THE MEDICAL COLLEGE OF VIRGINIA
SCHOOL OF MEDICINE
CONTINUING EDUCATION PROGRAMS FOR
1981

CHEST RADIOLOGY
Williamsburg, Virginia
March 1–5, 1981

CLINICAL DIAGNOSIS AND MANAGEMENT OF CORNEAL
AND EXTERNAL DISEASES
Williamsburg, Virginia
April 3–5, 1981

CLINICAL CONCERNS IN PRIMARY CARE
Williamsburg, Virginia
April 9–11, 1981

EMERGENCY MEDICINE FOR THE
PRIMARY CARE PHYSICIAN
Williamsburg, Virginia
April 24–26, 1981

34TH ANNUAL STONEBURNER LECTURES
RECENT ADVANCES IN
GASTROENTEROLOGY AND LIVER DISEASE
Richmond, Virginia
April 30–May 1, 1981

RADIATION ONCOLOGY
Williamsburg, Virginia
May 15–16, 1981

CARDIOLOGY
Williamsburg, Virginia
June 18–20, 1981

5TH ANNUAL NEUROLOGY
Virginia Beach, Virginia
July 14–18, 1981

5TH ANNUAL SUMMER RETREAT
Virginia Beach, Virginia
August 11–15, 1981

RADIATION BIOLOGY
Richmond, Virginia
August 11–12, 1981

For further information, please contact the Department of Continuing Education at (804) 786-0494 or Box 48, MCV Station, Richmond, Virginia, 23298.
Our recent surveys of primary care physicians and a review of our recent programs have identified several important areas of clinical concern that have not been adequately covered in the past two or three years. This program will be divided into four one-half day sessions—all day on Thursday—one-half day on Friday—and one-half day on Saturday, so that participants may enjoy the pleasures of Williamsburg in the springtime. The following topic areas will be covered.

DRUG ABUSE

PAIN

ANXIETY AND DEPRESSION

GYNECOLOGIC CONTROVERSIES
"CLINICAL CONCERNS IN PRIMARY CARE"

**DRUG ABUSE**
Session Chairman—Dr. William Lerner
Director, Division of Substance Abuse/Alcoholism Services, MCV

- Basic Mechanisms
- Alcoholism—Early Recognition and Management
- The "Street Scene" Today
- Available Therapeutic Resources

- Prescription Drug Abuse
- OD’s

**PAIN**
Session Chairman—Dr. Albert Wasserman
Chairman, Division of Clinical Pharmacology, MCV

- Physiology and Pharmacology (Endorphins, Prostaglandins, etc.)
- Arthralgia
- Pharmacologic Management

- Persistent Headaches
- Alleviation of Chronic Pain

**ANXIETY AND DEPRESSION**
Session Chairman—Dr. Robert Friedel
Chairman, Department of Psychiatry, MCV

- Early Recognition
- Office Therapy in Primary Care

- Differential Diagnosis
- Utilization of Resources

**GYNECOLOGIC CONTROVERSIES**
Session Chairman—Dr. John Board
Vice-Chairman, Department of Obstetrics and Gynecology, MCV

- Toxic Shock Syndrome
- Estrogen Therapy
- High Risk Pregnancy—Ultrasound

- Contraception
- Menopause
- Dysmenorrhea

For further information, please contact the Department of Continuing Medical Education at (804) 786-0494 or Box 48, MCV Station, Richmond, Virginia 23298
The Department of Obstetrics and Gynecology welcomed the opportunity to present the 51st Annual McGuire Lecture Series. The lectures were designed to provide the primary care physician with information which is clinically useful and applicable to the daily practice of obstetrics and gynecology. An effort was made to achieve a balance between those health problems that have been known for some time but whose understanding has changed and those problems that have been recognized more recently and whose solutions are still evolving.

Dr. David H. Nichols, at present Professor and Chairman, Department of Obstetrics and Gynecology, Brown University School of Medicine, was the 51st McGuire Lecturer. He is well known for his knowledge of the gynecologic literature, his research into the problem of pelvic relaxation, and his surgical expertise. Dr. Nichols has published numerous articles on female pelvic anatomy, pelvic relaxation and vaginal surgery. In addition he has co-authored texts on gynecologic pathology and vaginal surgery.

W. GLENN HURT, M.D., Professor
Department of Obstetrics and Gynecology
Antenatal Genetic Studies

FAY REDWINE, MS, MD

Department of Obstetrics and Gynecology, Department of Human Genetics, and Clinical Director, Antenatal Genetic Testing Program, Medical College of Virginia, Health Sciences Division of Virginia Commonwealth University, Richmond, Virginia

The Antenatal Genetic Testing Program at MCV began in 1973. The standard scheme for antenatal genetic testing involves counseling, the methods of carrier detection available, ultrasound, amniocentesis, and laboratory evaluation. Patients are referred because of a family or personal history of a genetic abnormality or because they have been evaluated in a carrier detection program like those for Tay-Sachs disease or Sickle cell disease and are known carriers. After referral, patients are given genetic counseling by me and members of the Department of Human Genetics; if antenatal genetic testing is deemed appropriate, we obtain informed consent and proceed with an ultrasound study. The primary reason for doing an ultrasound study prior to amniocentesis is to detect twins. Twins are most likely to be in separate amniotic sacs and have different karyotypes; therefore, fluid must be obtained from each sac.

The indications for referral are listed in Table 1. The most frequent is advanced maternal age, generally considered to be 35 years or greater. If a mother is less than 35 years and pregnant, she has a 0.2% risk of having a child with Down Syndrome (about 1 in 600). Between 35 and 40 years of age the risk of having a child with Down Syndrome is between 1% and 1.5% and between 40 and 45 years of age it is about 2% or about a 5 to 10 times greater risk than the general population.

Another common reason for ultrasound study is that the patient has had a previously chromosomally abnormal child. The most common abnormality is Trisomy 21 in which case risk of the recurrence is 1%. Occasionally, we find that the proband has a translocation abnormality and that one of the parents is a balanced carrier which results in a rate of recurrence of from 20% to 100%. A significant family history of chromosomally abnormal offspring (sister, brother, and their children) may also be a clue to a translocation defect. Other indications for studies include metabolic defects amenable to prenatal detection and a previous child or known carrier status for a sex-linked disease (hemophilia or Duchenne muscular dystrophy). The history of a previous child or close relative with a neural tube defect (NTD) (either anencephaly, encephalocele or meningomyelocele) is a very common reason for referral. Neural tube defects have a genetic component, so that if a couple has had an affected child, the risk of a subsequent child with a NTD is 5%, and if there have been two affected children, the risk is 10% for having a child with a NTD. Patients with close relatives with a NTD have a 1% risk of occurrence.

As mentioned, ultrasound is used primarily to diagnose twins. Once twins have been ruled out ultrasound is very useful for locating a pocket of amniotic fluid and measuring the angle and depth at which the needle has to enter the sac to withdraw fluid. The Figure is an ultrasound visualization of a uterus, with the fetus inside, at about 14 weeks gestation. The chest and head are easily identified, as is a thick anterior placenta. The amniotic fluid is the dark area and the proper needle placement is indicated.
TABLE 1
Indications for Referral for Antenatal Genetic Testing
1. Advanced maternal age (≥ 35 years old)
2. Previous child with a chromosome abnormality
3. Parents who carry a translocation gene
4. Previous child with an inborn error of metabolism
5. Previous child with a severe X-linked disease
6. Previous child or close relative with a neural tube defect

Amniocentesis is the procedure by which amniotic fluid is obtained through the abdomen of the mother with a needle. (If we have problems obtaining fluid we can use ultrasound in conjunction with amniocentesis to see the tip of the needle.) We use a disposable kit for amniocentesis which has a 22-gauge spinal needle, local anesthesia, and Betadine swabs, which are used to prepare the abdomen after we have decided where the needle is to be inserted. After draping the abdomen with a sterile towel, the skin and subcutaneous tissue is anesthetized and the needle is inserted. The needle has a stylet which is then removed and an extension tube attached without interrupting the flow of fluid being withdrawn through the needle. Since the most common laboratory evaluation from the amniotic fluid is chromosome analysis, the fluid is processed by the cytogenetic lab in the Department of Human Genetics. It takes three to four weeks to complete the analysis with a range of about two and one half to six weeks. The fetal karyotypes are obtained from cultured fetal cells in the amniotic fluid obtained at 14 to 16 weeks gestation.

Another fairly recent and exciting area in the field of intrauterine diagnosis is that of fetal structural defects. The first group successfully diagnosed is Neural Tube Defects (NTD) with the association of elevated amniotic fluid alpha-fetoprotein in pregnancies with a NTD. In 1972, Brock and Sutcliff published a series of patients in whom they had measured the amniotic fluid alpha-fetoprotein and found that there was clearly a significant difference between a group affected with NTD and a normal control group. The most accurate range of pregnancy to measure alpha-fetoprotein is 14 to 18 weeks. The diagnosis of anencephaly and large meningoceleces can also be made easily with modern ultrasound techniques. Because meningoceleces and spina bifida are more difficult to demonstrate by ultrasound, we rely mainly on alpha-fetoprotein in the amniotic fluid for their detection. In addition, with more sophisticated ultrasound equipment, we are able to diagnose other structural defects such as dwarfism (by measuring fetal limb lengths) and polycystic kidneys (Potter syndrome).

A number of questions are frequently asked about this testing. Could you accidentally hit the baby with the needle? This has certainly happened and has been reported in the literature. I reviewed one series with an intracardiac fetal puncture and death during an amniocentesis at 16 weeks. The recorded pregnancy loss rate nationwide is about 1% as a result of amniocentesis. At MCV two pregnancies have been lost in a series of 531 patients. One patient developed chorioamnionitis within 24 hours and one patient had ruptured membranes about an hour after the procedure, giving a fetal mortality of 0.4%. We have had no fetal punc-

![Image](image-url)

Figure—Ultrasound visualization of a fetus in utero at 14 weeks gestation.

TABLE 2
Results of Antenatal Genetic Testing
9-1-73 to 9-6-79

<table>
<thead>
<tr>
<th>Chromosome Abnormality</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>46XY (normal male)</td>
<td>269</td>
</tr>
<tr>
<td>46XX (normal female)</td>
<td>255</td>
</tr>
<tr>
<td>46XX+21 and 46XY+21 (Trisomy 21)</td>
<td>5</td>
</tr>
<tr>
<td>45XO (Turner syndrome)</td>
<td>1</td>
</tr>
<tr>
<td>47XX+18 (Trisomy 18)</td>
<td>1</td>
</tr>
<tr>
<td>45XY, t(18p 21p)</td>
<td>1</td>
</tr>
<tr>
<td>46XX, 46XX(r9) (mosaic)</td>
<td>1</td>
</tr>
<tr>
<td>45XX, t(14q 21q)</td>
<td>1</td>
</tr>
<tr>
<td>46XX, 45 XO (mosaic)</td>
<td>1</td>
</tr>
<tr>
<td>46XX, t(6p, 14p)</td>
<td>1</td>
</tr>
</tbody>
</table>
tures. This is an acceptable mortality rate considering that most of these patients have at least a 1% risk of having an abnormality and some as high as 5%.

Another common question is, how much does it cost to have the testing? The cost varies from center to center, but the range in Virginia is $470 to $520. MCV charges $520 which includes genetic counseling, amniocentesis, ultrasound study and karyotype examination. If the patient needs only the alpha-fetoprotein determination, the cost is $175. The MCV experience with antenatal genetic studies involves 531 patients, the majority of whom were studied because of advanced maternal age. The second most common indication was a previous child with a NTD and the third was a previous child with Trisomy 21. The rest were a variety of indications; perhaps the most interesting was one patient who demanded elective sex determination. The results of chromosome analysis from our patients are presented in Table 2. Five fetuses were diagnosed as having Down Syndrome, and of seven fetuses with abnormal alpha-fetoprotein, all had a NTD. All abnormal fetuses were aborted and the diagnosis confirmed.

REFERENCE
Identification of the High-Risk Gravida

ROBERT E. PETRES, MD
EMILY M. COOGAN, RN, MS, OGNP

Department of Obstetrics and Gynecology, Medical College of Virginia, Health Sciences Division of Virginia Commonwealth University, Richmond, Virginia

In the past, there has been considerable pessimism about our ability to identify the pregnant patient at risk. However, with the development of sophisticated diagnostic techniques these patients can be identified and with appropriate treatment their outcome can be improved. This paper presents the overall benefit of categorizing obstetrical patients, the method that has been developed at the Medical College of Virginia (MCV), and certain categories of high-risk obstetrical patients who continue to present problems and have unacceptably high complication rates.

A variety of systems has recently appeared in the literature designed to categorize the high-risk obstetrical patient. To be successful such a system must be accurate and simple enough to understand. Some of the initial systems of categorization were simply too complicated. They involved the tabulation of multiple factors drawn from virtually every aspect of the patient’s lifestyle, physical examination, and laboratory assessment. Consequently, they were too cumbersome to be practical. The goal of any identification system should be to separate patients into groups which can then be managed according to the common requirements of each group.

The classification system used at MCV is based on the premise that a given pregnancy may represent a progressive risk to the fetus or the mother and that this risk can be attenuated by appropriate care. Not included in the system are patients at risk for congenital anomalies. This group of patients undergoes comprehensive early antenatal evaluation. The results of this evaluation are then made available to the parents, who in turn determine what action is to be taken. On the other hand, there is a larger group of patients whose pregnancies are at progressive risk in utero. Identification, classification and appropriate intervention can improve perinatal outcome in this larger group.

The MCV identification system is divided into four categories. It was recognized at the outset that obstetrical patients could not simply be separated into normal patients and high-risk patients. If this were done, 90% of the patients would be in the high-risk category and only 10% in the normal category. Instead, it seemed more logical to group patients according to the severity of their problems.

Class IV Critical care pregnancies
- Eclampsia
- Severe preeclampsia
- Chronic hypertension with superimposed preeclampsia
- Chronic renal disease uncompensated (creatinine 1.2 mg/dl or greater)
- Organic heart disease uncompensated (early signs of failure)
- Hemoglobinopathies in crisis
- Pyelonephritis, acute
- Premature rupture of the membranes
- Premature dilatation of the cervix in the second half of pregnancy
- Diabetes (ketonuria)
- Placental accidents (abruptio placentae)
and placenta previa in the second
half of pregnancy)
Class III High-risk pregnancy
Mild preeclampsia
Diabetes without evidence of ketonuria
Chronic hypertension
Chronic renal disease compensated
(creatinine less than 1.2 mg/%) 
Organic heart disease compensated
(no signs of failure)
Hemoglobinopathy, disease stable
(hemoglobin less than 10 gm/%) 
Rhesus negative, sensitized
Previous intrauterine fetal demise in
second half of pregnancy
Proven intrauterine growth retardation
Maternal weight loss
Gestational age documented greater
than 42 weeks
Multiple pregnancy
Maternal weight greater than 300
pounds
Deficiency anemias (hemoglobin less
than 10 gm/%) 
Class II At-risk pregnancy
Maternal weight between 250 and 300
pounds
Hemoglobinopathy, trait (hemoglobin
10 gm/% or greater)
Deficiency anemias (hemoglobin 10
gm/ % or greater)
History of urinary tract infections
Bacteriuria
Rhesus negative, unsensitized
Suspected intrauterine growth retardation
Inadequate maternal weight gain
Previous cesarean section
Previous premature baby
Previous baby 10 pounds or greater
Class I Normal pregnant patients

Critical care pregnancies (Class IV) are
those pregnancies in which there is an imminent
possibility of decompensation. As is apparent
from the diagnoses, there is a risk of death to
the fetus or the mother. These patients should
generally be cared for in the hospital.

High-risk pregnancies (Class III) include
those that are not quite as critical as the Class
IV type but whose diagnoses carry an unaccep-
tably high perinatal loss. This is the category at
which all the "new" antepartum testing tech-

iques and methods of management have been
directed. Specialized high-risk obstetrical clinics
have been developed in referral centers to evalu-
ate and closely follow patients in this category.
The most substantial improvement in perinatal
outcome can be realized in the Class III cate-
gory.

At-risk pregnancies (Class II) need to be
identified but do not require specialized surveil-
ance. From the nature of the diagnoses it is ap-
parent that all these patients have the capacity
to decompensate and therefore require close
supervision.

Low-risk pregnancies (Class I) include pa-
tients with normal pregnancies. Frequently, the
least number of patients are found in this cate-
gory. These are patients with normal histories,
normal physical examinations and normal labo-
atory values. Their pregnancies follow the pro-
jected course for fundal growth, maternal
weight gain, blood pressure, and all other pa-
rameters of normal pregnancy.

It is important to note that the assignment
of a classification does not mean that the pa-
tient is necessarily going to remain in that classi-
fication throughout the pregnancy. Patients may
shift from one class to another as their status
improves or worsens. For example, if a patient
has an iron deficiency anemia with hemoglobin
of 11 gm/ % she is placed in the Class II cate-
gory. She is counseled about nutrition and ap-
propriate diet, and iron supplements are pre-
scribed. If, however, her hemoglobin drops to 9
gm/ % as her pregnancy progresses, she is
then placed in the Class III category. This may
mean that she is transferred from a routine ob-
stetrical clinic to a high risk clinic with special-
ized surveillance.

There are several diagnoses contained in
the classification system that are of special in-
terest. One such diagnosis is maternal weight
loss (Class III).

In the past, not enough attention has been
paid to adequate weight gain in pregnancy. A
great deal of emphasis has been placed on ex-
cessive weight gain yet poor weight gain or
worse, weight loss, has not been so readily rec-
ognized. It is important to realize that the corre-
lation between low-birth-weight infants and lack
of maternal weight gain is greater than with any
other single factor. When charts are examined
retrospectively for factors such as parity, so-
cioeconomic status, maternal weight gain, tox-
emia, renal disease, cigarette smoking, and number of children, the greatest influence on fetal weight gain is maternal weight gain.

Poor fetal weight gain is not necessarily due to the fact that the mother’s nutritional status is inadequate. Maternal weight gain is predicted both on her nutritional status and on the size of her fetus. If there is a problem preventing the growth of the fetus, such as rubella, the mother will not gain weight. This mother can be fed an adequate diet, but the baby will not grow because of its limited potential. Decreased maternal weight may cause poor fetal growth, but the reverse is also true. Poor fetal growth may be responsible for limited maternal weight gain.

Suspected intrauterine growth retardation (IUGR) is another category that deserves special attention because of the difficulty of diagnosis. Suspected intrauterine growth retardation, as measured by biparietal diameter with ultrasound, is often an iatrogenic problem. Erroneous measurements, or studies done too frequently, may indicate that there is lack of growth in the biparietal diameter. This points to the possibility of placental or fetal compromise, although, in fact, it may be nothing more than laboratory error.

Intrauterine growth retardation diagnosed prior to 28 weeks gestation should be extremely suspect. Even in placental insufficiency syndromes, the fetal head usually continues to grow past 28 weeks, and it is extremely unlikely that the diagnosis of IUGR can be made from biparietal diameter data before that time. A biparietal diameter four or more weeks behind the dates prior to 28 weeks usually indicates “wrong dates.”

Hypertensive disorders in pregnancy are important because of their frequency and because of the profound effects they have both on the mother and the fetus. They are divided into the toxemias (eclampsia and preeclampsia), chronic hypertension, gestational hypertension, and toxemia superimposed on hypertension. Gestational hypertension is hypertension that is unmasked in pregnancy but without the criteria for the diagnosis of toxemia.

Making the appropriate diagnosis of hypertensive disorders in pregnancy can be confusing. However, high blood pressure, regardless of etiology, has a deleterious effect on the end organs, be it the brain, the liver, the kidney, the cardiovascular system or the placenta. While it is important to establish a diagnosis, it is more important to realize that the magnitude of the blood pressure and the extent of end organ damage is directly proportional to fetal-maternal morbidity and mortality. In a series of hypertensives with proteinuria, the perinatal mortality rate was 37.9 per 1000 births. This compared with a rate of 17.2 per 1000 for normotensive patients without proteinuria. In patients with diastolic blood pressure greater than 120, the perinatal mortality is 50%.

Hypertensive syndromes in pregnancy continue to result in maternal mortality. The outcome is compromised particularly if accelerated hypertension occurs in the third trimester. Generally this is categorized as chronic hypertension with superimposed toxemia. Chesley reports that hypertension is rarely aggravated in pregnancy unless there is significant cardiac, renal, or retinal pathology. What must be emphasized, however, is that this type of pathology is fairly common in hypertensives and when these women become pregnant they are at increased risk.

In the past several years much attention has been directed at predicting the patient who will develop hypertension in pregnancy. Dalton looked at weight gain as an indicator. She reported the incidence of preeclampsia to be 26% in patients who gained more than 1½ pounds per week after the 30th week of gestation. The weight gain she is alluding to is not really caloric weight gain but rather fluid retention which is one of the triad of symptoms associated with preeclampsia. Edema, however, does not correlate well with increased perinatal morbidity and mortality. In fact, fluid retention is the least significant of the triad of hypertension, proteinuria and edema in relationship to perinatal mortality. Chesley has demonstrated that the diastolic blood pressure is the most significant factor in patients who will develop hypertension in pregnancy. In his study, diastolic elevation occurred as the first symptom in 58% of patients whereas proteinuria occurred as the first symptom in only 34%. Proteinuria is only a reflection of the end organ damage to the kidney in hypertensives. In toxemia the vascular changes resulting in decreased perfusion of vital organs is frequently long standing prior to a noticeable elevation in the diastolic blood pressure. Indeed, Gant and others have demon-
strated that the vascular changes typical of toxemia occur as early as 24 weeks. Using 140/90 as a standard, the physician may not be able to appreciate an elevation until 35 or 36 weeks when end organ damage is already substantial. If the diastolic blood pressure is 75-85 mm Hg, the perinatal mortality is about 7 per 1000. As the diastolic pressure increases to 85-90 mm Hg the rate is 10 per 1000. When the diastolic is 90-104 mm Hg, the perinatal mortality triples what it was at 75 mm Hg and there is a progressive linear increase in perinatal mortality as the diastolic blood pressure continues to elevate. A diastolic reading of 90 mm Hg at any point in pregnancy is distinctly abnormal.

Calculation of the mean arterial pressure (MAP) is the most sensitive method of predicting impending hypertension in pregnancy. This measurement is obtained using the following formula.

$$\text{MAP} = \frac{\text{Systolic} + 2 \times \text{Diastolic}}{3}$$

A MAP greater than 90 in the second trimester or greater than 105 in the third trimester is prognostic of hypertension, either gestational hypertension or toxemia.

Page and Christianson calculated MAP in the second and third trimesters and correlated it with outcome. They found that when the MAP went from 90 to 95 or greater, the incidence of preeclampsia tripled. It is important to note that a blood pressure of 140/90 yields a MAP of well over 100. A blood pressure reading that may appear grossly normal is often abnormal when calculating its mean arterial pressure.

Diabetes in pregnancy, while it represents a much smaller proportion of patients than the hypertensives, continues to be a problem. Diabetic pregnancies carry a perinatal death rate four to five times higher than normal pregnancies. The outcome depends largely on the severity of the diabetes and the amount of vascular disease present prior to pregnancy. Some of the common problems seen in these pregnancies are congenital anomalies (6%), oligohydramnios, premature rupture of membranes, macrosomia, toxemia (13% to 50%), urinary tract infections, increased incidence of cesarean section, birth trauma and intrauterine deaths. In addition, babies of diabetic mothers experience many problems in the newborn nursery. They include hypoglycemia, respiratory distress syndrome, and hyperbilirubinemia.

The key to improved outcome in diabetic pregnancies centers around early diagnosis and strict metabolic control. Patients with a family history of diabetes or macrosomic babies, (greater than 4000 grams) should have a glucose tolerance test to screen for diabetes. In women who have had a previous baby weighing more than 4000 grams, 10% have undiagnosed diabetes. These women have high blood sugars which stimulate the fetal pancreas to produce insulin. Insulin acts like growth hormones in the fetus resulting in macrosomia. Glycosuria in pregnancy is another indicator to screen for diabetes. It cannot be dismissed as a decreased renal threshold for glucose or as galactosuria secondary to breast development. Any patient with glycosuria in pregnancy should be considered diabetic until proven otherwise.

Finally, patients with a poor obstetrical history should be screened for diabetes. This includes previous congenital anomalies, stillbirth, and repeated pregnancy loss.

In conclusion, the classification system developed at the Medical College of Virginia to identify the high-risk gravida has been presented with a discussion of some of the problems in pregnancy that carry a high perinatal mortality. The importance of classifying patients according to risk is emphasized so that appropriate management can ensue. In this way, pregnancy outcome can be improved.

REFERENCES


Management of the High-Risk Gravida

SHELBY JARRELL, M.D.

Assistant Professor, Department of Obstetrics and Gynecology, Medical College of Virginia, Health Sciences Division of Virginia Commonwealth University, Richmond, Virginia

Comprehensive prenatal care has become the hallmark of modern obstetrical practice. Awareness by both physicians and patients that such care is necessary for satisfactory perinatal outcome has led to the establishment of an obstetrical subspecialty, Maternal Fetal Medicine, to provide a higher level of prenatal care and to increase our knowledge of perinatal events. Many of the management techniques currently being used for high-risk pregnancies can be readily applied to the routine obstetrical population. The additional physician time and laboratory tests required are minimal, and the early identification and prevention of perinatal complications will eliminate the need for “crisis” medicine.

Identification of the High-Risk Patient

The first step toward initiating a management plan for a high-risk pregnancy is recognition that a poor perinatal outcome is possible. Early identification of the “at-risk” fetus begins with the first antenatal screening visit. Although most conditions associated with an adverse maternal or fetal outcome have long been recognized, I have found it helpful to use a risk-scoring approach that provides a semiquantitative risk estimate. This method takes into consideration various historical, physical, and laboratory data to generate a numerical risk score; in general, as the risk score increases, the likelihood of an unfavorable perinatal outcome also increases. Depending on the clinical setting, one quarter to one third of all pregnancies will be identified prospectively as high risk and can be expected to experience the majority of perinatal mortality and morbidity. It is in this group of high-risk patients that recently developed methods of fetal surveillance are likely to find their greatest value. While details of this risk-scoring system are beyond the scope of this discussion, it should be mentioned that the Virginia State Department of Health currently has plans to implement a risk-scoring system into the state health care system.

Dr. Robert Petres has previously addressed the problem of identification of the high-risk gravida. Although his classification of pregnancies into various risk categories based on the worst single antepartum complication is a different approach from the numerical risk-scoring system, he accomplishes much the same result—prospective identification of the patient at risk for an adverse perinatal outcome.

Management

Ideally, every woman should be seen by an obstetrician prior to conception. At this time the physician may identify medical problems that should receive attention. The patient should be made aware of the importance of early prenatal care and be encouraged to seek an early diagnosis of pregnancy. The patient-physician relationship established at the preconception visit will encourage this.

Office management of the high-risk gravida begins with the initial visit. Postconception, patients should be seen as soon as possible in the office. It is difficult to convince patients of the importance of prenatal care if they must wait 3 to 4 weeks for their first postconception visit. If the physician is not readily available, the initial
office screening should be performed by a nurse. The patient’s blood pressure and urine should be checked, a pregnancy test performed to confirm pregnancy, and a check list history taken to identify any significant problems that may require immediate attention by the physician. If the patient is entirely normal with a negative history, she may be scheduled to see the physician at a later date; however, if a problem is identified on the screening visit, it should be dealt with as soon as possible.

**Initial Visit**

The objectives of the initial visit are to determine the health of the mother and fetus, to determine the gestational age of the fetus, and to initiate a plan for continuing obstetrical care. A thorough physical should be performed and a complete history taken. Special attention should be given to a chronological listing of all previous pregnancies and include length of gestation, fetal weight, route of delivery, and any maternal or fetal complications. Past obstetrical performance is the single most important historical fact that may predict potential problems during the current pregnancy. The date and character of the last two menstrual periods should be included at this time. Particular attention should be given to the funduscopic exam, thyroid, heart, lungs, breasts, fundal height, and to the presence or absence of fetal heart tones.

Routine laboratory work which should be performed on all pregnant patients is listed below:

1. CBC
2. Urine culture
3. Uralysis
4. VDRL
5. Blood type and Rh titers
6. Atypical blood group antibodies
7. Pap smear
8. Gonococcal culture
9. Rubella titers
10. Two-hour postprandial blood sugar

Additional laboratory work may be needed in selected cases depending on the patient’s history and physical findings. The more common additional studies to evaluate patients with hypertension or chronic renal disease include a SMA 12, SMA 6, and a 24-hour urine collection for protein and creatinine clearance. Diabetic patients will need blood sugar determinations and an ophthalmology consultation in addition to the tests for renal evaluation. Supplemental tests such as thyroid function tests, parathyroid function tests, and liver function tests should be obtained on those patients where historical or physical data suggest possible problems. The CBC, urine culture, and the two-hour postprandial blood sugar should be repeated at 32 weeks gestation because of the complications associated with undiagnosed anemia, pyelonephritis, and diabetes in the third trimester. In routine uncomplicated pregnancies no additional laboratory tests need be repeated. Atypical antibodies may develop in patients who become sensitized to various blood group antigens and many of these atypical antibodies can cause erythroblastosis and intrauterine fetal death. These patients need to be treated in a fashion similar to an Rh negative sensitized patient. The blood bank should provide information concerning which of the atypical antibodies are possible causes of erythroblastosis. Rubella titers should be included in all pregnant women; patients with positive rubella titers can be reassured that rubella will not be a problem during the course of pregnancy. Patients with negative rubella titers may be vaccinated in the postpartum period. If the two-hour postprandial blood sugar is greater than 120 mg/dL, a glucose tolerance test (GTT) should be performed to rule out gestational diabetes. Since the demand for insulin increases with gestation a second two-hour postprandial blood sugar or GTT should be performed at 32 weeks.

The frequency of subsequent office visits must be determined according to the needs of the patient as should the need for additional laboratory work and possible antenatal hospitalization.

Regardless of the patient’s high risk classification the objectives of prenatal management remain the same and include evaluation of the maternal condition, fetal condition, and gestational age. These must be considered on each prenatal visit. Although the number of additional visits, consultations and laboratory work necessary for proper evaluation should be individualized there are certain management techniques that apply to all patients in the first, second and third trimesters of pregnancy.

**First Trimester**

Maternal condition should be evaluated with a history and physical examination, routine
laboratory work, and selected laboratory work and procedures, when indicated, to establish a baseline medical status during the first trimester.

Fetal condition is difficult to assess in the first trimester and very little can be done to alter the course of pregnancy at this stage of gestation. Progressive fundal growth should be routinely documented as a means of assessing fetal condition. If uterine growth is abnormal or vaginal bleeding should ensue, ultrasonic evidence of a normal or abnormal gestation sac or fetus will provide prognostic data. This may lead to earlier intervention in cases of obvious pregnancy loss.

Gestational age must be accurately assessed during the first and second trimesters of pregnancy. The difficulty in accurately assessing gestational age in the third trimester is well known. The date, duration and character of the last menstrual period (LMP) should be clearly recorded in the chart. Additional information regarding the regularity of the patient’s menstrual cycle and her most recent means of birth control should be documented. Uterine size during the first trimester of pregnancy is also useful in determining gestational age.

Second Trimester

Maternal condition should be evaluated routinely with blood pressure determination, maternal weight gain, and urinalysis for protein, glucose and acetone. The frequency of visits and the need for additional lab work and possible hospitalization must be determined at this time. The minimum interval between office visits for patients with otherwise uncomplicated pregnancies should be every four weeks.

Although very little can be done to alter the course of pregnancy at this stage of gestation, fetal condition can still be evaluated by monitoring progressive fundal growth and the development of fetal movement. Should problems arise, many of the more serious fetal conditions can be evaluated with a careful ultrasound examination.

The second trimester of pregnancy contains many gestational landmarks that are important in determining gestational age for future management. The appearance of the first fetal heart tones heard with an unamplified fetoscope is a reliable means of determining gestational age; these should be heard at 20 weeks, plus or minus 1 week, in the majority of pregnancies. From 17 weeks on patients should be seen weekly until fetal heart tones have been heard with the unamplified fetoscope. In addition, a patient should also be asked to mark the date when she first feels fetal movement. If towards the end of pregnancy fetal movement has been present for more than 22 weeks and fetal heart tones have been present for 20 weeks, the patient has a 95% chance of being at least 39 to 40 weeks pregnant. Fundal height should be recorded as accurately as possible in the second trimester of pregnancy because of the narrow range of standard deviation in uterine size that occurs at this time. The large difference in uterine sizes that occurs with infants who are small, average or large for their gestational age does not usually occur until the third trimester of pregnancy. If fetal gestational age can not be reliably determined, an ultrasound study for biparietal diameter should be obtained.

Third Trimester

The mother and fetus both require increased surveillance during this period of gestation as numerous complications may arise in previously normal pregnancies. Early recognition and proper intervention will decrease the perinatal morbidity and mortality associated with many of these developing problems.

Maternal condition should be evaluated every two weeks during the third trimester and every week during the last month. Closer observation may be required in selected patients. Maternal condition should be evaluated with routine blood pressure, urinalysis, and weight gain observation. Routine laboratory work which should be repeated early in the third trimester of pregnancy includes a CBC, a two-hour postprandial blood sugar, and a urine culture. More frequent evaluation of renal function tests, blood sugars and additional laboratory work will be necessary in selected patients.

Evaluation of fetal condition during the third trimester of pregnancy has become a major part of antepartum fetal management. Both biophysical and biochemical means of fetal monitoring are available. At the present time, the only useful biochemical test for evaluating fetal well-being is urinary or serum estriols. However, if estriols are to be used to predict fetal compromise, specimens must be collected daily and the results must be available to the
physician within 12 hours. An isolated or weekly estriol value should not be used to monitor fetal well-being in complicated pregnancies.

The biophysical tests of fetal well-being include nonstressed fetal heart rate monitoring (NST) and an oxytocin challenge test (OCT). The decision as to when to start antenatal fetal heart rate monitoring should be based on the individual patient and the clinical situation. Monitoring may be indicated as early as 26 to 28 weeks of gestation in patients with advanced hypertension or diabetes, or delayed until 42 weeks in a previously uncomplicated post-term pregnancy. In general, antepartum fetal heart rate monitoring should not be performed prior to the time in gestation when the physician would consider terminating a pregnancy because of fetal indications. There are limited data available on the use of antepartum monitoring prior to 30 weeks of gestation.

Indications for antepartum fetal heart rate monitoring are any pregnancy at risk for uteroplacental insufficiency. There are no contraindications to the NST. The oxytocin challenge test is associated with the following contraindications: ruptured membranes, suspected abruptio placenta, undiagnosed uterine bleeding, placenta previa, previous cesarean section, incompetent cervix, previous premature labor and polyhydramnios. In addition, the OCT has not been shown to be of value in the management of erythroblastosis fetalis. In general, negative OCT or reactive NST allows the clinician to avoid unnecessary premature intervention and has a false-positive rate (fetal death in 1 week of monitoring) of 2 to 5 per 1000. A nonreactive NST or a positive OCT alerts the physician to possible fetal compromise and may be an indication for intervention before fetal death or irreversible damage occurs.

The NST has been shown to be as reliable as the OCT. Because of the reliability and simplicity of the NST, this monitoring technique has become the primary means of antenatal fetal monitoring here at the Medical College of Virginia. An outline of procedure for patient care is listed below.

1. The "at-risk" patient is identified using clinical risk assessment and scoring techniques at the first antenatal visit and as problems develop during gestation.

2. Based on the clinical situation the NST may be started as early as 28 weeks.

3. The patient is followed with weekly NSTs, as long as she remains reactive.

4. Any inadequate NST is repeated within 24 hours. Any nonreactive NST is evaluated the same day with an oxytocin challenge test.

5. If the OCT is negative, the patient is scheduled to have a NST the next week.

6. A suspicious, hyperstimulation, or unsatisfactory OCT is repeated within 24 hours.

7. Urinary or serum estriols may be obtained for additional information, depending on the clinical situation, and must be collected daily to be useful.

8. If a nonreactive NST is followed by a positive OCT, serious consideration must be given to delivering the fetus. At this time, amniocentesis may be performed and if the amniotic fluid indicates fetal maturity, or meconium-stained fluid is found, the fetus should be delivered.

9. If the amniotic fluid is clear and there is evidence of fetal pulmonary immaturity, a decision is made based on which risk is greater, prematurity or the intrauterine environment.

10. In the face of low or falling estriols, with a nonreactive NST and/or a positive OCT, we at MCV recommend delivering the fetus if it is viable.

11. If the estriols are stable and in the normal range, with a nonreactive NST or a positive OCT, the situation is ambiguous. A decision to await further maturation or to deliver the patient may be appropriate. Clinical judgment based on the overall assessment of the maternal status, pregnancy duration, and the condition of the fetus is required.

Determination of gestational age in the third trimester of pregnancy is indeed difficult. Ultrasound provides information about fetal size but does not differentiate between the small premature infant and the standard gestational
age term infant. To predict gestational age reliably, information from the first and second trimesters must be available. During the third trimester of pregnancy the emphasis shifts from gestational age to determination of fetal maturity. Without adequate clinical data concerning gestational age or when premature interruption of pregnancy is being considered prior to 39 weeks, I advocate amniocentesis for a lecithin-sphingomyelin (L/S) ratio.

Summary

Recognition of those patients at risk for a poor perinatal outcome is the most important step in reducing perinatal morbidity and mortality. Once at-risk patients are recognized, intensive observation with frequent assessments of maternal condition, fetal condition, and gestational age can be accomplished with minimal additional physician time and laboratory tests. The decision of when or when not to intervene in a pregnancy is not an easy one and should be based on all available data, an important part of which is information collected during the first and second trimester of pregnancy. Regional perinatal consultation services should be used more frequently for patients with management problems. Developing problems should be treated aggressively with antepartum hospitalization, intensive observation and evaluation, and consultation. Proper assessment of maternal condition, fetal condition, and gestational age will prevent many of the more serious complications and may allow the patient to remain in her own community under the direct care of her local physician. If, however, the patient requires a level of care that cannot be provided in her own community, she should be transferred to a regional perinatal center without hesitation.

REFERENCES


Relaxation of the Supporting Structures of the Female Pelvis

DAVID H. NICHOLS, M.D.
Professor of Obstetrics and Gynecology, School of Medicine, State University of New York at Buffalo, Buffalo, New York, and Head of the Department of Obstetrics and Gynecology, Buffalo General Hospital, Buffalo, New York

The purpose of this discussion is to share with you some thoughts about pelvic relaxation, its mysteries, some technical minutiae helpful in identifying them and some of the surgical problems involved. Thus, by looking at a number of these diagnostic challenges, you may be stimulated to some diagnostic thinking in an office setting.

Let me start with a few of the more deceptively simple challenges in pelvic relaxation, the goals we seek to achieve, and how to accomplish them.

We have seen within my generation a re-examination of sexual thinking whereby aging persons presume to continue a reasonably comfortable and satisfactory coital relationship well into their senior years. Solving a problem of procidentia or vaginal vault inversion by closing the vagina by LeFort colpocleisis or removing it by colpectomy is no longer a solution equally acceptable to all concerned. If we are going to consider a surgical approach to reconstruction and rebuild for someone a vagina that is both physiologically and sexually useful, we must have some idea of the purpose and benefits we hope to achieve by reconstruction.

Consider, for example, the old illustration from Cross-sectional Anatomy by Eycleshymer and Shoemaker (Fig 1), and notice that the vagina in this instance has an almost vertical axis. Is that then the goal we seek when we reposition a misplaced vagina? Or is the vagina being displaced anteriorly by a full rectum, which was full at the time of death, as this illustration obviously was from a cadaver dissection?

To resolve the issue, the vaginas of nulliparous young women can be lightly painted with a barium paste. This would not distort the vagina but would render it radio-opaque. Lateral colpograms taken of these women demonstrate that the vagina does have an S-shaped curve with a horizontal inclination to the axis of the upper vagina (Fig 2). If we were to ask these nulliparous patients to bear down, as by a Valsalva maneuver, this upper axis would become even more horizontal (Fig 3).

We can confirm this for ourselves daily in the office during vaginal examination of a nulliparous patient by letting the examining fingers follow the axis of the vagina. Usually the fingertips will end up in the hollow of the sacrum.

The usual upper horizontal vaginal axis is clinically significant and I will now discuss how this axis can be destroyed or changed and some of the surgery that can be done to restore it. The vagina in this situation rests on the generally empty rectum. The only time the rectum is filled is in the patient with a large rectocele, or in someone during the act of defecation, or in someone recently deceased. The empty rectum in turn "sits" on the levator ani. The portion of the levator ani behind the rectum upon which it rests is called the levator plate. It is formed from
the fusion of the two halves of the pubococcygeal muscle posterior to the rectum (Fig 4).

How many different anatomic entities or "systems" are there concerned with keeping the vagina inside the body? It is really an invagination, and it is unlikely that without help it would remain one. Invagination has many conceptual similarities to the finger of an in-turned rubber glove; by putting air into the glove and squeezing an in-turned finger promptly pops out. Why then does the vagina not "pop out" or evert more frequently than it does? What are the systems that affected, damaged, or missing parts can influence? Why is the birth canal where it is?

There are actually at least six responsible but independent systems that influence invagination. The first is the bony pelvis to which most of the soft tissues of the pelvis are ultimately attached. If there is a defect in the bony pelvis, for example, a congenital defect coincident with extrophy of the bladder, the mid-portion of the pubis may be missing in which case the rectus muscles and pubococcygeal muscles have a defective attachment influencing greatly the architecture of the anchoring supports of the vagina.

Second among the six systems is the round and broad ligament complex; third, the cardinal-uterosacral ligament complex; fourth, the pelvic diaphragm; fifth, the urogenital diaphragm; and sixth, the perineum and the perineal body. Let us examine these in some detail to see why they influence pelvic support.

We know, for example, that the round and broad ligament complex often influences pelvic support in a negative way. If the broad ligaments have been involved with either endometriosis or ligneous fibrosis as a result of previous infection, or sometimes by cancer, what would appear to be an easy vaginal hysterectomy isn’t easy at all. The uterus is arrested in its descent by pathologic fixation from the broad ligament. Certainly the role of the round ligaments as attributed to retro displacement of the uterus is always up for constant reexamination, particularly...
Fig 2—A normal vaginal depth and axis. The vaginal walls of a 25-year-old, healthy nulligravida have been painted with barium. The perineal curve of the lower vagina is shown along with a more horizontal axis of the upper vagina.
Fig 3—The same patient is straining as by a Valsalva maneuver which accentuates the horizontal axis of the upper vagina.
Levator plate

Fig 4—Drawing of normal vaginal axis of the living showing almost horizontal upper vagina and rectum lying on and parallel to the levator plate.

in view of Blue Shield’s national decision to exclude suspension operations from those authorized for payment. I do not believe that retroversion causes uterine prolapse, but that in many instances the same qualities that lead to retroversion may also lead to the development of genital prolapse. These conditions may be separate results of common etiologic circumstances. The significance of this observation is that suspension of a retroverted uterus does not of itself prevent subsequent prolapse.

We consider the cardinal ligaments together with the uterosacral ligaments as a single anatomicosurgical suspensory unit: the cardinal-uterosacral ligament complex.

The pelvic diaphragm consists of the levator ani and its fascial covering, the medial portion of the levator ani. The pubococcygeal muscles fuse behind the rectum, constituting the levator plate which is so important in pelvic support. The normally horizontal axis of this plate will sag if the diaphragm has lost its integrity. Not only will the hiatus or the distance between the anterior margin of the levator plate and the pubis increase, but the greater the sagging the greater the tendency for anything that rests on top of this levator plate to slide over and down, accentuated by the pull of gravity (Fig 5).

The urogenital diaphragm is a sort of sandwich between the two pubic rami. It is penetrated by the urethra and vagina, and also helps to support the urethra. The pubourethral ligamentous support of the urethra is, in fact, continuous with and part of the urogenital diaphragm, and has much clinical significance. Obstetrically, the posterior portion of this ligament is the one most likely to be damaged. Pathologic stretching may cause rotational descent of the bladder neck predisposing to stress incontinence.

There is a big difference in the perineal body between persons. Defect of the perineal body may be inherited, and occasionally a perineal body will be missing even in nulliparous
women. A defective perineal body is sometimes confused with a rectocele, and if congenital in origin, is usually asymptomatic unless there is a total absence of the perineum, in which case the patient is said to have a so-called "double-barrelled shotgun" type of vagina, and the vaginal canal is often contaminated by rectal soiling; such a patient has a virtual cloaca. The urethra essentially lies upon the perineal body; in instances in which a urethral repair has been done and a perineal defect is evident, correction of the perineal defect is complimentary to the support of the urethra and anterior vaginal wall.

The combinations of damage to the six different anatomic systems responsible for pelvic support that can be produced indicate why there is no one standard surgical procedure, for example, vaginal hysterectomy and repair or the Manchester procedure, that will solve all combinations of problems equally well.

There can be permanent elongation and stretching of the cardinal and uterosacral ligament complex permitting descent of the upper vagina but without any particular cystocele or rectocele. This may be acquired and is often quite significant. The process may be set in motion in someone who has had the misfortune of

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Fig 5—As the levator plate tips, the genital hiatus becomes larger as shown. In addition, the pull of gravity and the forces of intra-abdominal pressure accentuate the strain upon pelvic suspensory system.
being told to bear down during labor prior to full dilation of the cervix, and in so doing has pushed the cervix in front of the presenting part of the fetus. Many times that advice to bear down prior to full dilation has been accepted by the patient as a hopeful, though false and unknowingly dangerous means of shortening labor. It has often done intractable and permanent damage to the supports of the vagina.

In another situation, failure to perform an episiotomy in someone in whom vaginal elasticity is defective may result in a cystocele and rectocele, even in a patient who did not bear down prior to full dilation of the cervix. We are in an era where there are some young women who don’t want an episiotomy and who are questioning circumcision, as well as the need for hospital delivery even if operative intervention of any kind in the conduct of their labor is indicated. We can rest assured that some can get by without episiotomy, but many can not without sustaining serious damage. How can one tell the difference? Probably the most important single point is separating the care of those who have elasticity of the vagina and perineum from those who do not.

The so-called older primapara, the patient over 35, generally has reduced elasticity of the vagina and particularly the lower portion and the perineum. One can also distinguish the patient with poor elastic tissue by the presence of striae on the sides of the abdomen. The patient with many abdominal or breast striae is usually an obvious candidate for episiotomy if excessive vaginal damage is to be prevented. Episiotomy must be performed at a proper time; not just to prevent a tear, but before irreparable damage has been done to the soft tissues. Lastly, an episiotomy must be properly repaired with the goal of reuniting structures which were transected by episiotomy, and not simply just stopping the bleeding and putting the skin together.

Anterior colporrhaphy is not so simple as it would appear from the three or four pages given in the average surgical text, so let us look at some of the reasons why.

A typical conception of cystocele shows some pathologic stretching of the bladder that displaces the vagina downward. Are the symptoms that may be produced so predictable that reconstruction is always simple? The relationship between the bladder, the urethra and the posterior surface of the pubis has much clinical significance with or without a coincident cystocele.

Consider some of the various alterations that an anterior vaginal wall can undergo. Many years ago a characteristic descent of the base of the bladder during the act of voiding was emphasized so that the vesicourethral junction may be represented as a straight line. While this is physiologic during the act of voiding, it is not to a patient at rest who is not voiding; thus, when this flattening is apparent in someone who is not voiding, it indicates rotational descent or “wheeling” of the vesicourethral junction with elongation of the supporting tissues concerned with holding the urethra in its normal position. Such an altered relationship may be a significant factor in the production of stress incontinence as the vesicourethral junction may now be the lowest portion of the hydrostatic column of water. We know that incontinence may result from an abnormal relationship between intraurethral pressure and intravesical pressure as a function of urethral tone and not solely from positioning of the vesicourethral junction. A cystocele may or may not coexist. The anterior vaginal wall may thus bring down with it the base and neck of the bladder, but not the bladder proper; this is not a cystocele in the usual sense. Sometimes rotational descent of the bladder neck has been called “urethrocele,” and one will find many references to this fallacy in the literature, but a true urethrocele is a pathologic dilatation of the urethra and is very rare. I think in my whole operative experience I’ve seen but three or four true urethroceles. Some of these people with a true urethrocele are perfectly continent. Rotational descent of the bladder neck is also sometimes called “pseudocystocele.”

In addition, there may be funneling of the urethra. If the urethra is tunneled in addition to the rotational descent of the bladder neck, a yet different set of statistics prevails, whereby the bottom of the hydrostatic column of urine normally located at the base of the bladder is now located at the base of the funnel, thus reducing intraurethral tone and pressure and increasing the susceptibility to stress urinary incontinence.

If a patient has a cystocele serious enough to require anterior colporrhaphy, the operator should probably repair the full length of
the vagina and make sure that the vesical neck is adequately supported and that the cystocele is not repaired with more tissue than required, thus risking the development of iatrogenic stress incontinence from unwitting flattening of the posterior urethrovesical angle. Neither should a cystocele be repaired with less tissue than required. The vagina should be precisely trimmed to a size suitable to the particular needs of the patient.

A perineal defect with a rectocele is a factor in the defective support of the urethra. If the urethra and anterior vagina rest on nothing of substance, any operation that has been done to them will tend to have less mechanical support than if the anterior vaginal wall rests on something of strength. Rectoceles come in various sizes and shapes within the pelvis; some produce symptoms and some do not. It is difficult to improve a patient’s comfort by surgical correction of something that is asymptomatic and a surgeon would not normally operate on a rectocele or cystocele if it were producing no symptoms distressing to the patient and if the repair were not part of additional pelvic surgery. But if a vaginal hysterectomy were performed because of menorrhagia, prolapse, fibroid or something of that nature on a woman who has a coincident cystocele and rectocele, certainly the cystocele and rectocele ought to be repaired at the same time.

Let us now briefly consider enterocele. It is sometimes described simply as a peritoneal hernia. Sometimes symptoms are produced, sometimes not. Symptoms associated with an enterocele are caused by gravity-induced traction upon the contents of the sac: small bowel or omentum. If the sac is in fact empty, the patient will be relatively asymptomatic. But the sac is a potential site for further distress and should be removed if surgery is being performed on other parts of the pelvis.

Consider the difference in the relationship between the cul-de-sac and the vagina in the congenital type of enterocele versus pseudo-enterocele. The latter may be seen in a person in whom a high rectocele was treated by perineorrhaphy alone. Perhaps the doctor was not aware how high this rectocele extended because with the patient asleep and in the lithotomy position it is sometimes difficult to judge how it looks when the patient is standing. Failure to repair the full length of the rectocele gives rise to this condition which resembles an enterocele but isn’t and is usually symptomatic, the symptom being inability to completely empty the bowel. The sac, which is unrepaired rectocele, fills with fecal material, and the patient cannot evacuate it except by digital pressure in the vagina. A simple maneuver distinguishes enterocele from high or midvaginal rectocele or dropped cul-de-sac which is a function of support of the vault of the vagina. Because enterocele is most evident when the patient is standing, she should be examined in that position: index finger in the rectum, thumb in the apex of the fully replaced vagina and the patient asked to bear down. If enterocele is present, the physician can feel it fill with either small intestine or omentum. When gently squeezed between the thumb and forefinger, discomfort is evident. In that way the physician can distinguish preoperatively between enterocele, which is a sliding hernia, and descent of the cul-de-sac in someone in whom the vagina has dropped.

Failure to recognize and treat variances by appropriate surgery usually leads to postoperative disability.

One of the different approaches to the problem of massive eversion of the vagina has been ventral suspension or fixation of the everted vagina. Sometimes it is successful, but the 90 degree change in the usual axis of the vagina imposes a risk that would otherwise not be present. Pulling the vagina forward without obliterating the cul-de-sac has made the latter vulnerable to enterocele; a future enterocele that might not have been there had the cul-de-sac been obliterated. This risk is also present following some other surgical procedures that may change the axis of the vagina, if no attempt has been made to obliterate the cul-de-sac. For example, unless the peritoneum is opened and the cul-de-sac deliberately obliterated, the Marshall-Marchetti retropubic pin-up type of operation will be followed by a significant incidence of subsequent enterocele requiring a second operation.

A transabdominal approach to eversion of the vagina with the aim of restoring a sexually useful vagina is sacropexy. Affixing the vault of the vagina to the hollow of the sacrum has an advantage over ventral suspension in that the
normal vaginal axis is restored and the cul-de-sac is no longer vulnerable.

We have considered a variety of different kinds of damage to the supports of the pelvis. Let us consider the causes of damage.

1. Congenital defect: not only a missing or underdeveloped tissue or organ but a defective innervation. Striated muscle deprived of an adequate nerve supply may be hypotonic.

2. Increased intra-abdominal pressure: An obese woman may wear a girdle that is too tight, maybe she is doing heavy work; or there is the older woman in a situation where a loved one, sometimes a parent, has become disabled by a stroke. That disabled patient must be manually lifted in and out of the bed, in and out of the bathtub, on and off the commode, producing a massive increase in the intra-abdominal pressure of the person doing the lifting. Often there is no one else to do the lifting, but we see the consequences of that damage.

3. Obstetric damage: Obstetric damage can be caused in a number of different ways. In the 1940s we participated in problems of home delivery, usually among the poor in the large cities, as part of the home delivery service. Delivery was conducted reasonably comfortably, but the consequences of soft tissue damage during labor were sometimes greater than would have been seen in the hospital. Now there is some revival of interest in nonsupervised obstetric performance. Women are delivering one another, and there may be a significant return of some of these problems of genital prolapse that have not been so common recently. Obstetric damage, even if in a hospital, is often related to the conduct of labor. We are considering the supports of the urethra. Remember the damage they can sustain. There are at least six different combinations of damage to the anterior vaginal wall. If the baby's head is very closely applied to the undersurface of the pubic arch during labor, it may damage these tissues in contrast to circumstances in which, because of either a larger fetal head or a narrow arch, the baby's head is pushed away from these tissues beneath the urethra (Fig 6). Two more types of damage to the vagina, and secondary damage to the bladder, have to do with the conduct of labor. In the first instance, the vagina has been damaged from within out. An "explosion" type of damage has occurred in which the vaginal wall has been stretched beyond its limits of elasticity—much like a piece of crepe paper that has been stretched and at a certain point loses its elasticity and is permanently stretched out of shape. In contrast...
is a circumstance in which the labor patient has been told or has found herself bearing down prior to full dilatation of the cervix and pushes the cervix in front of the baby, overstretching the cardinal and uterosacral connective tissue supports of the cervix. Even when the cervix is fully dilated, the vagina may fail to dilate and the patient may push the vagina in front of the baby, almost like a doughnut, stretching the vagina itself in addition to stretching the supports, accounting for some of the combination damage. So our old friend the cystocele is not quite so simple as it appears on the surface. If one adds the distention cystocele, the one produced by overstretched, and the one from displacement to those six kinds of damage previously alluded to, there are now eight types.

With displacement cystocele, the vaginal wall may not have been stretched out of shape, but it is in the wrong place. There are reasonably good rugal folds in each vaginal wall. This patient requires major attention to restoration of the supports of the cervix and the vagina and less attention to reconstruction of the anterior vaginal wall itself. With displacement cystocele, the bladder has been pulled down from its normal position by the prolapsed uterus and by its attachment to the cervix.

The goal of most surgery for urinary stress incontinence includes elevation of the vesico-urethral junction to a point where it is once again within the abdomen and, therefore, presumably responsive along with the bladder to changes in intra-abdominal pressure.

The symptoms of genital prolapse are those of pelvic heaviness, backache, vaginal mass, dyspareunia and disorders of function primarily related to coitus or inability to empty the bladder or rectum. The patient may have to manually elevate the bladder in order to empty it or make digital pressure within the vagina to overcome inability to empty the rectum. When these symptoms are sufficiently disabling, or if they are progressive, the patient should indeed be treated.

The treatment includes different kinds of prophylaxis. If the patient is a heavy smoker with emphysema, asthma, or chronic bronchitis, successfully getting her to stop smoking will lessen the insults placed on the supporting tissues by coughing. If the patient is too fat, she should lose some weight. If she’s wearing a girdle that is too tight, she should stop wearing it and either lose the weight or buy a larger garment. If she is working at an occupation that requires heavy lifting, for example, a dipper in a bumper replating factory, or someone in nursing who is required to lift patients and is developing a genital prolapse, she should try another occupation. The pessary isn’t used very much anymore, although it is frequently used temporarily to replace the dropped tissues in someone awaiting surgery. Inserted and left as a definitive treatment, a patient will be temporarily comfortable enough that she may postpone surgery until a time when she is much older and unable to respond to the stress of surgery as smoothly as when younger. Pubococcygeal perineal resistive exercises and voluntary contraction of the pubococcygeal muscles, the Kegel exercises, are certainly helpful in relieving many of the symptoms. They must be done often enough: 20 contractions in a row, three seconds each, six times a day, for at least three months. Advise the patient that she can do them while in public, as the contractions can’t be seen. The physician can usually perceive the patient’s pubococcygeal strength by putting one finger in her vagina and asking her to squeeze her vagina shut. One can feel whether her pubococcygeal muscles are strong, and if they are not, estrogen replacement supplemental to surgery will improve healing qualities and tissue strength.

We have considered many aspects of genital prolapse including the clinical anatomy, sites of damage, causes and prevention of genital prolapse and a variety of treatments. Most can be readily recognized if we but take the time to look for them.

Figure 1 is reproduced with permission from Carter, et al, Cross-Sectional Anatomy: Computed Tomography and Ultrasound Correlation, New York, Appleton-Century-Crofts, 1977.

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Menstrual Abnormalities

LEO J. DUNN, M.D.

Chairman, Department of Obstetrics and Gynecology, Medical College of Virginia, Health Sciences Division of Virginia Commonwealth University, Richmond, Virginia

Any physician involved in primary care will encounter patients with menstrual dysfunction. Mismanagement of this disorder is not usually the result of its complexity but rather the lack of an orderly approach. In unusual circumstances one may encounter a patient with a menstrual disorder of sufficient complexity to require referral. This decision should be based on a work-up indicating such a need rather than frustration after unsuccessful empiric therapeutic trials.

The age of the patient is an important consideration for evaluation; the three main categories are the adolescent, reproductive, and climacteric age groups.

Adolescent menstrual disorders are generally the concerns of "too early," "too late," or "too much." Menarche, or the first period, is expected to occur by age 13. "Too early" would be prior to age 9 and "too late" would be after 16.5 years of age. Those who have menarche "too early" usually prove to be individuals who have undergone the normal sequential events of puberty and have cyclic hypothalamic and ovarian function. Only one out of ten of these individuals will have any serious disorder such as brain tumor, residual damage after meningitis, or Albright disease. If menstruation has occurred but cyclic function is absent and ovulation does not take place, then a search for a source of estrogen must be made, the two most common sources being exogenous estrogen that has been ingested or endogenous estrogen from a theca-granulosa cell tumor of the ovary.

Therefore, the first effort is to determine if the patient's condition reflects a full, orderly, pubertal change or whether it represents only the effect of estrogenic stimulation. If it appears to be true puberty, an intracranial lesion must then be ruled out. If it appears to be pseudo-precocious puberty from estrogen stimulation with only menstrual bleeding, skeletal growth and breast stimulation, then a source from the environment or the ovaries must be sought.

About 95% of women will have had their first menses by age 16.5 years and 99% by age 18. A detailed history and thorough physical examination will give a number of diagnostic clues to a physician confronted with a patient who has not yet menstruated. Although it cannot be precisely predicted, there is a relatively orderly sequence of events that occurs with puberty. The gradual elevation of estrogens is reflected in the early development of the breasts, and about one year later, the rapid increase in the rate of skeletal growth. The adrenal changes resulting in higher levels of circulating androgens influence the growth of axillary and pubic hair. The onset of the first period can be expected within about 18 months of the rapid growth spurt. Therefore, the history and physical examination will give an indication at about what level the problem exists. These patients may present in a number of ways.

First, let us take a 17-year-old female who has not menstruated and who has no secondary sexual characteristics. We know immediately that there are no significant amounts of estro-
gen being made in that individual and must de-
terminate whether the gonads are at fault or if the
disorder is central. A determination of follicle-
stimulating hormone (FSH) and luteinizing hor-
mone (LH) from plasma will divide these pa-
tients into two groups. If the gonadotropins are
elevated, we know that we are dealing with pri-
mary gonadal failure and must obtain genetic
studies by karyotyping. The usual abnormal kar-
yotypes found are 45X, 46 abnormal X, 46XX, and
mosaics. If the gonadotropins are low, we
are dealing with a central defect. The availability
of gonadotropin-releasing hormone will allow
the identification of those who have a hypotha-
lamic dysfunction from those with an anterior pi-
tuitary dysfunction but this hormone is not now
generally available. At present, the method of
management for all of these cases will be estro-
gen/progestin substitution therapy.

Second, we consider a 17-year-old with
primary amenorrhea who by history had breast
development beginning at age 11, a growth
spurt evident by age 12, and normal axillary
and pubic hair. We would know that her gonads
had been producing sex steroids for several
years and that the hypothalamus and pituitary
must be functioning. Physical examination
would be expected to reveal some abnormality.
An obstruction to the menstrual flow such as im-
perforate hymen might lead to a direct and
simple solution to the problem. Absence of the
uterus or vagina (or some combination thereof)
requires further evaluation. At this point some
physicians use a buccal smear, others a testos-
terone determination, in order to identify the pa-
tients with testicular feminization syndrome. If
the findings are positive for this diagnosis, then
gonadal removal is indicated after completion of
pubertal changes because of the risk of malign-
nancy. Gender identity for this person has al-
ways been female and this should not be dis-
rupted by informing the patient about the details
of the condition. If a normal testosterone level or
positive buccal smear is indicative of a genetic
female, then surgical vaginoplasty may be nec-
-essary, but gonadal removal is not necessary
since a Y chromosome is absent.

Third, we may be faced with a 17-year-old
female with a normal history of puberty, normal
secondary sexual characteristics, and both va-

Fig. 1: Evaluation and management of adolescents with menstrual abnormalities
FREQUENT, HEAVY, OR IRREGULAR PERIODS

Endometrial Sampling

- Proliferative Endometrium
- Simple Hyperplasia
- Adenomatous or Atypical Hyperplasia
- Carcinoma

Cyclic Progesterone
Estrogen/Progestin

Fig. 2: Evaluation and management of menstrual abnormality during climacteric

The adolescent with "too much" bleeding, who is otherwise normal, is most likely experiencing anovulatory cycles. The diethylstilbestrol (DES) problem has made it important that visualization of the vagina and cervix be carried out. However, it is not necessary to biopsy or curette the endometrium of these individuals except under unusual circumstances. Management is usually by the administration of oral contraceptives to control the cycles, and oral iron to replenish its loss.

During the reproductive age a variety of menstrual disorders may be found also. For those women whose menstrual function has ceased (secondary amenorrhea) we can follow the course of evaluation previously outlined for the anatomically and genetically normal adolescent. For all other disturbances of the cycles, where bleeding is not of sufficient magnitude as to create an urgent problem, it is necessary to rule out pregnancy and to determine whether or not ovulation is occurring. If the patient has excessive menstrual flow or intermenstrual bleeding with good evidence of ovulation (by basal body temperature, progesterone assay or endometrial biopsy) then coagulation disorders should be ruled out and dilatation and curettage performed. If anovulation is demonstrated, endometrial sampling is prudent for those women at the end of the reproductive scale to rule out abnormal hyperplasia or the rare carcinoma. In general, however, these patients can be treated by either combined oral contraceptives in a cyclic manner or by one week of oral progestin each month. When anovulation occurs it is important to recognize that there is a wide variety of emotional, endocrine and general health disturbances that may interfere with the menstrual cycle. Therefore, evaluation of the patient must be general and thorough in order that symptoms and signs of other disorders may be found.

Menstrual change in the climacteric is expected as anovulation becomes more frequent and ovarian function progressively declines. However, some patients will experience excessive bleeding and/or unpredictable frequent episodes of bleeding. The possibility of pregnancy still exists in this age group and must be considered. However, the most important requirement for these women is the sampling of the endometrium. Subsequent management depends upon the pathologist's findings and is outlined in Figure 2.

In summary, control of menstrual function is a very complex system that is highly integrated and subject to a number of types of malfunction from both within and without. Identification of the majority of menstrual disorders is within the reach of physicians responsible for primary care but requires a thoughtful, organized approach. Inability to reach a satisfactory diagnosis or lack of response by the patient to established methods of therapy indicate the need for more intensive evaluation.
The World Health Organization reported that 40% of the pregnancies in the world in 1977 were unplanned and 20% were unwanted; in the United States in 1978 there were 1,300,000 teenage pregnancies, of which one million ended in abortions. To prevent these unwanted pregnancies and also to abolish the cost in terms of money, time and lives, contraception is very important. Contraception is as old as the human race. In ancient times Chinese women swallowed live tadpoles three days after their menses for this purpose. North African women mixed gunpowder solution and foam from a camel’s mouth and drank the resulting potion. Egyptian women inserted pessaries made of crocodile dung to achieve contraception. Greek women in the second century made a vaginal plug that contained oil, honey, cedar gum and fig pulp; others ate the uterus of female mules. As recently as the 17th century, European brides were instructed to sit on their fingers while riding in coaches or to place roasted walnuts in their bosoms, one for every barren year desired. Obviously, an unwanted child was of as much concern to the ancients as it is to modern women.

These are the characteristics of an ideal contraceptive:
1. 100% effective
2. Safe with no side effects
3. Simple to use
4. Inexpensive
5. Removed from the act of intercourse
6. Completely reversible
7. Easily available

There are two types of effectiveness—
thoretical effectiveness and use effectiveness.
Use effectiveness is invariably found to be lower
than theoretical effectiveness.

The varieties of contraceptive methods available are:
1. Chance
2. Douching
3. The rhythm method
4. Use of spermicides
5. Condoms
6. Diaphragms
7. Condoms and spermicides or diaphragm and spermicides
8. Oral contraceptives, which can be a combined oral contraceptive or progestin-only (minipill)
9. Injectable contraceptives
10. Intrauterine contraceptives
11. Male sterilization
12. Female sterilization

Of these, chance and douching have the lowest rate of effectiveness, and the rhythm method, or the so called "safe period," supposedly one week before and one week after the first day of menses, should not be considered as particularly safe.

Condoms

Condoms have been in use since the 17th century both to prevent venereal disease and to avoid impregnating women. Today, in the United States, 700 to 800 million condoms are produced annually. Condoms may be a prob-
lem for men with borderline impotence or those who cannot maintain an erection for some time. The earlier objections to the use of condoms, such as decrease in thermal and/or tactile sensitivity have been overcome by the manufacture of condoms made of very thin but strong material. In Japan, the most commonly used contraceptive agent is the condom. Recently, the International Planned Parenthood Federation has reported that condoms and spermicides used in conjunction by motivated people are as effective as oral contraceptives. Those concerned about the use of oral contraceptives and their complications or the complications of intrauterine devices, can use condoms and spermicides. And condoms have the distinct advantage of preventing the spread of venereal disease.

Oral Contraceptives

The types of oral contraceptives are 1) the combination pill, 2) the progestin-only (minipill), and 3) the morning after pill. The mechanism of action of the combination pill is supposed to be a combination of the following:

1. Prevention of ovulation
2. Some alteration of tubal transport
3. Changes in the endometrium
4. Alteration of the cervical mucus

Symptoms attributed to estrogens in the combination pill are:

1. Nausea and bloating
2. Cyclic weight gain and/or edema
3. Nervousness, irritability and/or premenstrual tension
4. Venous or capillary engorgement
5. Headache
6. Breast tenderness or cystic changes
7. Mucorrhea, cervical erosion or polyposis
8. Hypermenorrhea
9. Dysmenorrhea
10. Fibroid growth
11. Changes in carbohydrate metabolism
12. Hypertension
13. Thrombophlebitis
14. Suppression of lactation

Symptoms related to progestins are:

1. Amenorrhea or oligomenorrhea
2. Acne
3. Hirsutism
4. Increased appetite and steady weight gain
5. Depression and changes in libido
6. Fatigue
7. Menorrhagia
8. Early spotting and breakthrough bleeding
9. Oily scalp and loss of hair

Side effects of oral contraceptives are:

1. Nausea and vomiting
2. Weight gain
3. Spotting and breakthrough bleeding
4. Headache
5. Nervousness and irritability
6. Depression
7. Loss of libido
8. Breast discomfort
9. Acne
10. Melasma
11. Amenorrhea
12. Thromboembolic effects

There is some concern that oral contraceptives may be responsible for genetic changes and some forms of cancer. So far, there is no definite evidence to support the idea of genetic changes, and no association, adverse or beneficial, between the use of oral contraceptives and the development of cancer of the breasts, endometrium, or cervix, according to current data. Long-term combined oral contraceptive use appears to be related to the development of benign liver neoplasia. There is also evidence that oral contraceptives may have an adverse influence on the resolution of hydatidiform mole.

ABSOLUTE CONTRAINDICATIONS TO THE USE OF THE PILL

1. Thrombophlebitis, thromboembolic disorders, cerebrovascular disease, or a past history of these conditions
2. Markedly impaired liver function
3. Known or suspected carcinoma of the breast
4. Known or suspected estrogen-dependent neoplasia
5. Undiagnosed abdominal genital bleeding
6. Known or suspected pregnancy
7. Congenital hyperlipidemia
8. Gestational diabetes
9. Progressive heart disease
10. Progressive high blood pressure

Some relative but not absolute contraindications are:

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1. Obesity
2. Headache
3. Fibroids

The progestin-dominant pill is suitable for a woman if she should have:
1. Excessive outpouring of leukorrhea
2. A generalized sense of bloating or nausea while taking a contraceptive with high estrogen component
3. A tendency toward fluid retention and premenstrual weight gain
4. A degree of emotional instability and irritability prior to the menses
5. Excessive menstrual flow
6. More than the average amount of fibrocystic disease and a tendency towards swollen, tender breasts and nipples

Women experiencing the following are not good candidates for progestin-dominant contraceptives:
1. Hirsutism and acne
2. Underdevelopment of breasts
3. Very scanty menstrual flow or a fore-shortened cycle
4. Increasing appetite and steady weight gain
5. Varying degrees of depression in the menstrual cycle
6. Excess weight gain during previous pregnancy
7. Intermittent depression or loss of libido
8. Breakthrough bleeding

**THE MINIPILL**

This is a progestin-only preparation which, when taken as directed, is an effective oral contraceptive, although it is less effective than an estrogen-progestin combination. The preparations available are Micronor, Nor-Q.D., and Ovrette. The anticonception effect is due to a combination of poor endocervical mucus preventing sperm penetration in addition to the endometrial changes that are out of sequence for proper implantation of the blastocyst. There is also an effect on tubal motility and the enzymes in the endosalpinges. Presently, the majority of women using the minipill continue to ovulate. These pills are administered on a continuous daily basis, starting on the first day of menstruation. The minipill seems to be perfect for women who cannot tolerate the combined prep-
changes in the amount and distribution of fluid in the endometrial stroma

ADVANTAGES OF THE INTRAUTERINE DEVICE
1. The greatest advantage is that once the device is in place, no further motivation, effort or treatment is required for continued contraception
2. It is especially useful for those who have trouble following directions or remembering to use any other method
3. There is a lack of systemic effects
4. It may be most suitable for older women

DISADVANTAGES OF THE INTRAUTERINE DEVICE
1. Pain and difficulty associated with insertion
2. Side effects of cramps and bleeding and vasovagal reaction
3. Failure (2% to 5% pregnancy rate)

COMPLICATIONS OF THE INTRAUTERINE DEVICE
1. Bleeding
2. Pregnancy
3. Expulsion
4. Pain
5. Perforation
6. Infection
7. Fracture of the device or loss of the string attached to the intrauterine device

CONTRAINDICATIONS
1. Severe dysmenorrhea
2. Menorrhagia
3. Pelvic infection, recent or chronic
4. Perimenopausal menstrual abnormality
5. Congenital anomalies of the uterus
6. Some women with fibroids

Surgical Sterilization

The use of sterilizing procedures is increasing world wide. In the male, vasectomy is simple, safe and effective, but has the mild disadvantage of not being immediately effective. On the other hand, in the female, the tubal ligation involves no measurable risk to life, can be done as an outpatient procedure, and is immediately effective. Tubal sterilization in the female can be performed in the postpartum period or as an interval procedure. The routes by which this procedure can be performed are via the abdominal wall, via the posterior fornix of the vagina, or by the use of a laparoscope or hysteroscope. Though the use of the laparoscope for tubal sterilization procedures has gained wide acceptance and popularity, the mini-laparotomy is as safe and quick and effective in selected females and has the additional advantage of low cost.

Damage to the tubes caused by coagulation or cautery via the laparoscope not only damages extensive areas of the tube and the broad ligament, but also may cause some ovarian dysfunction leading to post-sterilization problems of pain and bleeding. On the other hand, use of mechanical devices to occlude the fallopian tube such as the use of silicone rubber bands or plastic clips has been shown to minimize the above-mentioned postoperative symptomatology. Because the mechanical devices produce minimal damage to the fallopian tubes this method is most suitable for a young woman who may request tubal reanastomosis at a later stage.

To date, we do not have a single reversible method of sterilization. Any surgical sterilization method is designed to be permanent and tubal occlusion procedures are accepted as the preferred procedure for those women who have definitely completed their childbearing and who desire sterilization. Should any uterine pathology and/or symptomatology of significance be found, then hysterectomy is acceptable and fully justified as a sterilization procedure.

Overall, from my experience, I would advise the following as the best forms of contraception for the various categories of women:

Unmarried teenagers
1. Abstinence through education and self-control
2. Condoms and spermicides
3. Diaphragm and spermicides
4. Oral contraceptives

Married women
1. Condoms and spermicides
2. Diaphragms and spermicides
3. Oral contraceptives
4. Intrauterine contraceptive devices
5. Tubal occlusion by a method that would result in minimal damage to the
tubes. Example: clips, bipolar cautery or Falope rings
6. Hysterectomy only if uterine pathology of significance exists

Women over 35
1. Diaphragm and spermicides or condoms and spermicides
2. Intrauterine contraceptive devices
3. Tubal occlusion
4. Hysterectomy if uterine pathology or symptomatology of significance exists

Preabortal women
1. Suction dilatation and curettage followed by tubal occlusion

Postabortal women who desire further fertility
1. Barrier methods
2. Oral contraception
3. Intrauterine devices

Postpartum women
1. Use of condoms and spermicides
2. Oral contraceptives
3. Intrauterine devices
4. Tubal occlusion
Endometriosis is diagnosed when tissue which resembles the endometrial lining exists outside the endometrial cavity. Although first described as a pathological entity in the late 1800s, the term “endometriosis” was not introduced until the early 1920s by Sampson. The great volume of literature which has accumulated on this topic is, by and large, a product of the 20th century.

Many theories exist as to the histogenesis of endometriosis. All may be assigned to one of three basic groups in which 1) endometrial tissue is transplanted ectopically as a result of regurgitation, metastasis, or oviduct extension, 2) endometrial tissue develops ectopically in situ from local tissues, or 3) a combination of transplantation and development in situ. Of the three groups, only the first has been documented; the other two are speculative.

Grossly, endometriosis often presents as purplish, dusky red, or brownish spots or elevated nodules surrounded by varying degrees of fibrosis and scarring. Typically it involves the peritoneal surface of the ovary or ovaries, cul-de-sac, or bladder. Less frequently the bowel, appendix, bladder, ureters, cervix, vagina, and vulva are involved. Rarely, it is reported in the umbilicus, pleura, lungs, and extremities. Transplantation into surgical incisions of the abdominal wall and perineum has been documented.

Microscopic evidence of endometriosis is not always clear-cut. One would like to see endometrial-like epithelium, glands or gland-like structures, and stroma accompanied by evidence of hemorrhage. Not infrequently a picture “consistent with endometriosis” will present itself revealing hemosiderin, fibroblasts, and pigment-laden macrophages. However, one cannot be secure in the pathological diagnosis if it is based solely on such evidence.

Malignant degeneration occurring within areas of endometriosis is uncommon—less than 1%. When it does occur, it is seen much more frequently in the glandular component as an adenocarcinoma than in the the stromal component; rarely is the malignancy of a mixed type. Endometroid carcinoma of the ovary does not appear to be directly related in its histogenesis to endometriosis.

Clinically, endometriosis is a disease of the reproductive years. Although it is being seen more frequently in teenagers, it has never been reported to occur before the menarche. The disease may pose a problem for the perimenopausal woman.

The frequency with which endometriosis is reported to occur in a given population is highly variable. Perhaps as many as 20% to 25% of women 24-45 years old have some evidence of endometriosis recognizable at the time of laparoscopy. It is being detected with increasing frequency in blacks, historically a group thought to have a very low incidence of the disease.

The patient with endometriosis usually complains of secondary dysmenorrhea or pelvic pain, menstrual abnormalities, and frequently of infertility.

The pain is highly variable and its severity often cannot be related to the extent of the disease. Pain usually begins some years after
menarche and may be premenstrual or menstrual in occurrence. Extensive endometriosis may be associated with chronic pain throughout the menstrual cycle. Sometimes the disease causes pelvic pressure or a sense of heaviness and fullness which the patient does not interpret as pain. Low backache and deep dyspareunia are usually the result of uterosacral involvement. Rectal and bladder tenesmus occurs and cyclic sciatica (Head sign) has been reported.

Abnormalities of menstruation consisting of hypermenorrhea and an irregular menstrual interval imply ovarian involvement. Ten percent of patients with significant endometriosis have episodes of anovulation. As the disease is commonly associated with an increased incidence of endometrial polyps, leiomyomata, and adenomyosis, these conditions must also be suspect as causes of abnormal menstruation.

Infertility may be the result of a number of factors: ovarian dysfunction, kinking of the oviducts, scarring of the fimbria, uterotubal spasm, and a decrease in coital exposure due to dyspareunia and chronic pelvic discomfort. This problem becomes more perplexing, however, when one is reminded that most patients with endometriosis ovulate, few have blocked tubal lumens, and many have previously borne children.

The patient with complaints suggestive of endometriosis may or may not have the classic physical findings of pelvic tenderness, cul-de-sac nodularity, organ fixation, or abnormal adnexal masses. Many, with minimal endometriosis, appear to offer the most complaints, whereas others, with extensive involvement, may appear relatively asymptomatic. There is yet another group in which endometriosis is only an incidental finding at the time of laparoscopy or laparotomy.

Although the pelvic findings may confirm the suspicion of endometriosis, the diagnosis cannot be made unless the disease process is visualized or biopsied. Laparoscopy has proved invaluable in the diagnosis and management of patients suspected of having endometriosis. Indications for laparoscopy are given in Table 1. When endometriosis is encountered, diagrams of the extent of involvement should be entered in the patient's medical record. The Baylor classification of pelvic endometriosis is helpful in documenting findings and serving as a guide to medical and/or surgical therapy (Table 2).¹

Medical management of endometriosis is aimed at the relief of pelvic discomfort and the preservation of the patient's childbearing potential. Initially, analgesics and heat may provide relief. The patient should be advised to avoid the continued use of narcotics and alcoholic beverages. It is best not to undertake the medical suppression of endometriosis using hormonal therapy unless the disease has been documented visually or by biopsy, and the extent of involvement determined. Hormonal therapy is associated with many undesirable side effects and is expensive. Patients thought to have the disease but who in fact do not have it should be spared prolonged courses of hormonal therapy.

Current hormonal regimens employ the

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**TABLE 1**
Indications for Laparoscopy

<table>
<thead>
<tr>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe unexplained pelvic pain</td>
</tr>
<tr>
<td>Progressively severe dysmenorrhea</td>
</tr>
<tr>
<td>Dyspareunia, especially with deep penetration</td>
</tr>
<tr>
<td>Metrorrhagia uncontrolled by dilatation and curettage and/or hormones</td>
</tr>
<tr>
<td>Pelvic findings suggestive of endometriosis</td>
</tr>
<tr>
<td>Unexplained infertility</td>
</tr>
</tbody>
</table>

**TABLE 2**
Classification and Treatment

<table>
<thead>
<tr>
<th>Mild:</th>
<th>Fresh implants, minimal scarring, no adhesions, minimal or no ovarian involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx:</td>
<td>Medical suppression—</td>
</tr>
<tr>
<td></td>
<td>Gestogens (pseudopregnancy)</td>
</tr>
<tr>
<td></td>
<td>Danazol (pseudomenopause)</td>
</tr>
<tr>
<td></td>
<td>Supportive therapy— Analgesics, heat</td>
</tr>
<tr>
<td></td>
<td>No therapy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderate:</th>
<th>Implants with scarring and retraction, adhesions, endometrioma &lt;2 cm, minimal peritubular and periovarian adhesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx:</td>
<td>Laparoscopic minisurgery</td>
</tr>
<tr>
<td></td>
<td>Conservative surgery</td>
</tr>
<tr>
<td></td>
<td>Medical suppression</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Severe:</th>
<th>Endometrioma &gt;2 cm, tube(s) and ovary or ovaries bound down by adhesions, cul-de-sac obliteration, bowel or urinary tract involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx:</td>
<td>Conservative surgery</td>
</tr>
<tr>
<td></td>
<td>Hysterectomy with salpingo-oophorectomy</td>
</tr>
<tr>
<td></td>
<td>Medical suppression, postoperative, if indicated</td>
</tr>
</tbody>
</table>
gestogens to achieve pseudopregnancy or danazol to achieve pseudomenopause. Hormones appear to give the best results in the treatment of mild degrees of endometriotic involvement. They are capable of relieving pain and of reducing the extent of the disease to some degree; however, they are not likely to eliminate all foci of disease and thereby effect a cure.

The gestogens, combinations of estrogen and progesterone, interrupt the negative feedback within the hypothalamic-pituitary-ovarian axis at the pituitary level. Follicle stimulating hormone (FSH) and luteinizing hormone (LH) secretions are suppressed; ovarian follicular development and ovulation are inhibited, and the secretion of ovarian estrogen and progesterone is reduced. The inherent estrogenic and progestational properties of the gestogens initially stimulate endometrial growth and induce decidual change within the endometrial tissue. Subsequently, amenorrhea and gradual atrophy of the uterine and ectopic endometrial tissue results in symptomatic relief. Pseudopregnancy regimens have been reported to provide symptomatic relief in up to 94% of patients and a corrected pregnancy rate after treatment as high as 50%.

The return of symptoms and the recurrence of endometriosis after therapy appear to increase progressively with the length of follow-up unless menopause ensues. The side effects of gestogen therapy include nausea, mastodynia, vaginal discharge, fluid retention, breakthrough bleeding, and on occasion, thromboembolism. Pseudopregnancy regimens should be avoided in patients with a history of thromboembolic disease and breast or endometrial carcinoma.

Danazol, a weak synthetic testosterone, has antigonadotrophic properties similar to the gestogens. It is capable of inducing a pseudomenopausal state with its associated amenorrhea and endometrial atrophy but is unassociated with many of the undesirable side effects of gestogen therapy. Danazol suppresses FSH and LH secretion and therefore inhibits follicular development, ovulation, and corpus luteum formation. Ovarian estrogen and progesterone secretion is reduced to a minimum, causing endometrial atrophy and amenorrhea. This inactivity and atrophy of ectopic endometrial tissue allows reabsorption and healing. Side effects of danazol therapy include the vasomotor symptoms of menopause, weight gain, edema, vaginal spotting, and acne. Fortunately, significant androgenic effects are rare as the usual antigonadotrophic dose required for the treatment of endometriosis is approximately one third that capable of causing masculinization in the woman. Symptomatic improvement with the danazol-pseudomenopausal regimen is reported in up to 92% of patients. Clinical improvement is noted in approximately 60% and a corrected pregnancy rate of 50% is said to exist. Unfortunately, the recurrence of symptoms is relatively high after discontinuation of therapy. As with the pseudopregnancy regimen, conception after therapy prolongs the asymptomatic interval.

Moderate involvement with endometriosis is best treated with laparoscopic minisurgery for the lysis of adhesions, freeing of the ovaries, and cauterization of implants: a more extensive laparotomy may be required. Conservative surgery, in cases of moderate and severe involvement with endometriosis, is undertaken in an effort to correct reflux menstruation, relieve pelvic pain, and improve fertility. It consists primarily of lysis of adhesions, the excision or destruction of all discernable endometriotic implants and cysts, and is often accompanied by uterine suspension and presacral neurectomy in an effort to prevent subsequent retrofixation of the uterus and provide relief of pelvic pain. Conservative surgical approaches have been shown markedly to improve symptoms and childbearing potential. The addition of a pseudopregnancy regimen to surgery, although recommended by some, has in most cases not significantly added to the success of the operation as measured by subsequent pregnancy or reducing the need for future surgery. Approximately one quarter of patients undergoing conservative surgical therapy for endometriosis will require future operative procedures because of endometriotic involvement.

In severe cases of endometriotic involvement, "radical" surgery, such as total abdominal hysterectomy and bilateral salpingo-oophorectomy, may offer the only hope of cure. If this is not an acceptable alternative for the particular patient, the physician should realistically think in terms of palliation rather than cure. The growth of ectopic endometrial tissue cannot be permanently eradicated as long as functioning ovarian tissue remains within the body. Castration causes the involution and

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death of active foci of endometriosis; however, the patient may still be left with fibrotic adhesions and other residua which continue as a source of chronic pain. In selected cases, it may be advisable to follow a surgical approach to the treatment of endometriosis with a pseudopregnancy or pseudomenopausal regimen for the continued suppression of residual disease.

Hormonal therapy for the surgically-induced menopause may be required. If this can be anticipated, it is best to be sure that all foci of disease are removed at the time of surgery and not to depend upon castration alone to inactivate residual disease. If all endometriosis has been removed, the patient may be started on conjugated equine estrogen. If it is thought that some endometriosis remains, it is best to delay hormonal therapy for six months or treat the patient for that period of time with medroxyprogesterone acetate; subsequently conjugated equine estrogen therapy may be instituted on a cyclic basis.

Table 2 is adapted from Obstetrics and Gynecology (42:19-25, 1973).

REFERENCES


INTRODUCTION

The adult bladder and urethra acting as a unit allow for the voluntary dual function of urine collection and evacuation. Urinary continence is an acquired, "learned" state, and normal anatomy and function of the nervous and genitourinary systems are necessary to maintain it. Urinary incontinence is defined as "a condition where involuntary loss of urine is a social or hygienic problem and is objectively demonstrable." This definition takes into account both sociocultural aspects and the need for objective clinical assessment of urinary leakage. Marked individual variations in physical activity, occupation and hygienic standards call for appropriate clinical judgment when evaluating this condition. Although excessive vaginal discharge may be confused with urine loss, incontinence is often evoked to obtain psychologic or socioeconomic secondary gains. The element of the reproducibility is therefore of marked clinical importance. Eleven percent of patients evaluated in our urodynamic unit at the Medical College of Virginia had no objective evidence of urinary leakage during their evaluation.

TYPES, INCIDENCE, AND PATHOPHYSIOLOGY

The types and incidence of urinary incontinence in females seen in our unit are shown in Table 1.

Extraurethral incontinence such as fistulae and congenital anomalies, or incontinence due to neurologic conditions will not be included in the following discussion.

"Stress Urinary Incontinence" (SUI)

Stress urinary incontinence accounts for approximately 56% of the cases referred to our unit. This is a condition in which "involuntary loss of urine occurs when the intravesical pressure exceeds the maximal urethral pressure in the absence of detrusor activity." It should be differentiated from the symptom of SUI, which refers to data obtained from the history, and the sign of SUI, which indicates the physician's observation of the leaking episode.

It is not uncommon for otherwise healthy women to have occasional episodes of SUI. Conditions such as acute respiratory infections or asthmatic attacks can also precipitate episodes of SUI, which disappear after the acute situation subsides. A sudden increase in intra-abdominal pressure causes urine to flow from the bladder through the urethra to the exterior. The most common single cause for this condition is an extra-abdominal location of the proximal urethra or bladder neck below the pelvic diaphragm because of loss of support or inadequate support to the retropubic muscles (Zacharin). Atrophic and/or traumatic destruction of the puboprostatic ligaments (Zacharin) is responsible for this anatomic pathology. As a result of this anatomic situation any sudden increase in intra-abdominal pressure is transmitted unequally to both bladder and proximal urethra and results in urinary leakage.

Other factors which may contribute to or be of primary importance in, depending on individual cases, may increase intravesical pressure and/or decrease urethral resistance in the absence of detrusor activity (Table 2). It is important to determine in each patient which of these factors contributes and to what extent in the development of the condition of SUI.
Idiopathic Detrusor Instability (IDI)
(Detrusor Dysynergia-Unstable Bladder-Urgo Incontinence)

Before "toilet training," infants have no voluntary control of their bladder. It contracts spontaneously upon reaching a certain urinary volume. Adults, through a "learned" process, can suppress this autocontractibility and void only when convenient. Cortically controlled inhibitory impulses affect lower neurologic reflexes rendering the bladder "stable" or "asyn-ergic." During bladder filling, the intravesical pressure remains constant and no involuntary detrusor contractions occur. Increased tension in the bladder wall stimulates proprioceptive receptors which send impulses that reach the cortex, producing the sensation of urinary urge. By voluntarily removing these inhibitory cortical impulses the detrusor muscle contracts and voiding is established.

The detrusor muscle is considered unstable when uninhibited detrusor contractions exceeding 15cm/H₂O pressure occur during cystometric evaluation. This intravesical pressure elevation must be independent of any increase in intra-abdominal pressure and must occur while the patient is asked to inhibit.

During adulthood, several conditions such as urinary tract infections, tumors and stones of the lower urinary tract and neurologic disorders can alter the normal "stability" of the detrusor muscle. When the instability is severe enough to create intravesical pressure that exceeds the urethral resistance, the patient becomes incontinent. Most commonly the presence of detrusor instability exists in the absence of recognizable urologic or neurologic conditions. A patient with detrusor instability may therefore be continent as long as the urethral resistance is sufficient to counteract the increase in intravesical pressure.

C. Paul Hodgkinson in 1963 first described this condition which represented 8% of incontinent patients evaluated in his service. Multiple reports since then indicate incidence varying from 8% to 60%.

<table>
<thead>
<tr>
<th>TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types and Incidence of Female Urinary Incontinence</td>
</tr>
<tr>
<td>Ob-Gyn Urodynamic Unit</td>
</tr>
<tr>
<td>1976-1979</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stress Urinary Incontinence (SUI)</th>
<th>183</th>
<th>55.96%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detrusor instability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) idiopathic (IDI) (70)</td>
<td>79</td>
<td>24.16%</td>
</tr>
<tr>
<td>b) Secondary to urinary infection (9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed (SUI) + (IDI)</td>
<td>15</td>
<td>4.59%</td>
</tr>
<tr>
<td>Psychogenic</td>
<td>10</td>
<td>3.06%</td>
</tr>
<tr>
<td>Fistulae</td>
<td>3</td>
<td>0.92%</td>
</tr>
<tr>
<td>No objective incontinence</td>
<td>37</td>
<td>11.31%</td>
</tr>
<tr>
<td></td>
<td>327</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Detrusor contractions producing incontinence can be preceded by a strong desire to void (Fig 1) or can occur without symptoms (Fig 2). In addition detrusor contractions may coincide with a strong desire to void and not result in incontinence (Fig 3). Basically all three of these cases represent examples of idiopathic detrusor instability and have the same underlying pathophysiology. This is a decrease in or lack of cortical inhibitory impulses to the spinal reflex centers.

It should be noted that in more than 50% of cases in our series, detrusor instability was only observed after "provocative" testing (forceful coughing or heel bouncing). Cystometric techniques useful in the detection of this disorder should allow the patient to perform...

TABLE 2
Factors Influencing Intravesical Pressure and Intra-Urethral Resistance in the Absence of Detrusor Contractions.

A. FACTORS THAT INCREASE INTRAVESICAL PRESSURE
Abdominal Pressure Increment
1. Abdominopelvic tumors
2. Obesity
3. Chronic pulmonary obstructive disease

Vesical Tone Increment
β-Adrenergic block (propranolol)

Increased Urinary Volume
1. Urinary retention (overflow incontinence)
2. Bad voiding habits

B. FACTORS THAT DECREASE URETHRAL RESISTANCE
1. Urethral denervation (post-surgical)
2. α-adrenergic block (phenoxycamazine)
3. β-adrenergic stimulation (isoproterenol-isoxuprine)
4. Urethral fibrosis (post-surgical radiation)
5. Hypoestrogenism
TABLE 3
Symptoms Associated with Idiopathic Detrusor Instability

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incontinence</td>
<td>51 +</td>
</tr>
<tr>
<td>Urgency-frequence</td>
<td>39 ++</td>
</tr>
<tr>
<td>Nocturia</td>
<td>38</td>
</tr>
<tr>
<td>Dysuria</td>
<td>3</td>
</tr>
</tbody>
</table>

+ 20 patients with incontinence had no symptoms
++ 19 patients with urgency-frequency had no incontinence

comfortable "provocative" maneuvers while in the erect position. Several cases will remain undiagnosed if these techniques are not used.

Psychogenic Incontinence

This type of incontinence is usually part of a psychological condition. These individuals contract the voluntary muscles of the abdominal wall, producing what is viewed by them as "involuntary urine loss." Cystometric techniques which independently monitor intra-abdominal, (rectal) and intravesical pressures will record the coincidental elevation of both pressures.

Differential Diagnosis

History

The time of onset and the circumstances surrounding it may be of help in establishing the diagnosis. Incontinence since childhood can indicate congenital anomalies such as ectopic ureter or if it follows surgery and/or radiation therapy, it may be related to genitourinary fistulae.

The majority (96%) of patients with urinary incontinence have SUI or IDI, or a combination of both. Table 4 compares the most common symptoms of patients with SUI and IDI.

Physical Examination

A comprehensive examination with special attention to the genitourinary system is mandatory. Special aspects of the pelvic examination should include:

a) Assessment of the bulbocavernosus reflex. This is done with the patient in the lithotomy position by gently com-
pressing or touching the clitoral glands. If the lower spinal cord reflex (S₂ to S₄) is intact, contraction of the anal sphincter is observed.

b) Inspection and palpation of the anterior vaginal wall. It is preferable to use a Sims speculum on the posterior wall for proper visualization. The external urethral meatus should be inspected, and the presence of a urethral diverticulum and sensitivity of the trigonal area should be assessed. Changes in the entire anterior vaginal wall during maximal straining should be noted.

c) Assessment of pubococcygeus tone. This can be performed by placing two fingers over the posterior vaginal wall and asking the patient to elevate or squeeze the examiners fingers. Pubococcygeus tone may be improved with exercises and may help in the management of certain cases of SUI.

Special Diagnostic Studies

Once the preliminary evaluation through a history and physical examination has been completed, special studies may help to confirm the diagnosis.

If a neurologic disease is suspected, further evaluation by a neurologist is indicated prior to completion of the incontinence work-up.

Intravenous pyelography is indicated if any congenital conditions are suspected or if upper urinary tract pathology is suspected.

Determination of residual volume, sediment, and a bacteriologic evaluation for infection should be done prior to further evaluation. Infection can cause detrusor instability and incontinence. Large urinary residuals may be present in obstructive uropathies and atonic bladder dysfunctions because of neurologic disorders.

<table>
<thead>
<tr>
<th>TABLE 4</th>
<th>Comparison of Common Symptoms and Signs in Patients with SUI and IDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>SUI: Usually gradual</td>
</tr>
<tr>
<td></td>
<td>Remissions: Not usually</td>
</tr>
<tr>
<td>Sensation of incomplete voiding</td>
<td>SUI: Not common</td>
</tr>
<tr>
<td>Urgency and frequency of urination</td>
<td>IDI: Usually sudden</td>
</tr>
<tr>
<td>Dysuria</td>
<td>No</td>
</tr>
<tr>
<td>Nocturia</td>
<td>No</td>
</tr>
<tr>
<td>Bed-wetting</td>
<td>No</td>
</tr>
<tr>
<td>Characteristic type of leak</td>
<td>“Spurt”</td>
</tr>
<tr>
<td>Situations surrounding the leaking episode</td>
<td>At the “acme” of a forceful valsalva maneuver, without concomitant symptoms.</td>
</tr>
</tbody>
</table>

IDI: Common

Yes
No
Occasionally
“Stream”
Spontaneously or several seconds after a valsalva maneuver or positional change.
Usually with sensation of urge but not always.
Urethroscopy

This procedure should be performed, in our view, on all patients with incontinence, especially those with symptoms of urgency. Specific information obtained during urethroscopy should include:

a) urethral length and calibration,
b) inflammatory and trophic changes of the urethra and trigone
c) presence of urethral lesions, fistulae or diverticulum,
d) observation of the proximal sphincteric mechanism during retrograde filling and while bearing down, and
e) observation of the urethral orifices and trigonal area.

Bonney-Read Test or Vesical Elevation Test

Through a red rubber or Foley catheter, body temperature water or saline is instilled into the bladder until the patient expresses desire to void. The volume is noted, and the catheter removed, and the patient asked to cough hard; any leakage is noted. Subsequently, the procedure is repeated while elevating the anterior vaginal wall, being careful not to compress the urethra against the symphysis erect. Care should be taken to use similar volumes every time and the patient should not bend her knees while coughing. This prevents the extrinsic (voluntary) urethral closure mechanism from becoming inadvertently relaxed during maximal stress. Urinary leakage in spurts, occurring simultaneously with the cough, and disappearing while elevating the bladder neck, strongly supports the diagnosis of SUI.

Cystometry

This procedure allows for the evaluation of the detrusor muscle during bladder filling. It is basically a method of which the pressure-volume relationship of the bladder is measured, and the "stability" of the bladder ascertained. The access or route to bladder filling may be transurethral, percutaneous or orthograde. The medium may be liquid or gas, used in continuous or incremental filling rates. The position of the patient can vary from sitting or lying, to standing.

In our unit we use the method which C. P. Hodgkinson published in 1963. Direct electronic cystometry allows for slow, orthograde filling of the bladder with the subject's own urine. Small electronic transducer catheters placed in the urethra, bladder, and rectum transmit independent pressure readings and allow this study to be performed in any desirable position with no discomfort.

Stability of the detrusor muscle should specifically be tested in the erect position and after "provocative" maneuvers such as forceful coughing or heel bouncing. As mentioned above, if the chosen method of cystometry does not allow for this provocative testing, 50% or more of cases will remain undiagnosed. In our experience direct electronic cystometry remains the single most important diagnostic technique in the detection of detrusor muscle instability.

Metallic Bead-Chain Cystourethrography

This technique was described by C. P. Hodgkinson in 1953. A metallic bead-chain is placed in the urethra and radiopaque medium is instilled in the bladder and vagina. Lateral and anteroposterior radiographic views are obtained, in the erect position at rest and during straining.

Specific observations common to patients with SUI have been described. These include: a) Loss of posterior urethrovesical angle (PUV <) (Fig 4b), b) abnormal inclination of urethra axis in addition to the loss of the PUV < (Fig 4c), c) the urethrovesical junction becomes the most dependent position of the bladder base during strain (Fig 4d).

Although these observations are seen in cases of SUI, they are also present in cases of IDI. The overlap impedes the use of this technique for the differential diagnosis between these types of incontinence. In our unit the technique has been useful in the:

a) preoperative identification of the anatomic relationship between the symphysis pubis, bladder base, urethra and anterior vaginal wall. These can not be satisfactorily assessed by simple observation during pelvic examination.
b) prognostic assessment, based on degree of descent of the urethrovesical (UV) junction. The lower the UV junction preoperatively, the better the chance to elevate it with surgery.
c) postoperative evaluation of the surgical technique.
d) reevaluation of the reoccurrence of symptoms of incontinence.

TREATMENT

SUI

It is imperative to evaluate the contributory factors and to what extent they influence the incontinent condition. Weight reduction, change in voiding habits, and discontinuation of adverse medication may cause rapid improvement in the patient. Perineal exercises such as those devised by Kegel can have remarkable success in treating SUI, especially in patients with moderate-to-good pubococcygeus tone.

All the surgical procedures described for the treatment of SUI place the proximal urethra to an intra-abdominal location. This restoration to a location above the pelvic diaphragm can be accomplished either vaginally or suprapubically. There is a tendency to do more suprapubic procedures in view of results showing better long-term follow-up when this route has been chosen. However, it is wise to evaluate each case individually where surgery is indicated rather than establish fixed protocols.

IDI

Anticholinergic Therapy. Several anticholinergic preparations have been used with success. These drugs will block cholinergic preganglionic synapsis of the parasympathetic fibers in the detrusor muscle. The need for constant oral medication and the side effects observed with some of the doses needed make its use clinically unsatisfactory.

Bladder Drills

Bladder retraining techniques have been used with good results. Patients are instructed to void on predetermined schedules, prolonging progressively the intervals between voidings. This drill reestablishes the cortical inhibition of the bladder reflex by repeating the process of training. Similar programs have been utilized in hospitalized patients and cortical control has been achieved through biofeedback mechanisms. This form of management seems preferable to either drug therapy or drastic bladder denervation through surgical intervention.

CONCLUSION

Female urinary incontinence is a complex problem. Thorough physical examination together with diagnostic techniques such as urethroscopy and cystometry will avoid unnecessary surgery and diminish treatment failures. If surgery is indicated, the skilful surgeon should assess each patient individually and perform the procedure best suited to that particular patient.

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REFERENCES


Colposcopy was first described by Hinselmann of Hamburg in 1925. The colposcope is a binocular microscope of low power (10x to 25x) which contains a light source and is mounted on a stand to permit its use in the study of the surface of the uterine cervix. Using the colposcope, the physician can identify and evaluate cervical epithelial abnormalities.

Cytology, as a means of diagnosing cervical cancer, was introduced to clinical medicine by Doctors Papanicolaou and Traut of New York in 1943. With improvements in technique and specificity, cervical cytology has become the most practical and effective means of screening for preinvasive and early invasive cancer of the uterine cervix.

In the past, colposcopy and cytology have been considered to be competitive diagnostic techniques. Now, they are being used in a complementary manner to improve diagnostic accuracy, determine therapy, and evaluate results. Their combined use has significantly decreased the need for cold knife conization of the cervix, thereby reducing morbidity and costs.

As most cervical neoplasia develops about the squamocolumnar junction of the cervix, the following discussion will include a review of the biological activity of the area, brief mention of the cytologic sampling technique, the evolution of colposcopic patterns, and the presentation of a schema for the combined use of cervical cytology and colposcopy in the diagnosis and management of cervical neoplasia.

Transformation Zone

During childhood and the reproductive years the squamocolumnar junction of the uterine cervix is usually located on the vaginal portio. Changes in vaginal pH, trauma, and other local environmental factors cause the multi-potential reserve cells underlying the columnar epithelium to undergo squamous metaplasia and the basal cells of the squamous epithelium to proliferate in order to replace the more fragile columnar epithelium with a more resistant squamous epithelium. As these processes are continuous, the squamocolumnar junction tends to retreat within the distal endocervical canal. Therefore, the majority of premenopausal women will have the squamocolumnar junction of their cervix located on the vaginal portio while postmenopausal women are more likely to have the squamocolumnar junction of their cervix located within the distal endocervical canal where it is less accessible to direct visual examination.

The squamocolumnar junction and the surrounding areas of active squamous metaplasia combine to make up the transformation zone. Typical squamous metaplasia implies that the process is orderly and predictable, resulting in the production of normal squamous epithelium. Occasionally, atypical squamous metaplasia takes place. Some of the resultant atypical epithelium resists further change and persists as such or is replaced at a later date by normal squamous epithelium. That which is less resistant to change may progress, in an orderly sequence, through the various stages of dysplasia to carcinoma in situ and even to invasive carcinoma of the cervix. At this time there is no practical means of determining which atypical lesion will regress, persist, or progress to ad-
vanced neoplasia. Therefore, the identification of any degree of cervical neoplasia requires investigation and eradication if its course is to be interrupted. Fortunately, cervical intraepithelial neoplasia (CIN) develops over a long enough period of time to permit its detection, documentation, and eradication. The complete removal of the lesion prevents its progression to invasive carcinoma. New recurrences appear to repeat the developmental sequence from the beginning, rather than initiating it at a more advanced stage.

Cervical Cytology
Care should be exercised in obtaining the best possible specimen for cervical cytology. The endocervical canal should be aspirated in order to obtain an endocervical specimen, then a thorough abrasive scraping of the entire transformation zone should be performed using a plastic spatula shaped to conform to the external cervical os. Immediate smear preparation and fixation reduce artifacts. After appropriate staining, it is possible for the cytopathologist to evaluate the smear and classify the findings, using cytologic terminology, as normal, atypical dysplastic (mild, moderate or severe), carcinoma in situ, microinvasive, or invasive carcinoma. The diagnosis can be highly accurate and lesion specific. Often cervical and vaginal infections can be diagnosed by cytologic examination which, if recognized, should be reported to the clinician. All patients with evidence of cervical neoplasia on cytologic screening are candidates for colposcopy.

Colposcopy
The colposcope is used to visualize the portio and identify lesions recognizable because of alterations in vasculature, surface contour, color and opacity. Research has shown that most cervical neoplasia is unifocal in origin and that lesions which exhibit these alterations are the same ones that are responsible for the abnormal cytologic smears.

During the process of normal squamous metaplasia the vascular bundles which serve the columnar epithelium usually recede and form a flattened vascular layer underlying the new mature squamous epithelium. In the case

TABLE
Cervical Cytology

<table>
<thead>
<tr>
<th>Dysplasia, Carcinoma in situ, Invasive Carcinoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat cytology</td>
</tr>
<tr>
<td>Colposcopic examination</td>
</tr>
<tr>
<td>Directed cervical biopsy</td>
</tr>
<tr>
<td>Endocervical curettage</td>
</tr>
<tr>
<td>Extent of lesion not seen</td>
</tr>
<tr>
<td>Positive endocervical curettage</td>
</tr>
<tr>
<td>Microinvasive carcinoma</td>
</tr>
<tr>
<td>No lesion but abnormal smear</td>
</tr>
<tr>
<td>Cold knife conization</td>
</tr>
<tr>
<td>Fractional dilatation and curettage</td>
</tr>
<tr>
<td>Cervical intraepithelial neoplasia</td>
</tr>
<tr>
<td>Microinvasive carcinoma</td>
</tr>
<tr>
<td>Invasive carcinoma</td>
</tr>
<tr>
<td>Extent of lesion seen</td>
</tr>
<tr>
<td>Cervical intraepithelial neoplasia</td>
</tr>
<tr>
<td>No additional therapy</td>
</tr>
<tr>
<td>Hysterectomy</td>
</tr>
<tr>
<td>Radiation/Surgical therapy</td>
</tr>
<tr>
<td>Cryosurgery</td>
</tr>
<tr>
<td>Cold knife Hysterectomy</td>
</tr>
</tbody>
</table>

Frequent follow-up examinations are indicated after therapy for cervical neoplasia.
of cervical neoplasia, these vascular bundles persist among the clones of neoplastic cells. The evolution of colposcopic patterns is the result of layers of nuclear dense neoplastic cells covering up or distorting the vasculature to the surface epithelium. If neoplastic cells form layers across the top of the vascular bundles, the surface epithelium loses its pinkish color; if this epithelium is treated with 3% acetic acid, its metaplastic cells take on a white appearance. This colposcopic picture is referred to as white epithelium. On occasion, the neoplastic cells will form cuffs about the vascular bundles, and the tips of the vessels within the bundles will undergo dilatation. The resultant colposcopic picture is one of stippling or punctation. As these vascular bundles are connected by smaller vessels so as to form vascular baskets, and as neoplastic cells crowd within and about all these vessels, the dilated tips of the vascular bundles and the interconnecting vessels may both be visible giving the colposcopic picture of a mosaic. White epithelium, punctation, or the mosaic pattern may be seen singly or in combination, and to a lesser or greater extent. Experience enables the colposcopist to grade these findings into CIN I (minimal or mild dysplasia), CIN II (moderate dysplasia), or CIN III (severe dysplasia or carcinoma in situ). All lesions should be mapped in the patient’s chart and biopsied. To avoid inappropriate therapy, no patient should be treated solely on the basis of cytologic and/or colposcopic findings. It is essential to know the limits of all lesions and to have histologic documentation of each.

Correlation of Data

Cytologic, colposcopic, and histologic diagnosis must be in agreement in order to proceed with therapy. It must be remembered that although the volume of tissue obtained by cervical biopsy is larger than that obtained by cytologic sampling, the latter has the capability of sampling a more extensive area of the cervix. As cytologic and histologic diagnoses are lesion specific, receipt of a more advanced diagnosis of cervical neoplasia on cytologic examination than on histologic examination could mean that the most advanced lesion was not recognized colposcopically and therefore escaped biopsy. Should this occur a repeat colposcopic examination with directed biopsy or cold knife conization of cervix should be performed.

Using the schema in the Table, it is possible to combine the use of cervical cytology and colposcopy to identify histologically the most advanced cervical lesion in approximately 90% of cases. Conization of the cervix is still required when no cervical abnormalities consistent with the cytologic abnormality are found, the extent of the lesion cannot be ascertained, endocervical canal curettages are positive for neoplasia, or microinvasive cancer of the cervix is diagnosed. Failure to perform a cold knife conization and fractional dilatation and curettage in such cases may result in failure to detect the most advanced stage of cervical neoplasia or to appreciate the extent of disease. This has been a cause for inappropriate therapy and subsequent recurrence of cervical intraepithelial neoplasia and carcinoma.

REFERENCES


Office Endometrial Sampling

STEPHEN A. COHEN, M.D.
W. GLENN HURT, M.D.

Department of Obstetrics and Gynecology, Medical College of Virginia, Health Sciences Division of Virginia Commonwealth University, Richmond, Virginia

The concept of office endometrial sampling is not new. Kelly recommended its use in 1925. More recently, the procedure has received increased attention as physicians and the public have sought ways to curb the spiraling cost of medical care. Uterine curettage is the operation most commonly performed on women throughout the world. As an inpatient procedure, it costs $500 to $600. The same procedure performed in an outpatient surgical center costs $350 to $400. In over 90% of cases, an adequate endometrial sample may be obtained in the office at a cost of $50 to $60. For office endometrial sampling to be acceptable to the physician, it must be simple to accomplish, relatively inexpensive to use, and agreeable in terms of patient comfort and morbidity. The specimen obtained should be representative of the entire endometrium, adequate for pathological study, and easily preserved, transported, and processed.

Indications for office endometrial sampling are given in the Table. In the adolescent female there is rarely an indication for endometrial sampling; however, during the reproductive years and thereafter, there are frequent indications for sampling. As the endometrium is extremely sensitive to systemic levels of the sex hormones, estrogen and progesterone, sampling will help determine ovarian function and give indirect evidence of the status of the hypothalamic-pituitary-ovarian axis. Ovulation is usually followed by corpus luteum formation. The corpus luteum produces progesterone and causes the endometrium to take on a secretory appearance. Timed endometrial sampling may be used to prove ovulation and evaluate corpus luteum function. A delay in the maturation of the endometrium may be taken as evidence of an inadequate corpus luteum. Persistence of a proliferative endometrium, without the development of a secretory component, is evidence of anovulation. The documentation of anovulation or of inadequate corpus luteum function is important information in an infertility work-up. Chronic anovulation with prolonged stimulation of the endometrium by unopposed estrogen can lead to the development of endometrial hyperplasia. This is a common cause of abnormal uterine bleeding. Severe hyperplasia, of the adenomatous or atypical variety, is considered a precursor of endometrial carcinoma. Endometrial sampling may be used to evaluate the results of hormonal therapy whether it be for the induction of ovulation, the eradication of endometrial hyperplasia, or as replacement therapy to control the vasomotor symptoms of the menopause. The obese, hypertensive, and diabetic patient who is considered to be at increased risk for the development of endometrial carcinoma, or the patient with abnormal endometrial cytology, may undergo sampling as a screening procedure in an effort to detect the presence of a premalignant or malignant condition.

Absolute contraindications to endometrial sampling are acute pelvic infection and pregnancy, if abortion is not desired. Relative contraindications include an inadequate pelvic examination, cervical stenosis, marked anterior or posterior uterine flexion, and clotting deficiencies.
Techniques for sampling the endometrium usually produce either a cytologic or a histologic preparation. Cytologic preparations, in general, are less desirable than histologic preparations as they are more difficult to interpret. This is especially true in the detection and grading of neoplasms of the endometrium. Most pathologists are more comfortable using histologic preparations for the evaluation of endometrial disease.

There are two uterine curettes commonly used for office endometrial sampling. The Novak curette was developed in 1935, and the Vabra Aspirator (Cooper Laboratories, Inc, Wayne, New Jersey) in 1968. Both obtain histologic specimens.

The Novak curette has a metal cannula of 5 mm diameter and a rectangular, serrated opening just proximal to its distal end. A syringe may be placed on the proximal end of the Novak curette in order to apply suction against the endometrial lining and improve sampling. The Novak curette is especially well adapted to obtaining endometrial strips from various quadrants of the endometrial cavity for use in dating the endometrium in order to prove ovulation and evaluate corpus luteum function. Kahler, in 1969, presented a series of 160 patients in which he compared biopsies of the endometrium taken with the Novak curette with subsequent dilatation and curettage and hysterec­otomy specimen analysis. In his series there was a 96% positive correlation between the diagnosis obtained using the Novak curette and that obtained on subsequent dilatation and curettage or hysterectomy. Hofmeister reported on over 20,000 biopsies using the Novak curette. He sampled all patients over the age of 35 on a routine basis and those under the age of 35 who reported irregular menses. Seventeen percent of these patients who were found to have endometrial carcinoma were asymptomatic at the time of endometrial sampling. It is on this basis that he states that one in five endometrial carcinomas are asymptomatic and will not be detected without routine endometrial sampling. Hofmeister reported an accuracy of 94% using the Novak curette.

The Vabra Aspirator comes as a disposable unit consisting of a 3 mm metal cannula which has a rectangular curette with sharp lateral edges located just proximal to its distal tip. The metal cannula is attached to a plastic tissue filter and collection container. The collection container must be attached to a vacuum source supplying a negative pressure of approximately 160 mm Hg. With suction applied by the occlusion of holes in the proximal end of the cannula, the curette should be swept in a rotary fashion about the entire endometrial cavity. The specimen will be trapped in the plastic filter. When the procedure is completed, suction is disconnected. The curette is removed from the plastic container, fixative is added to the specimen, and the plastic container is capped. The Vabra Aspirator costs approximately $12 and is disposable. Discomfort caused by Vabra curettage has been equated to that of an intrauterine contraception device insertion. The procedure has met with a high degree of physician and patient acceptance. The Walter Reed Army Hospital has reported 95% accuracy in 300 cases of Vabra curettage followed by a subsequent gynecologic dilatation and curettage performed in order to compare pathologic diagnoses. In that series, one third of the patients were sampled without anesthesia and two thirds with paracervical block anesthesia. The paracervical block anesthesia did not significantly increase the acceptance of the procedure, although it reduced the percentage of patients who reported that they experienced "severe" pain. Ninety-four percent of the patients who have had both the Vabra curettage and subsequent gynecologic dilatation and curettage performed reported that they would prefer to have the Vabra curettage rather than an inpatient dilatation and curettage if this were indicated at a future date.

If office endometrial sampling is to be performed, the patient should be put at ease with an explanation of why the procedure is being done, how it is going to be performed, and what she should expect in the way of discomfort and bleeding. An adequate pelvic examination must be performed in order to determine uterine size

<table>
<thead>
<tr>
<th>TABLE</th>
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<tbody>
<tr>
<td>Indications for Office Endometrial Sampling</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Infertility work-up</td>
</tr>
<tr>
<td>Menstrual disorders</td>
</tr>
<tr>
<td>Postmenopausal bleeding</td>
</tr>
<tr>
<td>Hormonal therapy</td>
</tr>
<tr>
<td>Screening for endometrial cancer</td>
</tr>
<tr>
<td>Abnormal endometrial cytology</td>
</tr>
<tr>
<td>Follow-up of therapy</td>
</tr>
</tbody>
</table>
and position. A uterus which is over 8 to 10 weeks gestational size is not ideal for office endometrial sampling. If it is decided to proceed with sampling, the cervix should be cleansed with an antiseptic solution and a tenaculum placed on the anterior lip of the cervix so that traction will straighten the uterine canal. The uterus should be sounded in order to determine the direction and depth of the uterine canal. The sampling device may then be inserted and the specimen collected. The specimen may be preserved in formaldehyde solution.

Complications associated with endometrial sampling are similar to those of dilatation and curettage but rarely require surgical management. The most frequent complications are uterine perforation, hemorrhage, infection, syncope and pain. Drug sensitivity, if it occurs, is related to the use of systemic analgesia and paracervical block anesthesia.

It must be emphasized that if the physician is unable to obtain an adequate tissue specimen or the pathologist is unable to render an absolute diagnosis on the tissue specimen, office endometrial sampling must then be followed by a more thorough inpatient uterine dilatation and curettage performed under anesthesia. This is to stress the fact that although over 90% of all cases in which endometrial sampling is indicated can be handled as an office procedure, at least 10% of all cases needing sampling must have it performed on an inpatient basis because of inadequate sampling and technical or anatomical difficulties.

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The adnexa are those structures which lie along the uterus, the most important of which are the tubes and ovaries. The portions of the broad ligaments and mesosalpinx which contain embryonic remnants may also, at times, be palpable and therefore must be considered in any differential diagnosis.

Evaluation of the Adnexal Mass

Bimanual Pelvic Examination. The simplest, least expensive, and most fundamental technique in evaluating the adnexal mass is a bimanual pelvic examination. The normal ovary in a prepubertal female is usually not palpable and the normal postmenopausal ovary is so small and atrophic that it, too, is not often felt. The ovary in women between the ages of menarche and menopause, however, is about 1 1/2 X 2 X 3 1/2 cm. The experienced examiner can usually feel ovaries of this size in a cooperative patient of average body build.

During bimanual pelvic examination several determinations concerning the adnexal mass should be made. First, size should be estimated in reference to an absolute standard such as a centimeter ruler; comparison to fruits and vegetables lacks precision and should be avoided. It is important to differentiate cystic masses from those that are solid. The location of the mass and its position in reference to the uterus, rectum and bladder should be described; mobility and tenderness on palpation may also be extremely important in differentiating neoplasms from inflammatory masses.

Intravenous urogram, ultrasound, and computerized tomography. There are several technical procedures using modern medical technology which are available today including intravenous urograms, ultrasonography, and computerized tomography.

An intravenous urogram will often provide helpful information about an adnexal mass as well as outline important portions of the urinary tract. Solid adnexal masses that are extremely vascular may take up the contrast material whereas cystic masses are not likely to do so. Any deviation of the bladder and ureters can readily be seen. The usual scout film of the abdomen taken prior to the injection of contrast material will occasionally show a tooth or portion of bone most commonly associated with a benign cystic teratoma (dermoid cyst).

Ultrasonography is useful in determining the size and location of adnexal masses as well as differentiating solid from fluid components of a mass.

Computerized tomography is considerably more expensive but will precisely delineate certain characteristics of an adnexal mass, especially attachments to bladder and bowel, when used in combination with contrast enhancement techniques.

In spite of the current interest in these newer screening techniques the bimanual pelvic examination is still the most practical means...
whereby most adnexal masses are found and is the basis for most therapeutic decisions.

**Etiology**

**Physiologic.** The ovaries and tubes may be enlarged owing to a number of causes. Physiologic enlargement of the ovary occurs with the formation of the corpus luteum of menstruation and to a greater extent with the corpus luteum of pregnancy. Enlargement because of normal cyclic function should be recognized. Theca lutean cysts are commonly found in association with gestational trophoblastic disease.

Bilateral enlargement of the ovaries is the usual finding in the polycystic ovary of Stein-Leventhal syndrome. Evaluation and treatment are usually medical and directed towards the underlying hormonal problem.

**Inflammatory.** Inflammatory disease involving adnexal structures is due to gonorrhea, the most commonly reported communicable disease in our country today. Acute salpingitis of gonococcal origin may result in a tubo-ovarian abscess which may occupy the entire pelvis. These inflammatory enlargements are usually bilateral, tender, and are accompanied by the usual signs and symptoms of pelvic gonococcal infection.

**Neoplastic.** The third major category of adnexal masses is neoplastic which may be either benign or malignant. The benign cystic teratoma is the most common benign neoplasm of the ovary in the young adult woman. The identification of a tooth within the mass on a pelvic roentgenogram may be diagnostic, but most dermoid cysts are not identifiable in this manner. The dermoid cyst is often bilateral and arises in the central portion of the ovary. As it enlarges the ovarian cortex is compressed. In dermoid cysts up to 10 cm or 15 cm in diameter it is frequently possible to find a cleavage plane between the cyst and the ovarian substance. Ovarian conservation by cystectomy rather than oophorectomy may be practical.

A paraovarian cyst arises from embryonic remnants within the mesosalpinx and can usually be identified because it is separate from the ovary. The fallopian tube is often stretched across the cyst as the mesosalpinx is stretched. In this instance, also, a cystectomy will preserve a functioning ovary and tube on the involved side.

Approximately 17,000 cases of ovarian cancer are diagnosed in the United States annually. Each year between 11,000 and 12,000 women die from this disease. The majority of these patients have extensive disease involving structures out of the pelvis at the time of initial laparotomy. Most ovarian cancers are epithelial tumors and a smaller number are of stromal and germ cell origin. The scope of this discussion does not include the total management of ovarian cancer, but the importance of adequate evaluation at the time of initial laparotomy cannot be overemphasized. The cell type and degree of differentiation of the tumor, together with the clinical extent of disease determined at laparotomy, are critical in planning management and forming a prognosis. It is impossible to evaluate the upper abdomen adequately through a Pfannenstiel incision. While the cosmetic advantages are obvious, the critical importance of adequate staging must be the major consideration at the time of surgery.

Many ovarian cysts can be removed intact through an adequate incision. The major advantage of the vertical midline incision is that it can be extended from the symphysis pubis beyond the umbilicus (to the xyphoid cartilage if necessary) to remove a large cyst and to satisfactorily explore the upper abdomen. In the patient with Stage III ovarian cancer with involvement of the omentum and peritoneal surfaces it is necessary to palpate and visualize the liver and diaphragm so that biopsies can be performed. It is also important in the patient with ovarian cancer which appears to be grossly limited to the pelvis to evaluate the organs of the upper abdomen. If biopsies are taken from the inferior surface of the diaphragm, the omentum and para-aortic lymph nodes, between 10% and 25% of patients will be found to have microscopic disease even though grossly evident tumor is limited to the pelvis.

The adolescent and young adult woman with unilateral ovarian tumor presents a unique problem. It is natural for most of these patients to wish to preserve their childbearing capacity and it is reasonable that the operating surgeon will respect their desire. Conservative surgery consisting of unilateral salpingo-oophorectomy is certainly justified in young patients with tumors such as dysgerminomas and granulosa theca cell tumors. It is particularly important if such patients, when conservative surgery is initially done, that adequate inspection and biops
of the contralateral ovary be carried out. It is usually preferable, in the young patient, to perform a more conservative operation if there is any doubt about the final pathologic diagnosis. A more radical procedure can usually be safely done at a later time if careful pathologic examination proves it to be necessary.

**Metastatic cancer.** Ovarian cancer may be secondary to primary tumors in the gastrointestinal tract, the breast, and the endometrium as well as other less common sites. Usually, the primary site is obvious, however, in some patients with endometrioid cancer of the ovary (resembling endometrial malignancy) it may be exceedingly difficult to differentiate a primary endometrial cancer which is metastatic to the ovary from a primary endometrioid cancer of the ovary metastatic to the uterus.

**Fallopian tube.** The fallopian tube must also be regarded as a primary site for an adnexal mass. Aside from inflammatory conditions, ectopic pregnancy is probably the mass most commonly seen. The presence of pain, the tender mass, and the history of overdue menses together with a positive pregnancy test and blood in the cul-de-sac will often help in making this diagnosis.

Primary carcinoma of the fallopian tube is seldom suspected prior to operation. Occasionally, a history of intermittent watery discharge from the vagina and an oval-shaped pelvic mass are noted in cancers of the tube.

**Management Guidelines**

Certain guidelines should be kept in mind in evaluating adnexal masses. Any adnexal enlargement in the postmenopausal woman should be an indication for removal. In the adult woman prior to the menopause a cystic mass 5 cm or 6 cm in size that persists through one or more complete menstrual cycles is an indication for exploration. If the mass is enlarging during that time of observation, the indication for surgery is more urgent; solid, bilateral masses are more suspicious than cystic unilateral masses.

Finally, there are a few situations in which emergency exploration is indicated. Torsion of an ovarian cyst, characterized by pelvic pain of increasing severity, is often accompanied by a mild leukocytosis and low-grade fever; the pain is usually aggravated by motion. Hemorrhage from a ruptured ectopic pregnancy demands immediate surgery as soon as the diagnosis is made as does a ruptured tubo-ovarian abscess; the latter is best treated by complete hysterectomy and bilateral salpingo-oophorectomy. Failure to act promptly in such instances may result in generalized peritonitis.
Cancer has a potentially profound affect upon the emotional and physical life of the patient and his or her family. For most people the word “cancer” has a fearsome connotation.

This discussion explores the areas of self-image, body-image, and personal relationships that are often altered in cancer patients, as well as the emotional and cognitive states which can result from malignancy and its treatment. We will also review some techniques for helping the patient. It is important to remember that the psychological responses to any illness are individual and largely determined by the patient’s past experience, psychological strengths, weaknesses and social supports, and by the patient’s values, including religious beliefs.

Psychological Aspects

ALTERED SELF-IMAGE

Most healthy people live with a comforting sense of invulnerability; this feeling is violently interrupted by the diagnosis of cancer. Patients feel numb, shocked, and many even disbelieve the accuracy of the diagnosis. In extreme situations, this denial can be so strong that the patient even refuses complete evaluation and treatment.

Usually, as the shock fades and the awareness of illness increases, the patient must alter his or her self-image to include the unpleasant concepts of being sick and of being a patient; this frequently results in a loss of self-esteem as illness is often equated with inferiority, dependency, and helplessness.

In addition to feelings of helplessness, the cancer patient may even wonder if he or she is responsible for causing the illness. “If I had given up smoking 10 years ago, maybe this wouldn’t be happening to me!” Further, the belief that God punishes sinners with illness may motivate the patient to wonder if the cancer is a punishment for past sins, known or unknown. It is common to hear patients angrily protest, “What have I done to deserve this?” These angry and guilty feelings often contribute to depression and hopelessness.

Job performance is another very important aspect of self-image for most people. The cancer may be so debilitating that many weeks are lost from the job or homemaking, and these functions may have to be severely curtailed or discontinued. This frequently leads to a feeling of uselessness and a marked loss of self-esteem.

ALTERED BODY IMAGE

Just as people have images of themselves as personalities, they also have important mental pictures of their bodies synthesized from proprioceptive experience, self-observation, concepts of one’s personal appearance, the input of others, and from social norms. Any illness, especially one that mutilates the body, can alter the body-image, and to a greater degree if the damage is external. Thus, mastectomy seems to alter body-image more than hysterectomy.
Changes in body-image are associated with changes in self-image. For example, the hysterectomy patient may feel that her sexuality is diminished, while the patient with a colostomy may generate his or her inability to control defecation into a feeling of being generally out of control.

Each body part has individual meaning for each person; it is therefore important for the physician to explore the meaning of the damaged body part for each patient. Mental agility may be highly prized by one person and valued to a much lower degree by someone who is very concerned with physical attractiveness.

RELATIONSHIPS

Cancer patients often have significant problems with relationships. Friends and relatives may withdraw from the patient because they are unsure how to handle the subject of the patient's illness. The patients themselves may withdraw from relationships because they feel weak, worthless, depressed, and finished. Postoperative head and neck cancer patients often report that people stare at them and then move away. The mastectomy patient may have difficulty finding a comfortable sexual partner. Since appearance and health are important factors determining acceptability in our culture, patients who feel ugly and sick may fear that others will withdraw acceptance and love.

EMOTIONAL AND COGNITIVE STATES

In addition to problems with self- and body-image and relationships, certain abnormal mental changes often accompany serious malignancy. One study of hospitalized cancer patients revealed that more than one half showed moderate to high levels of depression, and 30% had elevated anxiety scores. Almost one quarter of these patients had overall emotional symptom patterns virtually similar to those of patients admitted to an emergency psychiatric service.

Depression vs Mourning. Although pathological depression is a common finding associated with cancer, it is often difficult to differentiate it from both the normal process of mourning and from the direct physical effects of the malignancy. Many of the signs and symptoms of depression are also characteristic of mourning and physical illness. Insomnia, anorexia, loss of weight, loss of interest in usual activities and sexuality are hallmarks of pathological depression but may also result directly from a painful malignancy. Diurnal variation in mood is a useful differentiating characteristic, as people with physical illness usually feel better when they are rested in the morning and worse as the day goes on. The reverse is true of clinical depression. Further, depressed patients often have a personal and family history of serious depression. Self-deprecation and guilt are more characteristic of clinical depression than normal mourning.

Anxiety. Anxiety in the cancer patient can result from realistic fears of pain, surgery, mutilation, or the side effects of chemotherapy. It can also be secondary to fears of helplessness, dependency or death and can add further debility to the patient's already troubled course since insomnia, nausea, and irritability are frequent accompaniments.

Organic Problems. Dementia is "a deterioration of previously acquired intellectual abilities of sufficient severity to interfere with job functioning, memory, abstract thinking, judgment, personality, and impulse control." Many cancer patients suffer from this loss of intellectual capacity and others even become agitated and out of touch with reality as a function of overwhelming stress, sensory isolation, or organic factors. Pain, fever, electrolyte and endocrine changes as well as treatments and medication can cause delirium, anxiety, and depression. Sedatives, psychotropic medication, and steroids can produce mental changes. Those patients who are quietly disoriented may be ignored and therefore undiagnosed. Their loosened contact with reality may be very frightening to them and it certainly decreases their ability to cope daily or to comply with treatment.

Defense Mechanisms. All people have unconscious mental mechanisms which are used to protect the ego from excessive emotional stress. Denial is one of the defense mechanisms frequently used by cancer patients. In denial unpleasant information is forgotten, a process which can be helpful or detrimental. The patient who continues chemotherapy but denies his or her unfavorable prognosis may be using this defense mechanism constructively to avoid anxiety. On the other hand, the patient whose denial prevents her from seeking prompt evaluation of a breast mass is hurting herself.

Polivy et al conducted a pertinent experi-
ment exploring defense mechanisms in a large group of women with breast masses. The study began in the pre-diagnosis phase and the study sample was later divided into one group who had benign lesions at biopsy and another group who had mastectomy for malignancy. The body image, self-image, and general mental well-being of all patients were studied before and after surgery and on 6 to 12 month follow-up. Before biopsy both groups strengthened themselves and mobilized their resources to deal with the stress. They maintained adequate body- and self-images and did not show significant anxiety or depression. Immediately post-biopsy the nonmalignant group, feeling safe, was able to express their emotions of feeling scared, assaulted, and helpless. The mastectomy patients did not express these feelings. They were busy maintaining their defenses by using denial to deal with the operative stress. They were being strong and brave and telling their doctors and their husbands and themselves that things were going well. Six to 12 months after surgery the nonmalignant group was back to normal and the cancer group, having survived the acute postoperative phase, was now showing evidence of marked decrease in self- and body-image with significant evidence of depression and anxiety. This study is clinically useful because it alerts us to be aware that the patient may be hiding emotional symptoms in the early postoperative phase when we are forming our opinion about her health and prognosis. Up to a year following mastectomy, many patients will have significant depression with insomnia, anorexia, suicidal ideas, and this is true even if the patients have an excellent long-term prognosis. About 15% will seek professional help for mastectomy-related problems and many who had normal and satisfying pre-mastectomy sexual relations will have significant sexual difficulties for many months post-surgery.

Therapeutic Management

A "temperogluteal" approach is usually required to competently evaluate the patient, to understand his or her feelings, and to facilitate the resolution of the problems. This approach means sitting down and spending time with the patient. A serious discussion of feelings is highly unlikely if you are standing by the bedside writing in the chart or if you are in your office answering the phone or being interrupted by your nurse. The presence of a box of kleenex is an important nonverbal message to the patient that you are a doctor who can handle the expression of feeling. Even in privacy and with an interested doctor, the patient may give an inaccurate social response, "I'm fine," when greeted. If you sit down and say, "How are you really doing?", there is a good chance the patient will talk honestly with you. Once the patient knows you are really interested in his or her feelings, then it is appropriate to find out exactly what the person is feeling about the condition, about the diseased body part and about the future. It is also important to find out what the patient knows about cancer as beliefs about treatment and prognosis may be inaccurate. In order to understand each patient's emotional response to the cancer and the person's strengths and weaknesses, the physician should ask personal questions to explore the patient's character, to determine how stress has been handled in the past, and what the personal meaning of the damaged organ or illness is to the individual. It is equally important to respect a patient's need for privacy and not to insist on exploration of these issues if the patient is unwilling or unready.

Understanding the patient's personality type can be extremely important in helping you to individualize your approach. A very dependent patient will usually be comforted by a fairly parental approach: "I'm going to help you get through this; things are under control." If you are dealing with a person who is more obsessive-compulsive, for example, someone who is hard driving, meticulous, and likes to control his or her anxiety by having facts and information, an approach that offers facts and a sharing of control with the patient will be welcomed whereas the parental approach may make this patient very anxious. There are many other personality types and guidelines for medical management.

In the advanced stages of malignancy many patients fear abandonment, a fear often greater than the fear of death. Repeated medically unnecessary calls for attention and requests for pain medication can be the patients' communication of their fear of loneliness and their attempt to obtain reassurance that they will be attended.

We may forget to evaluate how various...
family members are feeling about the illness and the future. Their attitudes and support can be critical. They may need help in coping with the illness and in dealing with their feelings about it. Mobilization of self-help organizations can also be effective by demonstrating that others with similar histories have returned to relatively normal and effective lives.

A stance of realistic hopefulness is most important in helping the patient. This concept embodies two necessary components of empathetic medical care; to be honest while retaining hope. No matter how grim the situation, no matter how grave the prognosis, a thoughtful physician can always offer something realistically hopeful. The ability to say, "we are going to stick with you, you are not going to be alone, we are going to keep your pain under control," is extremely helpful and comforting to the patient.

Most of the psychological problems of the cancer patient can be effectively managed by the primary care physician. Supportive psychotherapy is often sufficient; however, psychiatric evaluation, psychopharmacology, behavior therapy, or even electroconvulsive therapy may be indicated. Consultation with a psychiatrist skilled in the emotional problems of the medically ill is indicated if the emotional diagnosis is unclear, if there are questions about treatments, or if the primary physician is having difficulty managing the symptoms. It is important to properly prepare the patient for psychiatric consultation by emphasizing that many people have difficulty coping with illness and that the psychiatrist will offer the patient and physician advice about the emotional aspects of the illness and about the effects of treatments and medicines on mental functioning. Naturally, psychiatric consultation is best accepted when the psychiatrist is a regular member of a multidisciplinary team routinely working with cancer patients and their families.

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17th Annual RADIOLOGY POSTGRADUATE COURSE—CHEST RADIOLOGY
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COMPUTED TOMOGRAPHY OF THE PLEURA AND CHEST WALL: Stuart S. Sagel, M.D.
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COLLAGEN VASCULAR DISEASES OF THE LUNGS: Elias G. Theros, M.D.

TUESDAY, MARCH 3

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CT IN EVALUATION OF VASCULAR AND NON-VASCULAR MEDIASTINAL LESIONS: Stuart S. Sagel, M.D.
THE EVALUATION OF PERIPHERAL MASSES IN THE LUNGS: Elias G. Theros, M.D.
THE VARYING MANIFESTATIONS OF BRONCHOGENIC NEOPLASMS: Elias G. Theros, M.D.
NEEDLE ASPIRATION BIOPSY OF THE THORAX: Stuart S. Sagel, M.D.
PREOPERATIVE EVALUATION OF THORACIC NEOPLASM: Szabolcs Szentpetery, M.D.
RADIATION THERAPY OF THORACIC MALIGNANCY: Tapan A. Hazra, M.D.

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RADIOLOGY IN THE INTENSIVE CARE UNIT: Theresa C. McLoud, M.D.
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THORACIC LYMPHOMA: James W. Walsh, M.D.

RESPIRATORY DISTRESS SYNDROME—MEDICAL/SURGICAL CAUSES: Michael B. Kodroff, M.D.

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