

URGENT SURGERY IN THE AGED*

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LITTLE AS THE SURGEON may relish major operative procedures on patients in the seventh decade or beyond, there occur occasions when he is forced to intervene to preserve life. With the consistent aging of the population, such occasions may be expected to occur with ever greater frequency.

The Goldwater Memorial Hospital of New York, serving the chronic patients drawn from all the City's hospitals and from the City Home for aged and indigent persons, has furnished opportunity for the observation of surgical emergencies in old people. This review is based on the experiences of the Second Surgical Division over a period of seven years.

The 204 patients who were the basis of these observations ranged in age from 60 to 102. The average age of the group was 74. These patients presented not only the "normal" deteriorations of age, but also many of the diseases of senility in chronic and advanced form.

These factors of deterioration and of disease give the problem of urgent surgery in the older age group its special character. When an emergency arises, there is little opportunity to improve the patient's physical status and none to rectify fundamental organic defects. Frequently encountered in our patients were myocardial degeneration, valvular heart disease, overweight, malnutrition, the results of previous coronary infarction or cerebral vascular accident, tuberculosis, lues, diabetes, anemia, vitamin deficiency states, hypoproteinemia, arterial sclerosis, varieties of renal or hepatic dysfunction, or combinations of these defects.

These conditions often entailed difficulties of early and accurate diagnosis, since the defects might mask or mimic conditions requiring quick surgical intervention. There were also serious postoperative complications. These old patients are peculiarly susceptible to pneumonia, wound disruptions and sepsis. Many of them succumb, even weeks after operation, to cerebral-vascular accidents, to coronary occlusions, uremia, anuria, and cardio-vascular-renal collapse. While the mortality rate attending urgent surgery in this group was high (84 deaths following 188 operations, or 44 per cent), the survivals represent surgical salvage of individuals who, unaided, would almost surely have succumbed. Our attitude was well expressed by Rowntree¹: "All would agree that every effort should be made to save life in acute emergencies, unless the patient is already in extremis." Of our 204 patients presenting surgical emergencies, 15 were either in extremis or refused surgery, and all 15 succumbed.

Certain general principles of therapy were adopted to meet the requirements of this class of case: (1) Utilize every quickly available measure for support

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and protection. (2) Undertake the remedial operation with the least possible delay. (3) With a minimum of trauma and in the shortest feasible time, perform the simplest procedure that will relieve the emergency. (4) Employ every means to safeguard the patient against postoperative complications and watch diligently for signs of their development.

In carrying out the principle of support and protection in the preoperative period, we have tried to take advantage, as they became available, of all valuable measures: replacement of depleted fluids and electrolytes, correcting impending acidosis with glucose and insulin, furnishing new blood or plasma, using the hydrolysates to raise the lowered blood protein level, employing concentrated vitamin solutions to promote tissue repair or to minimize hemorrhage, or the anticoagulants in thrombotic or embolic states. The antibiotics have proved a powerful ally, and the patient about to be submitted to operation, whether septic or not, should not be deprived of their protective and prophylactic effects. Penicillin has become our stand-by (although more than half of our patients were seen before it became available), and it has been our custom to begin its employment preoperatively in doses up to 100,000 units at three hour intervals. We have found it important in these elderly patients to recognize the inability of the failing heart and kidneys to deal with large quantities of fluids if given rapidly by vein.

While the value of the principles enunciated by Ravdin² and by Whipple³ concerning replacement of weight loss, high caloric diet and the increased administration of food proteins as preoperative safeguards was recognized, time was lacking in these urgent cases to carry them out. In our own experience, as in Bailey's,⁴ all too often serious ailments were permitted to develop well beyond the margin of safety before surgical opinion was consulted.

Supportive measures should not delay unduly the performance of urgent surgery where early intervention is required. These old people deteriorate rapidly under sepsis, death of tissue, or obstruction of the intestinal tract. Delays in laboratory or X-ray investigations, in ineffective efforts at intestinal intubation or in trying to reach an unattainable optimum in the patient's condition may lead to failure.

The choice of appropriate anesthetic is important. Depressant or toxic anesthetics are unusually hazardous in the aged. We have veered away from spinal anesthesia, apprehending the circulatory depression that frequently attends its use. The fear of respiratory depression has deterred us from the barbiturates. Chloroform and vinethene have too marked toxic properties, while nitrous oxide anesthesia involves anoxia. Cyclopropane proved an almost ideal anesthetic, combining low toxicity, rapid induction and recovery and good relaxation, and permitting high oxygenation. Ether we found reliable, reasonably safe, and effective. Latterly, intocostrin has served to increase relaxation, permitting the use of smaller quantities of cyclopropane or ether. We have seen no ill effects from its use.

Local anesthesia was useful in many cases, but if it produced toxic effects, prolonged the operative procedure or failed to allay shock-producing pain, it

was inappropriate. Since large doses of morphine as a basic sedative are not well tolerated, we have supplemented smaller doses (gr. 1/8) with small amounts of scopolamine (gr. 1/150) with satisfactory results. In some cases we have combined scopolamine with demerol (50 mg.) with equally good effect. Refrigeration anesthesia for amputations, as proposed by Crossman⁵ and Allen,⁶ became almost routine after the middle of 1941.

With skilful use of the anesthetics now available, the anesthesia has not constituted a grave risk. In the 188 operations recorded, there was only one fatality in which the anesthesia was involved. Pneumonia, following operation, occurred in about the same relative frequency with each of the types of anesthesia employed, and in roughly half of the cases, appeared ten days or more after the anesthetic.

Our experience parallels that of other observers. Bancroft⁷ prefers local or cyclopropane anesthesia. Knight and Baird⁸ like local or block anesthesia, but have not been satisfied with them in abdominal operations. Forestiere,⁹ anesthetist at the Goldwater Memorial Hospital, states: "Results with inhalation anesthesia are not surpassed by those with local, regional or other anesthetic procedures." Rowntree¹ observes that old people take anesthetics well. Quigley¹⁰ found that the type of anesthesia had little or no effect on mortality. Rankin¹¹ sums up the matter: "A good anesthetist, a short operative time and careful postoperative care will render the use of general anesthesia in old people as safe as any other anesthetic available."

Minimum trauma at the operation is nowhere so important as in the poor-risk elderly patient where shock must be avoided. The surgeon learns that he must be both accurate and fast, although as Rowntree¹ puts it, "Better an hour or more of gentle manipulation than five minutes of clumsy bungling."

The emergency operation on the old patient should be the least and simplest procedure that will meet the issue. Once the emergency is passed, the patient may be prepared under far more favorable circumstances to undergo any additional operation required. Elective resections and anastomoses, meticulous repair of hernias, prolonged exploration of the common bile duct and plastic amputations have no proper place in emergency surgery on old people. As Rankin says,¹¹ "The nicety of surgical judgment as to when, what and how much to do is the keynote to success in these patients." During the course of the emergency operation, continuing support and protection of the patient are important. Most valuable, as Wangenstein¹² suggests, is the replacement of all blood lost by administration of blood, or at least by plasma.

During the early postoperative hours, shock has been our first concern. Our chief reliance in combatting it has been in the use of blood and oxygen. It has been our practice to continue oxygen for at least six hours after operation, and for several days in some instances. Stimulant drugs have been, in the main, disappointing. Postoperative sedation must be cautiously managed.

To prevent atelectasis, thorough aeration of the patient has been regularly performed at the close of the operation and during the succeeding 24 hours, rebreathing procedures carried out. Nurses were instructed to move and turn

the patients frequently, to assure that a free air-way was maintained and that no aspiration of vomitus occurred. These measures, plus the continuance of penicillin, are the best insurance also against pneumonia. The termination of bed rest at the earliest possible moment has been our policy since the start of our service. This practice no doubt has had value in preventing phlebo-thrombosis and decubitus. In our patients who were out of bed early we encountered no instance of wound dehiscence. This accident occurred more frequently in patients who of necessity remained bedridden and was the product of distention, sepsis, wound infection, vitamin deficiency, lowered blood protein or the presence of carcinoma, rather than of the muscular action produced by early rising.

Closely spaced through-and-through retention sutures in abdominal closure seemed to provide the best safeguard against disruption, supplementing careful repair by layers, special attention being given to accurate closure of the peritoneum. Special effort was made to provide optimum nutriment and to correct anemia, metabolic disturbances and deficiency states.

Fortunately phlebo-thrombosis has been rare. Our present policy is to ligate and divide the superficial femoral vein of the leg showing involvement. If cryptogenic embolization occurs, we rely on heparin plus dicumarol.

Attention to moving, keeping the patient dry (for many of them were incontinent), early ambulation, avoidance of pressure and maintenance of nutrition sometimes failed to prevent decubitus. When ulcers occurred, we were unable to reproduce in these old patients the brilliant results of plastic closure or grafting that we saw in the young victims of decubitus during the war.

A factor in the recovery of the old person who has undergone urgent surgery is the will to live. Rankin¹¹ emphasizes the bad effects of "regimentation and the domination of a relentless and impersonal routine." Lacking encouragement or an alert and sympathetic interest in their complaints, having no incentive and no outlook to a less miserable future, sick old people are prone to lapse into a state of unresponsive indifference and lethargy from which a terminal pneumonia usually provides the ultimate release.

The general principles above outlined may be illustrated by citing the more common surgical emergencies we encountered.

AMPUTATIONS

The emergency most frequently met was gangrene of the lower extremity, associated with arterio-sclerotic occlusion, with or without diabetes. Usually there was premonitory complaint of pain in the extremity and evidence of diminished arterial circulation. The onset of the complete occlusion was heralded by increased severity of the pain, cyanotic pallor of the affected part, and coldness. We encountered no case of embolic occlusion in which it was feasible to attempt embolectomy.

The obvious death of one toe or more, or a part of the foot or leg, did not constitute an emergency. Conservative treatment awaiting demarcation was then in order. If spreading infection in the extremity became apparent with

elevation of temperature, rapid pulse and an ascending flush or lymphangitis, amputation became urgent. Local incision or amputation anywhere within the zone of active cellulitis served only to make a bad matter worse. A lower-third or mid-thigh amputation was the proper treatment, and the sooner employed the better.

Penicillin was administered in large doses, blood for transfusion procured, and the infected extremity segregated by tourniquet and local refrigeration begun. Crossman's⁵ technic proved most effective and we rarely found it necessary to employ any other anesthesia. Following the application of tourniquet and ice, the patient's condition generally improved. This procedure put a stop to the spread of sepsis at once and gave three hours or more of refrigeration to devote to preparatory, corrective and supportive treatment. As a means of anesthesia the method in our hands was not superior to other anesthetics in the matter of operative risk or postoperative complications.

In septic cases, flap-forming procedures resulted often in septic and necrotic stumps and were abandoned in favor of the circular type of amputation. Loose closure of such stumps has been, until recently, our method, but a high incidence (60 per cent) of the breaking down of these wounds dictated the adoption of the completely open treatment with the application of skin traction, as advocated by Kirk for war injuries. With this method we have seen less suppuration and spreading infection in the stump. Applied with a plaster cuff and outrigger, such traction does not require bed confinement. One reason for the ineffectiveness of flaps and sutures has been demonstrated repeatedly at the operating table where, even at a generously high level, the main artery has been found completely obliterated by sclerosis and organized clot and the compensatory circulation so meager as to produce very little bleeding.

In patients suffering from diabetic gangrene there may, or may not, have been premonitory evidence of progressive peripheral circulatory failure. Invasive infection, with following cellulitis and gangrene gained access through an abrasion or dermatophytosis of the foot, from a closely cut corn or around an old horny toenail. Bringing the blood sugar under control in some instances served to localize the infection. Surgical treatment then was conservative. Where the infection was advancing, amputation was called for.

There were 73 cases of gangrene of the extremities. The average of these patients was 72 years. All showed evidence of arterial sclerosis, while 62 had clinical manifestations of arterio-sclerotic heart disease. Twenty-nine, or more than a third of them, had diabetes. Fulminating sepsis was present in 45. Fifteen were nephritic, 12 had had cerebral accidents and 17 suffered from coronary disease. Five had had previous leg amputations for gangrene. Among the other complications, which in most cases were multiple, were fractured femurs, leg ulcers, decubitis, active tuberculosis, anemia, prostatism, gastric ulcer, syphilis, rheumatic heart disease, bacterial endocarditis, pericarditis, cirrhosis, pneumonia and empyema, while one patient was recovering from an operation for acute intestinal obstruction.

Eight of the 73 either refused operation or were inoperable. All of these succumbed.

Incision and drainage of suppurating areas about the foot or the amputation of gangrenous toes was followed in 20 cases of the 65 by obligatory thigh amputation within a few days. We gained a distinct impression that it was often a precipitating factor.

Of the 65 operations performed, 59 were mid-thigh amputations, four were of the Carden type. One of these required subsequent mid-thigh amputation for sepsis. Two amputations were below the knee. One of these developed gas gangrene demanding a mid-thigh amputation four days later. Fifty-six operations were of the circular type, while three were done with flaps. Forty-six had light suturing of muscle and skin over the bone end and 30 of these stumps suppurated, two with gas infection. The skin alone was loosely sutured in 16 cases and broke down in six. Thus 60 per cent of the sutured stumps broke down, leading to the present tentative practice of leaving open stumps with skin traction in septic cases. This may prove to be too conservative, but thus far we have been pleased with their healing by granulation.

Other postoperative complications were: Pneumonia, 22; sepsis, 6; shock, 3.

For anesthesia, cyclopropane was used in 20 cases, spinal in ten. Most of these were given prior to 1941, as was one nitrous-oxide-oxygen anesthesia. Since the introduction of refrigeration anesthesia, most of the amputations

TABLE I
GANGRENE OF EXTREMITY
Number: 73 Average Age: 72

Preoperative Condition	Amputations, 65	Postoperative Complications
Arteriosclerosis	Thigh	Pneumonia
A. S. H. D.	Carden's (knee)	Sepsis
Diabetes	(1 reamp. for sepsis)	Shock
Sepsis	Below knee	Recovered
Nephritis	(1 reamp. p. 4 d.—gas)	Died
Cerebral accident	Circular (guillotine)	Mortality
Coronary disease	With flaps	Day of death (av.)
Decubitus	Suture of muscle and skin	Cause of death:
Pneumonia	Broke down	Pneumonia
Tbc.	(2 gas infections)	Sepsis
Lues	Suture of skin only	Shock
Fractured femur	Broke down	Decompensation or coronary
Leg ulcers		Cerebral accident
Previous major amputation	60% of sutured wounds opened	Bleeding gastric ulcer
Septic endocarditis		Gangrene other leg
Pericarditis		
Empyema	Anesthesia	
Acute intestinal obstruction	Cyclo (Pn. 8—40%) 21	
Cirrhosis	Spinal (Pn. 3—30%) 11	
Gastric ulcer	Crymal* (Pn. 9—30%) 31	
Prostatism	N ₂ O (Pn. 1) 1	
Severe anemia	* Supplemented with:	
	Vinethene (1)	
	Cyclo (1)	
	Pentothal (1)	

8 unoperated—all died.

No anesthetic accident.

(31) have been done with it. There have been no anesthetic accidents. Pneumonitis occurred in 40 per cent of the cyclopropane cases, in 30 per cent of the crymal anesthetics, and in 30 per cent following spinal. Six of eleven fatal cases of pneumonia occurred ten days or more after the operation.

Of the 65 patients operated upon, 40 recovered and 25 died—a mortality rate of 38 per cent. The average day of death was the 11th. Three cases of shock died within 48 hours, the other victims at intervals up to one month. Pneumonia took the highest toll of 11 lives. Sepsis claimed one, cardiac decompensation and coronary accidents killed six, cerebral hemorrhage two, and bleeding gastric ulcer and gangrene of the other leg one each. The operated diabetic patients showed as good a recovery rate as did the non-diabetics.

INTESTINAL OBSTRUCTION

Among the causes were incarcerated and strangulated hernia, carcinoma of the large bowel, adhesions causing kinks or volvulus, foreign bodies, mesenteric thrombosis, and fecal impaction.

The diagnosis of intestinal obstruction in old people and the determination of its cause and location presented difficulties. Since many of them were chronically constipated, the absence of bowel movements for a day or two was likely to pass unnoticed. The complaint of some abdominal discomfort might easily escape attention, or the combination of the two situations might elicit an enema or a cathartic. These people not infrequently developed atonic colons loaded with fecal matter, often associated with massive rectal impaction, which produced a degree of intestinal obstruction. In such instances the enemas and cathartics usually relieved the situation.

Two or three days might pass after the onset of a true obstruction, particularly if it were in the large bowel, before the development of distention and vomiting led to the calling in of the surgeons. Our cases of obstruction were often well advanced by the time surgery could be employed. Faced then with an emergency, little time was permitted for investigation. We adopted the policy of instituting early surgical treatment for such patients as rapidly as the necessary replacement and supportive therapy could bring them to a state of operability. Dehydration and electrolyte deprivation were corrected, plasma given, and blood administered or procured. A digital rectal examination was done, and three-position X-ray films of the abdomen were made to detect fluid levels and identify the distended loops of gut. This was sometimes supplemented by a barium enema picture. Such studies often proved helpful in determining the most direct approach and the shortest procedure, obviating an extensive exploration. With the insertion of a tube into the stomach and suction decompression established, the patient was ready for operation.

(1) *Large intestine tumors.* In obstructive lesions of the large bowel, only cecostomy or colostomy was usually required. This might be done under local anesthesia. In performing a cecostomy through a right lower quadrant muscle-splitting incision, the withdrawal of a good segment of cecum through the skin was preferred. No opening was made in the gut until the wound had been

closed and protected. Then a tube of good size or Pessar catheter was inserted well into the intra-abdominal portion of the gut within a purse-string suture.

When a large bowel tumor was demonstrated at exploration through a rectus incision, this incision was closed and cecostomy performed. We learned the unwisdom of attempting to deal with the new growth itself, even by exteriorization, in the presence of acute obstruction.

(2) *Ileus of small intestine.* In obstructions of the small intestine, the symptoms were usually more lively in onset, leading to earlier recognition. Preoperative speculation proved fruitless in estimating the nature of the lesion. One might find a constricting band, kinks, volvuli, or internal hernia, with or without gangrene of the intestine, or even an obstructing foreign body. We were unable to differentiate before operation the cases of mesenteric thrombosis from those of mechanical ileus.

We found a generous incision to be a sound investment. Once found, the obstruction was relieved as rapidly and with as little handling as possible. When the gut was found to be definitely gangrenous, exteriorization of the affected loop gave the best chance of immediate survival, but involved the dangers resulting from intestinal fistula. When the lesion was in the jejunum or upper ileum, an anastomosis seemed obligatory. In the low ileum, exteriorization might be done with spur formation and later effort at restoration of continuity.

(3) *Hernia.* Incarceration or strangulation of intestine brought the occasional hernia into the field of urgent surgery. In cases of suspected obstruction, a small hernial sac might easily be overlooked. In the operation we preferred an abdominal approach if there was likelihood of gangrenous gut in a sac. Relief of the obstruction and adequate management of the gut was the primary purpose in such operation, and repair of the hernia, other than closure of the internal orifice, was not important. Release of the gut and protection of the peritoneum from spilling of intestinal contents was more surely to be accomplished by the abdominal route.

The postoperative care of patients recovering from intestinal obstruction consisted of suction through the stomach tube while distention or vomiting persisted, plus supportive and nutritive treatment. The patients were taken out of bed within the first 24 hours, or as soon thereafter as possible.

Of our 56 cases of intestinal obstruction, 52 were operated upon, while four were received in such condition that operation could not be undertaken. Twenty-four patients were operated upon within 24 hours of the onset of the symptoms, while others were not seen until two, three, four or five days after the beginning of obstruction. The average duration of symptoms was two days. These patients averaged 81 years of age. The oldest, who made a complete recovery, was 102. Forty-seven were markedly arterio-sclerotic and 37 showed gross clinical evidence of arterio-sclerotic heart disease. Seven had had cerebral accidents (one had suffered two), and five had previous coronary thrombosis. Nephritis, cirrhosis, pulmonary tuberculosis, paralysis agitans, central nervous system lues, crippling arthritis, prostatism, pyelo-nephritis, carcinoma

of the bladder, spinal cord tumor and recent amputation for arterio-sclerotic gangrene were some of the preoperative complications.

Twenty-three of the obstructions were due to strangulated hernias, 11 to cancer of the large bowel, nine to adhesions, five to volvulus, three to foreign bodies (one gall stone, one peach stone, one meat bone—perforated), one to lymphopathia venereum, while the causes of two were never determined.

Operation in 29 instances consisted in reduction of hernia, volvulus, or freeing of constricting bands. Four small intestine resections were done. There were 11 cecostomies, two colostomies and one ileostomy with exteriorization of loop. Cyclopropane was the anesthetic used in 22, local in 20, pentothal in two, ether in three, and spinal in five. There was but one anesthetic death, which occurred from aspiration of vomitus in one of the spinal cases. Spinal anesthesia was administered in some of our earlier cases but we are now opposed to its use in patients of this type.

The mortality was high. Twenty-three survived, while 29 died, giving a rate of 55 per cent. Pneumonitis was responsible for 13 deaths. Six succumbed to shock, six to cardiac failure, two to peritonitis. The patients dying of shock or cardiac decompensation succumbed usually within three days. Pneumonia killed as late as the 54th postoperative day. Other late deaths occurred from ruptured esophageal varices, cerebral accident and uremia.

TABLE II
INTESTINAL OBSTRUCTION

Number: 52 Average Age: 81

Preoperative Condition	Cause	Anesthesia
Arterio-sclerosis 47	Hernia 23	Local 20
Arterio-sclerotic	Inguinal 11	Cyclopropane 22
Heart disease 37	Femoral 5	Pentothal 2
Cerebral accident 7	Incisional 2	Ether 3
(One had 2)	Umbilical 5	Spinal 5
Coronary thrombosis 5	Adhesions 9	
Nephritis 12	Volvulus 5	Postoperative Complications
Cirrhosis 1	Neoplasm of colon 11	Pneumonia 17
Urological	Foreign body 3	Peritonitis 2
Prostatism 4	(Gall stone 1)	Shock 7
Pyelo-nephritis 2	(Peach stone 1)	
Carcinoma of bladder 1	(Meat bone 1)	Cause of Death
Lues 2	Lymphopathia 1	Pneumonia 13
Decubitus 3	Undetermined 2	Shock 6
Arthritis (disabling) 4		Peritonitis 2
Tuberculosis 2	Duration	Uremia 1
Central Nervous System	Average 2 days	Cardiac failure 6
Disorders	Less than 24 hours 24	Cerebral accident 1
Paralysis agitans 4	Operation	Aspirated vomitus (anesthetic accident—spinal) 1
Cord tumor 1	Reduction 29	Ruptured esophageal varix 1
Lues (C N S) 1	Resection 4	
	Cecostomy 11	Result
	Colostomy 2	Recovered 23
	Ileostomy 1	Died 30
	Exploration 2	Rate 55%
	Enterotomy 3	
	(Removal of foreign bodies)	Day of death (average) 4

The one best guide to prognosis was found to be the physical status of the patient at the time of his obstructive accident and the nature and degree of his pre-existing ailments. This observation corresponds with the conclusion of Brooks,¹³ who noted that a high percentage of deaths in old people after operation occurred late and were due to pre-existing degenerative diseases.

APPENDICITIS

Acute appendicitis occurred only five times in 204 cases. (According to van Friedenfildt¹⁵ only 7.2 per cent of all appendicitis occurs in patients over 50.) Its behaviour was likely to be atypical, leading to difficulty in diagnosis. After a few hours of vague abdominal discomfort, without localizing signs, there might appear evidence of peritonitis and at operation a ruptured appendix be found. Or where a palpable right lower quadrant abscess was found, one might elicit the story of an episode of "indigestion" or "stomach ache" a number of days previously. In consequence, the diagnosis was often delayed. We noted, as did de Tarnowsky,¹⁴ the vague nature of the onset and development of appendicitis in old patients, and the frequent and early occurrence of gangrene. We have felt it important to pay strict attention to the older patients' complaint of abdominal pain and to watch with care the blood count, the temperature, and particularly the pulse rate. The abdominal physical signs we have frequently found to be undependable or misleading.

For appendectomy we preferred the intermuscular right lower quadrant incision. Since the peritoneum in old people seems less capable of handling an infective insult than in the young, we have been guided by Blake's dictum: "When in doubt—drain," even with the help of the antibiotics. In localized abscess, incision and drainage, preferably with local anesthesia, seemed sufficient.

In seven years our staff operated on only eight patients on the diagnosis of acute appendicitis. The diagnosis was correct in four instances and wrong in four. One additional case, diagnosed as acute intestinal obstruction, proved to have a ruptured gangrenous appendicitis with peritonitis. Thus the diagnosis was accurate only four times in nine cases. Of the four cases incorrectly diagnosed as appendicitis, one had a massive perinephric abscess, one a perforated gangrenous diverticulitis of the sigmoid colon, one carcinoma of the cecum, perforated, with abscess, and one presumably a gastro-enteritis, since no pathology was found. The first two succumbed to sepsis. Of the latter two, one survived to die of already established metastases two months later and the other lived for three years, eventually to die of a cerebral-vascular accident.

Of the four cases correctly diagnosed and operated upon, three had already suffered perforation although their active symptoms were of but a day's duration or less. One patient with a four-day history of vague abdominal pain was found to have a well-developed abscess. This patient succumbed to peritonitis, as did the patient incorrectly diagnosed as intestinal obstruction. The other three survived. Mortality, 40 per cent.

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TABLE III
ACUTE APPENDICITIS
Average Age: 71

Preoperative Condition	Diagnosis	Postoperative Complications
Arterio-sclerosis 3	Correct 4	Peritonitis 2
Diabetes 1	Incorrect 1	Shock 1
A. S. H. D. 2		
Nephritis 1		
Paralysis agitans 1		
	Operation	Cause of Death
	Incision and drainage of abscess 2	Peritonitis 2
	Appendectomy 2	(1 day and 9 days)
	Incorrect diagnosis 1	
		Result
		Recovered 3
		Died 2
		Mortality rate 40%
Symptoms	Anesthesia	
Pain 4	Ether 1	
Vomiting 3	Cyclopropane 2	
Constipation 1	Cyclopropane and local 1	
Fever 4	Local and pentothal 1	
Average Duration of Symptoms		
Days 2		

ACUTE CHOLECYSTITIS

Infections and obstructions of the biliary tract presented some of the most difficult and dangerous problems found in the old age group. Of the patient of 70 or 80 with an acute cholecystitis or obstruction of the common duct, it may be assumed that cholecystitis has existed in chronic form for years and that the liver has suffered commensurate damage.

Our cases demanding urgent surgery for lesions of the biliary system numbered 34. Their average age was 73. Twenty-seven had advanced arterio-sclerosis, while 19 had symptomatic arterio-sclerotic heart disease. Fourteen suffered from nephritis, three had suffered cerebral accidents, and three had had coronary occlusions. Three manifested chronic pyelonephritis, while among the other or associated disabilities were central nervous system lues, miliary tuberculosis, amyotrophic lateral sclerosis, diabetes and paralysis agitans.

Quigley,¹⁶ reporting on biliary disease in patients who averaged 69 years of age, noted that his ward patients presented poorer surgical risks than did his private patients. He ascribed this difference to poorer economic status and earlier deterioration in the former, as well as to delayed hospitalization. Of his 100 patients, five were operated upon for acute cholecystitis and one survived.

The cases in our group rapidly became profoundly ill with the onset of acute gallbladder inflammation or with the sudden occlusion of the common duct. More than once we have been puzzled to differentiate between acute cholecystitis or biliary colic and a coronary infarction. The patients' condition deteriorated so rapidly as the result of infection, pain and dehydration that delay in undertaking operation greatly enhanced the risk. Jaundice was not well tolerated.

Fifteen patients in this group manifested jaundice as a result of occlusion of the common duct, and six of them had concurrent cholecystitis. Common

duct exploration and drainage alone was performed in two cases, and common duct drainage with cholecystostomy in three. All succumbed. Cholecystostomy alone was done three times for obstructive jaundice, with one survival. Cholecystgastrostomy for obstructing cancer was performed twice, with one death and one early survival. Common duct drainage with cholecystectomy was done five times, twice successfully. Thus, 11 of 15 patients presenting obstruction of the common duct with rapidly advancing jaundice were lost. Hemorrhage was not a factor in this mortality due, it is believed, to liberal administration of vitamin K.

Acute cholecystitis without evidence of common duct obstruction also progressed rapidly. Seven of 19 such cases were found to have perforated, four of them within 48 hours of the onset of the attack, indicating the need for early operation. The four cases of early perforation all died.

When confronted with acute cholecystitis in an old and enfeebled individual, it would seem to be good judgment to perform a simple cholecystostomy, preferably under local anesthesia. This policy was pursued with our patients at first. Of ten patients for whom cholecystostomies were performed, four recovered and six died. Two of the six deaths were due to peritonitis, which in both instances was found present at operation, due to perforation. (The other four deaths were ascribed to cerebral accidents, pneumonia and heart failure). Later, influenced by the trend to cholecystectomy, we performed nine cholecystectomies for acute cholecystitis, with or without gangrene, and of these, five patients recovered and four died, two of peritonitis which was present at operation.

With cholecystectomy showing a 44 per cent mortality as against a 66 per cent mortality for cholecystostomy in old patients with acute cholecystitis, removal of the gallbladder would seem to be the operation of choice. But such a conclusion fails to take into account the patient's coincidental ailments. Where cholecystostomy was done, it was usually because the surgeon did not dare to do the preferred cholecystectomy because of the patient's condition. In both cholecystectomy and cholecystostomy, already established peritonitis accounted for roughly half of the deaths and removal of the gallbladder gave but little advantage in this one particular for which its added risk would seem to justify it as an emergency measure.

Of the total of 34 operated cases, 13 recovered and 21 died, giving a mortality rate of 62 per cent. Four deaths were due to peritonitis, six to pneumonia, six to cardiac decompensation or coronary infarction. There was one death each from cerebral accident, parotitis, multiple liver abscesses, gas bacillus septicemia and exacerbation of chronic osteomyelitis of the femur. The average length of survival of those who died was to the 25th postoperative day. It is assumed that the four surviving cases of carcinoma died later.

Delay in determining the cause of jaundice and reluctance to undertake surgical measures for its relief because of the grave risk involved has, we believe, worked to the disadvantage of some of our patients. It was difficult to decide when the time spent in preparation of the patient for operation began

to run against him in view of the rapidly increasing deleterious effects of jaundice and inflammation.

TABLE IV
ACUTE CHOLECYSTITIS AND COMMON DUCT OBSTRUCTION

Cases: 34		Average Age: 73	
(Minimum: 61		Maximum: 91)	
Preoperative Condition	Day of Operation	Cause of Death	
Arterio-sclerosis 27	Cholecystitis (av.) 3	Peritonitis 4	
A. S. H. D. 19	Obstructed duct (av.) 10	Pneumonia 6	
Diabetes 1		Cardiac failure or coronary . . . 6	
Pyelonephritis 3		Cerebral accident 1	
Nephritis 14		Other causes:	
Cerebral accident 3	Anesthesia	Parotitis 1	
Coronary accident 3	Cyclopropane 22	Liver abscesses 1	
Valvular H. D. 1	Local 11	Gas bacillus septicemia . . . 1	
Tbc. (miliary) 1	(Local with pentothal, 1)	Septic fractured hip (pinned) 1	
C. N. S. Lues 1	Ether 1	(Late deaths carcinoma, 4)	
Amyotrophic lateral sclerosis. 1			
Paralysis agitans 1		Death on postoperative day	
		(av.) 25	
		Result	
Operative Condition		Recovered 13	
Cholecystitis 19		Died 21	
(Perforated or gangrenous, 7)		Total mortality rate 62%	
Obstructed common duct . . . 15		Cholecystitis 50%	
(6 with cholecystitis)		Obstructed duct 73%	
Biliary carcinoma 5			
Biliary stone 10			

ACUTE INFECTIONS

Miscellaneous infections provided another group of emergencies requiring treatment regardless of the patient's age. Their management followed established principles of surgical procedure. Prompt and adequate drainage seemed to be even more urgent than in the younger age groups because of its rapidly damaging effect upon old and poorly vascularized tissues and because of poor systemic resistance.

The liberal and intensive use of the antibiotics in recent years has not succeeded in avoiding surgery for the control of local infective processes in these patients.

It was interesting to note the high incidence of septic arthritis occurring in this group. Apparently of hematogenous origin and without evidence of marked arthritis or of injury, this infection occurred nine times in our 36 cases. The shoulder joint was involved seven times, the hip once, and the elbow once. Ischio-rectal abscess occurred in eight cases. The other infections were scattered.

The physical status of the patients and the nature and severity of intercurrent disease were more important in their response to treatment and in the outcome than was age alone. The diabetics presented the most trying problems. Continuing or uncontrolled sepsis was the most common cause of death. The total mortality was 21 per cent.

TABLE V

ACUTE INFECTIONS

Cases: 36 Average Age: 73

Preoperative Condition	Site of Infection	Anesthesia
Arterio-sclerosis 30	Septic arthritis 9	Vinethene 1
Diabetes 6	Ischio-rectal 8	Local 9
Arterio-sclerotic heart disease 15	Carbuncles 3	Pentothal 3
Nephritis 9	(Neck—1)	Cyclopropane 19
Coronary disease 1	(Back—2)	Ether 1
Cerebral hemorrhage 2	Cellulitis 11	
Prostatism 2	(Toe — 2)	Postoperative Complications
Paralysis agitans 2	(Finger — 2)	Pneumonia 2
Pneumonia 2	(Hand — 2)	Sepsis 5
Fractured femur 2	(Foot — 3)	
Cirrhosis 1	(Buttock — 1)	Cause of Death
Decubitus 3	(Sacrum — 1)	Pneumonia 2
Pyelonephritis 1	Empyema 2	Sepsis 5
	Perinephric abscess 1	
	Ludwig's angina 1	Day of Death
	Gangrenous ulcer 1	Operated Cases (av.) 8
	(Microaerophilic)	
	Operation	Results
	Drainage 33	Recovered 26
	No operation (died) 3	Died 7
		Mortality rate (operated cases) 21%

SUMMARY

	Average Age	Number	Recovered	Died	Percent
Amputations	72	65	40	25	38
Obstructions	81	52	23	29	55
Appendicitis	71	5	3	2	40
Biliary	73	34	13	21	62
Infections	73	32	25	7	21
	—	—	—	—	—
Total	74	188	104	84	44

CONCLUSIONS

1. Among old people suffering from chronic or degenerative disease, there occasionally occur surgical emergencies which urgently require operation to save life.
2. One hundred eighty-eight indigent patients of average age 74 were operated upon for surgical emergencies at the Goldwater Memorial Hospital in a seven-year period. These conditions consisted of gangrene of the extremities, intestinal obstructions, inflammations and obstructions of the biliary system, appendicitis, and various infections.
3. Such conditions often presented difficulties of diagnosis which delayed their recognition.
4. These patients presented poor operative risks and required maximum preoperative supportive and preparatory treatment. Such measures could not always be pursued to the desired extent without unduly delaying surgical relief.

5. Operations were designed to meet the emergency with the least injury and shock to the patient.

6. General anesthesia, properly chosen and administered, was well tolerated by such patients.

7. The postoperative period required attentive nursing and supportive and protective measures, including transfusions, the antibiotics, adequate alimentation, and minimum confinement to bed.

8. The mortality rate was 44 per cent. The preexisting ailments of the patients were the greatest factor in this mortality.

9. Pneumonia was the major cause of death (34 per cent of deaths). Forty-nine per cent of the pulmonary complications began ten days or more after operation.

10. Complications not directly attributable to the operation or to the emergency for which it was performed, accounted for about half of the deaths.

11. Prompt treatment may save well over half of the victims of acute surgical emergencies in old and chronically ill people.

REFERENCES

- ¹ Rowntree, Cecil: Operative Surgery of the Aged, *Clinical Journal*, **60**: 257, 1931.
- ² Ravdin, T. S.: Protection of the Liver from Injury, *Surgery*, **8**: 204, 1940.
- ³ Whipple, G. H., and S. C. Madden: Plasma Proteins: Their Source, Production and Utilization, *Physiological Review*, **20**: 194, 1940.
- ⁴ Bailey, Fred W.: Surgery of the Aged, *American Journal of Surgery*, **24**: 487, 1934.
- ⁵ Crossman, L. W., W. T. Ruggiero, V. Hurley, and F. M. Allen: Reduced Temperatures in Surgery: Amputations for Peripheral Vascular Disease, *Arch. Surg.*, **44**: 139, 1942.
- ⁶ Allen, F. M.: Experiments Concerning Ligation and Refrigeration in Relation to Local Intoxication and Infection, *Surg., Gynec. and Obst.*, **68**: 1047, 1939.
- ⁷ Bancroft, F. W.: Surgery in the Aged, *New York State J. of Med.*, **43**: 37, 1943.
- ⁸ Knight, R. I., and J. W. Baird: Anesthesia for Aging and Aged, *Journal-Lancet*, **64**: 153, 1944.
- ⁹ Forestiere, R. J.: Anesthesia for the Aged, *Connecticut M. J.*, **7**: 243, 1943.
- ¹⁰ Quigley, Thos B.: Biliary Surgery in the Aged, *New England J. Med.*, **221**: 970, 1939.
- ¹¹ Rankin, F. W., and C. C. Johnston: Major Operations in Elderly Patients, *Surgery*, **5**: 763, 1939.
- ¹² Wangenstein, O. H.: Abdominal Surgery in the Aged, *Journal-Lancet*, **64**: 178, 1944.
- ¹³ Brooks, Barney: Surgery in Patients of Advanced Age, *Am. J. Surg.*, **105**: 481, 1937.
- ¹⁴ de Tarnowsky, George: Surgery of the Aged, *Surgical Clinics of North America*, **20**: 3, 1940.
- ¹⁵ von Friedefeldt, H.: Die Appendicitis in Höherem Alter, *Deutsch. Zeitsche f. Chir.*, **256**: 105, 1942.
- ¹⁶ Quigley, Thos. B.: Biliary Surgery in the Aged, *New England J. Med.*, **221**: 970, 1939.

DISCUSSION.—DR. FREDERIC W. BANCROFT, New York: I have had the opportunity to read Doctor Cutler's report in full and in many ways I am sorry that he has had to cut the contents of this report in order to stay within the time limit allowed for reading the paper.

In 1930, of a total population of 123 million, 14 million reached the ages of 50 to 64, and 6,600,000 were 65 or over. It has been estimated that by 1980 we will have 25 million people over 65 years of age.

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