
Original Articles

GYNECOLOGIC MORTALITY*

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THERE are many reports on maternal mortality but few on gynecologic deaths. This is understandable for the former is far more susceptible to analysis. When death occurs in obstetrics, a well patient dies promptly of a readily recognizable cause. Some gynecologic patients are also well on admission and die from an evident cause. However, the vast majority is suffering from lethal diseases even though the immediate cause of death may differ. The intermingling of immediate causes of death such as pulmonary embolism and peritonitis with remote causes such as cancer of the ovary or cancer of the cervix, which would have proved fatal if the acute complication had not resulted in death, renders difficult the accurate determination of the primary cause of death.

A small number of patients is transferred to terminal care institutions, to other services of the hospital or even, at their request or at the insistence of relatives, to their own homes. Their omission from the statistics artificially reduces the incidence of death. This is counterbalanced in part by the inclusion of patients who were received in extremis from other services, other hospitals or their homes. All obstetric conditions including abortion, ectopic pregnancy and chorio-epithelioma have been excluded. Gynecologic mortality includes all deaths occurring on the gynecologic service, even though no gynecologic lesion was present.

The general subject of death in gynecology was discussed in 1928 by Polak

and Tollefson¹³ who in a frank analysis presented ninety-five deaths in 3,125 operations at the Long Island College Hospital. They concluded that 60 per cent of these deaths were preventable inasmuch as they represented violations of fundamental surgical safeguards. Peterson¹² in 1929 reported 1,734 gynecologic operations with sixteen deaths, a mortality rate of 0.58 per cent. Norris¹⁰ in the same year reported an identical incidence of 0.57 per cent, twenty-four deaths occurring after 4,212 gynecologic operations. Greenhill⁷ studied 213 deaths (3.5 per cent) among the 6,022 gynecologic operations performed at the Cook County Hospital between 1926 and 1931. Peritonitis accounted for 48.8 per cent and shock for 16.6 per cent while pneumonia and embolism caused 8.5 per cent each. Bartlett and Simmons² in 1932 surveyed the experience of the Free Hospital for Women from 1902 to 1932. There were 262 deaths; 95 were due to terminal malignancy, 148 deaths were in the postoperative period, a postoperative rate of 0.96 per cent. The leading causes were peritonitis, shock and pulmonary embolism. Marshall and Thompson⁸ reported a mortality rate of 2.3 per cent, 183 deaths occurring in 7,812 patients from 1928 to 1934 at the Los Angeles County Hospital. Faulkner⁴ in 1941 reported 147 deaths from 1930 to 1940 at the Western Reserve Hospitals. He divided his patients into two groups, namely, Group 1 which includes cancer, emergency operations and non-surgical conditions and

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Group II which comprises all deaths following operation. Peritonitis, shock and embolism were the three chief causes. Miller⁹ in 1944 reported 401 gynecologic deaths at the Charity Hospital, New Orleans; 60 per cent of these were due to cancer. He stressed the

inasmuch as it is statistically insignificant (b or trend = $-.0162$; ob or standard error of trend = 0.0114 , $-.0162 \pm .0144$). The rise in the last year occurred because fewer patients were sent to institutions for terminal care and because a program of radical

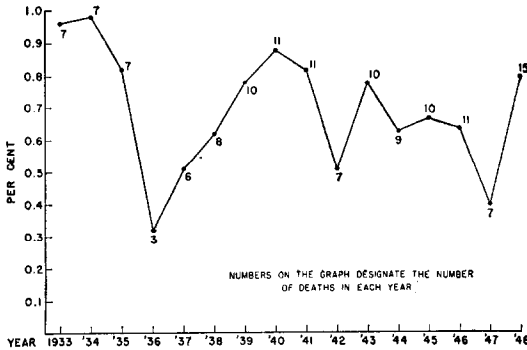


FIG. 1. Gynecologic deaths by year.

value of periodic physical examinations and the need for better education of medical students and doctors. He added parenthetically, "This is one of the most profitable exercises I have ever set myself." Truly such an analysis is a purgative for smugness.

TABLE I
POSTOPERATIVE DEATHS

	Number	Deaths	Per cent
Major operations.....	7052	52	0.73
Minor operations.....	10,665	23	0.23
Total.....	17,717	75	0.42

New York Hospital Statistics. This report covers the seventeen-year period from September, 1932, when the New York Lying-In Hospital merged with the New York Hospital, to December 31, 1948. There were 20,617 admissions during this period. One hundred forty deaths occurred, an incidence of 1:147 or 0.68 per cent. Postmortem examinations were performed on seventy-seven or 55.0 per cent of these patients. It is further significant that cancer was present in 104 or 74.3 per cent. The annual percentage of deaths is expressed in Figure 1. The downward trend is deceptive

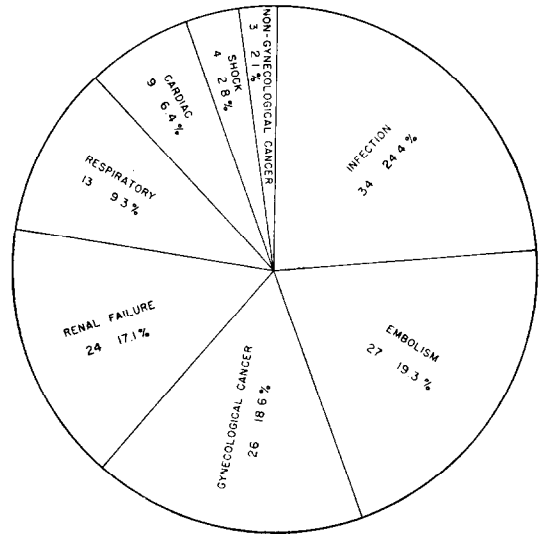


FIG. 2. Immediate causes of death.

surgery for far advanced cervical cancer was instituted.

Table 1 depicts the relationship to surgery. Seventy five (53.6 per cent) deaths occurred after major or minor operations, the remaining sixty-five (46.4 per cent) occurred without any preceding surgery.

IMMEDIATE CAUSES OF DEATH

Each history was analyzed to determine both the immediate cause and the remote cause of death. Many cases had no remote cause and it was impossible to determine beyond peradventure of doubt the immediate cause of death in all cases.

Infection. Figure 2 shows the distribution of the immediate causes. Infection was the leading cause in thirty-four. All but four of these patients died of peritonitis. The causes other than peritonitis included two retroperitoneal abscesses, one ischio-rectal abscess and one labial carbuncle which extended into a cellulitis of the buttock. Both retroperitoneal abscesses occurred in patients with cancer of the cervix

which had been treated by x-ray. Left psoas abscesses were present and retroperitoneal perforation of the sigmoid colon was suspected in each instance but it could not be proven.

Nine of the thirty patients with peritonitis had the source of the peritonitis in a perforated intestine. Two of these were cancer of the colon which perforated spontaneously; three were due to invasion of the bowel wall by cancer of the ovary. The bowel was perforated by an abdominal trocar at the time of paracentesis in a patient with far advanced carcinoma. Three perforations of the bowel followed radiation ulcers. This occurred once each in the treatment of cancer of the cervix, the endometrium and the ovary. One patient died of peritonitis due to rupture of a pyometra which developed subsequent to x-ray and radium therapy for cancer of the cervix. Extensive radionecrosis of the intestine was also present. Two patients died of peritonitis secondary to a ruptured appendix. The diagnosis was not suspected in one case; too much surgery was done in the other, a tube, an ovary and a cervical polyp being removed at the same time as the ruptured appendix. One fatal case of peritonitis resulted from the rupture of a liver abscess. The peritonitis was secondary to tubo-ovarian abscesses of gonorrheal origin in two instances. A tuberculous peritonitis with multiple abscesses failed to respond to extraperitoneal drainage by various routes. Peritonitis followed the spontaneous perforation of a multilocular pseudomucinous cyst once. In another instance there was perforation of an infected ovarian cyst, the correct nature of which could not be determined even at autopsy. Peritonitis followed urinary contamination of the peritoneum twice. In one case a ureter was cut at the time of hysterectomy. Despite the immediate febrile course this was not suspected and a second exploratory laparotomy was not done. The other case followed the avulsion from the bladder of a previously implanted ureter. Seven instances of peritonitis were associated with malignant

disease, namely cancer of the ovary in three instances, cancer of the endometrium twice, cancer of the cervix once and sarcoma of the uterus once. Perforation of the uterus although suspected in two cases could not be proven. Fatal peritonitis followed laparotomy for myomas and for sarcoma of the uterus in once instance each. Peritonitis also resulted from the inadvertent opening of the peritoneum during a radical inguinal node dissection.

Certain errors recur in the management of these patients. Admission was delayed in many instances; this was chiefly by the patient but occasionally by the referring physician or by the admitting officer. Adequate history was not elicited in some patients. Sufficient attention was not given to the story of bowel disturbances hence the presence in this group of non-gynecologic patients such as those with cancer of the colon or with ruptured appendix. Diagnosis was delayed in some instances thus preventing the administration of proper therapy. The presence of pelvic masses such as ovarian cysts or myomas occasionally confused the detection of an associated peritonitis. Inadequate preoperative work-up resulted in incorrect diagnoses. The attempts at drainage either by colpotomy or an abdominal extraperitoneal approach were at times too late. Postirradiation necrosis of the bowel resulted in retroperitoneal abscesses in two patients and in peritonitis in three patients. Failure to dilate the cervix after radium therapy in one patient resulted in a pyometra which ruptured, resulting in fatal peritonitis.

Although it is realized that a certain percentage of error is inevitable, attempts are now made to suspect peritonitis early and to treat it promptly. Some of these deaths occurred before the use of sulfonamides, many in the prepenicillin stage and virtually all in the prestreptomycin era. Adequate preliminary cystoscopy, proctoscopy, pyelograms and barium enema are stressed. The bowel is sterilized by sulfathalidine and diet if there is any possibility of intestinal surgery. The bowel is decom-

pressed prior to paracentesis when dilated loops of intestine complicate ascites. Irradiation necrosis of bowel is considered when patients who have been treated for cancer with x-ray present obscure abdominal symptoms. Drainage is instituted more promptly. Antimicrobial agents are used *en masse* or as indicated by cultures.

Embolism. The immediate cause of death in twenty-seven patients (19.3 per cent) was embolism, thromboembolism in twenty-five and air embolism in the remaining two. Both air embolisms resulted in sudden death on the operating table during the performance of tubal insufflation for sterility. A curettage was performed in each instance. One patient was in the tenth day of the menstrual cycle, the other in the twenty-first day. It was thought that in each instance carbon dioxide gas was introduced into the uterine cavity at a pressure higher than recorded by the pressure gauge. As recorded elsewhere⁵ insufflations are now performed only in the first half of the menstrual cycle; curettage with its resultant trauma to the uterine sinuses is not performed simultaneously and carbon dioxide gas is insufflated by machines which by means of a safety chamber prevent direct contact with the cylinder of compressed carbon dioxide.

Fourteen of the fatal thromboembolisms occurred after laparotomy. These varied from as early as two days to as late as twenty-one days postoperatively, the average being about eleven days. Three fatal thromboembolisms followed major vaginal operations. These occurred on the thirteenth, fourteenth and nineteenth days postoperatively. Half of the aforementioned seventeen cases happened on the first day out of bed, which prior to early rising was usually the eleventh postoperative day. Eight patients died of emboli without any antecedent operation. Fifteen of these emboli arose in thrombophlebitis of the legs, four in pelvic thrombophlebitis and six in undetermined sites. Fifteen of these patients had cancer as follows: nine in the ovary, three in the endometrium,

two had sarcomas of the uterus and one had cancer of the colon. Two patients had unsuspected pelvic inflammation, one an endometritis and the other an inflammatory ovarian cyst and a hydrosalpinx.

Three patients showed signs preoperatively which should have led to postponement of the operation; one patient had pain in the calf of the leg, one had a fever of undetermined origin for two weeks prior to operation while the third showed a marked increase in the sedimentation rate for no apparent reason. One patient who manifested pain in the calf postoperatively did not receive prompt, energetic therapy for the incipient thrombophlebitis. Another case in which fever developed immediately after operation was not diagnosed correctly until a lethal pulmonary embolism occurred. This group of fatal emboli suggests the need for a more careful evaluation of unexplained pains or fevers prior to operation. Thromboembolism should also be suspected when there is an unexplained fever in the immediate postoperative period. If a diagnosis cannot be made, the patient might be treated prophylactically as though she had an early thrombophlebitis. Since 1947 patients have been getting out of bed as soon after operation as they desire. This voluntary early rising seems to have lowered the incidence of both thrombophlebitis and fatal embolisms. The anticoagulants, both dicumarol and heparin, are used early both as treatment and as prophylaxis in indicated cases.

Gynecologic Cancer. The protean manifestations of gynecologic cancer were the immediate causes of death in twenty-six patients (18.6 per cent). Ovarian cancer caused fifteen deaths; nine patients died from peritoneal carcinomatosis, two from intestinal obstruction secondary to invasion of the bowel, three from pulmonary metastases and one from bony metastases. Two of the ovarian cancers were metastatic from the gastrointestinal tract, the so-called Krukenberg type. One had been treated for a gastric ulcer for the past two

years while the other had no antecedent gastric symptoms.

Three of the five patients who died of cervical cancer died from cachexia while the other two died of pulmonary metastases. One of the three deaths caused by sarcoma of the uterus was due to pulmonary metastases while the other two showed peritoneal sarcomatosis. Two patients died of cancer of the endometrium, one patient with pulmonary metastases and the other with peritoneal carcinomatosis. One patient with cancer of the vulva died of cachexia and extensive inguinal metastases.

This group of patients for the most part had far advanced cancer with an extremely poor prognosis. Many of them were admitted after they had been treated elsewhere without avail. A simple vulvectomy was performed for the cancer of the vulva. Had a bilateral groin dissection been performed, the outcome might have been more fortunate. The unreliability of clinical staging of cancer of the cervix was evidenced by the presence of pulmonary metastases which were not detected by x-ray because of small size, unusual location and error in interpretation.

Renal Insufficiency. Renal insufficiency was the direct cause of death in twenty-four patients, 17.1 per cent. Nineteen of these patients had cancer which caused renal obstruction as outlined in Table II. Either direct metastases of the urinary bladder or extensive peri-ureteral infiltration caused the urinary obstruction in thirteen patients. One other patient had a pyonephrosis of undetermined origin which resulted fatally. Seven patients had uremia which was not due to obstruction; one of these resulted from a hemolytic reaction following an incompatible transfusion. Three patients without gynecologic diseases were admitted through mistaken diagnoses.

A closer relationship should exist between the urologist and the gynecologist. The gynecologist in his formative years should receive sufficient training to be able to use intelligently the urologic diagnostic measures and treatments. He should recog-

nize and institute treatment for urinary tract obstruction. He should have urologic advice and should think in terms of ureteral catheterization, nephrostomy or even nephrectomy when necessary.

TABLE II
RENAL INSUFFICIENCY DUE TO CANCER

Location of Primary Cancer	Involvement of Urinary System			
	Total	None	Bladder Metastases	Peri-ureteral Extension
Cervix.....	9	2	3	4
Ovary.....	4	2	0	2
Endometrium..	4	1	2	1
Vagina.....	1	0	1	0
Pancreas.....	1	1	0	0
Total.....	19	6	6	7

Respiratory Diseases and Anesthesia. Thirteen patients, 9.3 per cent, died of respiratory diseases and anesthesia. Nine of these died of respiratory complications, four died of pulmonary edema and three died of bronchopneumonia. All of these deaths occurred in the presulfonamide days. Two patients died of massive atelectasis in the postoperative period. Seven of the nine patients who died of respiratory complications had cancer, four of the ovary and one each of the endometrium, tube and the urethra.

The pulmonary edema was not treated early enough and forcefully enough in two instances. Phlebotomy, tourniquets to the extremities, aminophylline, oxygen and/or helium under pressure should be used immediately. The atelectasis was diagnosed as pneumonia in both cases. Bronchoscopic aspiration might have helped.

An additional four deaths were due to anesthesia. The anesthetic agents in each case were ethyl ether and nitrous oxide. They occurred fifty, sixty, sixty and ninety minutes, respectively, after induction. Twice the respirations ceased abruptly, once the heart stopped without premonitory signs and in one instance the

respirations ceased after two short preceding episodes of apnea. The patients in two instances were difficult to relax and in the words of the anesthetist, "took a poor anesthetic." Autopsy which was performed in three instances showed hyperemia and congestion of the lungs, liver, spleen and kidneys twice and focal areas of atelectasis in the third case. Twice the surgeon urged the anesthetist to deepen the anesthesia and the anesthetist failed once to report the incipient respiratory distress.

The anesthetists now report any irregularity of the cardiac or respiratory rhythm to the surgeon who defers further operating and assists in the resuscitation of the patient. If respiratory or cardiac distress persists, the operation, if in a favorable phase, is terminated by closing all layers of the abdominal wall with through and through sutures. After the patient has recovered, the need for operation is reviewed. If it outweighs the medical complications as indicated by a thorough cardiac and respiratory study, the operation is performed at a later date. A wider range of anesthetic agents are now used. Ether, nitrous oxide and avertin were the standard modes of anesthesia fifteen years ago. Now pentothal, procaine, cyclopropane and other agents are used in addition. A combination of basal analgesia and regional block with 1 per cent procaine has been very useful in elderly patients. Gillespie⁴ in 1944 estimated that the incidence of deaths due to anesthesia was 1:1000. Waters and Gillespie¹⁴ concluded that inhalation anesthetics were safer than intravenous or spinal anesthetics.

Cardiac Disease. Nine patients (6.4 per cent) died from cardiac disease; two from coronary occlusion and seven in congestive failure. One patient died on the fifth postoperative day of a coronary occlusion following an oophorocystectomy, lysis of adhesions and repair of incisional hernia. The preoperative blood pressure was 210/120 and the heart showed moderate enlargement. The other patient died from a coronary occlusion on the second

postoperative day after an amputation of the cervix and anterior vaginal repair. Prior to operation blood pressure had ranged about 220/100. The patient complained of severe chest pain immediately after recovery from open drop ether anesthesia and died painlessly in her sleep twenty-four hours later. Autopsy in each case showed occlusion of the coronary vessels with myocardial infarction.

Two patients, aged sixty-four and sixty-six, respectively, died of congestive heart failure while in the process of diagnostic work-up for cancer of the cervix and of the endometrium. One patient developed auricular fibrillation and died seventy days after an exploratory laparotomy for cancer of the ovary. Another died of congestive failure two days after an exploratory laparotomy for a uterine sarcoma. A fifth patient with an extensive uterine prolapse who was fibrillating and showed an enlarged heart preoperatively was subjected to an anterior and posterior repair under 1 per cent procaine anesthesia. She died of congestive heart failure on the second postoperative day. Another patient with rheumatic heart disease died while receiving a transfusion prior to surgery. Although the transfusion was slow, fatal pulmonary edema developed. The last patient died on the sixth postoperative day after an exploratory laparotomy had revealed an abdominal mass to be an aortic aneurysm.

These patients represent a group of poor surgical risks. Preoperative evaluation consists of a careful history of previous failure, abnormal rhythms or chest pain, physical examination to determine heart size, valvular deficiencies and blood pressure, electrocardiogram, chest x-ray, vital capacity, urinalysis for albumen, concentration test and other renal function tests as indicated. A medical consultant examines the patient after the aforementioned determinations of cardiac, respiratory and renal capacities. Errors in judgment will occur as evidenced by the choice of vaginal repair on the woman who was fibrillating when a pessary might have sufficed, and by

the detection of an aortic aneurysm only by laparotomy.

Hemorrhagic Shock. Three patients died five, twelve and sixteen hours respectively, after laparotomy from shock due to intraperitoneal hemorrhage. The respective operations were salpingo-oophorectomy for a theca granulosa tumor of the ovary, laparotomy and biopsy for inoperable ovarian cancer and, lastly, total hysterectomy and bilateral salpingo-oophorectomy for sarcoma of the uterus. The sarcoma in the last case had extended so widely that the uterine vessels could never be identified during the operation. One patient with cervical cancer died from an exsanguinating hemorrhage. Although all these had fatal diseases, serious though unavailing attempts were made to correct the shock.

All patients who are about to undergo major operations have determinations of their blood group and Rh factor. Blood is then reserved in the blood bank subject to immediate call. An infusion of $\frac{1}{6}$ molar lactate on one limb of a Y transfusion set is started with an 18-gauge needle. Blood can be added to the opposite limb as necessary while the lactate helps to alkalinize the urine. In severe shock multiple transfusions are administered through several veins simultaneously, the flow of blood being accelerated by pressure. A "cut-down" is done if there is any difficulty in inserting a needle in a vein. Rh negative, group O blood with Witebsky substance added is used when necessary for unregistered patients who have not had determinations of blood type. It is realized that the treatment of shock is merely supportive therapy preparatory to ligation of the bleeding vessel.

Non-gynecologic Cancer. The last three (2.1 per cent) patients died of cancer of the bladder, cancer of the pancreas and lymphosarcoma of the pancreas and the mesenteric lymph nodes. The only point of interest is that biopsies of metastases from the cancer of the pancreas were diagnosed as cancer of the ovary, thus delaying establishment of the true diagnosis until autopsy.

REMOTE CAUSES OF DEATH

All but thirty-six of these patients had an accessory cause of death which would have proved lethal had they survived the immediate cause. These 104 patients (74.3 per cent) had various types of cancers. The

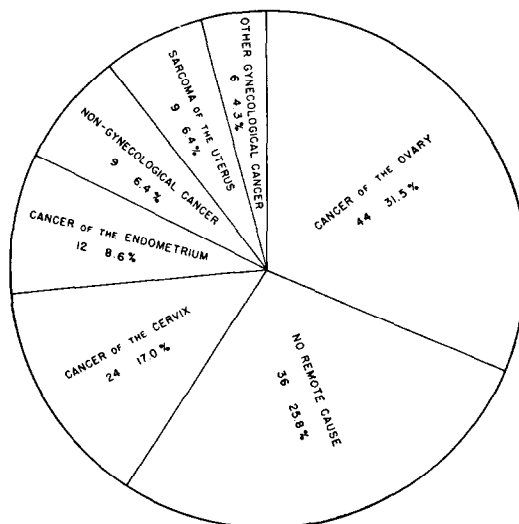


FIG. 3. Remote causes of death.

various remote causes of death are diagrammed in Figure 3.

Ovarian Cancer. The leading remote cause of death was cancer of the ovary which accounted for forty-four patients

TABLE III
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH IN PATIENTS WITH CANCER OF THE OVARY

Carcinomatosis	11
Thromboembolism	9
Peritonitis	7
Renal insufficiency	4
Pulmonary metastases	4
Hemorrhagic shock	2
Intestinal obstruction	2
Bronchopneumonia	2
Atelectasis	1
Congestive heart failure	1
Anesthesia	1
Pulmonary edema	1
	44

(31.5 per cent). The immediate causes of death in these patients are outlined in Table III. The pathologic types were as follows: serous cystadenocarcinoma, thirty-three; granulosa-cell cancer, five; unclassified, three; Krukenberg cancer, two and

squamous cancer arising in a dermoid cyst, one.

No Remote Cause of Death. The second largest group had no remote cause of death. This includes those who died of shock, anesthesia, peritonitis, etc., and who either

these patients. Four died as a direct result of radiation necrosis of the bowel with subsequent peritonitis or retroperitoneal abscesses.

Studies on the causes of death in cancer of the cervix have been made by Pearson¹¹

TABLE IV
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH WHEN NO REMOTE CAUSE PRESENT

Peritonitis.....	11
Thromboembolism.....	10
Anesthesia.....	3
Air embolism.....	2
Cellulitis.....	2
Coronary occlusion.....	2
Renal insufficiency.....	2
Congestive heart failure.....	2
Pyonephrosis.....	1
Pneumonia.....	1
—	—
	36

TABLE V
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH IN PATIENTS WITH CANCER OF THE CERVIX

Renal insufficiency.....	10
Bladder obstruction.....	3
Peri-ureteral obstruction.....	5
Undetermined.....	2
Peritonitis.....	4
Carcinomatosis.....	3
Pulmonary metastases.....	2
Retroperitoneal abscess.....	2
Congestive heart failure.....	2
Hemorrhage.....	1
—	—
	24

had no other cause of death or had serious degenerative diseases such as hypertensive cardiovascular disease or diabetes mellitus. Thirty-six (25.8 per cent) fell into this group. They are divided as follows: thirty-one had no cause of death other than the immediate one, two of the remaining five had diabetes mellitus, one had pulmonary tuberculosis, one had rheumatic heart disease and the last had chronic nephritis. The immediate causes of death for this group are tabulated in Table iv.

Cancer of the Cervix. The third remote cause of death was cancer of the cervix which was responsible for twenty-four deaths, 17.0 per cent. Squamous-cell cancer was present in twenty-two patients and adenocarcinoma in two patients. Table v outlines the immediate cause of death in

TABLE VI
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH IN PATIENTS WITH CANCER OF THE ENDOMETRIUM

Peritonitis.....	4
Thromboembolism.....	3
Renal insufficiency.....	3
Atelectasis.....	1
Carcinomatosis.....	1
—	—
	12

TABLE VII
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH IN PATIENTS WITH EXTRAGENITAL CANCER

Remote	Immediate
Sarcoma of pancreas	Sarcomatosis
Lymphosarcoma	Pulmonary embolism
Cancer of colon	Pulmonary embolism
Cancer of colon	Peritonitis
Cancer of colon	Peritonitis
Melanosarcoma	Peritonitis
Cancer of pancreas	Renal failure
Cancer of bladder	Carcinomatosis
Cancer of urethra	Pulmonary edema

in 1936, Auster and Sala¹ in 1940 and DeAlvarez³ in 1947. These authors are in general agreement regarding the frequency of uremia, sepsis, hemorrhage and pyelonephritis as causes of deaths. Auster and Sala who report the largest series, 802 deaths with 124 complete autopsies at the New York City Cancer Institute (1927 to 1938), comment, "Patients do not die directly as a result of their cancers." This is borne out by our patients in whom the immediate cause of death often differed from the remote basic cause.

Cancer of the Endometrium. Twelve (8.6 per cent) patients with cancer of the endometrium died. Their immediate causes of death are outlined in Table vi. It is striking that the cancer *per se* caused death only in a few cases.

† *Non-gynecologic Cancer.* This was the fifth remote cause of death, accounting for nine (6.4 per cent) deaths. The immediate and remote causes of death of these pa-

tients are tabulated in parallel columns in Table VII.

Sarcoma of the Uterus. Sarcoma of the uterus was the sixth remote cause of death, resulting in nine (6.4 per cent) deaths. The

TABLE VIII
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH IN PATIENTS WITH
SARCOMA OF THE UTERUS

Peritonitis.....	2
Sarcomatosis.....	2
Pulmonary metastases.....	1
Pulmonary embolism.....	1
Renal failure.....	1
Hemorrhagic shock.....	1
Congestive heart failure.....	1
	9

TABLE IX
REMOTE CAUSES OF DEATH
IMMEDIATE CAUSES OF DEATH IN RARE GENITAL-TRACT
CANCERS

Remote	Immediate
Cancer of the vagina	Renal failure
Cancer of the vagina	Congestive heart failure
Cancer of the vulva	Cachexia
Cancer of the vulva	Renal failure
Cancer of the peri-urethral ducts	Cancer of the pancreas
Cancer of the fallopian tube	Pulmonary edema

immediate causes of death in these patients are outlined in Table VIII which shows that half of these patients died directly because of the sarcoma while the other half died of unrelated causes. Five were myometrial, one was endometrial and three were unclassified.

Cancer of the Vagina, Vulva and Tube. This last group of patients accounted for six deaths (4.3 per cent). The immediate and remote causes of death in this group are outlined in parallel columns in Table IX.

COMMENTS

Interest in this subject was prompted by the need of material to present to classes in gynecologic pathology. The primary intention has been to present the deaths as they occurred with the utilitarian viewpoint of prevention as a secondary consideration.

The paucity of writing on the subject is striking. This is doubtless due to unsuitability of the material for statistical analysis and the natural reluctance to advertise failure.

The accurate determination of the number of preventable deaths is impossible. Twenty-eight deaths or 20 per cent were adjudged to be preventable insofar as they represented errors in judgment or

TABLE X
ANNUAL DEATH RATE

Year	Pa-tients	Infec-tion	Embolism			Hemor-rhage
			Lapa-rotomy	Vagi-nal	Pre-opera-tive	
1933 } 1937 }	4469	10	4	0	3	0
1938 } 1942 }	6525	10	5	3	2	3
1943 } 1948 }	9623	14	5	0	3	1
		34	14	3	8	4
			25			

technics. These were divided as follows: infection, nine; embolism, five; gynecologic cancer, one; renal insufficiency, three; respiratory involvement, five; cardiac disease, four and shock, one. These cases have been described in detail under the appropriate causes.

Gynecologic mortality will be reduced if (1) more attention is paid to a history of bowel disturbances; (2) peritonitis is detected when accompanying pelvic masses are present; (3) perforation of the bowel with peritonitis and/or retroperitoneal abscesses is suspected after x-ray therapy; (4) antimicrobial agents are used more promptly; (5) tubal insufflation is performed only in the first half of the menstrual cycle; curettage is not performed simultaneously; (6) early rising and movement is encouraged; (7) the patient with calf pain, unexplained fever or an increase in the sedimentation rate is treated prophylactically as though thrombophlebitis were evident; (8) renal obstruction is detected earlier; (9) the gynecologist has had urologic training; (10) pulmonary edema and

atelectasis are detected earlier and treated more promptly; (11) respiratory and/or cardiac irregularity is noted promptly by the anesthetist and heeded by the surgeon and (12) elective operations are not performed when the surgical risk outweighs the need for surgery.

Did the more general use of transfusions, advent of chemotherapy or the availability of the anticoagulants alter the mortality rates? Table x, which summarizes the occurrence by year of deaths from infection, embolism and hemorrhage, would indicate that they have not materially altered the rate from infection or hemorrhage but that there were fewer deaths from embolism.

SUMMARY

One hundred forty deaths occurred on the gynecologic service of the New York Hospital from September, 1932, to December, 1948. This is an incidence of 1:147 or 0.68 per cent. Seventy-five deaths (53.6 per cent) occurred after gynecologic operations. Since 17,665 operations were performed during this period the incidence of postoperative mortality was 0.42 per cent. Sixty-five (46.4 per cent) of the deaths occurred without preceding operations. Seventy-seven autopsies (55.0 per cent) were performed. Cancer was the immediate or remote cause of death in 104 patients (74.3 per cent). The chief immediate causes of death were infection (24.4 per cent), embolism (19.3 per cent), gynecologic cancer (18.6 per cent) and renal failure (17.1 per

cent). The leading remote causes of death were cancer of the ovary (31.5 per cent), cancer of the cervix (17.0 per cent) and cancer of the endometrium (8.6 per cent).

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