

# **Bariatric Surgery Colloquium**

SIXTH ANNUAL  
BARIATRIC SURGERY COLLOQUIUM

Program

Iowa Memorial Union  
Iowa City, Iowa

June 2 and 3, 1983

PROGRAM

Iowa Memorial Union  
June 2, 1983

- 7:45 a.m. Registration--Continental Breakfast  
Exhibits open for viewing
- 8:30 a.m. Welcome Inaugural  
James O. Freedman, President, The University of Iowa

Indications for Operation

Moderator: Kenneth J. Printen, M.D.

- 8:35 a.m. Obesity Surgery, a Reassessment of Indications  
Martin E. Felder, M.D.
- 8:50 a.m. Gastric Stapling for Patients over 50  
S. Ross Fox, M.D.
- 9:05 a.m. Bypass for Pseudo-obstruction of the Stomach  
Siroos S. Shirazi, M.D.
- 9:30 a.m. Discussion of Indications, Cost/Benefit and Third Party Payer Requirements  
Martin E. Felder, M.D., S. Ross Fox, M.D., Kenneth J. Printen, M.D. and  
Siroos S. Shirazi, M.D.
- 10:00 a.m. Break

Operative Procedures, Comparisons and Selection

Moderator: Edward E. Mason, M.D., Ph.D.

- 10:30 a.m. Gastric Wrapping: Observations, Changing Concepts and Results  
Lawrence H. Wilkinson, M.D.
- 10:45 a.m. Gastric Banding  
Marcel Molina, M.D.
- 11:00 a.m. Analysis of Seven Techniques in Dogs  
Robert E. Broline, M.D.
- 11:15 a.m. Vertically Stapled Gastroplasty with Chromic or Silastic Ring vs Gastric  
Bypass  
Gifford V. Eckhout, M.D.
- 11:30 a.m. Roux-en-Y Gastric Bypass, Gastrogastrostomy and Vertical Banded Gastroplasty  
Mal Fobi, M.D.
- 11:45 a.m. Greater Curvature Silicon-banded and Lesser Curvature Marlex-banded  
gastroplasty  
Cesar A. Gomez, M.D.
- 12:00 noon Discussion of Operative Procedures, Comparisons and Selection  
Robert E. Broline, M.D., Gifford V. Eckhout, M.D., Mal Fobi, M.D., Cesar A.  
Gomez, M.D., Edward E. Mason, M.D., Ph.D., Marcel Molina, M.D. and Lawrence  
H. Wilkinson, M.D.
- 12:30 p.m. Lunch--Main Ballroom

Stoma, Pouch Volume and Pressure

Moderator: Boyd E. Terry, M.D.

1:30 p.m. Stomach Volume in Obese Patients and Controls  
Lars Backman, M.D.

1:45 p.m. Pressure Measurement of Gastroplasty Pouches  
William W. Kridelbaugh, M.D.

Stomach Bacteria and Gallbladder Disease

Moderator: Charles A. Herbst, M.D.

2:00 p.m. Influence of Gastric Intubation on Stomach Bacteria  
Justin E. Arata, M.D.

2:15 p.m. Intraoperative Ultrasonography of the Gallbladder  
Charles A. Herbst, M.D.

2:30 p.m. Discussion of Stoma, Volume, Stomach Bacteria and Gallbladder Disease  
Justin E. Arata, M.D., Lars Backman, M.D., Charles A. Herbst, M.D., William  
W. Kridelbaugh, M.D., Boyd E. Terry, M.D. and Jose Torres, M.D.

3:00 p.m. Break

Biliopancreatic Bypass

Moderator: Darwin K. Holian, M.D.

3:30 p.m. Partial Biliopancreatic Bypass  
Nicola Scopinaro, M.D.

3:45 p.m. Biliopancreatic Bypass in Advanced Coronary Arteriosclerosis  
Darwin K. Holian, M.D.

4:00 p.m. Discussion of Biliopancreatic Bypass  
Darwin K. Holian, M.D. and Nicola Scopinaro, M.D.

4:25 p.m. Administrative Announcements

4:30 p.m. Adjourn

6:30 p.m. Iowa Shindig--American Legion Hall, Lone Tree, Iowa

Iowa Memorial Union  
June 3, 1983

8:00 a.m. Continental Breakfast

Complications

Moderator: Jeffrey W. Lewis, M.D.

8:30 a.m. Short- and Long-term Effects of Gastroplasty  
Lisa VanDyke, M.D.

8:45 a.m. Metabolic Deficiencies after Gastric Reduction  
John D. Halverson, M.D.

9:00 a.m. Vitamin B12 Deficiency after Gastric Bypass  
Gordon H. Hardie, M.D.

- 9:15 a.m. Neurologic Complications after Gastric Reduction  
George W. Paulson, M.D.
- 9:30 a.m. Respiratory Insufficiency and Pulmonary Hypertension, Correction with  
Gastric Reduction  
Harvey J. Sugerman, M.D.
- 9:45 a.m. Bulimia-vomiting Syndrome after Gastric Reduction  
Cathy Mojzisek, R.N.
- 10:00 a.m. Vomiting after Gastric Reduction  
Albert Stunkard, M.D.
- 10:15 a.m. Break
- 10:45 a.m. Discussion of Complications  
John D. Halverson, M.D., Gordon H. Hardie, M.D., Jeffrey W. Lewis, M.D.,  
Edward W. Martin, Jr., M.D., Cathy Mojzisek, R.N., Albert Stunkard, M.D.,  
Harvey J. Sugerman, M.D. and Lisa VanDyke, M.D.
- 11:30 a.m. Lunch

#### Reoperations

Moderator: Cornelius Doherty, M.D.

- 1:30 p.m. Conversion of Intestinal Bypass to Gastric Reduction  
Otto L. Willbanks, M.D.
- 1:45 p.m. Failed Gastroplasty for Morbid Obesity: Revised Gastroplasty vs Roux-en-Y  
Gastric Bypass  
Harvey J. Sugerman, M.D.
- 2:00 p.m. A Method of Revising Horizontal Gastroplasty to Vertical Banded Gastroplasty  
Burns J. Larson, M.D.
- 2:15 p.m. Reversal of Vertical Banded Gastroplasty  
Cornelius Doherty, M.D.
- 2:30 p.m. Discussion of Reoperations  
Cornelius Doherty, M.D., Burns J. Larson, M.D., Harvey J. Sugerman, M.D. and  
Otto L. Willbanks, M.D.
- 3:00 p.m. Break

#### Plastic Reconstruction

Moderator: Edward E. Mason, M.D., Ph.D.

- 3:30 p.m. Body Contouring for the Formerly Obese  
Hal G. Bingham, M.D.
- 4:00 p.m. Summation  
Edward E. Mason, M.D., Ph.D.
- 4:15 p.m. Organizational Meeting of the Bariatric Surgery Society

## GUEST FACULTY

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#### UNIVERSITY OF IOWA FACULTY

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Kenneth J. Printen, M.D.  
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Jeffrey W. Lewis, M.D.  
Associate Professor, Surgery

Siroos S. Shirazi, M.D.  
Professor, Surgery

A B S T R A C T S



Thursday, June 2, 1983, 8:35 a.m.

OBESITY SURGERY, A REASSESSMENT OF INDICATIONS

Martin E. Felder, M.D.

The classical indications for obesity are reviewed. A series of patients is presented who were operated upon in spite of the fact that they did not fall within the usually recommended parameters. Special emphasis will be given to those who were less than 100 lb above their ideal weights. Included among these are patients who had marked pulmonary problems, severe cardiac disorders, intractable diabetes mellitus and a variety of orthopedic problems. Results show satisfactory weight loss with marked improvement of the concomitant medical disorders. Postoperative morbidity is essentially unchanged from that same in heavier patients.

The conclusions from this study suggest that the classical indications for obesity surgery should be redefined. New criteria are proposed.

Thursday, June 2, 1983, 8:50 a.m.

## GASTRIC STAPLING FOR PATIENTS OVER 50

S. Ross Fox, M.D., Earl R. Fox, M.D. and David A. Simonowitz, M.D.

Gastric stapling was performed on 442 patients. Thirty (6.7%) of these were over 50 years of age. This study compares those over the age of 50 years with those less than 50 in regards to weight loss and complication rate. All gastroplasties were lesser or greater curvature types, reinforced, excluding gastrojejunostomies. Mortality in the over-50 group was one respiratory arrest in a patient with sleep apnea syndrome which was recognized prior to surgery. This constitutes a mortality rate of 3.3% as compared to a mortality rate of 0.48% in the under-50 age group.

Short- and long-term morbidity was 20% in the over-50 age group and 21% in the under-50 age group. The complications included wound infection, stenosis of the pseudopylorus, enterocutaneous fistula, ventral hernia, and subphrenic abscess associated with perforation of the pouch.

Weight loss in the over-50 group was less significant than in the younger age group. The older folks averaged 214% above ideal body weight. At one year they had lost 70 lb (50% of excess weight) and they remained at that weight two years postoperatively. The younger patients were 229% over ideal body weight and at one year had lost 109 lb. At two years they had lost a total of 118 lb on the average.

Although the mortality rate is greater in the older patients, it is less than in previously reported series. Being over age 50 is not a contraindication for gastric stapling, but older morbidly obese patients should be informed that their risk is greater than in the younger patients.

Thursday, June 2, 1983, 9:05 a.m.

BYPASS FOR PSEUDO-OBSTRUCTION OF THE STOMACH

Siroos S. Shirazi, M.D. (invited speaker)

NOTES

Thursday, June 2, 1983, 9:30 a.m.

DISCUSSION OF INDICATIONS, COST/BENEFIT AND THIRD PARTY PAYER REQUIREMENTS

Moderator: Kenneth J. Printen, M.D.

Panel: Martin E. Felder, M.D.; S. Ross Fox, M.D.; and Siroos S. Shirazi, M.D.

NOTES

Thursday, June 2, 1983, 10:30 a.m.

GASTRIC WRAPPING: OBSERVATIONS, CHANGING CONCEPTS AND RESULTS

Lawrence H. Wilkinson, M.D.

From June 1976 to December 1982, 316 patients have undergone gastric reduction achieved by completely covering the entire stomach, except the pylorus with a synthetic material. Animal (canine) studies began in 1974. Marlex, Teflon, Dacron and Dacron impregnated with Silicone have been used. Because of the intense desmoplastic reaction stimulated by Marlex, we felt it was stronger, not knowing that a material which generated less reaction would adequately contain the stomach which was trying to expand during mealtime. The first material used in the human in 1976 was a rectangular sheet of polypropylene mesh (Marlex). After 57 cases, we were finally successful in developing a mesh covering shaped somewhat like the stomach.

Because we felt that Marlex may have caused stenosis around the distal esophagus in a few patients, and Teflon studies in animals indicated it to be less reactive, we began using Teflon more frequently and have not used Marlex in the last 200 cases. In 1980, Dacron mesh impregnated with Silicone was first used with satisfactory results. Since 1980, several generations of Silicone pouches have been constructed and used with the expectation of finding a near-perfect pouch. Observations on the reaction of the human body to these materials will be discussed.

92% of these patients have maintained 40%, or more, weight loss  
70% maintained 60%, or more, weight loss  
53% maintained 70%, or more, weight loss  
31% maintained 80%, or more, weight loss  
18% maintained 90%, or more, weight loss  
5% maintained 100%, or more, weight loss

Thursday, June 2, 1983, 10:45 a.m.

## GASTRIC BANDING

Marcel Molina, M.D. and Horacio E. Oria, M.D.

A review of 400 consecutive gastric segmentations in morbidly obese males and females (average weight of sample 270 lb) between the ages of 14 and 69 performed between March 31, 1980, to present.

**TECHNIQUE:** Through a 7-cm epigastric midline incision, a Dacron band (#15 Dacron double velour vascular prosthetic graft [Meadox]) is placed circumferentially 5 cm from the esophagogastric junction over a 32F orogastric tube. The two limbs of the band are sutured together with three stitches of #1 coated Tycron obtaining a snug fit over the intragastric tube. A 3.0-sq cm silastic patch is placed over the exposed band and affixed to the gastric serosa with corner sutures of 4-0 Prolene. Average operative time, 35 minutes.

**POSTOPERATIVE MANAGEMENT:** Patient returned to hospital room. Orogastric tube and IV discontinued in Recovery Room. Immediate ambulation. Clear liquids in small increments started when patient fully reactive. No antibiotics, minimal analgesia. Average postoperative stay, two days.

**RESULTS:** On a 95% two-year follow-up, the pertinent statistics are: success rate - 88% of total sample (defined as 50% of excess weight lost in six to nine months and 60% of excess weight lost in more than 12 months); revision rate - 8% of total sample (defined as tightening of band or loosening up of band's fit or redo with new band); and reversals - 12% of total sample (defined as either due to bad result, patient's intolerance or optimal weight loss with patient's desire to have had removed). Operative time of reversal procedure, 20 minutes. Surgical complications: deaths, none; pulmonary emboli, none; abdominal wound disruption (dehiscence), 0.5%; intraoperative iatrogenic gastric perforation, 1.2%; incisional hernia, 1.2%; CVA, 0.25%; rehospitalization for management of minor psychological adjustments, 8%.

Thursday, June 2, 1983, 11:00 a.m.

ANALYSIS OF SEVEN TECHNIQUES IN DOGS

Robert E. Brolin, M.D.

During the past two years, seven techniques of stapled gastroplasty have been studied in our lab under controlled conditions. Techniques include: (1) unreinforced horizontal gastroplasty (UHG); (2) suture-reinforced horizontal gastroplasty (SHG); (3) one-layer Marlex reinforced horizontal gastroplasty (HG-1L); (4) two-layer Marlex reinforced horizontal gastroplasty (HG-2L); (5) one-layer Teflon reinforced horizontal gastroplasty (THG); (6) Marlex reinforced horizontal banded gastroplasty-Kroyer's technique (HBG); and (7) Marlex reinforced vertical banded gastroplasty-Mason's technique (VBG). After five weeks of a liquid diet and a week of solid food, the dogs were sacrificed, the stapled portion of the stomach excised, inspected and stomal measurements taken. Faxition x-rays were subsequently taken of the preserved specimens. Results:

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	UHG	SHG	HG-1L	HG-2L	THG	HBG	VBG
Deaths*	1/10	1/20	2/10	5/10	1/10	3/10	inc**
Mean <sup>β</sup> stomal diameter (mm)	21	15	16	19	24	14	inc
Disruption	4/10	0/10	3/10	2/10	4/10	1/10	inc
Distortion <sup>β</sup> of staples	5/6	inc	2/5	2/3	1/5	inc	inc
* leaks/peritonitis			** data incomplete			β intact staple line	

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These data suggest that incorporation of Marlex within the staple line (HG-1L, HG-2L) is unsafe, that suture reinforcement reduces the incidence of staple line disruption (SHG, HBG, VBG), that distortion of staples is common with horizontal gastroplasty and that some degree of stomal enlargement occurs with all of these techniques.

Thursday, June 2, 1983, 11:15 a.m.

VERTICALLY STAPLES GASTROPLASTY WITH CHROMIC OR SILASTIC RING VS GASTRIC BYPASS

Gifford V. Eckhout, M.D.

Gastric bypass (loop gastrojejunostomy, 85 patients) was compared to vertically stapled gastroplasty (chromic ring supported gastric stoma, 194 patients and silastic ring supported stoma, 155 patients) in regards to:

1. Percent of excess weight loss
2. Percent of preoperative weight loss
3. Morbidity and mortality
4. Percent requiring revision

Results were as follows:

Gastric bypass (GB), percent of preoperative weight loss at 12 months, 32%; 18 months, 34%; 24 months, 35.5%

Vertically stapled gastroplasty (VSG), chromic ring, percent of preoperative weight loss at 12 months, 29.4%; 18 months, 30%; 24 months, 28%

VSG, silastic ring, percent of preoperative weight loss at 12 months, 32.4%; 18 months, 36%

There were no deaths in any group. Complications were more serious in the GB group. Silastic ring erosion necessitated revision in three patients (2%) in the VSG group. The revision rate for GB was 20.0% and for VSG with a chromic ring was 8.4%.

VSG with a chromic ring does not produce as much weight loss as either GB or VSG with a silastic ring. VSG with a silastic ring supported stoma is a safer and more physiologic procedure than GB and, at 18 months produces equivalent weight loss. A longer follow-up period is necessary to determine whether weight loss will continue to keep pace with that of GB.



Thursday, June 2, 1983, 11:30 a.m.

ROUX-EN-Y GASTRIC BYPASS, GASTROGASTROSTOMY AND VERTICAL BANDED GASTROPLASTY

Mal Fobi, M.D.

Gastric procedures are fast replacing intestinal bypass surgery in the treatment of morbid obesity. It is now evident that any gastric procedure that provides.

- (a) A limiting proximal pouch less than 50 cc in size
- (b) A stomal outlet from this pouch less than 1-2-cm diameter in size
- (c) A means for assuring non-dilatation of the pouch or stoma
- (d) A means for preventing staple line disruption
- (e) Reversibility, safety and mortality of 2% or less

should be the procedure of choice to surgically treat the morbidly obese. Two gastric procedures that we modified to provide the above elements were evaluated prospectively. Sixty patients in each group have been followed from six to 15 months. There were no major complications or deaths. However, the weight loss is significantly more with the Roux-en-Y gastric bypass. The failure and revision rate in the gastrogastrostomy group is high (20%) and is increasing. We have abandoned this gastrogastrostomy and strongly recommend others not to use it in light of our objective findings and other developments in the field of bariatric surgery.

In search of a safer, simpler and more predictable procedure than the Roux-en-Y bypass procedure in the treatment of morbid obesity, we prospectively evaluated the gastric bypass procedure and the vertical banded gastroplasty. Thirty patients in each group had been entered into the evaluation when the study was stopped. It became obvious after the first 30 patients in each group that, the vertical banded gastroplasty was an easier procedure, the patients fared better immediately postoperatively. There were lesser incidence of vomiting and gas pain. The hospital stay is shorter and most importantly, the weight loss is about the same as with the Roux-en-Y gastric bypass. If the trend persists, vertical banded gastroplasty should be the procedure of choice for the morbidly obese.

Vertical banded gastroplasty appears to be the ultimate surgical solution to the problem of morbid obesity. It has all the qualities desirable of a surgical procedure for treatment of morbid obesity. We compared it to the Roux-en-Y gastric bypass and have abandoned the Roux-en-Y gastric bypass and use exclusively the vertical banded gastroplasty as the better for the treatment of morbid obesity. One hundred and fifty patients have had this procedure in the last year. Our follow-up data cover from three months to ten months. The surgical procedure is logical, the GI continuity is not disrupted, the procedure is simple, predilection to complications is minimal, hospital stay is shorter, weight loss is adequate. There are no major complications, patient satisfaction is good, long term outlook appears good. Close adherence to the procedure as described by Mason is strongly recommended.

Thursday, June 2, 1983, 11:45 a.m.

GREATER CURVATURE SILICON-BANDED AND LESSER CURVATURE MARLEX-BANDED GASTROPLASTY

Cesar A. Gomez, M.D.

Twenty-three patients underwent banded gastroplasty with a 10-mm greater curvature channel supported by an 8F Silicon band placed through a 25-mm gastric window. Double application of the TA90 instrument constituted the partition. There are 20 females and three males in the group. Weight loss as percent of excess weight has shown 37.6% at three months; 53.1% at six months; 59.6% at nine months; and 65.9% at 12 months. There were two leaks at the channel in this group with no mortality.

Forty-two patients underwent banded gastroplasty with a 10-mm lesser curvature channel supported by a 1.5-cm wide Marlex band placed through a 25-mm gastric window. Double application of the TA55 instrument constituted the partition. There are 38 females and four males in the group. Weight loss expressed as percent of excess weight compared favorably with the above group with 35.6% at three months and 51.3% at six months. By the time of the meeting, nine and 12 month follow-up data will be available. There has been no mortality in the Marlex-banded group with no leaks and with one wound infection as the only major complication.

Although this constitutes a short-term follow-up study, the long-term projection seems to indicate that the lesser curvature Marlex-banded gastroplasty is the preferable procedure. Long-term follow-up data, however, will be necessary to establish it as the procedure of choice.

Thursday, June 2, 1983, 12:00 noon

DISCUSSION OF OPERATIVE PROCEDURES, COMPARISONS AND SELECTION

Moderator: Edward E. Mason, M.D., Ph.D.

Panel: Robert E. Brolin, M.D.; Gifford V. Echkhout, M.D.; Mal Fobi, M.D.; Cesar A. Gomez, M.D.; Marcel Molina, M.D.; and Lawrence H. Wilkinson, M.D.

NOTES

Thursday, June 2, 1983, 1:30 p.m.

STOMACH VOLUME IN OBESE PATIENTS AND CONTROLS

Lars Backman, M.D. and L. Granstrom, M.D.

In a series of four subjects with a mean body weight of 158.4 kg, the gastric volume was studied by means of a balloon system. A thin latex balloon with a maximal volume of 24 liters, adopted to a duodenal tube, was introduced into the stomach with the subject in the supine position. Incrementally, the balloon was filled with 50 cc of saline until the subject, due to pronounced nausea, pain or vomiting refused further increase in the gastric volume. The volume when a feeling of satiety appeared was also observed. Parallel to the volume determinations, pressure registrations were also performed.

A control group of seven subjects with a mean body weight of 66.1 kg were also studied in a similar way.

The results are as follows:

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	Satiety		End Volume	
	Volume (ml)	Intragastric Pressure (cm saline)	Volume (ml)	Intragastric Pressure (cm saline)
Obese	881.5	44.3	1912.5	45.3
Controls	660.0	24.8	1110.0	29.9

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Obviously extremely obese subjects can tolerate considerably higher gastric filling volumes and pressures than subjects of normal body weight. During gastric surgery for treatment of massive obesity this should perhaps be taken into account when the position and size of the upper gastric pouch is being constructed.

Thursday, June 2, 1983, 1:45 p.m.

## PRESSURE MEASUREMENTS OF GASTROPLASTY POUCHES

William W. Kridelbaugh, M.D.

### OBSERVATION:

- A) The thinnest portion of the stomach muscular wall is the fundus of the stomach.
- B) The thickest muscular portion of the stomach is that magenstrasse of the lesser curvature.

Our initial gastroplasties and gastric bypass involved creating a pouch represented mainly by the thin fundic musculature. Recently we have been performing vertical banded gastroplasties in which the pouch is the thick muscular wall of the upper lesser curvature.

- C) The rate of weight loss seems to be greater with the vertical banded gastroplasty than when the pouch is created in the fundic portion of the stomach.
- D) The success of maintaining weight loss seems to be better with the lesser curvature thick muscle pouch than with the fundic pouch.

### QUESTION:

- A) Is the thin walled portion of the stomach actually designed to stretch and accommodate overeating and gastric distention associated with overeating?
- B) Are pressure sensations (postprandial fullness) therefore less reliable when elicited by stretching the greater curvature as opposed to stretching the thick walled lesser curvature of the stomach?

### EXPERIMENT:

- 1) Children's balloons were attached to the end of a Salem pump nasogastric tube. Patients who had gastroplasties of various forms were asked to swallow the balloon and tube. The tube was then attached to an ordinary central venous manometer. Conray was employed as contrast material, under fluoroscopic control, and the balloons were filled with varying increments of contrast material with frequent measuring of the pressure within the gastroplasty pouch balloon. The pressure measurements obtained indicate that individuals with a transverse gastroplasty or gastric bypass will reach fluid pressures of 40 cm of water or more before experiencing a sensation of fullness. In contrast, patients with a vertical banded gastroplasty begin complaining of fullness at 15 cm of water pressure and by 20-30 cm of water pressure invariably state that they are full and would stop eating at this point.
- 2) There is a surprisingly vivid emotional component in the personality of the morbidly obese. It requires a significant amount of discussion and encouragement to have these patients swallow the tube and balloon in spite of the fact that oropharyngeal anesthesia can be obtained with relative ease.
- 3) It must be emphasized that this is a preliminary report since we have only a few patients in each category who have undergone the successful measurement of pressures within the pouch.

I believe this is a valid observation and I think the topic is worth presenting to encourage those in teaching institutions who have much greater numbers of patients, residents and time available for continuation of this study to undertake further measurements of pouch pressures in order to confirm the observations which I have described. I believe these findings suggest a physiologic and anatomic basis for the construction of lesser curvature pouches as opposed to fundic pouches for gastroplasty.

I am in the process of trying to obtain anatomical specimens at autopsy to include the celiac axis, celiac ganglion, upper stomach and lower esophagus for gross dissection with the dissecting microscope in an effort to trace the pathways of nerve fibers from the

celiac plexis to the fundus and lesser curvature respectively to see if there is any difference in nerve fiber density to one area as opposed to the other. I cannot find by literature search that this has been done and I would encourage anybody interested in such a study to undertake this as well.

NOTES

Thursday, June 2, 1983, 2:00 p.m.

## INFLUENCE OF GASTRIC INTUBATION ON STOMACH BACTERIA

Justin E. Arata, M.D. and Allan J. Perry, M.D.

To define the influence of gastric intubation (by placing a tube from the mouth into the stomach) on the bacterial flora of the stomach, we carried out the following experiment.

In 25 patients who were to be subjected to a gastroplasty, cultures of the stomach were taken through a gastrostomy prior to intubation. After intubation, the vertical banded gastroplasty was carried out and cultures were then again taken from within the stomach prior to closure of the abdomen.

In eight patients, the culture was sterile both before the intubation and after completion of the stomach operation.

In nine patients, cultures were positive before the intubation and were also positive following the completion of the gastroplasty. A variety of organisms were found and these were generally similar to the oral cavity inhabitants.

In eight patients with sterile cultures prior to intubation, cultures taken after the completion of the stomach showed the predominance of alpha hemolytic Strep. One patient had a diphtheroid and another one a niesseria.

The pH of the stomach at the time of surgery was not determined nor were cultures taken on the wounds of patients who had a bacterial growth from the stomach at the completion of the gastroplasty. We will hope to carry out further studies to determine the effect of the pH of the stomach at surgery on bacterial studies.

We felt that this might be a possible cause for the incidence of postoperative wound infections in people undergoing gastroplasty.

Thursday, June 2, 1983, 2:15 a.m.

INTRAOPERATIVE ULTRASONOGRAPHY OF THE GALLBLADDER

Charles A. Herbst, M.D., J. A. Buckwalter, M.D., C. A. Mittelstaedt, M.D. and E. V. Staab, M.D.

It has been suggested that during gastric bariatric surgery cholecystectomy be performed routinely because of the high incidence of gallbladder disease in morbidly obese patients. We feel this is unnecessary and have utilized intraoperative ultrasound evaluation of the gallbladder to better detect abnormalities justifying cholecystectomy. Fifty morbidly obese patients undergoing gastric bariatric surgery who had not had previous cholecystectomy or symptoms of gallbladder disease have been studied since January, 1982. At surgery the gallbladder was visualized and palpated to evaluate for stone disease or gallbladder wall thickening. This was followed by ultrasound examination. Cholecystectomy was performed in the presence of any physical or sonographic abnormality. Twelve patients (24%) had cholecystectomy. Seven patients had palpable gallbladder disease confirmed by ultrasound. Five patients had abnormalities detected by ultrasonography only. Ultrasound abnormalities were classified as large intraluminal shadowing densities (6), small intraluminal non-shadowing densities (3 mm or less) (3) or density adherent to gallbladder wall (3). Pathologically, all specimens showed evidence of disease classified as stones, chronic cholecystitis, chronic inflammation, cholesterolosis or inflammatory polyp. Although follow-up time has been short, none of 38 patients with normal physical and sonographic examination has returned with gallbladder disease after bariatric surgery. In conclusion, intraoperative ultrasonography shows promise in detecting nonpalpable gallbladder disease and decreasing the incidence of delayed cholecystectomies leading ultimately to improved patient care. The techniques and correlations of ultrasound findings to the pathological findings will be illustrated.



Thursday, June 2, 1983, 2:30 p.m.

DISCUSSION OF STOMA, VOLUME, STOMACH BACTERIA AND GALLBLADDER DISEASE

Moderators: Boyd E. Terry, M.D. and Charles A. Herbst, M.D.

Panel: Justin E. Arata, M.D.; Lars Backman, M.D.; William W. Kridelbaugh, M.D.; and Jose Torres, M.D.

NOTES

Thursday, June 2, 1983, 3:30 p.m.

## PARTIAL BILIOPANCREATIC BYPASS

Nicola Scopinaro, M.D., E. Gianetta, M.D., D. Civalleri, M.D., U. Bonalumi, M.D., D. Friedman, M.D. and V. Bachi, M.D.

The goal of obesity surgery is to reach and maintain a body weight under the risk limit of 40% overweight. Partial biliopancreatic bypass (BPB) has proven to be an effective and safe procedure. There has been no mortality in 122 operated patients nor have serious complications appeared over seven years of clinical application. Diabetes, arterial hypertension, hyperlipemia and Pickwickian syndrome permanently disappear or their severity is greatly diminished. Liver morphology shows a sharp progressive improvement. Excess weight loss in 40 patients with the classic type of partial BPB (small bowel transected at its midpoint) averaged 70% 18 months after the operation and it was subsequently strictly maintained up to the fifth year of follow-up. Nevertheless, 25% of patients (all of them having a preoperative excess weight over 90%) did not drop below the risk limit and consequently cannot be considered "cured." Total BPB is a more complex and drastic operation which can cure all patients independently of their initial overweight, but it is a two-stage procedure. Since the majority of patients develop a protein malnutrition, they are supported, when necessary, with intravenous amino acid supplementation and, once they reach the desired weight, they all undergo surgical conversion to partial bypass, after which the attained weight is maintained and protein nutrition is permanently normalized. There was one operative death in 64 cases of total BPB and another two patients refused postoperative follow-up examinations and died from the consequences of a severe protein malnutrition.

Thus attainment of the goal in all patients required the execution of total BPB in all cases exceeding 90% overweight. In our experience that would be about half of the patients. In order to reduce the percent of cases to be submitted to the total bypass an attempt was made to increase weight loss after the partial BPB by shortening the alimentary tract. Sixty-seven obese patients were submitted during the last three years to a modified type of partial BPB in which the small bowel is transected 250 cm from the ileocecal valve (i.e., 200 cm of alimentary tract). Forty-five patients with a minimum follow-up period of six months (initial excess weight:  $89 \pm 31\%$ ) are comparable for age and sex to the group of 40 patients with the classic type of BPB (initial excess weight:  $83 \pm 29\%$ ). Excess weight percent loss (mean  $\pm$  S.D.) in the two groups was:

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	6 months	12 months	18 months	24 months
Classic type	51 $\pm$ 13 (40 s)	64 $\pm$ 18 (40 s)	70 $\pm$ 18 (40 s)	70 $\pm$ 19 (40 s)
Short type	56 $\pm$ 12 (45 s)	71 $\pm$ 17 (30 s)	75 $\pm$ 20 (21 s)	80 $\pm$ 18 (8 s)

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The greater weight loss obtained with the modified partial BPB will allow the limit to be raised over that which is indicated for total BPB. This limit has now been arbitrarily fixed at 120% overweight.

Thursday, June 2, 1983, 3:45 p.m.

## BILIOPANCREATIC BYPASS IN ADVANCED CORONARY ARTERIOSCLEROSIS

Darwin K. Holian, M.D.

Since June 1981, five relatively young, male patients (ages 37, 54, 39, 43 and 41) with advanced coronary artery disease have had a biliopancreatic bypass for morbid obesity. Two had previously undergone coronary bypass procedures. Four of them suffered from type IV familial hyperlipidemia with triglycerides as elevated as 8,000 and cholesterol levels over 800.

Anginal pain, in three patients so afflicted, regressed so quickly after surgery that oxygen transport increase appears to be the only way this phenomenon might be explained. Both cholesterol and triglyceride levels in the blood returned to almost normal levels within one week postoperatively.

Total oxygen content of the blood in these hyperlipidemia patients is not significantly different from normals. Improvement in glucose utilization as evidenced by lack of need for insulin postoperatively does not explain the changes because only one patient had insulin-dependent diabetes.

Treatment of these high risk patients was felt justified and predicated on the early findings that cholesterol levels in the routine biliopancreatic bypass patients had reduced to low normal or below normal during follow-up studies. This finding continues to be present in the over 60 patients operated to date.

Cholesterol and fat excretion via bile in stools is presently under study.

Angiographic studies done six months to a year later have shown reduction of cholesterol deposition in coronary vessels with marked increase in coronary vascularity.

Thursday, June 2, 1983, 4:00 p.m.

DISCUSSION OF BILIOPANCREATIC BYPASS

Darwin K. Holian, M.D. and Nicola Scopinaro, M.D.

NOTES

Friday, June 3, 1983, 8:30 a.m.

#### SHORT- AND LONG-TERM EFFECTS OF GASTROPLASTY

Lisa VanDyke, M.S., L. R. Pool, M.D., J. Bond, Ph.D., M. A. McCamish, Ph.D. and R. E. Dean, M.D.

Gastroplasty surgery involves an alteration of the stomach causing drastic limitation of food intake, however, substantial information regarding dietary intake and long-term nutritional status is not available. Forty-six patients participated in a postoperative, cross-sectional study of short- and long-term changes in nutritional status after undergoing Gomez gastroplasty. Patients were divided into four groups according to postoperative time, 0-6 weeks, 6 weeks-6 months, 6 months-1 year and beyond 1 year. All patients were evaluated using 24-hour dietary recall, anthropometric measurements and serum transferrin and iron. Dietary nutrient intake was analyzed and food habits were assessed. Analysis of variance revealed significant differences between the groups concerning seven parameters ( $p < 0.05$ ). These included weight loss, triceps skinfold and niacin intake which tended to decrease over time. Calories, protein, zinc intake, and ounces of food ingested, however, tended to increase over time. Serum iron and transferrin were within normal limits and were not significantly different between groups. Dietary intake of energy and several nutrients were significantly lower than the RDA (paired t test,  $p < 0.05$ ). Protein intake was significantly below the RDA in groups 1 through 3, but was adequate in group 4.

In conclusion, this study revealed a significant decrease in nutrient intake in post-gastroplasty patients which, without correction, may lead to nutrient depletion. The nutritional status of gastroplasty patients should be monitored for at least two years after operation. Patient education should include an emphasis on protein ingestion particularly during the first six postoperative weeks. The need for nutrient dense foods and vitamin and mineral supplementation should be emphasized for at least two years following surgery.

Friday, June 3, 1983, 8:45 a.m.

## METABOLIC DEFICIENCIES AFTER GASTRIC RESTRICTION

John D. Halverson, M.D.

Ninety-five morbidly obese patients have had a loop gastric bypass after complete preoperative evaluation in the Clinical Research Center. Periodic assessment of various metabolic parameters has revealed a number of measurable deficiencies which, because of prompt recognition and treatment, have not become clinically significant. A preliminary computer search has revealed deficiencies relating to blood formation and hemostasis as follows: B12 -- 44% of patients, Folate -- 27%, pro time -- 28%, iron -- 31%, TIBC -- 44%. Overall, nearly one-third of patients have manifested anemia (HCT <35%), and we are in the process of determining which of these patients might have developed anemia secondary to the above deficiencies.

Of particular interest is the B12 deficiency, which occurs (as previously reported) within the second postoperative year. This apparent depletion of vitamin B12 stores may be accelerated beyond that which occurs in simple starvation.

The metabolic ramifications of gastric reduction surgery in general will be discussed, and the importance of routine postoperative measurements of various metabolic parameters will be stressed.

Friday, June 3, 1983, 9:00 a.m.

VITAMIN B12 DEFICIENCY AFTER GASTRIC BYPASS

Gordon H. Hardie, M.D. and Daniel S. Thearle, M.D.

In our series of over 1000 loop gastric bypasses now at five years after operation we have had four documented cases of low serum vitamin B12 in association with significantly low Schilling tests.

We are in the process of sampling a large cohort of our patients and are finding depressed vitamin B12 levels the rule rather than the exception.

Schilling tests are in progress on indicated cases and other studies will be done and the true incidence of this problem will be established. We intend also to attempt to find the cause of this problem or the possible causes.

Friday, June 3, 1983, 9:15 a.m.

NEUROLOGIC COMPLICATIONS AFTER GASTRIC REDUCTION

George W. Paulson, M.D., Edward W. Martin, Jr., M.D., Cathy Mojzisek, R.N., B.S.N., and Larry C. Carey, M.D.

A variety of Neurologic complications have been observed after gastric reduction operations. Although many have been mild, six were major. After gastric partitioning for obesity, five women and one man developed emesis and profound neurologic disturbances in addition to weight loss. All had confusion and agitation, and electroencephalograms during the illness manifested symmetrical delta activity. All six developed severe weakness of the limbs and became unable to walk. Electromyograms were consistent with diffuse neuropathy, but cerebrospinal fluid protein was not elevated. Ophthalmoplegia was noted in three. Guillain Barre syndrome was diagnosed in two patients. Confusion was prominent in all, their course was prolonged for months, and recovery was incomplete. Coexisting emotional factors obscured initial awareness of organic disorder in all these patients. Possible causes include nutritional deficiencies, metabolic defects including carnitine, infection or a combination of these. Awareness of the possible occurrence of this syndrome may lead to early nutritional supplementation in these patients and eventual explanation of the causes.



Friday, June 3, 1983, 9:30 a.m.

## RESPIRATORY INSUFFICIENCY AND PULMONARY HYPERTENSION, CORRECTION WITH GASTRIC REDUCTION

Harvey J. Sugerman, M.D., R. Paul Fairman, M.D. and Lazar J. Greenfield, M.D.

Sixteen of 122 patients who underwent gastroplasty for morbid obesity had respiratory insufficiency of obesity. Six had obstructive sleep apnea syndrome (SAS) alone, defined as > 6 apneas/hr lasting > 15 sec each, five had obesity hypoventilation syndrome (OHS), defined as  $\text{PaO}_2 < 50$  torr and/or  $\text{PaCO}_2 > 45$  torr; and five had both SAS and OHS.

All patients with both SAS and OHS and three with SAS alone underwent tracheostomy as well as gastroplasty. Weight loss improved symptoms of SAS, and in the eight SAS patients available for study, the number of apneas/hr fell from  $72 \pm 25$  to  $24 \pm 15$  ( $p < 0.001$ ) and the percent sleep apneic decreased from  $52 \pm 17$  to  $11 \pm 11$  ( $p < 0.001$ ). Tracheostomies were allowed to close spontaneously within three to six months after correction of SAS.

In the patients with OHS, the  $\text{PaO}_2$  rose from  $47 \pm 7$  to  $64 \pm 8$  torr ( $p < 0.001$ ), the  $\text{PaCO}_2$  fell from  $53 \pm 8$  to  $40 \pm 5$  torr ( $p < 0.001$ ), and the forced vital capacity rose from  $60 \pm 16$  to  $83 \pm 17\%$  ( $p < 0.01$ ) predicted within eight months after surgery when they had lost  $47 \pm 8\%$  of their excess weight. Six OHS patients had measurement of mean pulmonary artery pressure (PAP) and pulmonary capillary wedge pressure (PCWP) before and three to eight months after operation. In these patients, the PAP fell from  $35 \pm 8$  to  $20 \pm 5$  mmHg and the PCWP fell from  $18 \pm 4$  to  $9 \pm 3$  mmHg ( $p < 0.05$ ).

Unfortunately, five of the 16 patients with respiratory insufficiency either did not lose weight (1) or subsequently regained (4). Two underwent revision after small weight gains prior to return of pulmonary symptoms. Respiratory insufficiency recurred in two patients after regaining weight. One patient with SAS died postoperatively from a leak and peritonitis and one with SAS was lost to follow-up. Of the 122 gastroplasties performed, 39% failed. In 44 additional patients, Roux-en-Y gastric bypass procedures have been performed with one death and no other failures. Eighteen of these patients have been followed up for more than one year and have lost  $64 \pm 17\%$  of their excess weight. In conclusion, although gastroplasty had a high failure rate, weight loss not only corrected life-threatening respiratory insufficiency of obesity but also its associated pulmonary hypertension. Gastric bypass will be a more effective procedure for these patients whose disorder is a clear indication for the procedure.

Supported in part by NIH Grant #RR00065-20

Friday, June 3, 1983, 9:45 a.m.

BULIMIA-VOMITING SYNDROME AFTER GASTRIC REDUCTION

Cathy Mojzisek, R.N., B.S.N., Randy Sansone, M.D., Larry Carey, M.D., George W. Paulson, M.D. and Edward W. Martin, Jr., M.D.

Vomiting associated with dietary indiscretions, eating behavior or mechanical obstruction can be anticipated to follow gastric reduction procedures to control morbid obesity. Alterations in diet or behavior modification control the vomiting. However, we have confirmed a bulimia-vomiting syndrome in ten of nearly 550 patients. This vomiting is self-induced to relieve the pain that follows deliberately eating amounts that exceeded the capacity of the pouch while attempting to maintain weight loss. Their eating behavior aroused no suspicion, and diagnosis of the syndrome was delayed because shame prevented them from providing information. The self-induced vomiting solved both the physical and psychological pangs of over-indulgence, and since it was a recognized complication of gastric reduction operations, it elicited sympathy. Such premediated overeating followed by self-induced vomiting is maladaptive behavior legitimized by aberrant behavior. This syndrome should be considered in the differential diagnosis of any postoperative patient who exhibits depression or hypokalemia and dehydration secondary to persistent vomiting. Current suggestions for treatment include rehydration, potassium supplements and psychiatric intervention with the ultimate realization that reversal may be the final solution. In our series, one patient did require reversal.

Friday, June 3, 1983, 10:00 a.m.

VOMITING AFTER GASTRIC REDUCTION

Albert Stunkard, M.D., Gary Foster, B.A., Jane Glassman, B.A. and Ernest Rosato, M.D.

This report describes the frequency of vomiting after gastric bypass for obesity, and suggests that the problem may be less severe than has generally been supposed. This study was carried out on 34 obese patients (26 women and 8 men) with a median percentage overweight of 114 and a median age of 38 years. They were asked to report each week by postcard the number of vomiting episodes that they had experienced daily during the preceding week. Then, in addition, six months after operation, they were asked by the surgeon (E.R.) as part of his routine follow-up to fill in a questionnaire that included items on vomiting.

The concurrent, week-by-week reports revealed a surprisingly low rate of vomiting --  $3.1 \pm 0.8$ /week throughout the first postoperative month, falling to  $2.1 \pm 0.5$ /week at two months and  $0.4 \pm 0.3$ /week at six months. By contrast, the retrospective reports showed a far higher rate of vomiting --  $7.8 \pm 2.5$ /week at the end of the first postoperative month. This discrepancy was largely due to ten patients whose retrospective reports of vomiting were 23.5/week more than the concurrent reports. This high rate of discrepant reports fell rapidly to 7.4/week at two months. These patients with large discrepancies between concurrent and retrospective reports lost significantly less weight than did patients without such discrepancies.

These data suggest that some patients may retrospectively exaggerate the frequency of vomiting after gastric bypass surgery. Since most reports on the extent of vomiting have been obtained retrospectively, the present study indicates that gastric reduction is followed by far less vomiting than we had been led to believe.

Friday, June 3, 1983, 10:45 a.m.

DISCUSSION OF COMPLICATIONS

Moderator: Jeffrey W. Lewis, M.D.

Panel: John D. Halvarson, M.D.; Gordon H. Hardie, M.D.; Edward W. Martin, Jr., M.D.;  
Cathy Mojzisek, R.N.; Albert Stunkard, M.D.; Harvey J. Sugarman, M.D.; and Lisa VanDyke,  
M.S.

NOTES

Friday, June 3, 1983, 1:30 p.m.

## CONVERSION OF INTESTINAL BYPASS TO GASTRIC REDUCTION

Otto L. Willbanks, M.D.

Patients continue to present with intestinal bypass operations of various types and with complications that fail to respond adequately to conservative measures. One hundred seventy-two such patients have undergone operation at Baylor University Medical Center, Dallas, Texas, to dismantle an intestinal bypass with concomitant construction of a gastric pouch, either gastropasty or gastric bypass, to reduce the possibility of regaining lost weight. Of these cases, one hundred forty-five were end-to-side jejunoileal bypasses, 22 were end-to-end jejunoileal bypasses, four were jejunocolic bypasses and one was a biliopancreatic bypass with intractable metabolic derangements.

Sixteen patients were operated upon for failure to lose sufficient weight as the only indication. The remainder were operated upon for consequences of the bypass and the most frequently encountered problems were pseudo-obstruction with gas-bloat syndrome, electrolyte abnormalities, hypoproteinemia, recurrent urolithiasis, arthritis and deteriorating liver function.

The complication rate (17%) and the rate of failure to maintain adequate weight loss are both significantly higher than when gastric stapling is done as the initial and only procedure.

It is recommended that patients undergo preoperative nutritional assessment, and those with decreased serum proteins or total lymphocyte count, reacting poorly to skin tests, or with compromised liver function be given parenteral hyperalimentation prior to surgery.

In cases of bacterial overgrowth in the excluded segment, re-establishing intestinal continuity can lead to bolus bacteremia, one consequence of which may be disseminated intravascular coagulopathy. The importance of parenteral and intraluminal antibiotics to prevent this catastrophe is emphasized.

With the implementation of appropriate precautions, the conversion of an intestinal bypass to a gastric pouch is a practical and effective technique for coping with the complications.

Friday, June 3, 1983, 1:45 p.m.

FAILED GASTROPLASTY FOR MORBID OBESITY: REVISED GASTROPLASTY VS ROUX-EN-Y GASTRIC BYPASS

Harvey J. Sugarman, M.D. and James L. Wolper, M.D.

Gastroplasty has been recommended for the surgical treatment of morbid obesity. We sequentially performed three types of gastroplasties in 122 patients. Of these, 14 of 21 (66%) disrupted a single application of staples (3/1979 to 4/1980), 13 of 46 (28%) disrupted a double staple line with a central, 2-0 prolene reinforced stoma (4/1980 to 2/1981), and 13 of 55 (24%) disrupted a "Gomez" gastroplasty (2/1981 to 6/1982). In addition, two patients in each group required operative revision for stomal stenosis. Revisional operations were performed in 26 patients with gastroplasty failures. Eight patients underwent gastroplasty revision and 18 conversion to a Roux-en-Y gastric bypass. Problems developed in seven of the eight patients with gastroplasty revision, including severe delayed distal gastric emptying (3) unrelieved in two with metoclopramide, stomal stenosis (2), stomal dilatation (1), and an upper pouch leak (1). Three of these patients have subsequently been converted to a Roux-en-Y gastric bypass. Complications in the 21 patients converted to a gastric bypass have been at a lower rate and less severe. They include: marginal ulcer which resolved with cimetidine (2), mild stomal stenosis treated with endoscopic balloon catheter dilatation (3), small bowel obstruction (1), postprandial hypoglycemia (2), and an anastomotic leak from failure to perform gastrostomy for decompression (1). Each of the patients with gastric bypass has early satiety and a decreased appetite. Twelve of these patients have been followed up for more than one year and have lost  $64 \pm 17\%$  of their excess body weight. In conclusion, gastroplasty as performed in this series carried an unacceptable incidence of failure. Furthermore, the high complication rate associated with attempts to revise a failed gastroplasty, was lower with conversion to a Roux-en-Y gastric bypass. The latter should, therefore, be the procedure of choice if a patient desires revision of a failed gastroplasty.

Friday, June 3, 1983, 2:00 p.m.

A METHOD OF REVISING HORIZONTAL GASTROPLASTY TO VERTICAL BANDED GASTROPLASTY

Burns J. Larson, M.D. and W. J. Hollingsworth, M.D.

Presentation of the details of this method in 35 cases.

Results:

- 1) Weight loss at six months and one year.
- 2) X-ray and blood results at two months and one year.
- 3) Objective and subjective effect of operation after one year.
- 4) Intraoperative and postoperative complications and pitfalls of procedure.
- 5) Number of successful revisions/those attempted.

Friday, June 3, 1983, 2:15 p.m.

REVERSAL OF VERTICAL BANDED GASTROPLASTY

Cornelius Doherty, M.D.

Presentation of several case histories of patients who have had their vertical banded gastroplasties reversed at various postoperative intervals and for various reasons will be given. The operative technique will be described and intraoperative measurements of the pouch and outlet channel will be reported. Also follow-up information will be given especially regarding weight status and relief of symptoms necessitating reversal procedures. Some comment will also be made regarding pitfalls in the selection of patients for vertical banded gastroplasty and how they can be minimized.



Friday, June 3, 1983, 2:30 p.m.

DISCUSSION OF REOPERATIONS

Moderator: Cornelius Doherty, M.D.

Panel: Burns J. Larson, M.D.; Harvey J. Sugerman, M.D.; and Otto L. Willbanks, M.D.

NOTES

Friday, June 3, 1983, 3:30 p.m.

BODY CONTOURING FOR THE FORMERLY OBESE

Hal G. Bingham, M.D. (invited speaker)

NOTES

OWING TO TIME AND SPACE LIMITATIONS, THE FOLLOWING ABSTRACTS COULD NOT BE ACCOMMODATED ON THE PROGRAM.

#### AN ATTEMPT TO MEASURE STOMAL DIAMETER OF A VERTICAL BANDED GASTROPLASTY BY VARIOUS SIZED RADIOPAQUE OBJECTS

Justin E. Arata, M.D. and Allan J. Perry, M.D.  
3301 Lake Avenue, Fort Wayne, Indiana 46805

At the time of performing a vertical banded gastroplasty, we have been measuring the internal diameter of the stoma of the small gastric pouch. The volume has also been measured.

Since we are uncertain as to the ultimate diameter of the stoma, we are comparing the results obtained by the patients swallowing various sized barium spheres. We are hoping we will be able to correlate the ultimate size of stomal diameter, and the pouch size, on the ultimate weight loss of patients subjected to vertical banded gastroplasty.

#### A COMPARISON OF RESULTS OF THE VERTICAL BANDED GASTROPLASTY AND TRANSVERSE STAPLING OF THE STOMACH

Justin E. Arata, M.D. and Allan J. Perry, M.D.  
3301 Lake Avenue, Fort Wayne, Indiana 56805

Since 1978, we have carried out in excess of 700 gastroplasties for exogenous obesity.

We have defined one year good results as those who have lost in excess of 20% of their body weight from the time of initial surgery.

Using a single row of staples with three removed from the center, at one year, on 100 patients, we had a 43% follow-up with 10% good results of the 100 patients.

On 100 patients whom we subjected to the single firing of a TA90 stapling device and used reinforcing sutures, we had a 50% follow-up and had 16% satisfactory results at one year.

When we applied the TA90 device twice, transversely, in 120 patients, we had a 54% follow-up at one year with 20% of the 120 as good results.

We modified our technique to staple Mersilene mesh over the anterior wall of the stomach with two TA90 stapling devices and with staples removed from the center on 120 patients. It was necessary to use a tube gastrostomy through the staple line to prevent early obstruction. We had a 60% follow-up of these patients and 36% good results at one year.

We then used a single firing of TA90 staples with the same Mersilene mesh and gastrostomy tube on 14 patients. We have a 60% follow-up on these patients and 42% good result at the end of one year. We did not carry this study further because we followed Dr. Mason's lead with the vertical banded gastroplasty.

The results of the vertical banded gastroplasty have been remarkably different. By the time of the Bariatric Conference in June, 1982, we will have followed up approximately 50 patients for over one year. These patients that have been followed up for over six months have had a satisfactory weight loss in over 90% and we see no reason why our results will not be at least that well at one year, using a 20% weight loss as a satisfactory result. We have had two instances in which the band of mesh intruded into the stomach necessitating removal.

## DOES GASTRIC PARTITIONING SURGERY WORK VIA BEHAVIOR EFFECTS?

Paul E. Baer, Ph.D., Richard A. Evans, M.D., Lois C. Friedman, Ph.D. and Robert G. Harper, Ph.D.  
Psychiatry Department, Baylor College of Medicine, 1200 Moursund Avenue, Houston, Texas 77030

Our study consists of a psychosocial follow-up of a large number of patients whose obesity was treated with gastric partitioning surgery. A packet of questionnaires and inventories was mailed to over 900 patients who had the operations during the last several years. The purpose of the study was to investigate the effects partitioning surgery on psychological and behavioral grounds. A central theoretical consideration is whether the various aversive side effects of surgery (nausea, fullness, vomiting and referred pain) serve to control the patients eating behavior. Specifically, patients can avoid the unpleasant consequences of eating brought on after surgery by eating less, more infrequently, and by selecting foods judiciously - changing food preferences. The patient's anticipation of unpleasant consequences of eating injudiciously may motivate changes in eating behavior. The data we are in the process of collecting will provide information regarding this issue. We intend to analyze the patients' responses in relation to weight loss, adjusted to time elapsed since surgery. Corollary variables to be considered are family support and the sense of personal well-being.

(No title listed)

Charles B. Covert, M.D.  
One Woodway Centre, Suite 300, 6363 Woodway Drive near Voss Road, Houston, Texas 77057

The author will present data produced from the psychiatric screening of over 200 patients for bariatric surgery, including MMPI data, clinical interview observations, common historical features found in the obese, etc.

## GASTRIC REDUCTION SURGERY IN HIGH RISK PATIENTS

Luigi M. De Lucia, M.D.  
10738 Riverside Drive, Toluca Lake, California 91602

All surviving patients had a marked improvement of their cardiorespiratory status as well as their quality of life.

The eight patients in the cardiac and respiratory subgroups had documented history of multiple hospitalizations for medical problems (some of an emergency nature) prior to their surgery. After the gastric reduction operation only one of these eight patients has required a single hospitalization for his extensive and advanced carotid and coronary disease. This patient is presently doing quite well under the circumstances, four years after his operation.

The two patients in the renal subgroup died of fundic blowout and pulmonary embolization. One of them was on dialysis, having irreversibly lost her renal function following a jejunoileal bypass. The other patient literally sabotaged the operation with her extreme noncompliance which she indirectly admitted to in writing before her demise.

The patient in the "extreme obesity" subgroup has lost her entire excess weight of 282% (302 lb) in 18 months in spite of her nearly total lack of behavioral change.

The analysis of this limited number of cases seems to suggest that severe cardiorespiratory problems complicating morbid obesity are no contraindication to gastric reduction.

As a matter of fact patients in this category seem to draw the greatest benefits from the operation.

This study also seems to confirm previous observations that obese males have a higher incidence of complicating medical problems than obese females.

#### UPDATE ON GASTRIC VERTICAL STAPLING FOR MORBID OBESITY

Daniel C. Fabito, M.D.  
3009 North Ballas, Suite 202, St. Louis, Missouri 63131

Our experience with the surgical treatment of morbid obesity using gastric vertical stapling for the last four years has been quite satisfactory. The present study includes 400 consecutive patients operated on from November 1978 to July 1982. Three hundred patients underwent gastric vertical stapling with prolene reinforced channel and 100 patients had gastric vertical stapling with silicone banded channel.

#### FOLLOW-UP INVESTIGATION OF MORBIDLY OBESE PATIENTS NOT SELECTED FOR GASTRIC BYPASS

K. Gentry, M.S. and J. D. Halverson, M.D.  
114 North Taylor, St. Louis, Missouri 63108

Thirty morbidly obese patients, who had contacted a university center for evaluation for a gastric bypass, were located and reinterviewed. The interval time span was one to three years. None of these patients underwent gastric bypass at the time of the initial contact because they 1) failed to meet the weight criteria; 2) met the criteria but never pursued the evaluation; 3) met the criteria but were not accepted for medical or psychiatric reasons; or 4) had met all of the criteria, but for personal reasons decided not to undergo surgery.

A detailed weight history for the interval was obtained. If a patient had received a weight reduction operation by another surgeon during the interval, preoperative and postoperative data was obtained. Inquiry was made concerning the medical and psychiatric histories of each patient during the interval. Private physicians were contacted whenever possible to supplement patient information. Motivation for weight loss was explored. Satisfaction with life was measured. Particular patterns associated with obesity, such as, bingeing, snacking, loss of sensation of hunger, and emotional factors, were investigated.

#### INITIAL (HALF-YEAR) WEIGHT LOSS AFTER GASTRIC BYPASS, GASTROPLASTY AND GASTRIC BANDING

L. Granstrom, M.D. and L. Backman, M.D.  
Department of Surgery, Karolinska Institute at Danderyd Hospital, Stockholm, Sweden

In an earlier study we have found that the main cause for inadequate weight loss after gastric operations for obesity was increase in the outlet diameter. In most cases this increase appeared within nine months after surgery. In order to avoid such widening of the outlet or staple line rupture we have since November 1981 used a technique with gastric banding as originally suggested by Wilkinson (Arch Surg 116:602-605, 1981). The results after six months in the first nine patients in each of four groups, operated with:

Gastric bypass	= BYPASS	Gastroplasty (LaFave et al)	= PLASTY II
Gastroplasty (Gomez procedure)	= PLASTY I	Gastric banding (without stapling)	= PLASTY III

The results are evident from the following table (mean  $\pm$  SEM):

	BYPASS	PLASTY I	PLASTY II	PLASTY III
Age (years)	29.2 $\pm$ 1.7	31.9 $\pm$ 2.2	37.0 $\pm$ 3.6	41.7 $\pm$ 3.1
Weight (kg)	124.2 $\pm$ 4.4	138.4 $\pm$ 6.7	124.6 $\pm$ 5.7	122.2 $\pm$ 5.7
Broca's Index	1.81 $\pm$ 0.05	2.06 $\pm$ 0.16	1.9 $\pm$ 0.1	1.92 $\pm$ 0.17
Rate of Weight loss (index/week)	0.017 $\pm$ 0.002	0.012 $\pm$ 0.003	0.022 $\pm$ 0.001	0.024 $\pm$ 0.004
% Weight loss at 25 weeks	22.3 $\pm$ 3.6	14.0 $\pm$ 3.2	25.3 $\pm$ 3.5	31.3 $\pm$ 2.3
Continuing weight loss, 25 weeks	8/9	5/9	6/9	9/9

Compared to other types of gastric operations for obesity in our series, external gastric banding seem to result in: longer sustained period of weight loss, higher initial absolute weight loss and in a higher proportion of operated patients.

#### TREATMENT OF JEJUNOILEAL BYPASS FAILURE BY REANASTOMOSIS AND GASTROPLASTY IN A SINGE-STAGE PROCEDURE: REVIEW OF 47 CASES

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Jejunoileal bypass (JIB) for morbid obesity has resulted in a variety of metabolic complications requiring reanastomosis. Although reversal of the JIB is usually effective in resolving the metabolic problems, weight gain to pre-JIB levels is common. A single-stage operation combining JIB reversal with gastroplasty (RGP) was performed on 47 patients to correct metabolic complications associated with JIB and reduce the recurrence of morbid obesity. Hospital records, office visits and telephone follow-up were used to evaluate each patient. Mean follow-up was 17 months with a range of 6-34 months. Average weight at time of revision was 81 kg, 16.6 kg above the mean ideal weight. Ninety-six percent of complications leading to reversal were resolved. Mean postoperative weights showed a gradual increase up to two years, at which time weight gain terminated. Patients two to three years after operation averaged 36.5 kg above ideal weight (64.4 kg) and 19.8 kg above weight at time of reversal of the JIB. Seventy percent of patients remained below morbid obesity levels.

Complications of RGP included eight cases of stomal obstruction, two of which required reoperation. Stomal dilatation was identified in two patients. There were no mortalities or pulmonary or wound complications.

RGP was found to be ineffective in producing weight loss in patients who had not lost significant weight after JIB.

This study suggests that JIB reversal with gastroplasty as a single procedure is safe and effective in resolving nearly all JIB complications. RGP is associated with gradual increase in weight for two years, after which weight gain appears to plateau. However, return to morbid obesity levels can be prevented in 70 percent of patients undergoing RGP.

## RESULTS OF VERTICAL BANDED GASTROPLASTIES VS HORIZONTAL GASTROPLASTIES

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Presentation of 135 cases of vertical banded gastroplasties plus results re:

1. % excess wt lost at 6 months and 1 year.
2. Complications, intra- and postoperative.
3. OR - time
4. Hospital stay

compared to 150 horizontal gastroplasty cases performed by same surgeons at same hospital.

## THE LEFT SUBCOSTAL INCISION-BETTER EXPOSURE AND LESS MORBIDITY

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Since January, 1981, a left subcostal incision has been made in 213 consecutive patients undergoing horizontal gastroplasty with or without associated cholecystectomy. Excellent exposure is obtained with minimal morbidity and no mortality:

Wound infection	1	(0.5%)	Splenectomy	0
Wound dehiscence	1	(0.5%)	Minor atelectasis	10-20%
Incisional hernias	0		Postop pneumonia	1 (0.5%)

A 25-cm long skin incision is made just below the costal margin. The left and upper edge of the right rectus muscles are transected in subcostal fashion, as well as the lateral abdominal musculature high in the left upper quadrant of the abdomen. The Valley-Lab instrument is used for subcutaneous tissue and fascia. The "upper hand" and Balfour retractors are then used, giving excellent exposure. After the procedure, fascial closure includes running 0-Prolene with Auto-Suture fascia staple reinforcement. Subcutaneous tissue is drained and the skin closed with staples. Quite adequate exposure of the gallbladder is obtained and a cholecystectomy has been done frequently with relative ease. Reopening the fascia staple line has posed no problems when necessary. Using this technique, and a TA-90 cartridge modification with no C-clamp attachment, in a horizontal gastroplasty, we continue to get an average 70% excess weight loss at one year after operation.

## GASTRIC BANDING

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This paper introduces a new technique in surgical treatment of morbid obesity, named "gastric banding." The operation is performed through an upper midline laparotomy. A similar slit is made 8 cm from the esophagus on the lesser curvature. The upper part of the stomach is then encircled with a lockable nylon band (Cerclene) covered by an arterial graft to prevent pressure necrosis or with an arterial graft only. The band is tightened until it fits the stomach snugly around an intragastric tube.

84 patients have been treated with "gastric banding."

Average preoperative weight was 123 kg.

Average weight loss after six months was 42 kg.

The band has been removed in three cases because of serious side-effects due to excessive vomiting. The band has easily been cut two, six and eight months after the operation.

Conclusion:

"Gastric banding" - is reliable and effective as a weight reducing procedure.

- is a technically easy, safe and speedy procedure that does not open the gastrointestinal tract.
- retains the possibilities of upper endoscopy and x-ray.
- may easily be reversed.

#### NEW MODIFICATION OF ROUX-EN-Y GASTRIC BYPASS PROCEDURE

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We have developed a method of creating an anterior pouch that does not require ligating any vasa brevia nor mobilizing any of the greater curvature. It is not located on the lesser curvature as is Torres' EEA technique. The pouch can be made as small as desired (we use a 10-15 ml measured pouch), and being anterior, the anastomosis is relatively easy to construct. We prefer using a GIA plus TA-30 staple technique. The efferent limb is to the left of the midline permitting a gastrostomy in the excluded stomach should that be desired. We have used this modification for one year and it appears to be at least as effective as our standard Roux-en-Y gastric bypass procedure which has held up well for over four years.

We also have used Torres' Roux-en-Y technique in 12 patients and now have one year follow-up. We have found this method equally effective, but not quite as simple in our hands. The efferent jejunum is so far to the right that a gastrostomy with gastropexy is usually not possible.

#### GASTRIC BYPASS - AN INTEGRATED PROGRAM, NOT JUST AN OPERATION

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Moline Lutheran Hospital Experience - 1975-1983 with 650 cases of loop gastric bypass

This paper is presented to show the importance of preoperative evaluation and postoperative observation, counseling and monthly and bimonthly visits for the first postoperative year. This will deal with probably 650 cases of loop gastric bypass, a critical evaluation of the operative procedure, follow-up data to include revisions, etc, and finally, panniculectomy, and thigh, arm, buttock and hip reductions as the final surgery for the total rehabilitation of the morbidly obese patient.



## DEVELOPMENT OF COMPUTER PROGRAM AND COMPUTERIZING GASTRIC BYPASS STATISTICS

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This paper deals with development and experience in getting our over 650 patients computerized.

### AFTER BYPASS, WHAT?

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A presentation of data from over 100 panniculectomy, thigh, arm, buttock and hip reductions.

### THE COMPARISON OF WEIGHT LOSS FOLLOWING VERTICAL GASTROPLASTY (25 CASES) AND ROUX-EN-Y GASTRIC BYPASS (65 CASES) OVER A TEN MONTH PERIOD OF TIME

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In the past ten months 25 patients have undergone vertical gastroplasty for morbid obesity and 65 patients have undergone Roux-en-Y gastric bypasses. These similar groups will be compared regarding weight loss, as well as percent of excess weight.

Complications, morbidity, hospital stay and postoperative care modes will be summarized.

Ten patients with severance of the stomach between the staple lines will be discussed. An expression of the relative values of each operation and where they should fit in the treatment of morbid obesity will be made.

### GASTRIC STAPLING--THE AFTERMATH

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A long-term patient's point of view--talk based on personal experience (gastric bypass done June 1979, weight 355 lb, current weight 148 lb) and 2½ years working with over 400 patients of Dr. Alan Y. Newhoff as a patient counselor.

Gastric stapling can be the start of a new life, but it's only the beginning. A good surgeon, assistant, anesthesiologist and hospital can insure a successful gastric stapling procedure with weight loss as its goal. The goal cannot be guaranteed, however, by gastric stapling alone. For long-lasting success the patient needs help in many ways, including: long-term follow-up, support groups, family support, nutritional guidance, encouragement in developing a positive mental attitude before and after the operation, and support while making mental, emotional and sexual adjustments.

## COMPLICATIONS OF GASTRIC POUCH OPERATIONS

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The complications encountered in 1,034 gastric pouch operations, either gastric bypass or gastroplasty, are reviewed with particular emphasis upon those that potentially could result in death or reoperation.

There have been 17 perforations with subphrenic abscess and of these four have died. The early signs of perforation such as pain, tachycardia, leukocytosis with left shift, radiographic or endoscopic demonstration of the leak were inconsistently observed, and a high index of suspicion and careful application of clinical judgment is mandatory for early diagnosis and timely reoperation. Oversewing the stoma and staple line and liberal use of drains and gastrostomy are helpful in averting this disastrous complication.

There have been two fatal pulmonary emboli, and the measures invoked to minimize this catastrophe include minidose heparin, careful positioning of the patient on the operating table, short operating time and early ambulation.

Severe vomiting has occurred in 4% of our cases, and 12 patients have required reoperation to correct some anatomic problem such as stricture, atonic and dilated pouch or gastroesophageal reflux.

As the technique has been altered to incorporate principles of a small, measured pouch, a banded stoma of 9 mm and a reinforced staple line, the operations have become more and more effective at inducing weight loss, and both failure and complication rates have decreased. Clearly, of the various operations performed, vertical banded gastroplasty has the lowest complication rate and the highest success rate. Of 268 such patients there has been only one perforation and weight loss has been excellent.

There have been almost eight times as many women as men operated upon, and yet half the perforations, deaths and other serious life-threatening problems have occurred in men.

A small but definite complication rate indicates gastric pouch procedures are acceptably but not absolutely safe and effective. Constant attention to the principles and details of the surgery will, hopefully, further improve these figures.

## INTRAOPERATIVE SIMPLE AND SAFE METHOD TO DIAGNOSE GALLBLADDER DISEASE DURING GASTRIC BYPASS SURGERY

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This is an early report of five weeks experience on 35 patients, who underwent Roux-en-Y, lesser curvature, gastric bypass for the treatment of morbid obesity.

Fourteen patients (40%) had cholecystectomy either before surgery (10 patients) or at the time of gastric bypass (4 patients) due to cholelithiasis.

During gastric bypass a bile sample from the gallbladder was taken from 21 patients (60%) with negative cholecystograms or ultrasound, using No. 18 gauge needle and 20 cc of syringe for microscopic studies.

Cholecystectomy was performed on 28 patients with positive crystals in the bile sample.

Pathologic report showed cholelithiasis or cholesterols in 50% of the patients and chronic cholecystitis in the remaining 50%.

From this small number of cases we conclude that direct microscopic studies of the bile gives a high percentage (86%) of diagnosis of gallbladder pathology on patients undergoing gastric bypass for morbid obesity.

#### THE EFFECT OF HYPERTENSION AFTER GASTRIC BYPASS ON MORBID OBESE PATIENTS

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One hundred fifteen patients underwent Roux-en-Y, lesser curvature gastric bypass between June 1979 and September 1981.

There were 100 females and 15 males with an average age of 36 years and 283 pounds of admitting weight with 156 pounds of average overweight (123%).

Sixty-eight patients were taking medication (59%) before operation and within three months after operation the number of patients on medication dropped to 41 (35.6%).

The need for antihypertensive or diuretic agents was reduced from 59% to 8.5% (10 patients) at the end of 12 months.

Three patients (2.5%) are on a two drug treatment 18 months after operation due to persistent hypertension, even with a weight loss of more than 92% of their initial overweight.

The blood pressure has normalized in 110 patients (95.6%) within 3-12 months. The mortality among hypertensive patients was 1.7% (the only 2 deaths out of 300 combined normotensive and hypertensive gastric bypass patients).

#### RESPIRATORY COMPLICATIONS AFTER GASTRIC BYPASS

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I have carried out approximately 140 to 150 gastric bypass operations. All patients have had preoperative blood gases, pulmonary functions, pulmonary therapy instruction, internal medical evaluation, and most patients have had subsequent vigorous pulmonary management, arterial blood gases and, occasionally, follow-up pulmonary function studies.

Our respiratory laboratory, one of the finest in the country for our size hospital, is equipped with sophisticated respiratory analytic capabilities. We are presently in the process of computerizing our results, attempting to assay which factors appear to be the best predictors of pulmonary difficulties after operation as well as detecting which therapeutic approaches appear to be the best for these patients prior to, during and after operation. Respiratory complications seem to be a significant problem in these patients and we feel that we are on the right track in giving this problem a heavy emphasis preoperatively, both in analysis and in treatment including cessation of smoking and preoperative respiratory instruction.

