

CLEVELAND SURGICAL SOCIETY

RESIDENT RESEARCH FORUM

AND ESSAY CONTEST

ABSTRACTS

April 28, 1982

University Club

3813 Euclid Avenue

Cleveland, Ohio

RESIDENT ESSAY CONTEST

3:00	-	3:10 p.m.	Vogt, Clifford Jr., M.D., Michaels, Mary Beth, Phd., Gibbons, Don, Phd., Pica, G.J., M.D., Phd., and DesPrez, J.D., M.D. Case Western Reserve University "Evaluation of Polytetrafluorethylene in the Microvascular System".
3:10	-	3:15 p.m.	Discussion
3:15	-	3:25 p.m.	Wagner, Douglas, M.D.-Akron City Hospital "Splenectomy: Indications, Complication and Mortality".
3:25	-	3:30 p.m.	Discussion
3:30	-	3:40 p.m.	Ashley, Julia V., M.D. and Fazio, Victor W., M.D. Cleveland Clinic Foundation "Rectovaginal Fistula Secondary to Malignant and Actinic Disease".
3:40	-	3:45 p.m.	Discussion
3:45	-	3:55 p.m.	Crowe, Joseph P., Jr., M.D. - University Hospitals "The Prognostic Importance of Estrogen Receptors for Stage I Breast Cancer Patients".
3:55	-	4:00 p.m.	Discussion
4:00	-	4:10 p.m.	Chamberlain, Timothy, M.D. - Akron City Hospital "Abdominal Aortic Grafts and Small Bowel Contamination - A Dog Study Concerning Infection Rate and Prophylaxis".
4:10	-	4:15 p.m.	Discussion
4:15	-	4:25 p.m.	Duda, Andrew, M.D., Gill, Carl C., M.D., Kitazume, Hidemasa, M.D., Moodie, Douglas, M.D. and Loop, Floyd F., M.D. - Cleveland Clinic Foundation "Surgical Treatment of Idiopathic Hypertrophic Subaortic Stenosis with Other Cardiac Pathology".
4:25	-	4:30 p.m.	Discussion
4:30	-	4:50 p.m.	*COFFEE BREAK*
4:50	-	5:00 p.m.	Werner, Stephen J., M.D., Lees, C. Douglas, M.D., and Beven, Edwin G., M.D.-Cleveland Clinic Foundation "Primary Aorto-Duodenal Fistula: A Report of Two Cases - Concepts in Diagnosis and Treatment".
5:00	-	5:05 p.m.	Discussion
5:05	-	5:15 p.m.	Pine, Richard, M.D., Urban, Jacqueline, Plecha, Fred R., M.D., and Hoffman, Marilyn, M.D. - Lutheran Medical Center "Control of Post Carotid Endarterectomy Hypotension".
5:15	-	5:20 p.m.	Discussion

RESIDENT ESSAY CONTEST

5:20 - 5:30 p.m. Slezak, Frederick, M.D. - Akron City Hospital
"Delayed Pneumothorax".

5:30 - 5:35 p.m. Discussion

5:35 - 5:45 p.m. Aeder, Mark, M.D., Crowe, Joseph, M.D., and
Rhodes, Robert S., M.D. - University Hospitals
"Technical Limitations in the Rapid Infusion of
Intravenous Fluids".

5:45 - 5:50 p.m. Discussion

5:50 - 6:00 p.m. Feldman, Bruce, M.D., Hooley, Ruth, R.D.,
Steiger, Ezra, M.D., and Pino, Fidel, M.D.
Cleveland Clinic Foundation
"Nutritional Assessment Parameters and
Postoperative Morbidity".

6:00 - 6:05 p.m. Discussion

6:05 - 6:15 p.m. Ciraldo, Al, M.D. - Akron City Hospital
"A Comparison of Cecostomy and Transverse
Colostomy in the Management of Acute Colonic
Obstruction".

6:15 - 6:20 p.m. Discussion

6:20 p.m. Adjournment

6:30 - 7:30 p.m. Cocktails

7:30 - 8:30 p.m. Dinner

8:30 p.m. Awards Presented - Prize Essay will be read.

EVALUATION OF POLYTETRAFLUROETHYLENE IN THE MICROVASCULAR SYSTEM

Clifford Vogt Jr., M.D., F.A.C.S., Mary Beth Michaels,
Don Gibbons Ph.D., G.J. Pica M.D., Ph.D. and J.D. DesPrez M.D.
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A series of experiments have been performed in the rat model to evaluate the blood-foreign surface interaction in the microvascular system. Polytetrafluroethylene (P.T.F.E., Gortex^R) grafts have been fabricated into 1.5 cm. lengths with a diameter of 1 mm. and interposed in the rat aorta. This paper is a preliminary report of our experience to date with P.T.F.E. grafts with an effective porosity of 90 micra.

We have evaluated the variables of anastomosing techniques, surface chemistry, surface porosity, and compliance. The methods of evaluation are direct observation, scanning electronmicroscopy, and histology. The time periods that have been investigated are 10 minutes, 30 minutes, 24 hours, 4 days, and 7 days. A total of 18 experiments were performed.

Previous experience with P.T.F.E. in a microvascular setting have been inconsistent with regard to patency rates. Our experience has been encouraging with over 90% patency rates for the time periods studied. Previous studies have used P.T.F.E. with a 30 micron porosity. In contrast, our grafts have a 90 micron effective porosity and were preprocessed by vacuum impregnation with buffered saline. Thus, there appears to be a correlation between patency rates and effective porosity for this material. The possible mechanisms for this will be discussed. Scanning electron microscopy revealed a pseudointima of constant thickness with leukocyte adherence at the distal anastomosis. Histologic results are pending.

SPLENECTOMY: INDICATIONS, COMPLICATION AND MORTALITY

Douglas Wagner, M.D.

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525 East Market Street, Akron, Ohio 44309

The Akron City Hospital experience with 120 consecutive splenectomies over a three-year period is reviewed. The purpose of this retrospective study was to determine the current indications for splenectomy in our hospital and to compare our mortality and morbidity statistics with other large series.

The most common indication was traumatic rupture (35 percent), planned addition to more extensive procedure (24 percent), hematologic disease (24 percent) and iatrogenic injury (19 percent). Overall mortality was 14 percent, and the complication rate was 30 percent (exclusive of the multiple trauma victims). The highest mortality was with trauma (17 percent) and iatrogenic injury (17 percent). The lowest mortality was in hematologic disease (7 percent).

No correlation was found between mortality and morbidity and age except in the cases in which incidental splenectomy was performed. In these cases, patients greater than sixty years old fared more poorly.

Current literature on splenectomy, indications, morbidity and mortality is reviewed and compared to our experience.

Incidental splenectomy carries significant morbidity and mortality, especially in patients over sixty years old in this series.

RECTOVAGINAL FISTULA SECONDARY TO MALIGNANT AND ACTINIC DISEASE

Dr. Julia V. Ashley & Dr. Victor W. Fazio

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In a review of patients with rectovaginal fistulae seen at the Cleveland Clinic Foundation between 1970 and 1980, four etiological groups were identified. Of 168 patients seen, follow-up of six months or more was completed on 151 patients. Follow-up consisted of: 35 with malignant/actinic fistula, 68 with fistulae due to inflammatory causes, 39 with traumatic origin, and 9 due to miscellaneous causes. This paper addresses fistulae arising in association with malignant and actinic disease. In nine patients fistulae were secondary to colorectal cancer; 26 occurred in association with endometrial or cervical cancer. Twenty-nine of 35 patients had been treated with radiation therapy. Four thousand Rads or more were delivered by external beam radiation; most of the cervical or endometrial cancers received an additional radiation treatment in the form of intracavitary radiation up to 2500 Rads being delivered. Eleven patients underwent palliative colonic diversion alone with eight of these patients dead of metastatic carcinoma. Fourteen of 16 patients who underwent abdominal resection of the fistula with a protective colostomy had the fistula heal. One patient of this group subsequently died of cancer; another died without the fistula having healed. A further patient is alive but with a persistent fistula. Five patients underwent local perineal repair with a covering colostomy. In these five patients following closure of the colostomy, three were healed and two recurred. The merits of using a rectal advancement flap for the repair of these difficult fistulae is discussed.

THE PROGNOSTIC IMPORTANCE OF ESTROGEN RECEPTORS FOR
STAGE I BREAST CANCER PATIENTS

Joseph P. Crowe, Jr., M.D.

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Determination of estrogen receptor content of primary breast cancer specimens is becoming common practice and has been shown to have prognostic value for certain patients. Women whose tumors contain estrogen receptors have a greater response to endocrine therapy and a better overall prognosis compared to women whose tumors lack estrogen receptors. Whether estrogen receptor determination has independent prognostic value for breast cancer patients has been a study problem because many patients have had postoperative adjuvant therapy. Whether the relative level of estrogen receptor has any prognostic importance has been difficult to determine as well, utilizing various techniques, because estrogen receptor assays are frequently done in different laboratories. This study focuses on both these questions.

Since 1974 at University Hospitals, Cleveland, a group of 828 breast cancer patients has been followed as part of a regional multi-institutional clinical trial to evaluate adjuvant therapy of breast cancer. Each patient had a complete mastectomy with evaluation of axillary nodes and measurement of estrogen receptor content of the primary tumor in one laboratory (McGuire). Three hundred eighteen Stage II patients were randomized to adjuvant therapy and results of this study have been published (Hubay, 1981). Five hundred ten Stage I, node negative patients were treated by mastectomy alone and comprise this study group. Median follow-up for this group is 51 months with a total follow-up of 66 months.

A value of 3 fm/mg cytosol protein was chosen to separate the estrogen receptor negative from positive women with ER- <3 and ER+ >3 . Three hundred seventy-eight or 74% of the patients were estrogen receptor positive and 132 or 26% were estrogen receptor negative. Results of this study indicate that estrogen receptor positive women have a much better prognosis, 78% recurrence free and 92% alive, compared to estrogen receptor negative women, 67% recurrence free and 75% alive, at 5 years after mastectomy ($p < .034$ recurrence and $p < .0003$ for survival). To investigate whether women with higher values of estrogen receptor have a better prognosis, we analyzed the data for values of 10, 25 and 50 fm/mg and compared this to the results using 3 fm/mg. Identical recurrences were found for the estrogen receptor positive patients regardless of which value was chosen.

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Further stratification of patients by menopausal status indicates that premenopausal estrogen receptor positive patients appear to constitute a particularly poor risk group of patients.

We conclude from this study that estrogen receptor determination does provide an important independent prognostic factor for women with Stage I breast cancer and that the presence or absence of estrogen receptor, and not the relative level, is more significant.

ABDOMINAL AORTIC GRAFTS AND SMALL BOWEL CONTAMINATION -
A DOG STUDY CONCERNING INFECTION RATE AND PROPHYLAXIS

Timothy Chamberlain, M.D.

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During exposure for abdominal aortic surgery, there is always a small risk of inadvertently entering the duodenum or small bowel and causing contamination - especially in those patients that have undergone previous abdominal surgical procedures. Since any infection involving an arterial graft is a horrendous problem, often involving a loss of life or limb, procedures involving any contamination by small bowel contents are usually terminated prior to placement of a graft due to the increased risk of infection. This requires a second surgical procedure and carries its own risk of increased morbidity and possible increased mortality.

Several clinical studies indicate that the addition of a concomitant secondary procedure to an abdominal aortic graft, involving violation of the gastrointestinal tract, does not increase operative risk or infection rate. A study was designed using a dog model to examine the question of whether there is an increased infection rate due to small bowel contamination in dogs undergoing abdominal aortic graft placement that have received a preoperative antibiotic preparation.

Thirty mongrel dogs were divided into three groups of ten. Group A underwent placement of Dacron velour abdominal aortic grafts with prior measured small bowel contamination and no preoperative antibiotics or bowel preparation used. The grafts were removed at three weeks and cultured and an infection rate of 60% was found. Histological examination of the grafts were also performed.

Group B underwent placement of similar abdominal aortic grafts with an antibiotic and bowel preparation given preoperatively consisting of cefamandol nafate intramuscularly and erythromycin base and neomycin sulfate orally, along with magnesium sulfate and bisacodyl as a mechanical bowel preparation. No small bowel contamination occurred knowingly. Cultures of grafts excised at three weeks yielded an infection rate of 20% consisting of staphylococcal aureus and an alpha-streptococcal species. One of the two cultured contaminated grafts showed no histological evidence of infection and all grafts were patent.

Group C had the same antibiotic and mechanical bowel preparation and procedure performed along with purposeful measured small bowel contamination of the peri-aortic tissues prior to placement of the dacron graft. Cultured grafts at three weeks yielded an infection rate of 30%, with all three grafts showing histologic evidence of an infectious process. The bacterial species cultured were diptheroids, staphylococcal aureus, and Fusobacterium varium.

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There was no statistical difference ($p = .5$) between Group B and C (uncontaminated vs. contaminated) although Group C did have a higher infection rate. The high infection rate in the uncontaminated Group B cannot be explained at this time. There is a difference between the two contaminated Groups A and C (30% vs. 60%) - reflecting a higher infection rate in those not receiving prophylactic antibiotics, but receiving the same small bowel contamination. There is no statistically significant difference ($p = .3$) due to the small total in each group.

The results of this experimental study support the axiom held by most vascular surgeons, that small bowel contamination is a contraindication for placement of an abdominal aortic graft even if the patient is prepared prophylactically with antibiotics and a mechanical bowel preparation.

SURGICAL TREATMENT OF IDIOPATHIC HYPERTROPHIC SUBAORTIC STENOSIS
WITH OTHER CARDIAC PATHOLOGY

Andrew Duda, M.D., Carl C. Gill, M.D., Hidemasa Kitazume, M.D.,
Douglas Moodie, M.D. and Floyd F. Loop, M.D.

The Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, O. 44106

Twenty-nine patients underwent surgery for idiopathic hypertrophic subaortic stenosis (IHSS) solely or in combination with other cardiac pathology. Fifteen men and 14 women, 26 to 75 years old (mean 56 years), had peak subvalvular gradients with or without provocation ranging from 0 to 220 mmHg (mean 93 mmHg). The diagnosis of IHSS was confirmed preoperatively by echocardiography in 22 patients on whom it was performed. Twenty-seven patients underwent left ventricular septal myectomy; one had a left ventricular myotomy, and another received mitral valve replacement (MVR) alone for palliation of IHSS. In addition, coronary artery bypass was performed in 18 of these IHSS patients (8 single, 5 double, 4 triple, and one quintuple); other operations included mitral valve replacement in two patients, aortic valve replacement in one, and tricuspid annuloplasty in one. One operative death (3%) occurred 34 days postoperatively. There have been two late deaths; one at 22 months from bacterial endocarditis on a prosthetic mitral valve, and another suddenly at 29 months after septal myectomy. Follow-up is complete to November 1981. After a follow-up ranging from 2-93 months (mean 25 months), 22 of 26 patients are asymptomatic. Three asymptomatic patients have been recatheterized 12, 14, and 21 months postoperatively. Marked amelioration of subaortic gradients and patent grafts were found. Septal myectomy can be combined with other cardiac operations to provide effective relief of symptoms.

PRIMARY AORTO-DUODENAL FISTULA: A REPORT OF TWO CASES
CONCEPTS IN DIAGNOSIS AND TREATMENT

Stephen J. Werner, M.D., C. Douglas Lees, M.D., and Edwin G. Beven, M.D.

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Primary aorto-duodenal fistula, first described by Sir Astley Cooper in 1822, continues to be a diagnostic enigma. The diagnosis is usually made only by surgical exploration or uncontrollable upper gastrointestinal hemorrhage. Under these circumstances the mortality rate has remained very high. The incidence of primary aorto-duodenal fistula is much less than for the secondary type of fistula, a well recognized complication of aortic reconstruction. However, Ferguson reported an incidence of seven in 10,000 consecutive autopsies. Kane and Associates found that primary aorto-enteric fistulae accounted for 6.1% of all deaths related to gastrointestinal hemorrhage, the majority of these being aorto-duodenal in nature.

Diagnosis requires a high index of suspicion. Patients often present with the classic triad of 1). gastrointestinal hemorrhage; 2). abdominal mass; and 3). pain characteristic of aortic disruption. Surgical correction should be instituted immediately by ligation of the infrarenal aorta and closure of the duodenal defect, combined with extra-anatomic vascular reconstruction. Mortality for aorto-duodenal fistula has been quoted as 45% of those who reach the operating room, but the majority of patients die prior to operative intervention.

Two cases of primary aorto-duodenal fistula are presented.

CONTROL OF POST CAROTID ENDARTERECTOMY HYPOTENSION

Richard W. Pine, M.D. (Vascular Fellow), Jacqueline Urban (Medical Student, C.W.R.U.),
Fred R. Plecha, M.D., Marilyn Hoffman, M.D.

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The reported incidence of post operative hypotension following carotid reconstruction ranges from 21% to 41%. Other studies indicate greater mortality and morbidity with hypotension occurring after carotid endarterectomy. If a thorough clinical review fails to show the cause of postoperative hypotension, baroreceptor dysfunction then must be suspected. It is likely that this response is a reflection of increased stretch after repair of a carotid sinus previously stiffened by atherosclerosis. Vasoactive drug therapy for this dysfunction has been associated with increased myocardial morbidity, and for this reason, alternate methods to control hypotension have been sought.

In 173 consecutive carotid reconstructions, a teflon catheter was positioned intra-operatively at the carotid bifurcation over Herings' Nerve and placed through a skin incision. Postoperative hypotension was defined as a systolic blood pressure of less than 100 mm Hg.

Of the 173 reconstructions, 121 (70%) cases had no hypotension. In the remaining 52 (30%) cases a postoperative pressure of ≤ 100 mm Hg was observed and could not be explained by other than baroreceptor dysfunction. Twenty-nine of the 52 cases, Group I, were treated with 1-2 cc lidocaine via the catheter. Twenty-seven of the 29 cases (93%) responded with a prompt increase in systolic blood pressure from 92 to 138 mm Hg (means) within 30 minutes of treatment). In 16 of 52 cases, Group II, no treatment was given and patients had no morbidity.

Seven of the 52 cases, Group III, were treated with vasoactive drugs or fluid bolus, also with no morbidity. In the entire series there was no mortality and one CVA (0.5%). There was no morbidity associated with the use of the catheter or the lidocaine instillation.

The rate of postoperative hypotension following carotid reconstruction in this series of 173 cases is 30%, similar to that reported in other series. Our mortality (0%) and a stroke rate (2%) in hypotensive patients is much lower than that reported by others.

Our current preference for treatment of suspected baroreceptor dysfunction postoperatively is treatment with lidocaine via a teflon catheter placed intra-operatively. This simple, safe method is effective in 93% of the patients treated.

DELAYED PNEUMOTHORAX

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Delayed pneumothorax, a relatively unrecognized complication of subclavian vein catheterization, is caused by a slow pleural air leak. Undetected by the immediate post-insertion chest x-ray, this complication may be a potential hazard for the patient. Delayed pneumothorax appears to be associated with the "difficult" insertion and other complications as illustrated by three case reports.

Subclavian catheterization has become an increasingly popular method for central venous access for a variety of applications. This procedure, first introduced by Aubaniac in 1952, has been utilized for rapid administration of fluids and blood products, central venous pressure monitoring, routine fluid administration in the patient without peripheral venous access, parenteral hyperalimentation, cardiac pacing and hemodialysis.

A multitude of complications have been ascribed to subclavian vein puncture. The most common complication is pneumothorax - partial, complete, tension - representing approximately 30 percent of all complications. Aside from failure to place the catheter and catheter misdirection, another frequent error is arterial puncture. The technique of subclavian catheterization includes a post-insertion chest x-ray to detect injury to the pleura and other unwanted problems.

Successful subclavian vein cannulation relies on a thorough knowledge of the local anatomy as well as meticulous technique. Since the entity of delayed pneumothorax associated with this procedure is not well-appreciated in the literature, guidelines are proposed for its detection. An immediate post-insertion chest x-ray should be obtained whenever subclavian vein puncture is attempted. A delayed chest-ray should be considered for the following situations:

1. Difficult subclavian insertions requiring multiple attempts.
2. Suspicion of pleural injury such as aspiration of air during insertion or the presence of subcutaneous emphysema with a normal post-insertion chest x-ray.

3. The presence of another major complication.
4. If the patient complains of persistent pleuritic or back pain after insertion.
5. Preoperatively after previous insertion of a central venous line if associated with situations 1 through 4.
6. Postoperatively when a subclavian catheter is inserted intraoperatively.

TECHNICAL LIMITATIONS IN THE RAPID INFUSION OF INTRAVENOUS FLUIDS

Mark Aeder, M.D., Joseph Crowe, M.D. and Robert S. Rhodes, M.D.
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Rapid repletion of intravascular volume is a fundamental priority in the resuscitation of the patient in hypovolemic shock. The success of this resuscitation may ultimately depend on both the site of vascular access and the equipment chosen for fluid administration. This study compared the rates of fluid delivery among commercially available fluid administration systems.

A one liter bag of lactated Ringer's solution was suspended 100 cm. above a baseline with various intravenous administration tubing connected to the bag. Data consisted of the time required for the delivery of five hundred milliliters (ml) of this solution through different combinations of administration tubing and catheters. The administration sets tested were a mini-drip, a maxi-drip, and a blood infusion set, with standard anesthesia extension tubing added. The catheters included short (2 inches or less), 14, 16, 18 and 20 gauge plastic intravenous catheters used for peripheral venous access, longer (8 and 24 inch), 16 and 18 gauge catheters, normally used for central venous access, and an 8 French catheter introducer, used for the placement of Swan-Ganz catheters. For each combination of tubing and catheter, 4 observations were made and the results expressed as ml's delivered per second.

The blood infusion tubing set delivered fluid at a mean rate of $3.12 \pm .12$ cc/sec, the most rapid of the systems tested. Using this rate as 100%, we found the maxi-drip delivered fluid only 83% and the mini-drip only 18% as fast as the blood infusion set. Among the catheters, the 8 French introducer was by far the most rapid. It provided no additional resistance to the rate of flow over the tubing alone. The other catheters, meanwhile, all slowed the velocity of flow:

Catheter Gauge (Length-Inches)	Percent of maximum Flow
14 (2")	68%
16 (2")	49%
18 (2")	32%
16 (8")	30%
20 (1½")	21%
19 (8")	18%
16 (24")	15%

We conclude that a blood infusion set allows for faster crystalloid delivery than either a maxi-drip or mini-drip set. We also confirmed that the short bore catheters may deliver fluid more rapidly than larger but longer central lines. The use of an 8 French Swan-Ganz introducer as a catheter provided the most rapid avenue for fluid administration. It has the further advantages of more versatility, less contamination, and longer potential use than direct venous insertion of administration tubing via a cutdown. Blood infusion tubing and an 8 French catheter introducer are the optimal administration equipment for the resuscitation of the patient in hypovolemic shock.

NUTRITIONAL ASSESSMENT PARAMETERS AND POSTOPERATIVE MORBIDITY

Bruce Feldman, M.D., Ruth Hooley, R.D., Ezra Steiger, M.D., Fidel Pino, M.D.
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It is helpful to identify patients at risk from the complications of surgery related to malnutrition with preoperative nutritional assessment. In this retrospective study, 44 patients, who had complete nutritional assessment preoperatively and no nutritional support were evaluated for postoperative complications. The prognostic nutritional index as defined by Mullen et al was correlated with postoperative morbidity as well as individual nutritional assessment parameters: arm-muscle circumference, delayed hypersensitivity, triceps skinfold, transferrin, percentage decrease in weight, and albumin.

Of the nutritional factors reviewed, only albumin was found to be of help in identifying those patients at greatest risk of postoperative morbidity. Patients with no complications had albumin levels of $3.82 \pm .54$ gm%. Patients with complications had albumin levels of $3.32 \pm .60$ gm% ($p < .025$). Patients with a prognostic nutritional index (PNI) $\geq 50\%$ had a 38.5% complication rate. Patients with a PNI $< 50\%$ had a 22.6% complication rate. Using a Chi-Square test it was determined that these values were significantly different. From this study it was determined that the PNI, and albumin by itself are both valid predictors of postoperative morbidity.

A COMPARISON OF CECOSTOMY AND TRANSVERSE COLOSTOMY
IN THE MANAGEMENT OF ACUTE COLONIC OBSTRUCTION

Al Ciraldo, M.D.

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The cases of 178 patients who were treated with either transverse colostomy or tube cecostomy at our institution in a six year period from 1974 to 1980 are reviewed. Of this number, 102 required emergent colonic decompression for an obstructive process. Transverse colostomy was used for this purpose in 75 patients; tube cecostomy was used as the mode of decompression in the remaining 27. The overall mortality for all transverse colostomies, done usually in an emergent situation, was 18%. Those done in acute colonic obstruction carried a similar mortality rate of 18.6%. For tube cecostomy, the total mortality rate was 12% and in the face of colonic obstruction, 11%.

Complications following transverse colostomy were seen in 15% of patients, as compared to 36% following tube cecostomy. Wound infection was the most commonly seen complication in both groups. Failure to adequately decompress the colon was seen in 8% of the transverse colostomy group, and in 7% of the cecostomy group. Only one tube cecostomy failed to close spontaneously. Duration of hospitalization was comparable, 30.5 days in the transverse colostomy group and 33.5 days with cecostomy.

Tube cecostomy has never merited universal acceptance by surgeons in the treatment of colonic obstruction. We feel that when used for the appropriate indications, and performed and maintained properly with close adherence to surgical principles, it offers some advantages over transverse colostomy. The advantages, indications, and suggestions for proper management of the tube cecostomy are enumerated.