Original Articles.

OPERATIONS UPON BENIGN DISEASES OF THE STOMACH AT THE BOSTON CITY HOSPITAL AND MASSACHUSETTS GENERAL HOSPITAL 1898-1903 INCLUSIVE.*

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I. INTRODUCTION.

THE object of this paper is to review the surgery of benign diseases of the stomach at the two large hospitals in Boston during the last six years. Not long ago the medical aspect of ulcer of the stomach² at one of the hospitals was critically studied by a physician and surgeon, and it seemed fitting that the surgical side of the question should be as impartially treated. The above paper showed that the immediate success attending medical treatment of ulcer of the stomach in Boston was far below that usually given in the literature. Fifty-five per cent of the patients were discharged well from the hospital in contradistinction to Leube's 74% cured.³ The ultimate results were still worse, and demonstrated that 56% of the ulcer patients were either dead, or had had stomach trouble referable to the ulcer since their discharge from the hospital. It is with patients similar to this 56% of medically unsuccessful cases that this paper deals. While the results are not as favorable as have been elsewhere reported, they represent the facts. Furthermore, they show the condition of the patient some time after the operation and not the immediate result alone. In the opinion of the writers the next six years will show remarkable improvement in this branch of surgery.⁴

* Read in part at a meeting of the Surgical Section, Suffolk District Medical Society, January 6, 1904.

¹ At a meeting of the Surgical Section of the Suffolk Branch of the Massachusetts Medical Society, held last winter, the question of operation in benignant gastric disease was discussed, and at its conclusion the suggestion was made that the results of the operations at the two large hospitals in Boston be combined and published. The writers are indebted to the chairman, Dr. F. B. Harrington, and the secretary, Dr. E. A. Codman, for permission to use the statistics of the Massachusetts General Hospital, which had been partially compiled for them by one of the writers, and to the Surgical Staff of the Boston City Hospital for permission to record their cases.

The writers further wish to express their appreciation of the kindness of Dr. Arthur T. Cabot, who read the manuscript before it was sent to the printer.

² Gastric Ulcer at the Massachusetts General Hospital, 1888-98. Greenough and Joslin. Amer. Jour. Med. Sci., August, 1899.

³ Centralbl. f. Chirurgie, 1897, No. 28, p. 66.

⁴ Should it meet with the approval of the surgeons at the Boston City Hospital and the Massachusetts General Hospital, it is the intention of the writers to record yearly the condition of all patients operated upon for benignant gastric disease since Jan. 1, 1898.

ANALYSIS OF THE STRICTURES OF THE PYLORUS.
PYLORIC OBSTRUCTION.

Number of cases	21	
Number of recoveries	16	76.2%
Mortality	5	23.8%
Present condition: well	9	42.9%

On analyzing the fatal cases, we find that there were two fatal cases of pyloroplasty for stricture of the pylorus, Cases 3 and 17. We find that Case 3 had been exhausted by five years of vomiting and hemorrhage, and had had three terms of medical treatment during that time. She was in very poor condition for operation, and died on the fourth day, without recovering from shock.

Case 17 was of similar character, being that of a woman who had had daily vomiting and suffered daily stomach washings for a year, and had lost 40% in weight. She almost succumbed to shock on the table, and died on the fifth day of pneumonia.

As to permanent results of the pyloroplasties for stricture, Cases 8, 5 and 7 are classed as cured.

Case 8, a man who was in truly desperate condition at hour of operation, was well and at work four years after operation.

Case 5 was well four years after operation, and had worked steadily since.

Case 7 had vomiting and lived on soft solids for three years after operation, but in March, 1904, reported well.

As relieved are classed Cases 1, 2 and 4.

In Case 1 the relief only lasted a few months. In this case a further operation (gastro-enterostomy) ought to be considered.

In Case 2 relief after operation remained till two years later, when she died after removal of a ureteral calculus.

Case 4 was at work four years after operation, but obliged to live on soft solids.

Case 18 was not relieved.

In considering these cases in which relief was only temporary or did not occur, we must remember that the method of Heineke-Mickulicz, owing to the danger of recontraction, has been replaced by the gastro-duodenostomy of Finney, which affords a much larger opening and one much less likely to recontract. In these cases not relieved further operative procedure ought to be considered, as no other treatment affords any prospect of relief.

Of the gastro-enterostomies for pyloric stricture, ten in number, six are classed as cured, - Cases 20, 37, 43, 10, 25 and 38.

Case 20, emaciated to the last degree at time of operation, was in good health, and had gained forty-nine pounds three years after operation.

Case 37 was well and at work five months after operation.

Case 43 was well six week after operation.

Case 10 was well at discharge from hospital.

Case 25 reported well three years after operation.

Case 38 reported well eighteen months after operation.

Of the gastro-enterostomies for pyloric stricture, there were three deaths,—Cases 13, 29 and 36.

Case 13 was operated upon twelve weeks after swallowing carbolic acid. Here probably faulty method was the cause of death, as no shock followed operation, but persistent vomiting. Anterior operation with the Murphy button was done. It is a question whether the opening was not made too high in the stomach. Case 29 was exhausted and emaciated. He had had seven weeks treatment in medical wards, and died. Died probably of shock after a quick anterior button operation. Case 36 died of inhalation pneumonia.

As not relieved are classed Cases 24, 26, 32.

Case 24 had a sponge removed six months after discharge, and pain and vomiting continued two years after operation (error in technique).

Case 26 "no better" two years after operation.

Case 32 died one month after discharge, and autopsy showed contraction of opening.

ANALYSIS OF THE CHRONIC ULCERS.

Number of cases	21	
Number of recoveries	16	76.2%
Number of deaths	5	23.8%
Present condition: well	7	33.3%

Review of the operations for chronic ulcer, 21 in number, shows that excision of the ulcer was done three times with no deaths; pylorotomy twice, both cases proving fatal; gastro-enterostomy 15 times, with 3 deaths; gastro-duodenostomy twice, with no deaths.

The fatal cases of gastro-enterostomy were Cases 16, 30 and 41.

Case 16 died on the fourteenth day of circular vomiting, constriction of the descending loop by the opening in the meso-colon, which was thickened by old adhesions and was not sutured to the stomach wall. This was an error in technique.

Case 30, a chronic alcoholic, died of delirium tremens.

Case 41. In this case the omentum adherent in the pelvis had to be tied off. A large portion tied with a coarse silk ligature became adherent to the line of union between the stomach and intestine and caused circular vomiting. An error in technique.

Of the pylorotomies, Case 12 died of shock after a difficult operation which was performed under the impression that the case was one of carcinoma. A gastro-enterostomy would have been, probably, a safer procedure.

In Case 19 a pylorotomy was also done, owing to supposed malignancy. Here, also, a gastro-enterostomy might have been preferable.

As cured of the excisions are classed Cases 9 and 11.

Case 9 was well three or four months after operation.

Case 11 required a year for convalescence, but worked after that steadily till the present, three years after operation, when he is well.

Case 22 is unrelieved, though a second operation showed the gastro-enterostomy to be patent.

Case 23 is no better than before operation.

Case 35 is classed as not relieved, his pain and distress having returned five months after operation.

Of the gastro-enterostomies, five are classed as cured,—Cases 21, 28, 34, 39 and 42.

Case 21 was in fine condition two years after operation.

Case 28 was well fourteen months after operation.

Case 34 was well six months after operation.

Case 39 in excellent condition four months after operation.

Case 42 in excellent condition two months after operation.

As relieved are classed three cases,—14, 15 and 31.

Case 14 after relief for some time died of carcinoma, probably originating in the old ulcer, sixteen months after operation.

Case 15 had more or less vomiting for two years, but improved and was able to do her work. In February, 1904, three years and four months after operation, there was return of vomiting and bloody stools.

Case 31 (a case of perforation prevented by adhesion to anterior abdominal wall) had an abscess of the lung three months after operation, and died six months later.

As "not relieved" are classed Cases 40 and 33.

Case 40, a case of gastric tetany, from chronic ulcer, had successively a gastro-pxy, gastro-enterostomy, entero-enterostomy and gastro-duodenostomy (Finney) performed, and five months later was vomiting and still in hospital in poor condition.

Case 33 was better for four months, but later had return of vomiting and distress, and six months after operation was in poor condition.

Of gastro-duodenostomies, Case 27 is classed as relieved, which was her condition on leaving the hospital. No subsequent report.

Case 6, an acute dilatation of the stomach, was fatal, and is classed alone.

REMARKS AND CONCLUSIONS.

On review of these cases of the surgery of benign disease of the stomach, we find that we have in all of them been dealing with conditions which have been obstinate and irremediable by medical treatment. In stricture of the pylorus we have been dealing with a mechanical condition curable only by mechanical, that is, operative procedures. The final results fall into the classes given above,—a class who were cured, that is, restored to perfect health for a long period, those who were temporarily relieved, a small number who were not relieved, and the fatal cases.

In estimating the advantages which operation offers at the present time, we must take into consideration several facts. First, that these cases have been the early cases, operated upon during

the developmental period of gastric surgery in a conservative community. The technique has been in many instances faulty, owing largely to the inexperience of the operators, which was unavoidable. Lack of belief in the favorable results of surgical intervention has influenced the medical consultants to delay too long in calling in surgical consultation, and the surgeon himself has in many instances felt it so necessary to assure himself of the absolute necessity of undertaking an operation of such supposed magnitude that he too has lost valuable time and wasted the strength of his patients.

During the period that these operations have been done, the surgery of the stomach has progressed under the leadership of men who have devoted themselves to its study and practice, notably, Robson, Moynihan, Mayo, Mickulicz and Finney, until gastro-enterostomy and gastro-duodenostomy have become simple and safe procedures in the hands of those who are interested sufficiently in this subject to keep abreast of the modern technique. A knowledge of the pathological appearances *in vivo*, sufficient to enable the surgeon to decide accurately at the time of operation what measures to adopt, is also the reward of special attention and study of gastric surgery.

Medical clinicians who have interested themselves in the stomach are learning to differentiate those cases which are amenable to surgical treat-

ment while there is yet time and opportunity for surgical aid; in other words, are alive to the advantages offered by surgery in suitable cases. Under these improved conditions the prospects for those patients suffering from stricture of the pylorus and chronic ulcer of the stomach are daily becoming brighter. Distrust and jealousy on the parts of both medical men and surgeons of each other's methods and results have in the past done much to limit the field of surgery, and mis-called conservatism, which conserves everything but the health of the patient, has also contributed to the bad results. Only by early consultation, courtesy, confidence and good faith on the part of physician and surgeon can this undesirable state of things be avoided. Its avoidance in the future will mean much to those afflicted with benign disease of the stomach.

Modern surgical technique, and, in particular, posterior gastro-enterostomy by the method of Moynihan, and the gastro-duodenostomy of Finney, have shortened the convalescence and improved the final results in gastric surgery enormously.

The judicious application of these procedures in the cases narrated in this paper might have lessened the mortality, increased the class of cures and diminished the number of those not relieved, besides shortening the immediate surgical convalescence of many.

II. OPERATIONS FOR CHRONIC GASTRIC ULCER, PYLORIC OBSTRUCTION AND ACUTE DILATATION OF THE STOMACH.

NAME AND DATE	SEX	AGE	SYMPTOMS AND DESCRIPTION	CONDITION FOUND OPERATION	RESULT	REMARKS
J. Q. July, 1898. 1	F.	53	Gastric trouble for 5 years. Pain. Vomiting, without blood, of large quantities of old food. Stomach holds 3 quarts.	Stenosis of pylorus from thickened wall and adhesions. Pyloroplasty.	Disch. much rel'd.	Comfortable for some months after operation, then vomiting returned. "A living skeleton."
M. R. Aug., 1898. 2	F.	39	Gastric symptoms for 13 years. Vomiting, without blood, pain after eating. Peristaltic waves seen in epigastrium.	Pylorus stenosed, so that it will admit only a lead pencil. Gall bladder full of stones. Pyloroplasty. Gall bladder drained.	Well.	Second operation Dec. 23, 1899. Adhesions around pylorus divided. Well till Feb. 2, 1901, when she died after removal of calculus from ureter.
M. C. Sept., 1898. 3	M.	43	Burning pain in epigastrium and vomiting for 5 years. Loss of 45 pounds in weight. In bed at various periods, 5 to 6 weeks at a time. Three times in hospital for medical treatment. Hematemesis at various times. Stomach capacity, 5 pints. Free HCl. Had been relieved by treatment on medical side, but relapsed.	Stomach dilated and pylorus thickened. Pyloric opening size of lead pencil and not dilatable. Heineke-Mickulicz pyloroplasty.	Died. Sept. 15, in 4 days.	Shock followed operation and active stimulation employed. No vomiting. Gradual loss of strength, and death on fourth day.
N. H. Jan., 1899. 4	F.	28	Probable gastric ulcer 14 years previous. Since then chronic indigestion. Symptoms more acute for 3 months. Vomiting of old food, epigastric pain p. c.	Stenosis of pylorus and hour-glass stomach. Pyloroplasty and gastro-plasty.	Disch. much rel'd.	Well for about a year. Since has had three attacks of pain and vomiting of 3 to 4 weeks' duration. Is now at work, but lives on soft solids.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Results	Remarks
C. D. G. Feb., 1899. 5	M. †	48	Swallowed muriatic acid 10 months past. Since then classical symptoms of pyloric obstruction.	Stenosis of pylorus. Pyloroplasty.	Disch. much rel'd.	Digestion good. Worked steadily since discharge.
H. C. Feb., 1899. 6	F.	19	Indefinite history of injury 14 months before by striking the epigastrium against a curbstone. Since then much distress with gas and after eating special food. Distress had been irregular. No vomiting of blood. The history suggested a neurotic tendency. Abdominal examination negative. Vomitus contained lactic acid but no free HCl. For 3 weeks irregular attacks of vomiting and epigastric pain. Feb. 15 a sudden collapse occurred. In the left hypochondrium a large tumor appeared.	Before operation a stomach tube was passed and failed to reduce the size of the tumor. At operation the stomach was found much dilated. Under ether a second attempt was made to empty the stomach by a stomach tube, but without success, though apparently no obstruction by stricture. On opening the stomach about a gallon and half of yellow fluid escaped. Gastroenterostomy by Murphy button.	Died 3 days after oper'n.	Condition at end of operation very poor. On the third day after operation a mass similar to that found before operation appeared in the left hypochondrium. No relief from the passage of stomach tube. Collapse and death. No autopsy.
G. Z. 1899. Mar., 7	M. †	54	Chronic gastric trouble for years. For 10 months unable to work. Had vomited and passed blood by rectum.	Pylorus buried in adhesions, thickened walls causing stenosis. Pyloroplasty.	Disch. rel'd.	No work for 1 year, 5 months. March, 1901: Returned to hospital with pain in stomach and dark stools and vomitus. May, 1903: Improving. Some vomiting, without blood. Lives on soft solids. Able to work. March, 1904, well.
L. L. Nov., 1899. 8	M. †	39	Two years before operation symptoms began with epigastric pain and much vomiting. Grew worse constantly. Now much epigastric pain, vomits everything he eats. Vomitus generally dark, once or twice slightly tinged with blood. Free HCl absent. Lactic acid present. Stomach capacity 37 oz. Lower border at umbilicus. Patient much emaciated.	Pylorus small, thickened, and opening admitted only a director. No ulcer found. Heineke-Mickulicz pyloroplasty. No shock.	Rel'd.	Dec. 31, 1903, was in fine condition. Had worked steadily since leaving the hospital.
J. S. Nov., 1900. 9	M.	37	Indigestion for one year. For last two weeks very uncomfortable, epigastric pain so severe that he was unable to eat. For two days vomited "coffee ground" material, and continued to vomit in spite of feeding. Nodule felt in pyloric region. Patient pale and emaciated. Free HCl absent. Lactic acid present.	A large ulcer with much indurated elevated edges 2 in. in diameter on lesser curvature. $\frac{3}{4}$ in. from pylorus. Malignancy suspected. Ulcer excised. Hemorrhage controlled by continuous silk suture. Plastic to prevent narrowing on pyloric side. Resection of healthy tissue around ulcer was free on account of suspected malignancy.	Rel'd.	Disch. from hospital Jan. 16, 1900. Reported well soon after leaving hospital, when he moved to Philadelphia, where he could not be traced.
J. M. Feb., 1901. 10	M. †	31	Epigastric pain. Vomiting begun 9 years past. Gradually grew worse. Pain independent of food, but increased by lying on right side. Operation, — anterior gastro-enterostomy (Murphy button) — gave relief for about 2 years. Then old pain returned.	First operation, many adhesions and pylorus stenosed. Question of T. B. peritonitis. Anterior gastro-enterostomy. Murphy button.	Disch. Rel'd.	Second operation. Stricture of pylorus as before. Gastroenterostomy opening had contracted to size of tip of little finger. Gastroenterostomy (McGraw) at site of former anastomosis. Well Feb., 1904.
H. S. June, 1901. 11	M.	32	Symptoms began 6 months ago with sudden attack of faintness, epigastric pain, and vomiting. These attacks were frequently re-	Pylorus contracted too much to admit tip of finger. Ulcer extending $\frac{3}{4}$ inch along greater curvature. Excision of ulcer	Rel'd.	Convalescence 1 year, but since has worked steadily and without gastric discomfort.

CASE 11. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			peated and obliged him to leave off work for varying periods. Hematemesis occasional. Had six weeks careful hospital treatment without marked improvement. Pale, emaciated, slight epigastric tenderness.	and stricture, involving almost a complete pylorotomy, only a small strip being left posteriorly. Pyloroplasty.		
J. H. B. July, 1901. 12	M.	30	Three years previous to entrance sharp pain in the right hypochondrium. Vomiting. In following year and also one year ago had a similar attack. Three months ago — was seized with acute abdominal pain, lasting four weeks. Since getting up has had daily attacks of epigastric pain and much distress from gas. Vomiting in night. No hematemesis. Stomach holds 88 oz., and in the first washing considerable coffee-ground material. Visible peristalsis at times. Free hydrochloric and lactic acid present. Medical treatment was tried for eight days, and patient grew steadily worse. Exploration of stomach resulted in temporary relief. Numerous firm adhesions about the pylorus and the pylorus thickened. Improvement continued for 6 or 8 months. Three months after the operation had gained 45 pounds. Symptoms reappeared, and for 3 weeks before entrance there had been daily vomiting, $\frac{1}{2}$ hour after eating.	Under ether a mass in the region of the pylorus was palpable. At operation this pyloric mass was thought to be carcinoma. Pylorotomy was done, and in the operation the surrounding tissues and vessels were badly traumatized. Union, end-to-end, was accomplished by means of a Murphy button. Death all but occurred on the table.	Died within a few hours after oper'n.	No autopsy.
J. P. Aug., 1901. 13	M. †	61	Entered medical service July 5, 1901. Symptoms dated from 7 weeks before, when he had swallowed strong carbolic acid. Epigastric pain, vomiting continued in spite of medical treatment. He did not improve, and was transferred surgical on Aug. 6. Pale, emaciated. HCl. absent. Lactic acid present. Stomach holds 21 oz.	Pylorus thickened, and opening barely admitted a director. Gastro-jejuno-stomy with a Murphy button (anterior). No shock.	Died seventh day.	Vomited for 10 days until relieved by lavage. Then vomiting recurred, and gradually failed.
E. F. Sept., 1901. 14	F.	44	"Dyspepsia" for 3 years. Eighteen months ago fainted, and vomited a cupful of blood. Had rectal feeding for 3 weeks. After this epigastric pain. No melenas. Vomiting, but not of blood since first attack. No loss of weight. Pale, tender below left costal margin, and some general abdominal tenderness. Free HCl. present. No lactic acid. Normal blood in stomach contents.	Pale, indurated ulcer on anterior wall, about midway of lesser curvature. Posterior gastro-enterotomy.	Rel'd.	In Jan., 1903, patient was explored for intestinal obstruction (partial), and carcinoma of peritoneum, stomach, omentum, colon, etc., found, probably having started from the old ulcer.
J. H. Sept., 1901. 15	F.	28	Since youth has had nausea and epigastric pain, vomiting usually after eating. Three years ago vomited blood, fainted and had bloody stool. Several simi-	Omentum found adherent to old laparotomy wound. Tied off and released. Pylorus admitted finger. No ulcer found at operation. Posterior	Rel'd.	Had more or less vomiting for two years after operation, but improved much in general condition, and was able

CASE 15. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			lar attacks since. Has lost considerable weight and noticed a tumor in epigastrium. Pale, emaciated. Tender mass felt in left epigastric region. Free HCl present. Capacity, 920 cc. Laparotomy 4 years ago for disease of ovary.	gastro-enterostomy. No shock.		to do her work. Early in Feb., 1904, vomited for a week, with much pain in the stomach. Clots of blood in the stools.
E. S. Oct., 1901. 16	F.	19	For 4 months sharp epigastric pain and vomiting after every meal. Has fainted and suffered from dizziness and dyspnea. No hematemesis. No melena. Treatment in medical ward for 5 weeks with improvement, then relapsed, and vomited blood after solid food. Pain returned. Very anemic and weak. Systolic murmur at base.	Indurated area on greater curvature close to pylorus. Posterior surface of stomach adherent to transverse meso-colon by old fibrous adhesions. Cicatrix on posterior surface of stomach. Meso-colon considerably thickened. Posterior gastro-enterostomy. Opening in meso-colon not sutured to stomach wall.	Died in 14 days.	Did well for 4 days, except for occasional bilious vomiting. Then vomiting became severe and was not relieved by lavage. Grew quite weak, and on fourteenth day entero-enterostomy was done with the Murphy button. Operation showed obstruction of descending loop by thick edge of transverse meso-colon which had slid laterally. Death 8 hours after entero-enterostomy.
H. E. C. Dec., 1901. 17	M. †	50	Twenty-three years before entrance he had nervous dyspepsia and for two years much discomfort from gas. Since then stomach has been delicate. In 1899 jaundice, lasting for 2 months, and gallstones in the stools. Since 1900 there had been frequent attacks of pain in right hypochondrium. For 1 year stomach symptoms have been decidedly worse. Daily vomiting, often very large amounts of old food. Almost daily stomach washings. Weight has gone from 140 to 85½ pounds in the last 12 months. Visible peristalsis below umbilicus. Stomach held 58 oz. Analysis of contents showed the presence of free HCl acid. Hemoglobin 65%; white cells, 6,400. Was kept on medical treatment for 15 days, during which time he gained weight, but treatment did not relieve the evident pyloric stenosis.	Pylorus buried in adhesions, walls thickened and lumen constricted. Pyloroplasty.	Died 5 days after oper'n.	Autopsy showed a stenosis of the pylorus, due to an ulcer which extended out into the duodenum. The stitches of the pyloroplasty were holding and apparently the obstruction had been relieved. Also a pneumonia, which was cause of death.
L. Q. T. Feb., 1902. 18	M. †	43	For 20 years had had difficulty in emptying stomach. No vomiting, no pain. Stomach held 50 oz.	Lumen of pylorus small. No induration. Pyloroplasty.	Disch. rel'd.	"I am just as bad now as I was before the operation."
J. C. Apr., 1902. 19	M.	42	For 4 years symptoms of pyloric obstruction, — epigastric pain, vomiting of large quantities of old food, sometimes with blood. Stomach held 64 oz. Had lost 25 pounds.	Indurated mass at pyloric end of stomach on the anterior surface. Thought to be malignant. Pylorectomy, with end-to-end suture.	Died 9 days after oper'n.	The course after operation was uneventful until the seventh day, when a gastric fistula developed. Death 2 days later. No autopsy.
G. P. L. Apr., 1902. 20	M. †	41	For 15 years epigastric pain and vomiting, growing gradually more frequent. Excessive hematemesis on 2 occasions within 10 years. Vomitus constantly coffee colored. Has had hospital treatment for two periods	Pylorus much constricted. Lower border of stomach below umbilicus. Anterior gastro-enterostomy by silk suture.	Rel'd.	Had no gastric disturbance after leaving hospital. In Jan., 1904, was in perfect health and weighed 140 pounds, a gain of 49 pounds since the operation.

CASE 20. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			of several weeks. Much loss of weight. Now weighs 91 pounds. Much emaciated, pale. Lower border of stomach 2 inches below umbilicus, and peristalsis of stomach visible through abdominal wall. Free HCl. absent. Lactic acid, trace.			
D. C. July, 1902. 21	F.	48	Pain in left hypochondrium, eructation and occasional vomiting for 8 to 10 years. Four weeks before operation copious bloody vomiting, preceded by 10 days of severe nausea and anorexia. After this, bloody vomiting for 5 days. Pale, emaciated, epigastric tenderness.	Stomach appeared normal. Ulcer not found. Anterior gastro-enterostomy with suture. Pylorus patent and not thickened.	Rel'd.	Convalescence complicated by a parotitis which required incision. Left hospital Sept. 3 in good condition, with no gastric symptoms. Jan. 4, 1904, reported to be in fine condition.
T. McG. July, 1902. 22	M.	44	Headache and vomiting for 15 months. Vomited 5 to 12 times daily. Had been unable to work for over 6 months.	A few adhesions, but no definite induration about pylorus. Anterior gastro-enterostomy (McGraw).	Disch. rel'd.	Return of pain and vomiting, which have continued, despite a second operation, which showed patent anastomosis, and a third in which pus was evacuated.
J. L. July, 1902. 23	M.	41	Constant epigastric pain for 1½ years. Pain increased by taking food. Examination negative.	First operation 7 months after onset of symptoms; an exploratory laparotomy gave no relief. Second operation 10 months later. A few adhesions separated. No definite induration about pylorus. Anterior gastro-enterostomy (McGraw).	Disch. rel'd.	"I am no better than when I left the hospital, . . . stomach troubles me continually, . . . what I eat distresses me."
B. G. July, 1902. 24	M. †	32	Gastric pain for 10 years without vomiting. Pain came at irregular intervals and lasted a day to 2 weeks. In one attack jaundiced.	Pylorus indurated and lumen stenosed. Anterior gastro-enterostomy (McGraw).	Disch. rel'd.	Sponge removed 3 months after discharge. Pain and vomiting continue.
J. J. B. Sept., 1902. 25	M. †	36	Swallowed nitric acid 5 weeks previous. For about 3 weeks had vomited practically everything taken by mouth.	Pylorus and first part of duodenum were like a rope. Anterior gastro-enterostomy (McGraw).	Disch. rel'd.	Well. Serving a 6-months' term in Deer Island for stealing.
W. K. W. Oct., 1902. 26	M. †	42	Dyspepsia for 20 years. No history of any acute attack with vomiting of blood. Stomach held 55 oz.	Old scar at pylorus which constricted the lumen. Anterior gastro-enterostomy (McGraw).	Disch. rel'd.	"I don't feel any better than . . . the day I went in."
M. M. Nov., 1902. 27	F.	44	Vomiting and epigastric pain for 3 years. Hematemesis 2 days before entrance. No melena. Vomiting ½ to 2 hours after eating. Indefinite resistance and dullness in epigastrium. Loss of weight, 25 pounds in 3 years.	Dilated stomach. Distinct scar on pylorus. A few old adhesions of omentum to duodenum. Finney's operation of gastro-duodenostomy.	Rel'd.	Discharged from hospital Dec. 16. No gastric symptoms. Appetite and general condition improving.
L. F. Nov., 1902. 28	F.	33	Four years ago a severe attack of vomiting and epigastric pain. Some hematemesis. Delicate stomach always. Right ovary and tube removed Oct. 20, 1902, for salpingitis. Ventro-suspension also performed 18 days after operation. Severe and persistent vomiting with hematemesis began and continued 10 days. Some blood in vomitus. Exhausted and emaciated. Tenderness in epigastrium.	Separations of old adhesions of duodenum and pylorus to posterior abdominal wall. Anterior gastro-jejunostomy with Murphy button. Patient in poor condition and operation had to be rapidly completed.	Rel'd.	Vomited almost constantly for six days after operation. Vomiting continued occasionally at gradually increasing intervals till Dec. 28. Discharged in good condition Jan. 10, 1903. No symptoms.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
G. N. T. Nov., 1902. 29	F. †	37	After birth of twins, 11 months ago, did not recover strength, and 9 months ago began to have attacks of vomiting once a week, gradually increasing during 2 months until they occurred daily. Five months ago began lavage, which relieved her. Has lost much strength and 20 pounds in weight. No solid food for 2 months. In medical ward from Oct. 4 to Nov. 25, 1902. At time of transfer surgical, on Nov. 25, was emaciated and exhausted.	No distention of stomach. Small intestine distended. Marked spasm of pyloric end and of duodenum, practically closing lumen for several inches. Anterior gastro-enterostomy with Murphy button. Good recovery from ether.	Died.	Five hours after operation began to fail, and died about 8 hours after operation.
J. F. May, 1903. 30	M.	29	Eight years ago for 4 weeks had epigastric pain and vomiting for 6 weeks. Hematemesis once during this period. Four days ago vomiting and epigastric pain returned. Tenderness in epigastrium.	Thickening of pylorus found, but no definite evidence of ulcer. Posterior gastro-jejunostomy by Mickulicz method.	Died.	Patient did not vomit, but did not sleep, became delirious, and steadily failed after operation. Died on third day. No autopsy.
A. R. June, 1903. 31	M.	50	Epigastric pain for 5 weeks, very severe for past week. Pale, emaciated. Dullness and marked tenderness in epigastrium, especially in left. Marked muscular spasm. Normal pulse and temperature.	Chronic ulcer of stomach on anterior surface near the cardia on the left, having a large perforation at its center, but adherent at point of perforation to abdominal wall. Much thickening of walls of stomach about ulcer. Gastro-plication. Posterior gastro-enterostomy by suture.	Rel'd.	Convalescence was slow on account of mural abscess which was opened on 8th day. The sinus was slow in healing. Was discharged on July 24, 6 weeks. Was up and about with no symptoms, and wound healed except for a small granulating area. Returned to hospital Aug. 13 and was operated Aug. 29 for abscess of right lung. Gradual convalescence. Small tumor excised from abdominal scar Oct. 22 and pronounced "Small, round, called sarcoma." Discharged Nov. 3. Up and about, though in rather poor condition and having a small sinus. Died at home about Dec. 10.
T. J. W. June, 1903. 32	M. †	58	Chronic epigastric pain without vomiting. No history of symptoms suggesting ulcer.	Pylorus small, nothing else remarkable. Posterior gastro-enterostomy (McGraw).	Disch. rel'd.	One week after discharge all symptoms returned and died 1 month later. Autopsy showed anastomosis contracted so as to admit only tip of little finger.
A. C. June, 1903. 33	F.	19	Pain and burning in epigastrium for one year. Had vomited blood. During attacks, epigastrium had been tender.	Stomach not remarkable. Posterior gastro-enterostomy (McGraw).	Disch. rel'd.	Better for 4 months. "After I eat I have the same bad pain, and I vomit most everything."
N. C. June, 1903. 34	F.	35	Six years ago attack of sharp abdominal pain with occasional hematemesis began and has continued with varying intervals since. Attacks last about 2 days. Last attack 2 weeks ago, accompanied by hematemesis. In good general condition, tender spot in epigastrium.	Stomach normal in size and contour. Some thickening at pylorus and a few slight adhesions. Posterior gastro-enterostomy with suture. Clamps used for hemostasis, linen thread used.	Rel'd.	Left hospital July 23 in excellent condition, with no symptoms, and was in excellent health on Jan. 5, 1904, 6 months later.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
J. McL. July, 1903. 35	F.	28	Gastric trouble for 10 years. For 3 months constant epigastric pain increased by food. In past attacks had vomited blood. Epigastric tenderness.	Old ulcer on anterior wall which had perforated and was buried in adhesions. Ulcer excised.	Disch. rel'd.	Well for 5 months, when pain returned and distress after any kind of food.
N. D. P. Aug., 1903. 36	M. †	52	Pain in epigastrium, nausea and vomiting for 3 years. Attacks of these symptoms have increased in severity and frequency. No hematemesis, no melena. Lower border of stomach 8 inches below umbilicus when inflated.	Pylorus found thickened and apparently obstructed. Anterior gastro-enterostomy with Murphy button at most dependent portion of stomach.	Died.	On second night after the operation vomited copiously and pulse was up to 135. On fourth day was comfortable and convalescence satisfactory. On eighth day developed a cough, became cyanotic and died suddenly. Autopsy showed an inhalation pneumonia.
J. W. Aug., 1903. 37	F. †	39	Distress after eating for 18 years. Pyrosis and sour eructations. Vomits large amounts every day or two. Daily stomach lavage for past 3 months has relieved her symptoms, but during this time she has lost 13 pounds. No hematemesis. Emaciated, but pulse good and in fairly good general condition. Gastric tympany a finger's breadth below umbilicus. Nodule sometimes felt in right side of epigastrium.	Stomach dilated, lower border below umbilicus. Marked thickening of pylorus, no lumen made out. Much induration of pylorus, suggesting possible malignancy. Pylorus undoubtedly almost completely occluded. Posterior gastro-enterostomy according to Moynihan's method.	Rel'd.	No vomiting after first night. Left hospital Sept. 12 in excellent condition. Soon went to work, and was well and at work in Jan., 1904.
S. I. McP. Aug., 1903. 38	F. †	24	Entered hospital in Sept., 1901. Symptoms suggesting gallstones. Operated and nothing found except a liver which was scarred so that diagnosis of probable syphilis was made. Re-entered July, 1903. Had taken mercury only for 6 months after discharge. For 3 months had been improved. Since then had suffered from dragging pain in epigastrium, belching of wind and nausea, but no vomiting. Good appetite. Medical treatment for 3 weeks without relief. Stomach held 36 oz. Analysis of contents showed no free HCl.	At operation many adhesions found around pyloric end of stomach. Posterior gastro-enterostomy, McGraw. (No mention of condition of stomach or liver.)	Disch. well.	
A. C. Sept., 1903. 39	F.	39	For seven or eight years has vomited pretty regularly 1 to 3 hours after meals. Steady pain—relieved only by vomiting—in epigastrium extending through to back. Treated at medical O. P. D. about 1 year. Diagnosis: Slight hyperacidity and gastroptosis. Lavage 3 times a week for just 3 months, has not relieved vomiting. In 5 months has lost 19 pounds.	Indurated area on anterior surface near lesser curvature. Pylorus much thickened, but not indurated. Enlarged glands in mesentery, one of which was excised. Posterior gastro-enterostomy with suture.	Rel'd.	No vomiting after operation. Left hospital Sept. 29, 1903, eating full diet and having no discomfort. Jan. 3, 1904, was in excellent condition.
L. L. Sept., 1903. 40	F.	23	Brought to the hospital on July 12, 1903, for tetany. Was said to have had a gastric ulcer ten years ago. While on medical side had epigastric pain, tenderness and vomiting. No hematemesis. No melena. Treated	Sept. 10, 1903, gastropepy. No evidence of ulceration found, no relief of symptoms. Oct. 7. Stellate cicatrix found on anterior surface near the greater curvature. Thickening at pylorus. Poste-	Rel'd.	Patient still in hospital to-day (Feb. 11, 1904). Gaining steadily, and vomiting only occasionally. Subsequently vomiting increased, and on March 23, was re-

CASE 40. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			from July 12 to Sept. 10, 1903, without much improvement.	rior gastro-enterostomy. Marked relief of symptoms till Oct. 31, 1903, when vomiting returned, and continued at intervals until Dec. 7, when entero-anastomosis was done with the Connell suture. A spur was found at site of anastomosis, probably obstructing loop. Temporary relief, followed by return of vomiting and symptoms of tetany. Jan. 6, 1904, Finney's operation. Pylorus found contracted and gastro-enterostomy wound closed so as not to admit tip of finger.		ported in poor condition.
E. G. C. Sept., 1903. 41	F.	44	Stomach trouble 20 years ago. For 6 months epigastric pain and nausea, increased by eating. Has vomited coffee-ground material several times. No melenæ. Loss of 25 pounds in weight. Insomnia. Pyrosis. Anorexia. For 6 months has had stomach washed every few days. Occasionally blood in the washings. Trouble began 20 years ago, with an attack of inflammation of the bowels. Is in fair general condition. Stomach not dilated. Slight tenderness in epigastrium.	Omentum found adherent to pelvic viscera and walls, evidently due to an old pelvic inflammation. Stomach normal size. Slight thickening on posterior wall, near greater curvature to the left. Pylorus normal. Omentum ligated with silk and freed from pelvic attachments. Stomach then turned up and posterior gastro-enterostomy performed by Moynihan's method.	Died in 8 days.	Excellent convalescence for 48 hours. Then patient began to look badly and vomit. Vomiting of greenish fluid became constant in spite of lavage, and condition became very poor. On Sept. 26 (eighth day) entero-enterostomy was performed, but patient never rallied, and died that evening. Autopsy: Several small ulcerations on the fundus. A rather large omental stump, with a coarse silk ligature, had attached itself to the anastomosis, and surrounded by this had formed a mass which obstructed the gut at the anastomosis. Gastro-enterostomy tight and also entero-anastomosis.
P. J. G. Oct., 1903. 42	M.	20	Admitted Oct. 13. For 1 week had had dull pain in right hypochondrium. 24 hours before was seized with sharp pain shooting into right scapular region, with chill and vomiting. Examination: Pale, sick looking, marked tenderness and spasm in right hypochondrium. Probable diagnosis: Cholecystitis.	Incision at outer border of right rectus. Gall bladder found normal. Appendix buried in adhesions very long and sharply bent on itself. Tedious appendectomy. The excess of clear fluid noted in peritoneal cavity, and on further examination pylorus found to be much thickened, especially in upper portion, and firmly attached to fresh adhesions to under surface left lobe of liver; fearing that detachment of the pylorus would almost certainly result in a perforation (there had probably been a perforation which was closed by immediate adhesion of the liver), the stomach and colon were turned up and a posterior gastro-enterostomy performed with suture.	Rel'd.	Vomited for two days after operation, but pulse and temperature remained good. Elevated to a sitting posture stopped the vomiting on the third day. Left hospital in good condition in 21 days; and 2 months later, Jan., 1904, was in excellent health.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
S. B. Oct., 1903. 43	M. †	30	Vomiting a short time after meals for two years. No hematemesis. No melena. In hospital 3 times and operation advised. Dilated stomach visible and palpable in upper left abdomen. Tetany.	Stomach found much dilated and pylorus obstructed, apparently by fibrous thickening. Posterior gastro-enterostomy	Rel'd.	No vomiting after operation. Solid food on tenth day. Convalescence delayed by a phlebitis of left leg. Left hospital on Dec. 19, with no gastric symptoms.

III. OPERATIONS FOR PERFORATION OF GASTRIC ULCER.

PERFORATION.

Number of cases	18	
Number of recoveries	5	27.8%
Mortality	13	71.2%
Present conditions — well	5	27.8%

It is certainly gratifying that surgery was able to save these five patients whose condition rendered recovery almost hopeless. In the next series of eighteen cases with perforation of a gastric ulcer operated upon at the Massachusetts General and Boston City Hospitals, we feel sure that the per cent of recoveries will be far greater, and we are led to this conclusion by the study of results obtained in the last six years.

Duration between perforation and operation. — The lapse of time between perforation and operation can be only approximately determined. In the five successful cases the duration was on the average fourteen and one-half hours, while in twelve of the fatal cases it was nearly twice as long, namely, twenty-five hours. Three of the fatal cases were operated upon under such favorable conditions as regards time — four, six, ten hours respectively — that their fatal issue demands especial explanation. The first of these patients (Case 18) walked to the Medical Out-Patient Department, but was allowed to depart with the condition undiagnosed. She shortly returned to the accident room and was promptly operated upon. This active exertion at the time of perforation had probably much to do with the final result. Case 12 was operated upon six hours after perforation, and did well until the eighth day. The stitches were then removed. Shortly after, in a fit of coughing, the wound was burst open, and, despite a prompt secondary operation, the patient rapidly failed and died. Case 8 was forty years of age, and had used whiskey to excess for one week previous to the operation.

Three cases were operated upon sixteen hours after perforation. Of these, one died upon the table (3) and another (11) in three hours, thus showing the desperate condition of the patients. The remaining patient (14) lived until the ninth day.

A study of the fatal as well as the successful

cases plainly shows the advantage of early operation. This implies an early diagnosis, which, as a rule, is not difficult to make from the severe epigastric pain and the history of the patient. The importance of prompt action does not appear, however, to have been grasped by surgeon or physician in several instances. Case 1 was kept on the surgical side for some twenty-four hours after perforation took place, and Case 6 remained in a medical ward for the same length of time. Case 2 remained in the medical ward eleven hours after perforation. Case 17 while on the medical side developed sharp epigastric pain and abdominal rigidity at 6.30 p.m. The liver dullness became partially obliterated. Leucocytes = 17,500. At midnight the leucocytosis had slightly increased and the patient had vomited. Both medical and surgical house officers agreed in the diagnosis of perforation, and the condition was reported to the visiting physician, who advised medical treatment. The next morning the belly was much more distended, and an operation was finally performed. Death occurred in this instance in sixteen days from the general infection plus the acute infection due to a fecal fistula.

Age. — The average of the five patients who recovered was twenty-one years, while the average age of the thirteen fatal cases was twenty-nine years. Only one case above the age of twenty-one recovered, and this patient was thirty years old. Only three patients died who were twenty-one years of age or less. The influence of age appears striking in these 18 cases, but quite possible in a larger series it would lose its significance.

Sex. — There were nine male and nine female patients, and of the five patients who recovered two were female. Sex is therefore without import.

Condition since operation. — Five of the 18 patients left the hospital alive, and of these three have been continuously well. Of the remaining two, one patient (Case 5) developed intestinal obstruction twenty months after operation. This was relieved, and now, five and a half years after the first operation, he is in good health and at work. The remaining patient (7) had a recurrence of the ulcer, and at the present time is convalescing from a gastro-enterostomy.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
J. M. Dec., 1898. 1	M.	40	Operation 24 hours after perforation. Entered as an accident room emergency. For five weeks attacks of sharp epigastric pain, lasting a few hours. Two days before entrance confined to bed by this pain, which had	Operation about 30 hours after entrance. The abdominal cavity was filled with stomach contents. A perforation in the lesser curvature of the stomach was closed with Lembert sutures, and the general	Died.	Died a few hours after operation. Autopsy showed a general peritonitis.

CASE 1. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			grown worse. Examination made by attending surgeon, and patient sent to ward. During the afternoon abdominal rigidity developed. Attempts were made to move the bowels. The following morning vomiting began and later became peritonitic in character. In the afternoon, pulse 140, with signs of general collapse.	cavity washed out with salt solution and drained.		
J. M. Jan., 1899. 2	M.	19	Operation about 15 hours after perforation. Acute indigestion for one week. Probable perforation a few hours before entrance to hospital. At entrance temperature, 95.4. Pulse 60. Blood count 43,600. Abdomen rigid. Kept in ward about 12 hours before operation.	Perforation the size of a lead pencil on anterior wall. General cavity filled with debris. Perforation closed, lavage, drainage.	Well.	Well, Jan., 1904.
C. L. Apr., 1899. 3	F.	22	Operation 16 hours after perforation. For three or four years much nausea and epigastric pain after eating; worse during last year. Vomitus sour. No blood vomited or passed by rectum. The night before entrance went to bed apparently in the usual condition. At 2 A.M. awakened by severe pain on the left side, and vomited three or four times. Deep inspiration caused acute pain and the attending physician diagnosed diaphragmatic pleurisy. During the day constant epigastric pain, increased by food, which also caused vomiting. A haggard expression and pale face. Rigidity of abdominal muscles; localized tenderness over the eleventh rib, near the spine. White count 23,200. Temperature 102.8. Pulse 120.	The general peritoneal cavity was full of debris, and on the anterior wall of the stomach at the cardiac end was a perforation.	Died.	Died on the table. No autopsy.
M. B. Apr., 1899. 4	F.	35	Operation 24 hours after perforation. Two years before entrance an attack of epigastric pain with vomiting. Ten months ago a similar attack which lasted several weeks. For five days severe epigastric pain after eating and frequent vomiting. Evening before entrance a sharp pain in the left hypochondrium, worse than ever before. At entrance patient was in state of collapse. Abdomen distended and tympanitic. Liver dullness obliterated. Abdominal wall rigid. White count 13,000. Pulse 120. Temperature 99.	Immediate operation. General peritoneal cavity filled with gastric contents. At the cardiac end a perforation of the stomach wall the size of a cent. Perforation closed, lavage, drainage.	Died.	Died the same night. Cultures from general cavity showed mixed growth of bacteria with abundant streptococcus hyogenes. No autopsy.
W. L. June, 1899. 5	M.	30	Operation 18 hours after perforation. Indigestion for one year. Twenty-four hours before operation vomited, after drinking moderately of beer. Eighteen hours before operation a sudden attack of epigas-	On opening abdomen in epigastrium, gas and bile-stained fluid escaped. General peritonitis. Pus and fibrin everywhere, and in pelvis. Induration of pyloric portion of stomach, and a perfora-	Rel'd.	Operated upon Feb. 16, 1901, for intestinal obstruction by a band. Jan. 5, 1904, 5½ years after first operation, was in good health and at work every day.

CASE 5. — Continued.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			tric pain, which was severe and continuous. Pale, eyes sunken, abdomen retracted and held in boardlike hardness. General tenderness, extensive in epigastrium.	tion $\frac{3}{4}$ in. in diameter on anterior surface, $\frac{1}{4}$ in. from the pylorus. Gastroplication, folding stomach over on to first portion of duodenum. Lavage of cavity and drainage of pelvis by glass tube passed through incision below umbilicus.		
M. McE. Dec. 1899 6	F.	20	Operation 72 hours after perforation. Four days ago suddenly seized with sharp pain in lower left chest, running up into shoulder. Two days ago severe pain in epigastrium caused her to go to bed. Vomited only once two days ago. Twenty-four hours ago vomited dark brownish material and spasm appeared in epigastrium. Peritoneal facies. Temperature 102. General abdominal spasm and tenderness, especially marked in epigastrium.	Median epigastric incision enlarged by lateral cut at upper end. Alimentary contents in peritoneal cavity. Perforation size of slate pencil in lesser curvature. Large ulcer surrounding perforation. Gastroplication. Lavage of peritoneum. Drainage of pelvis by glass tubes and gauze.	Died.	Shock, 24 hours after operation.
M. H. Jan., 1900. 7	F.	19	Operation 24 hours after perforation. Eighteen months ago in hospital for gastric ulcer with epigastric pain and hematemesis. Two subsequent attacks of pain and vomiting. Twenty-four hours ago acute violent pain in epigastrium, left abdomen and left shoulder. No vomiting. No syncope. Good color, does not look sick. Spasm and tenderness over left rectus and whole left abdomen. Extreme tenderness in epigastrium.	Median epigastric incision. Peritoneal cyst beneath abdominal wall. At pyloric end, close to lesser curvature, a perforation $\frac{1}{4}$ inch in diameter lying in the midst of edematous tissue. Gastroplication, after partial excision of ulcer. Lavage of peritoneum. No general peritonitis.	Rel'd.	Subsequently had a recurrence, and on Jan. 5, 1904, was recovering from a gastro-enterostomy.
J. K. May, 1900. 8	M.	40	Operation 10 hours after perforation. One week ago began to vomit in the evening. Worked until yesterday. Ten hours ago sudden sharp pain in abdomen, constant, general. Vomiting every few minutes. No blood. Has taken whiskey to excess during last week. Pulse 136. Pale, peritoneal facies. Abdomen slightly distended, tender and tympanitic.	Incision in epigastrium. Free brownish fluid in cavity. One inch from pylorus a perforation nearly $\frac{1}{2}$ in. in diameter. Gastroraphy. Lavage and drainage of peritoneum.	Died.	Shock and peritonitis. Died in eight hours.
E. J. Oct., 1900. 9	F.	17	Operation 10 hours after perforation. Stomach trouble for a year. Pain, eructation. For one week severe pain in epigastrium. Sudden onset. Vomiting at first. At work till this A.M. Sudden attack of pain this P.M. at 1 so severe that she lay down on the floor for some time before getting strength to crawl to bed. Vomiting continued with a little blood. Looks sick. Temperature 102. Pulse 110. General abdominal tenderness and spasm, much more marked in epigastrium.	Median epigastric incision. Turbid serum free in peritoneal cavity. Flakes of fibrin on anterior surface of stomach. On drawing stomach out, slightly adherent to liver; near the cardia on anterior surface was an indurated area $1\frac{1}{2}$ in. in diameter, having a pin point perforation at its center. Ulcer inverted, sutured with interrupted sutures of silk.	Rel'd.	Excellent convalescence. Went to work in 2 or 3 months, and in Jan., 1904, was in first-rate health.
N. O'C. Dec., 1900. 10	F.	21	Operation 48 hours after perforation. Stomach trouble for about 6 months, pain after eating, relieved	Short incision below umbilicus. Cloudy serum free beneath peritoneum. Diffuse fat necrosis of	Died.	Died in 8 hours Shock and peritonitis.

CASE 10. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			by vomiting. Two days ago, three hours after eating, taken with severe pain in upper part of abdomen. Vomiting. No blood. Pain very severe that evening. Chill yesterday. Pain continued. Flushed, face drawn. Tenderness and spasm all over abdomen, most marked in epigastrium.	omentum. Thin pus in pelvis. Adhesions in epigastrium, showing omentum surrounding a large pocket of bile and thin pus. Fibrin at pylorus and on anterior surface and upper border, close to pylorus, and on gastric side a clean punched opening about $\frac{1}{4}$ in. in diameter. Very little surrounding induration. Gastroplication. Drainage after irrigation.		
A. H. June, 1901. 11	M.	26	Operation 16 hours after perforation. Epigastric pain 8 or 9 years, and occasional vomiting of watery material. No hematemesis. No malena. About 16 hours before operation, at 8.30 in the evening, sudden severe pain in abdomen, with great prostration, sweating and vomiting. Pain severe all night, but better this A.M. Face drawn and anxious. Abdomen tender. Marked muscular spasm. Dullness in flanks, changing with position.	Median incision below umbilicus. Gas, pus and stomach contents escaped from peritoneum. Epigastric incision. Perforation found on lesser curvature, near pylorus, surrounded by considerable induration. Two silk sutures applied, but did not close it very well. Perforation walled off with wicks and glass drainage tube. Thorough irrigation and drainage of abdomen through another incision below umbilicus with tubes and gauze.	Died.	Died in about 3 hours. General peritonitis.
A. F. Aug., 1901. 12	M.	23	Operation 6 hours after perforation. Two years ago short attacks of pain in right abdomen, with vomiting and fever. Six hours ago while carrying heavy sac on shoulders felt something give way in abdomen, with pain so severe as to double him up. Vomited twice. Looks sick. Pulse 89. Temperature 100.8. Abdomen rigid. Excessive tenderness below umbilicus in median line.	Median incision, with umbilicus as central point. Thick pus in abdomen. Incision carried to ensiform. On anterior surface near greater curvature 2 inches from pylorus, a perforation 1 cm. in diameter. Induration $2\frac{1}{2}$ cm. in diameter. Gastroplication. Irrigation. Suture without drainage.	Died.	Steady improvement for 8 days. Stitches then removed. Patient had a mild chronic bronchitis. In a fit of coughing burst open the wound and intestines protruded. Etherized and intestines irrigated and replaced. Considerable shock attended this procedure, and patient died in about 2 hours.
A. G. Oct., 1901, 13	M.	48	Brought to accident room at 4.30 A.M. During the past year attacks of epigastric pain. For 2 months the stomach symptoms have been more acute, requiring treatment in the Out-Patient Department. No attacks of sudden pain or faintness. At entrance, temperature 97; pulse 96. Examination of the belly was remarkable only from the presence of a small epigastric hernia. White count 12,000. Patient sent to the ward. Immediate operation advised at 9 A.M.	On opening the peritoneum, gas and milky fluid escaped. On the anterior wall of the stomach was found a good-sized perforation. This was closed with a silk stitch and the general cavity washed out. On the day after operation condition was satisfactory. On next day abdomen became distended, and an attempt was made under ether to drain the bowel by an artificial anus.	Died.	Died 2 days after operation. No autopsy.
K. H. June, 1902. 14	F.	18	Operation 16 hours after perforation. Entered accident room at 10 A.M. Temperature 102.4; pulse 146. Up to 3 months ago general health good, when for 3 weeks attacks of pain developed at intervals of 2 or 3 days in the region of the	Immediate operation demonstrated the general peritoneal cavity filled with turbid fluid. At the cardiac end of the posterior surface there was a perforation. This was closed and the cavity washed out. The after	Died.	Died 9 days after operation. Autopsy showed general peritonitis. The stomach wall, where the ulcer had been closed, had remained solid. On the anterior wall of the

CASE 14. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			umbilicus. Vomiting during the attacks, but without blood. Four days before entrance, after lifting a pail of water, patient was seized with acute pain in right side of abdomen. Pain was severe during all of that day and finally shifted to left side. At 6.30 P.M. on day before entrance she had a sharp pain in the umbilical region and vomited twice. In the night the epigastrium became tender. Examination showed general abdominal rigidity. Belly tympanitic. Shifting dullness in flanks and liver dullness obliterated. Color fairly good.	course was that of a typical general peritonitis.		stomach were multiple ulcers.
L. P. Oct., 1902. 15	M.	21	Operation 6 hours after perforation. Not well for 2 to 3 weeks. Afternoon of entrance had very acute abdominal pain without vomiting. At entrance temperature 101; pulse 100. Leucocytes 21,000. Shifting dullness in flanks. During examination vomited blood.	Immediate operation. Perforation on anterior wall at pyloric end. Small amount of turbid fluid which gave no growth on cultures. Perforation closed and posterior gastro-enterostomy, with McGraw ligature, lavage and drainage. Mixer tube in cecum.	Well.	Well Sept., 1903.
M. M. Jan., 1903. 16	F.	22	Operation 48 hours after perforation. "Stomach trouble" for many years. Two years ago was treated on medical side 46 days for gastric ulcer. For 2 days has not felt well. Strained herself while lifting, and soreness appeared in umbilical region. Vomited. Color pasty. Sensorium dulled. Abdomen distended, soft, except on right, where there is slight voluntary spasm. For 2 days pulse rose from 104 to 120, and temperature from 101.4 to 102.8.	Longitudinal incision over gall bladder. Gas and bloody fluid escaped from peritoneum. Grape seed removed from peritoneum. Incision carried to left, but patient's condition became so poor that perforation was not searched for. A thick wall cyst containing hemorrhagic and fine contents was packed with gauze. Query: Was not this the stomach?	Died.	Rallied from operation, but gradually failed and died 4 days later. No autopsy. Patient was admitted "surgical."
A. S. R. Jan., 1903. 17	M.	39	Operation 17 hours after perforation. For 7 years pain in the epigastrium about 2 hours after eating. At the end of 4 years the pain became worse, more frequent and associated with nausea and vomiting. Entered hospital in 1901. Hemoglobin, 75%; leucocytes, 9,900. Capacity of stomach, 3 pints. Free HCl. present. Lactic acid absent. By the hemin test blood was demonstrated in the stomach washings. The diet was regulated and in 9 days the patient was discharged, much relieved. Improvement continued for a year and one half. Six months before final entrance to the hospital, Dec. 30, 1902, there had been constant epigastric pain in attacks of 3 or 4 weeks' duration, followed by several shorter attacks. Once after passing a stomach tube he had vomited blood. For 3 weeks	On opening the abdomen, gas and stomach contents were found, as well as a perforation in the anterior wall of the stomach. Perforation closed and an omental graft applied; cavity washed out and drained. Pulse at end of operation 180, and condition poor. Thirteen days after operation a fecal fistula, not gastric, developed.	Died 16 days after oper'n.	The patient had apparently overcome the acute peritonitis, and death was due to the chronic absorption plus the acute process caused by the fecal fistula. Autopsy showed evidence of a general peritonitis and multiple small abscesses imbedded in meshes of fibrin around the spleen. In the left pleural cavity a moderate amount of blood-tinged fluid. The stomach showed at the pyloric end an old ulcer, 8 cm. in width by 7 cm. in length, extending in the direction of the lesser curvature. The base of the ulcer was fairly smooth, but showed several depressions. At the base of one of the

CASE 17. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			previous to Dec. 30, 1902, had suffered from epigastric pain. Pain not dependent upon food, and was relieved by sodium bicarbonate. No large amounts vomited. Hemoglobin 75 %; white count 9,600. During the day of entrance and until evening of the following day the patient was comfortable. At 6.30 P.M. sharp epigastric pain appeared, and abdominal rigidity developed. The liver dullness became partially obliterated. Leucocytes 17,500. At midnight the leucocytes had slightly increased and the patient had vomited. Iodophilia test gave slight reaction. Condition was reported to the visiting physician, who advised medical treatment. The next morning the belly was much more distended and operation advised.			deeper depressions, situated nearest to the lesser curvature and about 5 cm. above the pylorus, there was a small, blackish-red area. Section through this area showed that the depression reached quite to the peritoneal coat and was covered over by an adherent ridge of rather dense grayish tissue material. Fecal fistula in descending colon.
M. E. R. Jan., 1903. 18	F.	22	Operation 4 hours after perforation. Entered hospital as an accident room case. General health good until 2 months ago, when epigastric pain, gas and sour regurgitations developed. At times the epigastrium was tender, but on lying down tenderness and pain would pass away. No mention of vomiting, with or without blood. At nine o'clock on the morning of entrance the patient was seized with a violent pain in the right hypochondrium unaccompanied by chill or vomiting, and came to the Out-Patient Department, but her condition apparently did not warrant entrance to the hospital. Later in the accident room immediate exploration was advised.	At the operation an indurated mass without definite perforation was found in the region of the pylorus. Within this mass several small abscesses were evacuated. Abdomen wicked. On reaching the ward after the operation, the temperature was 104.8 and pulse 120. For 3 days the temperature remained at 104, 105, 106.	Died.	Died 3 days after operation, evidently from general peritonitis. No autopsy.

IV. OPERATIONS FOR GASTRIC HEMORRHAGE.

Ten cases; ten deaths. The series includes 6 females and 4 males. Four of the patients were under thirty years of age, 3 between thirty and forty, 2 between forty and fifty and 1 of unknown age. The youngest man of known age was twenty-eight, the oldest forty-six; the youngest female twenty-three, the oldest forty-seven.

In 9 cases gastric symptoms had existed for two to ten years. In one, a female of twenty-three, the hemorrhage ushered in the first gastric attack. A definite history of previous attacks of bloody vomiting was obtained in 3 cases. In 5 cases the hemorrhage came without other acute symptoms, and in 3 of these cases there was also a sudden collapse. Three times definite severe epigastric pain preceded the vomiting of blood or melena.

A lowered percentage of hemoglobin or pallor

was noted in all cases. Epigastric tenderness was general. Once there was definite tenderness in the back, on the level of the eleventh rib.

In the case of the female in her first attack the operation was within thirty-six hours of the hemorrhage. In the other cases the time of operative interference varied between two and thirty days after the beginning of the acute attack.

The general condition of each patient before operation was desperate, as is shown by the fact that 6 of the cases were medical transfers which were regarded as cases of forlorn hope and the remaining 4 were admitted as surgical emergencies of the most severe type.

Eight times the stomach was incised and explored by invagination of the wall. Twice no general examination of the interior was made. Of the 8 careful explorations 3 were negative; 1 other was negative, save for two bleeding points which were possibly due to manipulation; 1

showed numerous areas which seemed to ooze; 1 had pyloric thickening; 1 showed an ulcer on the posterior surface without any evident point of hemorrhage, and 1 had an ulcer on the lesser curvature with a definite point of hemorrhage. In the two operations where no exploration of the interior was made, one stomach showed at operation an induration on the anterior surface near the pylorus and the other a thickened pylorus.

Twice the operation consisted in the repair of the stomach wall after incision; twice the ulcer was excised; once the ulcerated area was turned in with a purse-string suture; once the stomach was sutured to the abdominal incision and tamponed with gauze; and four times a gastro-enterostomy was done.

Death occurred from three hours to eight days after the operation, seven dying within seventy-two hours.

The cause of death given in order in the cases in which an autopsy was made was gastric hemorrhage, general peritonitis following a second operation, gastric hemorrhage, gastric ulcer with probable bleeding point at its center combined with operative shock, inhalation pneumonia.

The probable cause of death, given in order, of the cases in which no autopsy was made was continued hemorrhage with inanition, acute hemorrhage, continued hemorrhage into bowel, probable acute hemorrhage, shock of operation in the extreme condition.

The large proportion of males in this series, a ratio of 2 to 3, is a striking illustration of the accepted fact that gastric hemorrhage in men is a much more serious symptom than in women.

The previous histories and entrance examinations are not remarkable. Only the severity of the symptoms differentiates them from routine gastric hemorrhage cases.

Operation was undertaken at a time when the resistance of the patient had been reduced too far. This in our opinion was due primarily to the belief that gastric hemorrhage is a condition for medical treatment alone, and rarely to unavoidable circumstances.

Isolated instances of operations "*in extremis*" are justified, but to continue to interfere in these cases of gastric hemorrhage only at the point where all hope of recovery under medical treatment had gone would seem to be a questionable procedure and to offer practically no advantage to the patient. Operations must be attempted before the resistance has been reduced to the extreme, and that time, it seems to us, must be determined by the internist and the surgeon working together. Their combined judgment of

general condition and probable prognosis under either method of treatment will determine in each case the advisability of operative interference.

The findings at operation are disappointing, in that autopsies when made and the subsequent course of the case so generally disproved their negative reports.

In the 2 cases in which nothing was done but to repair the wounds of the stomach wall, certainly no advantage was given the patient. The method of suture to the abdominal wall and tampon of the stomach, considering the necessary course of the wound, must be classed as a procedure of questionable value. Excision or turning in of the ulcers as performed in 3 cases, while apparently indicated, is certainly not the accepted doctrine of to-day. Hence in 6 of the cases the operation was theoretically in error. Gastro-enterostomy which was done four times was equally unsuccessful. Why this was so, probably depended upon the condition of the patient, but the one autopsy finding available is suggestive, that is, "the anastomosis admitted the passage of the middle finger." As the whole virtue of this operation depends on the theory of free and easy drainage of the stomach cavity, the explanation is suggested that the location and size of the anastomosis may have been at fault. The failure to relieve the irritation of the ulcer probably accounts in at least some cases for the continued or recurrent bleeding.

The "bleeding point" is so seldom found, and the results of a hurried examination so unreliable, that a prolonged exploration in these hemorrhage cases where operative shock may be such a factor is not justified. A properly placed gastro-enterostomy with an ample opening is, in our opinion, the operation which offers the greatest hope of success.

The cause of death may be stated in general as a continuation of the conditions existing before the operation plus the shock of operation. The inhalation pneumonia attracts notice from its presence in so small a number of cases and serves to emphasize the importance of the consideration of this risk in stomach surgery. The one general peritonitis which followed a second operation after the breaking open of the wound must be regarded as an unfortunate calamity that is not likely to occur again. Three deaths in females under thirty years old is in marked contrast to the results of medical treatment as shown by statistics. Two of these cases, however, were admitted to the medical wards and transferred after treatment for five to eight days as practically hopeless.

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
M. J. A. May, 1898.	M.	46	Chronic indigestion for 10 years. Markedly worse for 2 months. Two days before entrance vomited blood and fainted. At entrance, examination negative, except for localized tenderness in the	Indurated mass the size of a silver dollar on the anterior surface of the stomach, near the middle of the lesser curvature. Indurated area turned in with a purse-string suture.	Died on 7th day after operation.	After operation stools continued to be tarry for 48 hours. For 6 days condition of patient was satisfactory. On 7th day sudden collapse with

CASE 1. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			back over eleventh rib. Blood showed hemoglobin 35%: white corpuscles 4,800; reds 3,324,000. Medical treatment for 48 hours without relief. Transferred for operation, with pulse of 120 and temperature 96°.	Condition at end of operation, poor.		classical symptoms of hemorrhage. Autopsy demonstrated a hemorrhage from the gastric ulcer on the anterior surface of stomach. General peritoneal cavity clean.
C. C. Dec., 1898. 2	F.	29	For 3 years epigastric pain about 30 minutes after eating. Eighteen months before entrance vomited considerable coffee-ground material. Two days ago vomited 4 oz. more or less blood, and fainted. Entrance examination negative, except for localized tenderness in epigastrium. Hemoglobin 70%. No free hydrochloric acid in stomach contents. Rectal feeding for five days, but continued to vomit bright blood. Transferred for operation with pulse of 140.	No definite area of ulceration. Exploration of stomach showed several areas which seemed to ooze blood. Stomach sutured to abdominal wall and packed with gauze.	Died on the eighth day after operation.	Gauze tampon in stomach apparently caused no special symptoms. Packing removed after 48 hours, during which time the general condition was satisfactory. Removal of gauze followed by continued hemorrhages and usual sequelæ of gastric fistulæ. Death apparently due to hemorrhage and inanition. No autopsy.
T. McG. Mar., 1901. 3	F.	33	For 2 to 3 years distress after eating. On morning before entrance, without other symptoms. Vomited a cupful of blood. Entrance examination negative. Medical treatment for 22 days without relief. Pulse suddenly went from 70 to 140, abdominal pain increased, localized tenderness developed in epigastrium, and vomiting became more nearly constant. Transferred to the surgical wards, where rectal feeding was continued for 48 hours. Condition before operation extremely poor.	No definite point of hemorrhage or perforation. Adhesions about pylorus and pyloric end of stomach thickened. Anterior gastro-enterostomy with suture.	Died 3 days after operation.	After operation the stomach was less irritable. On the evening of the third day the pulse suddenly shot up, and this, with other signs of collapse, suggested another hemorrhage as the cause of death. No autopsy.
W. R. May, 1901. 4	M.	28	For 3 years attacks similar to present one. Had been in hospital 3 times for treatment of gastric ulcer. Medical treatment for 1 month, during which time hematemesis, melena and hiccough persisted. Systolic murmur at apex. At surgical transfer there was epigastric tenderness, and stomach tympany extended below umbilicus.	Exploration of stomach and as much of the duodenum as possible was negative. Gastro-enterostomy with suture.	Died 5 days after operation.	Vomiting continued, and 3 days after operation the patient strained the wound open. Chloroform and suture of wound. Vomiting continued. Autopsy showed slight lesion of mucosa 1 cm. square, situated 4 cm. from the pylorus and general peritonitis.
M. S. Aug., 1901. 5	F.	39	Indigestion for 2 years. Two weeks ago had severe epigastric pain after eating. 48 hours ago vomited blood and began to have bloody stools, which continued up to entrance to hospital. At entrance, there was pallor of skin and mucous membranes and general tenderness over abdomen, but most marked in the epigastrium. Pulse 88, irregular and intermittent.	Median epigastric incision. Stomach explored, but no evidence of ulcer. Duodenum also explored as far as possible, but with negative results. Anterior gastro-enterostomy with Murphy button.	Died on 3d day after operation.	Rectal hemorrhages continued after operation. Occasional vomiting. Pulse and temperature gradually went up. No autopsy.
M. R. Sept., 1901. 6	F.	23	Previous history unimportant. 36 hours before entrance vomited blood, and had a bloody stool. Hematemesis repeated twice. Evening of entrance vomited about a basin full of	Subcutaneous infusion of salt solution before operation. Exploration of stomach failed to show any ulceration. Two small bleeding areas near edge of incision excised.	Died on 3d day after operation.	Rallied from shock, which was extreme, but the following day began to grow weak, pale and very restless, and failed to respond to stimula-

CASE 7. — *Continued.*

Name, etc.	Sex	Age	Symptoms, etc.	Condition, etc.	Result	Remarks
			blood, and pulse became rapid, feeble and thready.			tion. It was a question whether the bleeding points which were excised, might not have been caused by the trauma of the operation. No autopsy.
M. B. Sept., 1901. 7	F.	25	Had been in hospital 6 years before for chlorosis, and 1 year before for gastric ulcer. For 13 days before entrance vomited all food. Once vomited a cupful of bright blood. Medical treatment for 8 days without relief of vomiting or hematemesis. Transferred for operation with sub-normal temperature, pulse of 150, and epigastric tenderness.	Not much blood in stomach and no definite bleeding point. On posterior stomach wall, close to the center of the lesser curvature, was an ulcer 15 by 12 mm. Ulcer excised. Stomach wall sutured in layers.	Died on second day after operation.	Patient did not rally from the shock. Pulse and temperature rose. No response to stimulation. No autopsy.
M. L. Apr., 1902. 8	F.	47	Chronic indigestion for 6 to 8 years. Symptoms more marked for 10 months. Vomiting of bright blood and collapse 4 days before entrance. Two days after entrance vomited half a pint of bright blood. Operation 3 days after her first gastric hemorrhage. Patient in state of moderate collapse. Hemoglobin 75 %.	Pyloric end of stomach indurated. Posterior gastro-enterostomy with the aid of a bone bobbin.	Died 2 days after operation.	After the operation hematemesis continued. Autopsy showed a small ulcer on the anterior surface of the stomach, situated near the lesser curvature and midway between the pylorus and esophagus. At base of ulcer was an erosion of a large branch of the gastric artery. Near the open ulcer were 2 small cicatrices. The anastomosis admitted the passage of middle finger.
J. J. F. Mar., 1903. 9	M.		"Indigestion for years." Two days before entrance had a sharp epigastric pain; and later vomited coffee-ground material. Vomiting continued at entrance. There was extreme pallor, a retracted abdomen with epigastric tenderness and a thready pulse at 190.	Exploration of stomach through incision in anterior wall showed only blood clots. Two other incisions at cardiac end failed to show any ulceration. Incisions sutured.	Died 3 hours after operation.	Did not rally after operation. Autopsy showed a small ulcer with a cicatricial base, located at the pylorus. At the center of the indurated base was a bright red spot which was evidently the source of the hemorrhage.
A. R. F. Nov. 1903. 10	M.	39	"Stomach trouble" for 2 years. For 5 weeks epigastric pain and occasional vomiting, during which time he had lost much weight and strength. For 2 days stools had been tarry and offensive, and he had grown weaker. Five hours before entrance there was a sudden collapse. At entrance the skin was grayish; expression anxious; pulse of 100, regular and of fair strength. Tenderness and spasm in epigastrium.	High left rectus incision. Ulcer 2.5 cm. in diameter, situated 10 cm. from the pylorus on the lesser curvature. Ulcer evidently chronic, having a cicatricial base. At the center of the base was an eroded vein, which was plugged by a clot. Excision of ulcer and suture of stomach wall.	Died on 3d day after operation.	For 36 hours did well. Then followed a rapidly rising pulse, restlessness and marked thirst. Salt infusions, gelatin and adrenalin without effect. Autopsy. Stomach free from blood, but considerable old blood in the intestines. Inhalation pneumonia, which was probably the cause of death.

V. GENERAL CONCLUSIONS.

(1) The results of the operations in benignant disease of the stomach at the Massachusetts General Hospital and the Boston City Hospital between Jan. 1, 1898, and Jan. 1, 1904, are as follows:

	Number Deaths Well Rel'd Not Secondary of Cases Rel'd Operations					
Chronic ulcers	21	5	7	4	5	8
Pyloric obstruction	21	5	9	3	4	2

	Number Deaths Well Rel'd Not Secondary Rel'd Operations					
Acute dilatation	1	1				
Perforation	18	13	5			2
Hemorrhage	10	10				1
Total	71	34	21	7	9	13

(2) Surgical intervention in gastric hemorrhage should be considered even before it is urgent and the surgeon should jointly with the physician

watch the course of the patient. Cases of gastric hemorrhage entering the accident room should be seen as a rule by a physician as well as a surgeon. Operations upon females under thirty years of age should be most conservatively advised, since death under medical treatment is rare. This generalization, however, should not unduly influence consultants in a case of repeated hemorrhages threatening life, even in a patient below this age. Time should not be lost during an operation in seeking the bleeding point, but gastro-enterostomy should be performed.

(3) Mortality in operations for perforation of the stomach is chiefly dependent upon the length of time intervening between perforation and operation and the virulence of the infection. To lessen the mortality, house officers should report suspected cases simultaneously to the physician and surgeon on duty, or their substitutes, and should obtain permission for a possible operation from the patient or friends.

(4) Patients with chronic ulcers of the stomach or strictures of the pylorus should be jointly watched by the physician and surgeon. The surgeon should know the patient before being compelled to operate. Postponement of operation after it is indicated is dangerous, owing to the possibility of hemorrhage, perforation and exhaustion.

(5) Errors in surgical technique occurred, which in subsequent operations will presumably be avoided. Methods of operation were chosen which in the light of the experience of to-day would be considered unsuitable. Together these classes of cases account for about half of the deaths.

(6) The seventy-one cases were operated upon by twenty-five different surgeons — an average of one case to each surgeon in twenty-five months. It is reasonable to conclude that the mortality would have been less if each surgeon had had more experience.

THE UNION OF THE TEACHINGS IN CYSTOSCOPY AND MICROSCOPY.

BY FRANK M. JOHNSON, M.D., BOSTON.

AN adage of an earlier time still rings with the same truth and its forcible meaning to-day. It was then the thought had birth that "in union there is strength." Thus from a medical standpoint might its application be converted to carry out the peculiar characteristics of these two adjuvants in our investigation of the diseases of the bladder and the kidneys. It is not the intention at this time to enter into the minute details of the methods used, or descriptions of various instruments, but rather to bring perhaps more forcibly to your attention and consideration the value of suggestions to be gained when in harmony the microscope and cystoscope can give to us more clean-cut and definite knowledge. Before instrumental interference is demanded or warranted, the wise procedure is to obtain a com-

plete record from an exhaustive chemical and microscopical analysis of a specimen of urine. By this step a diagnosis is obtainable that will most likely approximate the conditions to be met with.

From the number, condition and appearance of the epithelia present, the presence or absence of casts, mucus, red blood corpuscles, pus corpuscles, connective tissue shreds and the varied forms of crystalline and amorphous sediments, — all these with the data of clinical history, in a certain case, will repay by the value of the deductions that are now far less difficult to surmise.

If a doubt might remain, it is then that the cystoscope will readily prove or disprove the microscopic findings. The tiny brilliant electric light, in conjunction with delicate lenses, gives to the observer vivid pictures and often clears up mysteries that were perplexing.

A growth is discovered that before gave no symptoms or signs of its existence. A clever instrument, lately devised by Dr. Follen Cabot of New York, enables an operator to secure a small piece of such a growth, and then our microscope will reveal its nature, or a fragment of a calculus is caught up, and its composition soon determined. Again, with angular or straight observation telescopes, all parts of the bladder can be viewed. Various grades of inflammatory origin can be seen and exact conditions realized.

Now perhaps it is fairly said that the microscope first gives permission, and then may demand the cystoscope as its aide-de-camp. May the day come, and that quickly, when such examinations as have been noted play their important parts in our routine practice; may our microscope receive the consideration that its teachings merit! No doubt a human life cannot nor will not last long enough to make the master of any person who may attempt to solve all the problems, all the riddles and all the kaleidoscopic transformations that lie within the minute drop — under the fragile crystal. Errors arise due more often to the lack of complete understanding on the part of the observer than to any fault that could possibly escape detection in a finely made instrument. Each and every object must meet with recognition, and relative values of the more important elements must have our careful consideration. The surgeon whose time is absorbed with many operations, the general practitioner who has no moments he may call his own, yes, even the successful follower of some special subject, is forced to rely upon some one else and accept his conclusions. The necessity of true, impartial, microscopic findings, however, will still constitute a factor of mighty value.

This same thought can apply again to the cystoscopic revelations. Both these measures require time, patience and a long experience. Can one in a pardonable enthusiasm overestimate their true worth? At the present time the most important rôle played by the microscope and cystoscope is in the examination of the kidneys. With the catheterization through the