ECTOPIC PREGNANCY: CURRENT CLINICAL TRENDS, A FIFTEEN YEAR STUDY

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Ruptured ectopic pregnancy represents a major gynecologic emergency and presently accounts for 12 percent of all maternal deaths in the United States. Although the absolute number of maternal deaths due to ectopic pregnancy has been decreasing over the last two decades, this decrease has not been as great as the reduction in maternal deaths from other causes, particularly abortion related fatalities. Consequently, ectopic pregnancy has become the major cause of maternal mortality in the first trimester of pregnancy.

Ectopic pregnancy continues to be a source of unpreventable fetal wastage and preventable maternal deaths, even in modern day obstetrics. Although the mortality rate is decreasing, the incidence of ectopic pregnancy is increasing.

The occasional maternal deaths and the rising incidence of ectopic pregnancies reinforce the need for understanding and recognizing the clinical manifestations of this condition and the importance of aggressive surgical intervention. This paper reviews the clinical recognition, diagnosis, and management of ectopic pregnancy at the Queen of Angels Hospital for the past 15 years. An addendum discusses a five year study of ectopic pregnancy at a neighboring hospital, Temple Hospital; one remarkable case is added from the files of the Western Park emergency room.

MATERIALS AND METHODS

During the 15-year period between 1963 and 1973, and 1975 and 1980, there were 34,073 deliveries and 174 ectopic pregnancies at the Queen of Angels Hospital—an incidence of 1 ectopic pregnancy to 195 deliveries. This rate of incidence is high when compared to the 1 to 265 deliveries in the author’s earlier unpublished communication for the years 1963 to 1968. During the period 1975 to 1980 there were 67 ectopic pregnancies and 8,693 deliveries, for an incidence rate of 1 to 129. While this figure shows a slight increase in the incidence of ectopic pregnancy, it is not as significant as the current trend in the literature.

RACE

Most authors find a higher incidence of ectopic pregnancy in nonwhite women; however, this article, like other recent series, arrives at the reverse conclusion. The age and parity reported here are similar to those in other studies. It should be noted that any woman capable of conceiving is able to have an ectopic gestation and that multiparity is a more common finding than was thought in the past.

The majority of information included in this report was obtained from a retrospective analysis of hospital and operating room records and pathology files.

FINDINGS

The typical picture of ectopic pregnancy consists of a patient of childbearing age who has missed one or more menstrual period and has developed sudden abdominal pain with or without vaginal bleeding, syncope, or shock. Unfortunately, the majority of patients in this series exhibited a wide variety of symptoms and physical...
findings that imitated other diseases affecting the abdominal organs.

Abdominal Pain
This is the cardinal symptom of ectopic pregnancy. It occurred in all of our patients in varying degrees and for different periods of time. It may vary in nature from a dull ache to colic like intermittent pain, or the sudden severe stabbing sensation frequently associated with syncope or collapse. Almost all the patients had adnexal tenderness on vaginal examination.

Menstrual History
Amenorrhea of some degree was present in most of the cases. There were only one or two instances in which it could not be readily defined. Amenorrhea means that pregnancy, whether intrauterine or ectopic, must be suspected.

Pelvic Inflammatory Disease
Pelvic inflammatory disease undoubtedly is a factor in the development of tubal pregnancy in some women. Furthermore, both inflammatory disease and the operative procedure used for the management of tubal pregnancy probably affect the possibility of future pregnancies. If a woman does conceive after an ectopic pregnancy, the prospects for a viable infant are decreased, while the risks of a second ectopic pregnancy are increased.

The question of whether salpingectomy or salpingo-oophorectomy produces the highest fertility rate after tubal pregnancy is yet to be answered. Obviously, the bias to preserve ovarian function is important, and the choice of procedure is often influenced by the severity of the pelvic inflammatory disease. Therefore, it is not surprising to find that the degree of involvement of the pelvic anatomy by previous inflammatory disease is a determinant not only of the risk of primary ectopic pregnancy, but also of the risk of a repeat ectopic pregnancy.

Review of the reproductive performance of 208 women who had tubal ectopic pregnancy and who were not sterilized or using contraceptives, revealed that only 61 percent conceived and only 38 percent had at least one conception resulting in a viable infant. The conception rate after salpingectomy was similar to that following salpingo-
oophorectomy. The risk of repeat ectopic pregnancy among the women that conceived after their first such pregnancy was 27 percent. This figure is probably low, however, because of a short period of follow-up.

DIAGNOSIS
In general, ectopic pregnancy is known as an atypical disease because of the variability of history and physical findings. The most seasoned clinician will fall short of 100 percent correct pre-operative diagnosis. However, to attain as high a percentage as possible, one must be ever conscious of the possibility of pregnancy in a female from age 15 to 45. A careful history and detailed physical examination are most necessary. Sequential observations of the blood picture, so far as hematocrit, packed cell volume, pulse rate, and blood pressure are concerned, will indicate the degree of stability of the blood volume.

DIAGNOSTIC PROCEDURES
Laboratory procedures are of limited value in the diagnosis of ectopic pregnancy. An hematocrit or hemoglobin determination may reveal a severe degree of anemia as evidenced by the fact that 12 percent of patients studied had an hematocrit of 24 percent or less. A drop in the hematocrit level is not essential to substantiate the diagnosis. The only laboratory tests of constant value are the blood type and Rh determination which are necessary for blood transfusion.

Some degree of abdominal tenderness was noted in 93.5 percent of patients and was usually limited to the lower abdominal quadrant.

A mass was palpable in the adnexa or cul-de-sac in 50 percent of cases; this does not imply that the area felt is always the ectopic pregnancy because of the high incidence of associated pelvic disease.

Examination of endometrial tissue obtained by biopsy or curettage has proved useful in the diagnosis of ectopic pregnancy, but is not totally decisive. In 1961, Birch and Collins reported a study of the endometria of 144 patients treated for ectopic pregnancy. They found that the endometrium could exhibit a secretory or proliferative phase, a resting or missed phase, or a decidual reaction. The Arias-Stella reaction was present in a variety of other conditions.
Arias-Stella described the typical change that occurs in endometrial epithelium when trophoblastic tissue is present in the body. These include focal enlargement of gland cells with nuclear hypertrophy and hyperchromatism; piling of gland cells, causing intraluminal tufts and loss of cell boundaries; vacuolation; loss of cell polarity; variations in nuclear size; mitoses; increased cytoplasm that is foamy; and diminished, or at times obliterated, lumens of the glands. The change may be hormonally induced and confused with malignancy.

A decidual reaction is not always indicative of pregnancy, whether intrauterine or extrauterine.

Examination Under Anesthesia

This can be a most rewarding and definitive procedure. When doubt still exists, it can be combined with other vaginal procedures such as culdocentesis, colpotomy, or culdoscopy.

Readmission

In our study, there were two instances of failure to make the diagnosis of ectopic pregnancy on initial hospitalization. One was diagnosed as pelvic inflammatory disease and the other as threatened abortion. In the first case, where the pregnancy test was negative, the pelvic inflammatory disease was finally operated as an acute abdomen. A ruptured tubal pregnancy was found with 400 ml of blood in the peritoneal cavity. In the second case, where there was a positive pregnancy test, the patient returned in a week in shock. She had a ruptured tube and an hematoperitoneum of 1,500 ml. This diagnosis could have been made earlier had the pathologist report of decidual tissue been made with greater haste.

Culdocentesis

Culdocentesis is performed in the outpatient clinic on all patients suspected of having ectopic pregnancy and has proved to be the diagnostic procedure of greatest value in the prompt recognition of intraperitoneal hemorrhage, secondary to a tubal pregnancy rupture. Although an occasional unruptured tubal pregnancy will not be diagnosed, or blood obtained from the cul-de-sac in the absence of hematoperitoneum, the percentage of accuracy is exceedingly high. This procedure has been utilized extensively in the emergency room and serious sequelae have not resulted. When an ectopic pregnancy is suspected but no blood is obtained from the peritoneal cavity, patients are allowed to return home provided there are no other telltale signs. The woman is instructed to follow up with her private or clinic physician.

The authors make a plea for the early use of culdocentesis in all patients in whom the diagnosis of ectopic pregnancy is suspected. While it is true that either diagnostic laparoscopy or ultrasound is helpful in patients with so-called “mild” ectopic pregnancy, a positive culdocentesis with a syringe full of nonclotting blood provides information that cannot be denied. A sample can be obtained in minutes before the patient becomes involved in hospital red tape. Certainly an unyielding tap is not informative, but every gynecologist (and especially those in training) should be prepared to perform it on every patient who is not in shock and who has the characteristic pelvic abdominal findings that make one suspect ectopic pregnancy.

In short, of all procedural tests, culdocentesis has been the most useful. It increases the correct preoperative diagnosis (with history and physical) from 65 to 70 percent to approximately 95 percent. 10

Colpotomy or Culdoscopy

Culpotomy or culdoscopy requires anesthesia and hospitalization. Neither of these procedures was used during the past five years. Colpotomy was used seven times during the first ten years of study in diagnosis, treatment, or both, while culdoscopy was not utilized at all.

Laparoscopy

Pelvic inflammatory disease that does not respond to treatment must be considered a possible ectopic pregnancy. It is even more important to consider seriously the possibility of ectopic pregnancy before assuming that pelvic inflammatory disease is the problem. Laparoscopy is indicated when doubt exists. It is a relatively benign procedure, has produced an increase in the number of ectopic pregnancies diagnosed before rupture, and has enabled the tube to be saved in a few cases. If laparoscopy is not possible, colpotomy or laparotomy should be considered. No patient should be discharged when the diagnosis is still in doubt.
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While laparoscopy can facilitate an immediate decision of whether a case of suspected ectopic pregnancy should be treated by laparotomy, most other diagnostic measures constitute a more or less time-consuming procedure, resulting in a considerable delay before a decision can be made. Obviously, liberal and skilled use of laparoscopy reduces the instances of delay to a very small number.

Laparoscopy in suspected ectopic pregnancy has certain limits. It is contraindicated in fulminating cases, where it is unnecessary and even dangerous. Thus, laparoscopy would be prohibited in association with shock due to gross intraperitoneal hemorrhage. Such patients should be operated on without delay.

Ultrasound

With ultrasound, it may be difficult to see an ectopic gestation; but, if one is faced with a differential diagnosis of ectopic pregnancy without an intrauterine gestational sac, further exploration by either laparoscopy or laparotomy would certainly be justified. The cystic nature of the ectopic pregnancy makes it difficult to distinguish it from a corpus luteum or other cystic adnexal structures. But again, with a positive test, no intrauterine gestational sac, and an adnexal mass, the pelvic cavity, regardless of the result of culdocentesis or ultrasound, should be explored.

Ultrasound is often a very useful tool in confirming a suspected diagnosis of ectopic pregnancy. Depending on the study, the accuracy of ultrasound in diagnosing ectopic pregnancy ranges from 70 to 92 percent. The incidence of false negative results ranges from 7.7 to 30 percent, and that of false positives from 2.4 to 12.8 percent, depending upon the expertise of the investigator.

With ultrasound 50 percent of patients with suspected ectopic pregnancies will be found to have normal intrauterine pregnancies; 25 percent will have pelvic inflammatory disease, and the remaining 25 percent will have other pathologic entities including ectopic pregnancy.

Entities that have been confused on ultrasonography with ectopic pregnancy include corpus lutea, dermoid cysts, serous cystadenoma, hydrosalpinx, tubo-ovarian abscess, leiomyoma of the uterus, and endometriosis. A loop of bowel lying above the uterus can also be mistaken for ectopic pregnancy.

Pregnancy Test

There is a new pregnancy test that was recently developed by Saxena in New York. A radioreceptor assay, it uses a corpus luteum of the lamb as the radioreceptor. With this ultrasensitive test physicians are able to diagnose pregnancy before implantation. An ectopic pregnancy is a precariously implanted pregnancy, and it has been demonstrated that the human chorionic gonadotropin (HCG) titer is often lower in ectopic pregnancies than in normal ones. Conventional pregnancy tests are negative in almost 50 percent ofectopics. This new sensitive test would be positive for pregnancy and greatly enhance early diagnosis.

REPEAT ECTOPIC PREGNANCY

There is little agreement in the literature regarding the incidence of repeat ectopic pregnancy. Reports vary from 2 to 15 percent. The outlook was much the same for those patients whose first pregnancy was ectopic. The study showed that 70 percent of these patients did not produce a living infant after the ectopic episode, and 30 percent of these patients subsequently had a repeat ectopic pregnancy.

In general, the obstetric outlook, performance, and prospects for a viable infant are poor for any patient who had an extraterine pregnancy. In the patient whose first pregnancy was ectopic, there is an increased risk of recurrence as compared to the overall incidence of ectopic pregnancy.

Women who have experienced an ectopic pregnancy have a higher subsequent incidence of persistent infertility, recurrent ectopic pregnancy, and pregnancy wastage. Swallen and Tall reviewed the literature in 1972 and found that 38 to 70 percent of patients were infertile after surgery, 25 to 69 percent had a subsequent normal intrauterine pregnancy, and 4 to 25 percent had a recurrent ectopic pregnancy. From these figures, it appears that no more than half are likely to conceive again, and only one third will have a successful term pregnancy. Finally, the risk of another ectopic is increased 30- to 50-fold.

Jeffcoate’s proposal, in 1955, that concomitant ipsilateral oophorectomy be considered in women subjected to salpingectomy in order that the remaining tube be provided with as many ova as possible has been both supported and refuted.
Available evidence does not clearly establish an advantage in removing a normal ovary and it appears that preservation of such ovaries is indicated in women who already have a low fertility potential.

The current availability of improved techniques for tubal reconstructive surgery may provide better opportunities for successful subsequent fertility in the future. Timonen and Nieminen20 found similar rates of successful pregnancy after radical (anything more than tubal reconstruction) and conservative surgery, but the recurrence rate of ectopic pregnancy was greater in the conservatively treated group.

Case Reports

M.B., a 35-year-old Filipino woman, gravida 2 para 0, admitted on May 15, 1979, having had a ruptured tubal pregnancy in 1972, was readmitted as a probable repeat ectopic. Ultrasound showed a gestational sac in the left tube. The patient had a second laparotomy in 1974 which was a left tubo-plastic. An exploratory laparotomy with left salpingo-oophorectomy, total abdominal hysterectomy, and right oophorectomy were performed on the following day. The right tube was absent.

J.M., a 21-year-old white female, gravida 3 para 1, with a history of previous tubal pregnancy, had a negative pregnancy test and had passed some tissue that was diagnosed as fetal by the pathologist. She had a previous right salpingectomy for ectopic pregnancy. On this exploration, a left ampullary tubal pregnancy was found. A left linear salpingotomy was performed and the products of conception were expelled. The pathology report revealed tubal pregnancy. This case was unique in that it presented a repeat ectopic pregnancy with a combined intrauterine and tubal pregnancy.

J.L., a 28-year-old gravida 3, para 1 ectopic, was admitted complaining of vaginal bleeding and severe lower abdominal pain. She had had a previous tubal pregnancy in 1976. Culdocentesis and laparoscopy were done and the diagnosis of left tubal pregnancy was confirmed with slight hematoperitoneum. At laparotomy, a left tubal pregnancy with early rupture was found. A left salpingotomy was performed.

Comment

Despite the clear risk of recurrent ectopic pregnancy, it must be reemphasized that successful pregnancies do occur in about one third of women; this is a highly significant proportion when it is recognized that many have not had a prior successful gestation. Although one should be realistic about the prospects for future pregnancy, it is possible that too many salvageable tubes are sacrificed because of defeatism and unwillingness to assume reasonable risks. Bender21 suggested that the uninvolved tube be carefully inspected before the affected one is excised; salpingotomy may be considered if the uninvolved tube is rudimentary or hopelessly damaged. He and others22 stress the importance of removing clots and blood (in an effort to decrease the incidence of adhesions and infection) as well as the use of prophylactic antibiotics. He concluded that any reasonable management concept that might enhance future fertility is desirable.

INDUCED ABORTION

A tenfold increased risk of ectopic pregnancy exists in cases of previous induced abortion. When an induced abortion is performed, the pathology report must be reviewed in order to prevent an early ectopic pregnancy for mistaking an early ectopic pregnancy from an intrauterine pregnancy.

As more induced abortions are done, a concomitant increase in ectopic pregnancies may be seen. Panayotou and associates20 verified this suggestion.

ECTOPIC PREGNANCY AND IUD

Women who experience accidental pregnancies with an IUD in situ have a greater chance of extrauterine pregnancies than either women not using any method of contraception or women who use other contraceptive methods and have unwanted pregnancies.24 Tietze suggests that the increased incidence of extrauterine pregnancies among IUD users is the result of the IUD's being more effective in preventing pregnancy within the uterine cavity than preventing it within the oviduct. It is highly probable that the intrauterine device prevents pregnancy by altering the uterine environment, thus making it hostile to implantation.25,26

P.T., a 30-year-old gravida 5, para 4 married Filipino, was admitted on January 6, 1978, by her
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family physician because of uterine bleeding of eight days duration. She had an antecedent period of amenorrhea of 2 1/2 months. The admitting diagnosis was either fetal death in uterus or hemorrhage, probably secondary to an IUD.

During her hospital course, the patient had a hypotensive episode for which she was given one unit of blood; a dilatation and curettage was also performed. The tissue obtained showed a decidual reaction and an Arias-Stella reaction. Because the patient continued to improve over the next few days, although remaining weak, she was reevaluated.

Gynecological consultation was secured. At this point, a tubal mass could not be ruled out. An ultrasound was done and the mass verified. Since the patient developed fever at the time, the possibility of an abscess was entertained. The existence of a hematoperitoneum also could not be eliminated. Laparotomy verified the presence of a massive hematoperitoneum with active bleeding from the fimbriated end of the left tube. The tube was distended with clot and what appeared to be a small dead fetus.

The right tube was also greatly distended with blood, suggesting the presence of an old salpingitis (hematosalpinx). A bilateral salpingectomy was recommended. Furthermore, because of the presence of fever and the possibility of further abscess formation by leaving in the uterus, it was decided to do a total abdominal hysterectomy and bilateral salpingo-oophorectomy.

The hematoperitoneum was estimated at 3,500 ml. Her hemoglobin level at one point dropped as low as 4.9 gm. The patient received approximately 16 units of blood during the crisis and did well thereafter. Antibiotics were given intravenously. The patient was discharged on the sixth postoperative day.

The final diagnosis was left tubal pregnancy with rupture, massive hematoperitoneum, and bilateral chronic salpingitis and right hematosalpinx.

Approximately one month later the patient reentered the hospital with severe jaundice. Liver biopsy showed acute hepatitis. Jaundice was thought to be due to homologous serum hepatitis or delayed transfusion reaction.

Although this patient survived, the author feels that in the presence of a massive hematoperitoneum, surgery should have been more conservative. Bilateral salpingectomy would have resolved the emergency and definitive pelvic surgery, such as hysterectomy, could have been postponed.

The extent of the hematoperitoneum was in direct proportion to the delay in making the diagnosis. It is advisable that a physician presented with symptomatology suggesting an ectopic pregnancy not relate the symptoms to the IUD, unless ectopic pregnancy has been excluded by proper diagnostic means.

ECTOPIC PREGNANCY IN THERAPEUTIC ABORTIONS WITH IUD IN PLACE

Since an ectopic pregnancy is not uncommon in the pregnant patient with an intrauterine device in place, a high incidence of suspicion must be maintained to properly diagnose and manage these patients. The differential diagnosis between an ectopic and an intrauterine pregnancy becomes less and less of a problem as the uterus continues to grow. However, early in the first trimester, a time when more and more women are requesting therapeutic abortion, neither uterine size nor a pregnancy test will differentiate the ectopic from the intrauterine gestation. A pregnancy test is usually positive in both the intrauterine pregnancy and the asymptomatic ectopic pregnancy. Postoperatively, the curettage pathology report should be obtained when products of conception are not seen and the patient should be contacted immediately and reexamined with ectopic pregnancy as a definite consideration.

HEMATOPERITONEUM

M.G., a 29-year-old Spanish parous female, was admitted on January 1, 1979, to the emergency room with possible acute appendicitis. Gynecological consultation diagnosed right tubal pregnancy. There was a massive hematoperitoneum. The general surgeon did not make an effort to remove the blood from the peritoneal cavity. A medical consultant considered possible pulmonary embolus, coronary infarction, or peritonitis.

The surgeon's failure to remove the blood from the peritoneal cavity at the time of surgery contributed to this protracted postoperative course.

ABDOMINAL PREGNANCY

Abdominal pregnancy (broad ligament implantation) is usually encountered as an aborting ec-
topic pregnancy in the first trimester. As such, it is amenable to local excision and hemostasis, without the need for adnexal ablative. However, an abdominal pregnancy that has advanced into the second trimester offers a challenge for conservative management. Believing that placental abruption has been secured and completed, surgical intervention may then be deferred until the fetus is viable. Such a case was reported to have been successfully terminated at 36 weeks.27

D.R., a 24-year-old black nulliparous female, was admitted to the hospital on March 22, 1980, complaining of vaginal bleeding and lower abdominal pain for two weeks. The pregnancy test, pelvic examination, and ultrasound were all positive for a pregnant adnexal mass. At laparotomy, an abdominal pregnancy of 12 weeks duration was found plastered intimately to the right adnexa. By block dissection the pregnancy, right tube, and ovary were removed with only slight loss of blood. No transfusion was necessary.

IDIOPATHIC THROMBOCYTOPENIC PURPURA

T.F., a 29-year-old gravida 3 para 2, married black female, was admitted to the emergency room on April 17, 1980, in shock with severe lower abdominal pain. The patient had an IUD. History and presenting findings, along with positive culdocentesis, were consistent with massive intraperitoneal bleeding secondary to tubal rupture. She was taken directly to surgery with adequate support systems of intravenous fluids and blood. The isthmal portion of the right tube was ruptured. A right salpingo-oophorectomy was done along with evacuation of the massive hematoperitoneum, estimated at 3,000 ml.

The patient's postoperative course was uneventful except for some slight hemorrhagic seepage from the wound site. On the third postoperative day some additional swelling was noticed consistent with a hematoma of the wound. She was taken to the operating room for evacuation of clots and repair of the wound. As the surgeon was beginning to open the wound, the report came from the laboratory that she had only 800 platelets. The diagnosis of idiopathic thrombocytopenic purpura was made. For the next two days the patient, under the supervision of an hematologist, received 23 units of platelets, with only a slight and not sustained elevation of the platelet count. She was switched to prednisone and, within 24 hours, she began to experience an increase in the platelet count which, in about ten days, was sustained at 300,000. The patient became asymptomatic and was discharged in good condition.

In cases of idiopathic thrombocytopenic purpura the patient must be admitted to the hospital immediately because she is likely to collapse suddenly. In acute rupture the first consideration is to keep the patient alive until she reaches the operating room. The second is to stop the bleeding, which can be done only by operative interference. The third is to restore the blood volume as rapidly as possible.

An intravenous infusion should be started at the same time blood is collected for typing and cross-matching. It is wise to choose a large vein through which the infusion will run rapidly. Blood transfusions will of course be requested, but in patients with acute rupture much valuable time will be lost in attempting to resuscitate an individual who is bleeding rapidly within the abdomen. Immediate laparotomy should be performed, and preparations made for autotransfusion if bank blood is not immediately available. If properly done autotransfusion can be a lifesaving stopgap measure.

AUTOTRANSFUSION

This lifesaving procedure was utilized in 11 patients (six percent) who were in shock and where bank blood was not immediately available. The rapidity with which blood can be processed today in a hospital equipped to manage trauma cases leaves less opportunity to use autotransfusion than previously.28-30

G SUIT

L.A., a 26-year-old gravida 1 para 0 entertainer, who collapsed in the wing of a theater while preparing to perform, was brought into the emergency operating room in a semiconscious state and in shock. All possible emergency measures were instituted including mouth to mouth resuscitation, intravenous fluids and plasma, and finally the g suit. Culdocentesis was positive. She was taken directly to the operating room where two units of type specific uncrossed blood were started. Additional typed and crossed blood was available im-
immediately making autotransfusion unnecessary, although preparations had been made.

At laparotomy, left interstitial rupture was found with hematoperitoneum in excess of 3,500 ml. She had a left salpingectomy and repair of left cornu with number one vicryl suture. The patient received a total of ten units of blood.

During the postoperative period, the patient developed a pulmonary infiltrate with fluid which was compatible with pulmonary embolus.

This g suit was considered critical in sustaining the patient in severe hypovolemic shock.

**SALPINGECTOMY**

The propriety of complete salpingectomy by cornual wedge excision must be challenged. Its use in ectopic pregnancy is illogical, unnecessary, and dangerous by predisposing to interstitial pregnancy and ruptured uterus. Excision is a traditional procedure and most gynecologists have been taught and continue to teach the technique. When a wedge excision of the cornu is performed, the surgeon is entering the uterine cavity, which actually extends out to the cornu. The tube will reestablish its continuity at the cornu more effectively and efficiently than in any other area of the tube. A partial salpingectomy does not compromise the blood supply to the ovary as much as does a total salpingectomy which is rarely necessary.

**HYSTERECTOMY**

This procedure was performed in three cases: two had experienced previous ectopic pregnancy for which salpingectomy was performed, and a third was complicated with pelvic inflammatory disease. This is contrary to the overall rule that governs the treatment of ectopic pregnancy—get in and get out. In one instance the risk was considered extreme but in the other two involving an unruptured tubal pregnancy, it was permissible, if not indicated, by some present day investigators.

**RESULTS OF TREATMENT**

When the diagnosis of ectopic pregnancy is made relatively early and surgery is prompt, one may expect an excellent survival rate. Currently the mortality rate is far less than one half of one percent. Beecham\(^3\) of New Orleans reported one death in 860 cases.

**CONSERVATIVE SURGERY**

Surgery for ectopic pregnancy need not be ablative. Early diagnosis based on the characteristic history, pelvic findings, and diagnostic aids will permit surgical intervention in most patients before rupture occurs.\(^32\)

Ectopic pregnancy must be regarded as inevitably fatal. Such was the accepted medical attitude throughout the world less than 100 years ago. It was Lawson Tait\(^33\) of Birmingham, England, who in 1888, pioneered the concept that timely surgical intervention could be lifesaving. Surgical excision of the involved structures accomplished hemostasis enabling him to save the lives of 38 to 40 women with an ectopic pregnancy. His policy of surgical intervention and ablation soon became widely accepted. At the present time, Tait’s procedure has remained, with virtually no modification, the routine surgical method for treating ectopic pregnancy.

The first report in 1953 demonstrated that preservation of the tube involved with an ectopic pregnancy was feasible and practical.\(^34\) When an ectopic pregnancy was recognized early, the new surgical procedure of salpingotomy could be performed, and the extrauterine pregnancy removed, without sacrificing the involved tube. Because of its initial success, this operation has been performed with increasing frequency, as have other conservative operative procedures in the management of ectopic pregnancy. Reasonable experience has been acquired during the past 20 years.

The following conservative procedures may be employed: (1) salpingotomy; (2) partial salpingectomy; (3) expression of tubal abortion; (4) hemostasis only; (5) resection of interstitial pregnancy; (6) removal of broad ligament pregnancy; (7) evacuation, per vagina, of cervical pregnancy; and (8) conservative surgery for advanced abdominal pregnancy.

**DEATH**

Most maternal deaths due to ectopic pregnancy are the result of a sudden massive hemorrhage before the patient even has the opportunity to receive medical assistance. The closer the point of rupture is to the uterus, such as the isthmal or interstitial portions, the more likely it will be horrendous and the bleeding extensive. Since most
patients who have ruptured ectopic pregnancies have visited a physician a few days before the rupture, many deaths might be prevented by establishing the diagnosis of ectopic pregnancy early and by initiating therapy prior to rupture.

MORTALITY RATES

The most frequently quoted incidence of ectopic pregnancy is that of Schumann, namely, 1 ectopic pregnancy to 303 intrauterine gestations. These rates were obtained from data in Philadelphia hospitals during 1918.6

During the five-year period 1944-1948 there were 862 ectopic pregnancies in 19 Baltimore hospitals. There was one ectopic gestation to 177 total births in white women, as compared to one ectopic pregnancy to 120 total births in black women.35

The mortality from ectopic pregnancy from 1944 to 1948 was 0.7 percent for white patients and 3.9 percent for blacks, with a combined racial mortality of 1.6 percent (862 cases with 14 deaths).36

The author Joseph May36 calculated the maternal mortality rates from ectopic pregnancy in the southeastern United States. Between 1960 and 1975, 81 percent of ectopic deaths occurred in nonwhite women. A more detailed study of 24 deaths from ectopic pregnancy in North Carolina shows that, from 1961 to 1976, 4.2 percent of all direct obstetric deaths and 15.9 percent of all deaths from hemorrhage were due to ruptured ectopic gestation. The most striking observation was the dramatic reduction in deaths from ectopic pregnancy among nonwhite women. The missed diagnosis of ectopic pregnancy as a factor in maternal mortality rate requires more intensive educational efforts directed toward primary care physicians.

Overall, maternal mortality rates from ectopic pregnancies in the South Atlantic region have decreased more than 40 percent from the period 1960-1963 to that of 1971-1975.36 The most striking observation in this report is the dramatic reduction of deaths of nonwhite as compared to white subjects, whose death rate has remained essentially constant. This implies that factors other than improved diagnostic acumen are primarily responsible for the reduction in deaths. The author suggests that improvement in socioeconomic status, better patient education, and easier access to a medical system with increased availability of physicians trained to be more aware of ectopic pregnancy are of major importance. This opinion is supported by the North Carolina experience.

In one instance, a physician was dissuaded from her original diagnosis of ectopic pregnancy by a negative culdocentesis. Culdocentesis can be extremely helpful if it is positive for blood in the cul-de-sac. However, a negative tap should not cause one to dismiss the diagnosis of a ruptured ectopic pregnancy.

Conscious of these causative factors, one must address the primary problem of the reduction of the maternal mortality rate, as it relates to ectopic pregnancy. In the years reviewed in this study, there has been an overall reduction of 40 percent in the maternal mortality rate. The answer is an overall improvement in medical coverage in general rather than a credit to this specialty. The rate has not changed significantly for white subjects but has decreased in nonwhite groups. One would assume that, on the whole, the nonwhite subjects were seen in a clinic and the white subjects were seen by private physicians. As socioeconomic status, awareness of medical needs, and transportation facilities for nonwhite groups have improved, the maternal mortality rate has decreased.

CONCLUSION

It should be emphasized that proper management of ectopic pregnancy in order to achieve decreased mortality and morbidity depends upon a number of factors. These include early diagnosis, early correct surgery, operative room, quality anesthesia, and excellence in postoperative care. However, a few unfortunate women will have interstitial (cornual) implantation with sudden catastrophic hemorrhage and will not immediately have the advantages of the above ideal management with a nonpreventable death ensuing. Consequently, complete prevention of all deaths may not be possible.

In order to decrease the maternal mortality rate secondary to ectopic pregnancy, obstetricians and gynecologists must be more aggressive in the research and treatment of ectopic pregnancy. In turn, educators must program the primary care physician to search for ectopic pregnancies.

Finally, most cases of ruptured ectopic pregnancy are brought to the emergency room at odd
hours and in varying states of impending and actual shock for treatment by emergency room personnel. Since this is such a critical time for making the specific diagnosis and effecting early and proper treatment, the author is recommending that a gynecologist be part of the trauma team. This procedure has been instituted at Queen of Angels Hospital, and it is responsible for an excellent record in managing these obstetrical and gynecological emergencies.

ADDENDUM

Temple Community Hospital, a neighboring hospital having 200 beds but without an emergency room or maternity service, furnished an additional ten cases for this study during 1976 through 1979. Two cases were of significant clinical notice.

P.L., a 30-year-old nulliparous black airline stewardess, was admitted with a diagnosis of pelvic inflammatory disease. On her third day of treatment, she developed a sudden drop in the hemoglobin and accentuation of her pain. Laparotomy was performed and a ruptured right ampullary portion of the tube along with multiple fibroids were found. The hematoperitoneum was minimal so a partial salpingectomy with reanastomosis of the right tube was performed along with a multiple myomectomy and uterine suspension.

This case is an example of conservative plastic surgery in a young nulliparous woman in excellent condition, who was not jeopardized by additional procedures.

L.G., a 29-year-old white gravida, was readmitted to Temple Hospital on February 11, 1978, complaining of severe lower abdominal and right shoulder pain. Two days earlier the patient had had an induced elective abortion. The pathology report described only decidual tissue.

The patient was explored and a ruptured right tubal pregnancy was found along with a perforation in the lower uterine segment with a hematoperitoneum of about 1,500 ml. A right salpingectomy, suturing of the cervico-uterine tear and evacuation of blood were done. The patient received three units of blood.

This case is a prime example of the failure to diagnose an ectopic pregnancy at the time of doing an induced abortion in the presence of an undiagnosed extrauterine pregnancy.

F.U., a 28-year-old parous Vietnamese adult female, was admitted to Western Park Hospital through the emergency room as a probable ruptured ectopic pregnancy. The patient presented in a state of hypovolemic shock. A pelvic ultrasound revealed findings consistent with ectopic pregnancy, at least 11 weeks gestational age, and myomatous enlargement of the uterus.

She was taken directly to the operating room with fluids running and blood on the way. Laparotomy revealed an hematoperitoneum of approximately 3,000 ml. The right adnexa were intimately attached to an approximately 12-week fetal sac. There were some fibrinous attachments to the parietal peritoneum and contiguous loops of bowel. A perforation was noted in the lower uterine segment from which there was some active bleeding. This perforation was closed and the right adnexa and fetal sac with placenta were removed by block dissection. The patient received four units of blood and was stabilized.

This case demonstrates a graphic representation of a uterine perforation in an attempted induced abortion in what was thought to have been an intrauterine pregnancy.

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