormal mental state and two objective signs to be mentioned later, revealed nothing abnormal. No defect could be discovered in the motor or sensory functions; in particular, the optic discs were normal, as also were the visual acuity and the visual fields. The sense of smell was intact in both nostrils, and odours could be distinguished and named. The cerebro-spinal fluid showed no cells and no excess of protein; the Wassermann reaction was negative both in the fluid and blood. An x-ray examination of the skull gave no indication of any bony change. The two slight signs referred to were an occasional fine tremor of the hands, such as is commonly seen in nervous patients at a first examination, and an exaggerated flexor response in the plantar reflexes. The patient remained in hospital for four weeks, and during that time had frequent headaches, but after the lumbar puncture the headache ceased for several days. After investigation he was allowed to go home (he said that he "felt quite well"), and was instructed to report himself if any new symptoms developed. Bromide and luminal were given during this time. After two months the patient returned to the out-patient department, complaining of a loss of vision and the occurrence of "petit mal" attacks—momentary losses of consciousness about three times a week. It was found a week later that the visual acuity of the left eye had diminished to 6/60 and that of the right to 6/9. The left disc showed some doubtful pallor of its temporal half and the right appeared normal; colours of small objects could not be distinguished in any part of the field of the left eye.

The patient was again admitted to hospital under my care on April 9th, 1927. At that time, more than a year after his first fit, his condition was as follows. He answered questions and behaved intelligently, and had no delusions or hallucinations, but he did not seem to realize fully the seriousness of the threatened blindness. He was probably somewhat deficient emotionally, and was slightly euphoric: there was less than the usual emotional modulation in his voice. His speech was tremulous and slow, but there was no aphasia; his memory was bad. The sense of smell was still normal on both sides. The vision was seriously impaired. In the right eye there was a central scotoma, which was quickly enlarging, though the disc appeared normal. In the left eye acuity was reduced to counting fingers at half a metre, and the central and upper temporal parts of the field were completely obliterated; on the disc there was some temporal pallor. The pupil reactions and eye movements were normal. The right palpebral fissure was wider than the left, suggesting slight weakness of the right facial muscles, but such weakness as there was did not affect voluntary movements. The remaining cranial nerve functions were normal. In the limbs no motor or sensory abnormality was found except that the patient was at times generally tremulous. This was a fine irregular tremor, not unlike that seen in early stages of general paralysis, and it affected his speech as well as his limbs. All the abdominal reflexes were brisk. The plantar reflexes were peculiar in that they were very briskly flexor: the slightest touch of the sole produced full and immediate flexion of the great toe, unaccompanied by any withdrawal of the foot. The gait was normal and there was no incontinence.

During May the vision rapidly deteriorated and the temporal parts of both discs became pale; the visual field of the right eye was almost entirely obliterated by enlargement of the central scotoma. An x-ray photograph of the skull now showed some change about the pituitary fossa, and rather open sutures suggesting intracranial pressure. It seemed that there must be a tumour involving the optic chiasma and the optic nerves, affecting the left side more than the right; it was decided to explore that region by operation. On June 22nd the operation was performed by Mr. Sargent, the exploration being made through a quadrilateral opening in the left frontal bone. Part of the temporal bone in the temporal fossa was extremely thin; the dura was very tense, and to relieve the tension about 40 c.cm. of cerebro-spinal fluid were withdrawn by lumbar puncture. When the dura had been opened and the left frontal lobe was elevated a soft gelatinous-looking mass was seen protruding from under the frontal lobe, on the outer side of the olfactory bulb. It surrounded the left optic nerve and the chiasma, and from these structures a portion of it was dissected off; the site of origin of this growth could not be determined. This operation resulted in a considerable improvement in the patient's vision, and the wound healed uneventfully.

A few weeks later definite weakness of the right side of the face and right arm began to develop, and was accompanied by motor aphasia. At this stage (July 29th, 1927) the plantar reflexes were still of the same exaggerated flexor type as before, and stroking of the sole of the left foot caused flexion of the great toe on the right side as well as on the left; but by Oppenheim's method a feeble extensor response could be obtained on the left. During the last few weeks of his life the patient was emotional and very depressed. His general state gradually deteriorated, and he died on August 28th, 1927.

At the necropsy a very hard tumour was found on the medial