SUGGESTIONS IN TEACHING GYNECOLOGY, WITH DEMONSTRATION OF SPECIAL (MECHANICAL) CHARTS AS AN AID IN THIS WORK[1]

By JOHN A. SAMPSON, M. D., Albany, New York
Clinical Professor of Gynecology, Albany Medical College Gynecologist to Albany Hospital and South End Dispensary

FROM the standpoint of the development of the student's knowledge of medicine in general, three phases in the study of any of its clinical branches naturally suggest themselves:

1. The study of each disease as a "science" i. e., its etiology, the changes in anatomy occurring in its different stages as we see them in the pathological laboratory and, of the greatest importance, the study of the explanation of its symptomatology;

2. The rearrangement of the knowledge gained from the study of disease as a science in order that this knowledge may be applied to its greatest advantage in clinical work, i. e., the classification of the symptoms caused by the diseases studied, and the study of the various causes of each symptom from the standpoint of that symptom and also with a view to ascertaining how its causes may be differentiated. This phase may be called "the study of the significance of the various symptoms";

3. The study of the art or technique of the clinical branch of medicine under consideration which requires actual contact with the patient.

FIRST PHASE, THE STUDY OF ANY DISEASE AS A "SCIENCE"

In order that the student may clearly understand the changes caused by the disease in any part of the body, its effect on the individual as a whole, and the explanation of its symptomatology, knowledge of the following is necessary:

1. The normal anatomy of the organs and parts which may be altered by the disease, i. e., their development, structure, form, size, anatomical relations, mobility, *and the manifestations of these;*

2. The normal physiology of the organs and parts, how their functions are accomplished, and especially their sensibility because pain, one of the most important subjective symptoms, can arise only from sensitive structures;

3. The changes which the pathological process under consideration (whether injury, infection, or new growth) causes in the tissues of the body.

In addition, the student must realize that the symptoms of any abnormal condition are only manifestations of normal anatomy and normal physiology as altered by that condition; those which the patient perceives are known as subjective symptoms and those which the physician detects are known as objective symptoms. Thus equipped, the student is ready to study the diseases intelligently and, I believe, only when thus equipped.

The etiology and course of each disease may be demonstrated by means of sketches on the blackboard, charts, modelling clay, casts, or actual specimens, using whichever of these methods as are best adapted to the particular subject under consideration. In this way the various conditions arising during the course of any disease or resulting from it may be developed before the class, always beginning with the normal and from it developing the abnormal.

The conditions caused by each disease may thus be presented to the class as illustrated problems which they should attempt to solve from their knowledge of normal anatomy, normal physiology, the manifestations of these, and the knowledge of the changes caused by the pathological process present. In order to facilitate the solution of these problems, such questions as the following are asked (calling the members of the class up in turn): 1. Describe the abnormal condition present? How did it arise? 2. With what functions may it interfere? 3. What manifestations of altered anatomy and altered physiology may be noticed by the patient, i. e., what are the sub-

[1] Presented to the American Gynecological Society, May 26, 1908.

jective symptoms? 4. What manifestations of altered anatomy and altered physiology may be detected by the physician, i. e., what are the objective symptoms. 5. What conditions, already studied, may simulate the present one? As this phase of the subject is preparatory to future clinical work, methods of diagnosis, treatment. and prophylaxis may be briefly discussed.

The students are thus taught to observe, use what knowledge they already have and work out, with the aid of the teacher, the various problems presented, instead of memorizing data obtained from didactic lectures or text-books. The students' answers corrected, when necessary, and supplemented by information which they cannot be expected to reason out should constitute our present knowledge of the disease under discussion.

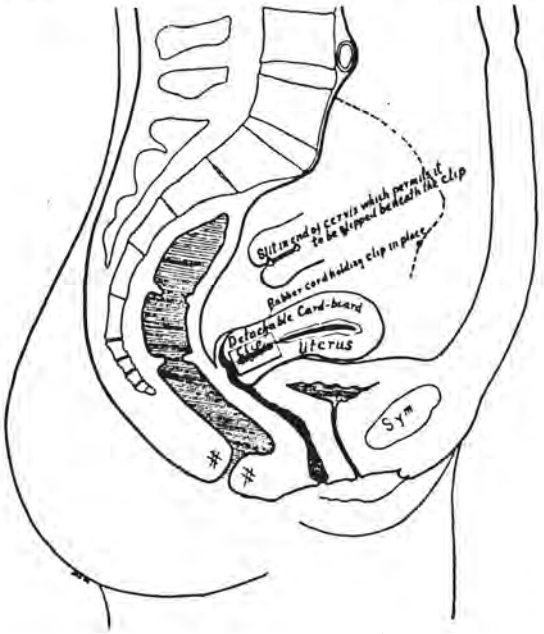

Fig. 1. Illustration of (mechanical) chart representing the pelvis in sagittal section. The cardboard uterus may be removed and other pieces of cardboard, representing various pathological conditions, may be substituted.

The chart, from which the illustration was made, represents a natural size sagittal section of the female pelvis; the cardboard uterus is held in place by the clip shown in the drawing. The uterus may be moved about indicating the effect of distension of the bladder, posture of the individual etc., and as soon as the uterus is released the elasticity of the rubber cord, holding the clip in place, causes the uterus to return to its previous position. The slit in the end of the cervix (see illustration) permits the cardboard uterus to be removed and other pieces of cardboard, representing abnormal conditions, to be inserted as shown in the next illustration, thus showing that the normal may be replaced by the abnormal.

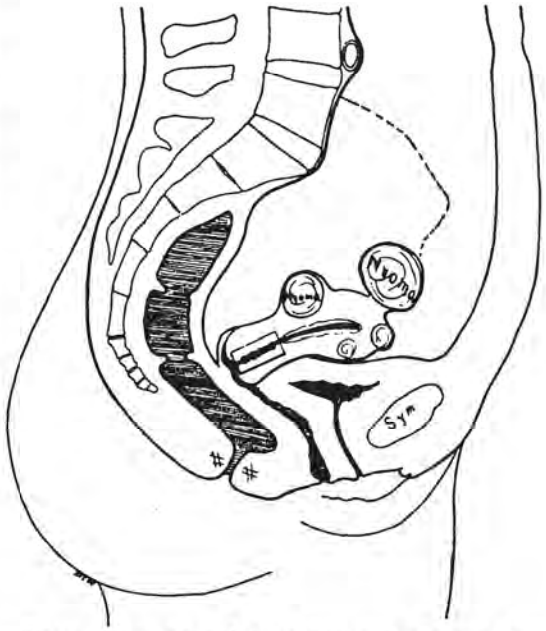

Fig. 2. Illustration of chart representing a uterus containing several small myomata.

The piece of cardboard representing the normal uterus shown in Fig. 1 has been replaced by one representing a uterus with several small myomata. This uterus may be moved about as in the previous instance.

This illustrated problem is presented to the class and they are expected to solve it from their knowledge of normal anatomy, normal physiology, the manifestations of these, and the knowledge of the changes caused in the pelvic structures by the condition present. They are aided in this work by asking such questions as these: 1. Describe the abnormal conditions present. How did they arise? 2. Do they interfere with the function of any of the pelvic structures or with the general well-being of the patient? and if so, how? 5. What manifestations of altered anatomy and altered physiology may be noticed by the patient? i. e., what are the subjective symptoms? 4. What manifestations of altered anatomy and altered physiology may be detected by the physician? i. e., what are the objective symptoms? 5. What conditions, already studied, may simulate the present one? 6. How can a diagnosis be made? 7. What should be the treatment of this condition? 8. Can this condition be prevented? and if so, how?

Let us consider the subject of uterine myomata from the standpoint of its study as a "science" and particularly with a view to the demonstration of mechanical charts as an aid in illustrating the various problems occurring in its different phases.

The development of myomata should be discussed first. Their possible situations in

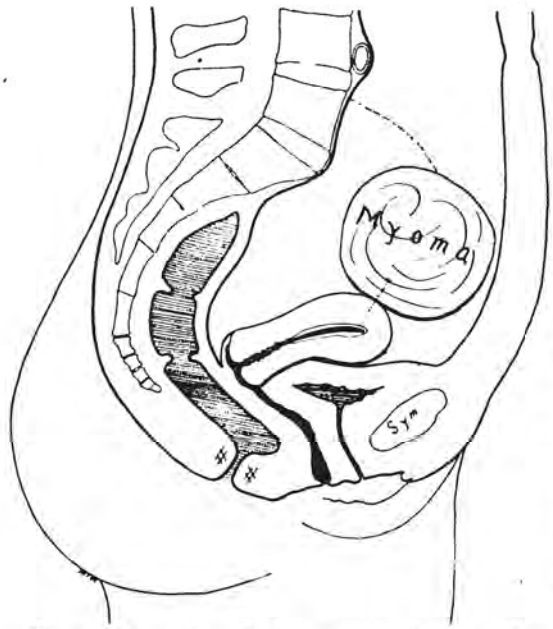

Fig. 3. Illustration of chart representing a medium size subserous myoma arising from the upper surface of the body of the uterus.

This condition could be represented as in the previous illustration, but is better shown by adding the myoma to the uterus. As myomata may arise in any portion of the uterus so "artificial myomata" may be added to any portion of an artificial uterus and the resulting conditions indicated and studied. The uterus is made of heavy cardboard and is held in place by a rubber cord passing through two holes in the cervix, which permits it to be moved about as in the previous chart. The myoma is also made of similar cardboard and can be attached to any portion of the uterus by means of the pin embedded in it.

The problem is presented and solved by asking questions similar to those asked in the solution of the preceding problem.

the uterus can be well indicated by drawings on a blackboard or by charts. The various degenerative changes are best shown by actual specimens. The frequency and significance of these changes should be emphasized.

The use of mechanical charts as a means of illustrating the problems arising in the various phases of this subject are shown in Figs. 1, 2, 3, 4, 5, 6, 7, and 8.

In this way and by means of other methods of illustration, the various conditions, arising from or associated with uterine myomata, may be presented to a class as illustrated problems and solved by them.

At the close of the study of uterine myomata, a clinical summary should be given. Their frequency, the age at which they occur, etc., should be discussed. The classification, which is usually presented at the onset of the study of any subject, I believe should be given at the close, as it is but an enumeration of the various types which have been studied. The one worked out in my course this year was as follows: 1. Small interstitial and subserous myomata — seldom any symptoms (Fig. 2); 2. Medium size subserous myomata — may or may not cause any symptoms depending on their situation (Figs. 3, 4, and 5); 3. Large subserous myomata — do not necessarily cause any subjective symptoms; 4. Small submucous myomata — may cause bleeding (Fig. 7); 5. Large interstitial and submucous myomata — often cause bleeding; 8. Submucous myomata protruding from the cervix; 7. Cervical myomata; 8. Adeno-myomata; 9. Myomata with secondary changes (degenerations); 10. Myomata with other pelvic conditions, as pregnancy, weakened pelvic floor, tubal infection, ovarian cysts, other uterine tumors.

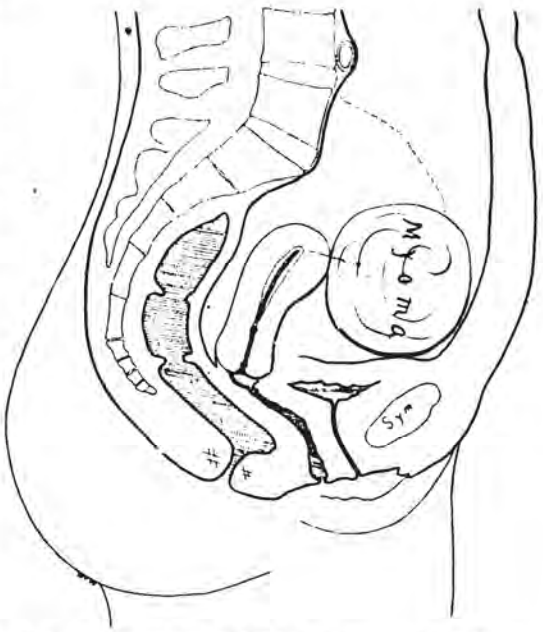

Fig. 4. Illustration of the chart represented in the preceding illustration, and demonstrating the effect of changing the position of the myoma from the upper to the anterior surface of the body of the uterus.

The condition resulting is presented to the class as an illustrated problem and solved as in the previous instance. See Fig. 2.

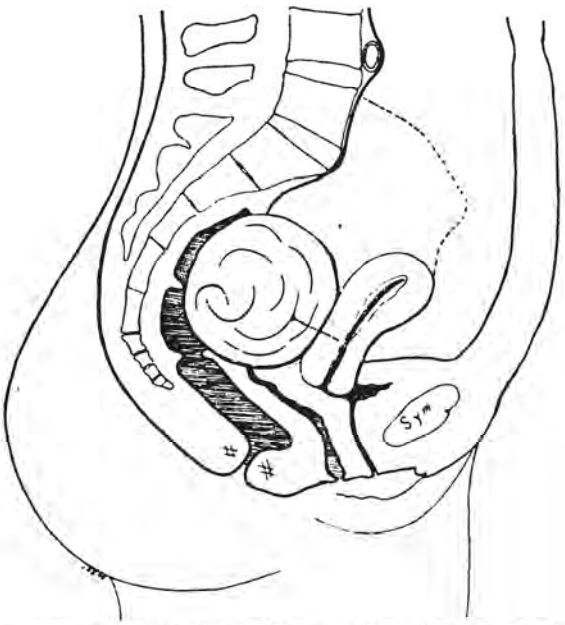

Fig. 5. Illustration of the same chart shown in Figs. 3 and 4, with the position of the myoma changed to the posterior surface of the uterus.

The change in the position of the uterus is well shown and the change in the rectum and bladder can be imagined or shown by another chart.

The condition resulting is studied as in the previous illustrations.

In this way the conditions resulting from *different size* subserous myomata in *various situations* may be demonstrated, and these same conditions may be studied as illustrated problems by answering questions similar to those asked in Fig. 2.

This chart may be used in the study of other conditions than uterine myomata by attaching pieces of cardboard, representing these conditions, to the uterus.

The student realizes that the symptoms of uterine myomata vary with their size, situation, whether or not submucous, with secondary changes and with associated conditions. He also realizes that often they do not cause any subjective symptoms, but may give rise to certain subjective and objective symptoms and, therefore, they should be considered when any of these symptoms are present in a given case.

Other abnormal conditions of the pelvic structures may be studied in like manner, some lending themselves to this method of presentation better than others.

SECOND PHASE, THE STUDY OF THE SIGNIFICANCE OF EACH SYMPTOM

Each symptom (whether subjective or objective), which may be caused by diseased conditions of the pelvic structures, is presented to the class for their consideration and is studied by asking the members of the class in turn such questions as will give for their answers the various causes of that symptom, how each cause gives rise to it and how these causes may be differentiated.

Let us consider the most important subjective as well as objective symptom referable to the pelvic organs, namely, uterine bleeding, as

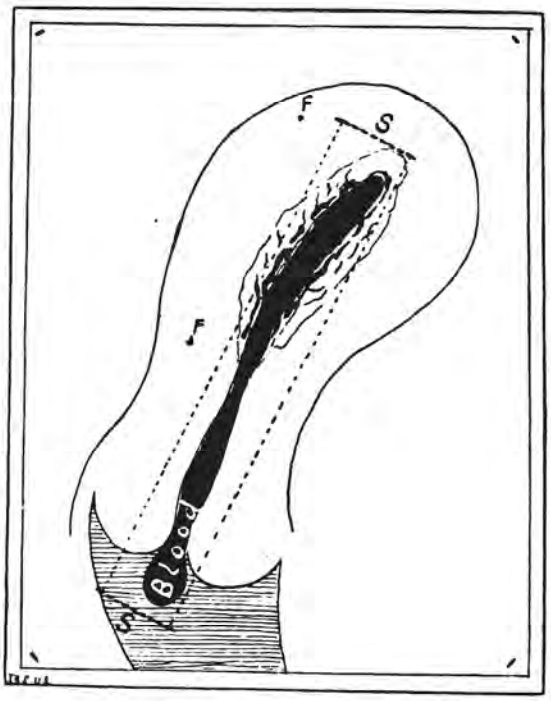

Fig. 6. Illustration of chart representing normal menstruation.

The chart represents the uterus (in sagittal section), about six times enlarged. The drawing is made on heavy index bristol board which is attached at its four corners to a very heavy pulp board. The endometrium is thickened and hæmorrhage into its tissues and just beneath the surface epithelium is indicated by red ink (black in the illustration). A strip of cloth about four inches wide (see dotted lines) passes through two slits in the pulp board (S S in drawing) which are so situated that the cloth lies behind the uterine cavity and portion of the vagina. The uterine cavity and portion of the vagina are cut and thus the portion of the cloth behind the part cut out is exposed. Half of the cloth is red (black in the illustration), and by drawing the cloth through the slits in one direction the red portion appears, i. e., bleeding, and by reversing the motion it disappears, i. e., the bleeding ceases. The two paper fasteners F F are for the purpose of attaching pieces of cardboard representing abnormal conditions, as shown in the next illustration and in Fig. 9.

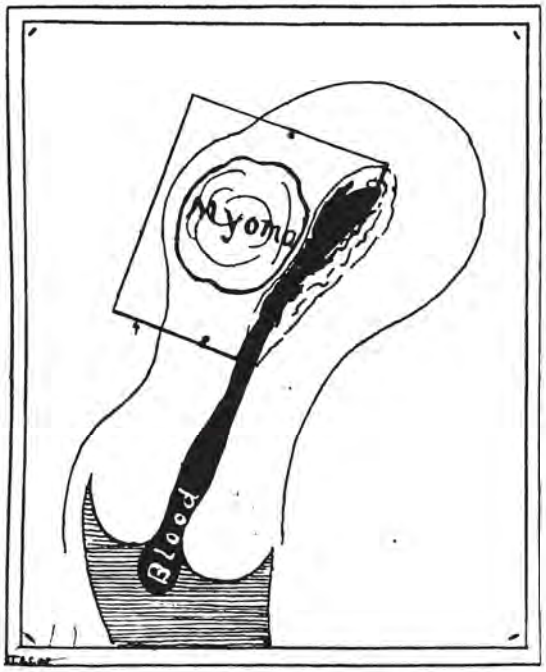

Fig. 7. Illustration of chart demonstrating the influence of a submucous myoma on menstruation.

A piece of cardboard representing a submucous myoma has been attached to the chart shown in the previous illustration by means of fasteners F F. The thinning of the endometrium over the tumor is shown and the local congestion often resulting from the same is indicated by the increased hæmorrhage into the tissues of the endometrium at this place.

Menstruation is indicated by drawing the cloth so that the part stained red (black in illustration) appears and this with the increased local congestion of the endometrium over the myoma suggests that a submucous myoma is apt to prolong the menstrual flow and make it more profuse.

an example of a symptom which is very well adapted to this method of teaching. The members of the class are asked to enumerate the various conditions (already studied) which cause uterine bleeding. Each cause is studied by presenting the illustration previously used to demonstrate how that particular condition gave rise to this symptom in the study of that condition in the first phase of the work. The type of bleeding is now noted, and methods of diagnosis are discussed.

The following illustrations represent the charts used in demonstrating how some of the causes of uterine bleeding give rise to that symptom.

The significance of uterine bleeding is thus appreciated by the student and also that of the various types, i. e., whether or not connected with pregnancy, whether associated with menstruation or independent of it, whether scanty or profuse, frequent or infrequent, with or without pain, in young, middle aged, or those past the menopause. He furthermore appreciates how he should go about to make a diagnosis.

Let us consider the median symmetrical abdominal pelvic tumor as an example of an objective symptom which is well adapted to this method of teaching. This is best shown by studying the five illustrations (Figs. 15–19) which represent the charts used in demonstrating how four common causes of this symptom give rise to it.

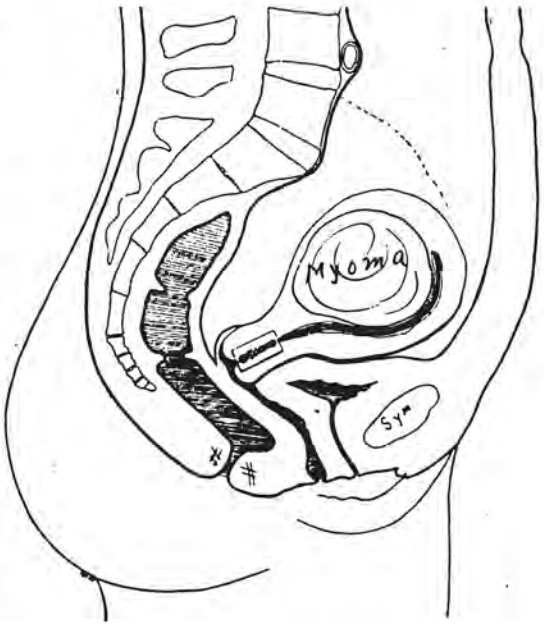

Fig. 8. Illustration of chart representing a symmetrically enlarged uterus containing a submucous myoma.

This is the same chart illustrated by Figs. 1 and 2, except that a piece of cardboard representing a uterus containing a submucous myoma has been inserted in place of the others.

The problem is presented in the same way as the one shown in Fig. 2.

By this and other methods of illustration, other types of uterine myomata may be presented to the class as illustrated problems. See Fig. 18, which is an illustration of another chart used in the study of uterine myomata.

The chart represented in this illustration may also be used in the study of other conditions than uterine myomata by inserting pieces of cardboard representing these conditions in place of the one shown in the above-mentioned illustration.

The student thus sees how the various conditions which may give rise to a median symmetrical abdominal pelvic tumor cause it, viz., by occupying that part of the body. He also appreciated how these conditions may be detected.

In like manner the other subjective and objective symptoms may be studied; but all are not as well adapted to this method as the two just presented.

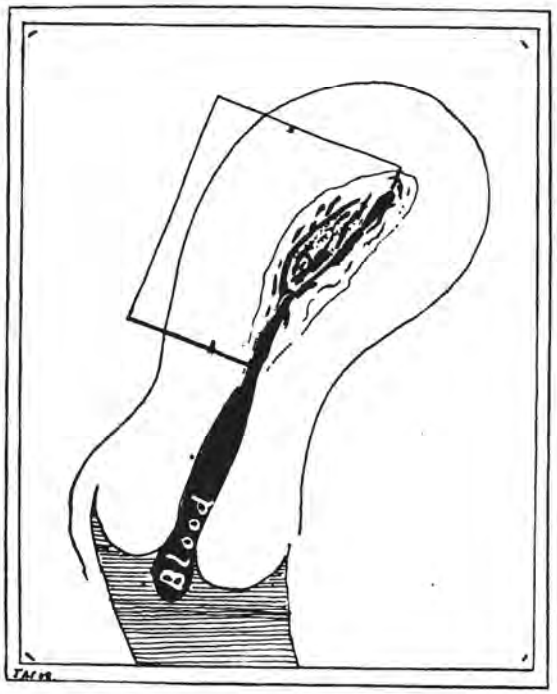

Fig. 9. The significance of uterine bleeding. Illustration of chart demonstrating how a polyp causes "menorrhagia."

This is the same chart shown in Figs. 6 and 7, and in place of the cardboard representing a submucous myoma, as shown in Fig. 7, one representing a polyp has been substituted. The same chart was used to demonstrate the origin of uterine bleeding in the study of uterine polypi in the first phase of the work.

The problem is presented to the class and solved by asking such questions as these: 1. How does a uterine polyp cause "menorrhagia." 2. What is the type of the bleeding? 3. How can a diagnosis be made?

The piece of cardboard showing the polyp may be substituted by others representing a submucous myoma (as already shown), a portion of retained placenta, hypertrophy of the endometrium, and cancer of the body of the uterus. Each of these conditions often give rise to the same type of bleeding, i. e., a "menorrhagia," and each may be presented and studied as the one just shown.

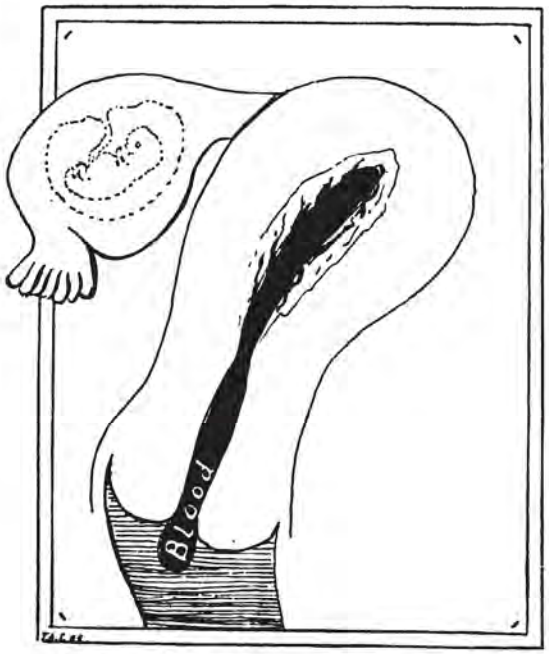

Fig. 10. Illustration of chart demonstrating the source of "irregular menstruation" in tubal pregnancy.

This is the same chart shown in the preceding illustration. The piece of cardboard representing the polyp has been removed and a piece of cardboard representing a tubal pregnancy has been inserted in a slip made to receive it.

This problem is presented and solved as the preceding one, i. e., by asking such questions as these: 1. How does tubal pregnancy cause uterine bleeding? 2. What is the type of the bleeding? 3. How can a diagnosis be made?

THIRD PHASE, THE STUDY OF THE ART OR TECHNIQUE OF GYNECOLOGY

Proficiency in this art, whether in "taking histories" or detecting the manifestations of altered anatomy and altered physiology (physical examination) or carefully considering each datum obtained and from this consideration determining the condition present (making a diagnosis) or treatment, requires actual clinical experience on the part of the student in the dispensaries, wards of our hospitals, and in private practice. I believe that this phase of the subject is best taught by dividing the class into small groups of two or four men — two if feasible — and permitting them to study the cases in the dispensaries and wards of our hospitals. Charts, models, specimens, etc., are also of great value in this work as a means of

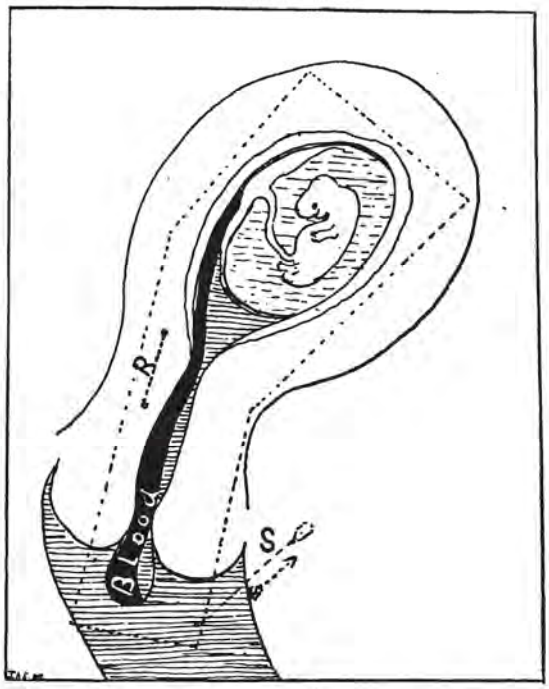

Fig. 11. Illustration of chart demonstrating the source of uterine bleeding in threatened abortion.

The chart is the same size as the preceding ones and represents the uterus in sagittal section. The uterine cavity and portion of the vagina have been cut out, and back of this chart is placed a piece of cardboard (see dotted lines) on which is represented the contents of the uterus and vagina which have been cut out. The rest of this piece of cardboard is painted red (black in illustration) to represent blood. The cardboard is held in place by a rubber cord (R), and a piece of string (S) is attached to its lower right hand corner. When the piece of cardboard is in place one sees the pregnant uterus in sagittal section and no evidence of bleeding, but on pulling the string, as indicated by the arrow, the cardboard is pulled to one side, thus separating the placenta from its attachment to the uterus, and the portion colored red appears as shown in the illustration by the black ink.

This chart is studied as the preceding one.

demonstrating the probable origin of the symptoms present in a given case and also enabling a comparison with other conditions. I have a series of casts representing the various conditions appearing about the vulva and perineum — as new growths, cystocele, rectocele, and prolapsus — and another series representing various conditions of the cervix. I have used various material in making these casts, as plaster paris, clay, "plasticine," wax, printer's roller composition and rubber, each having its own field of usefulness.

Case-teaching gives practice in the process of reasoning so essential in making a diagnosis and it is particularly applicable in teaching gynecology where clinical material is often inadequate.

The method of presenting abnormal conditions as illustrated problems may also be used in examinations, as for example, the mid-year

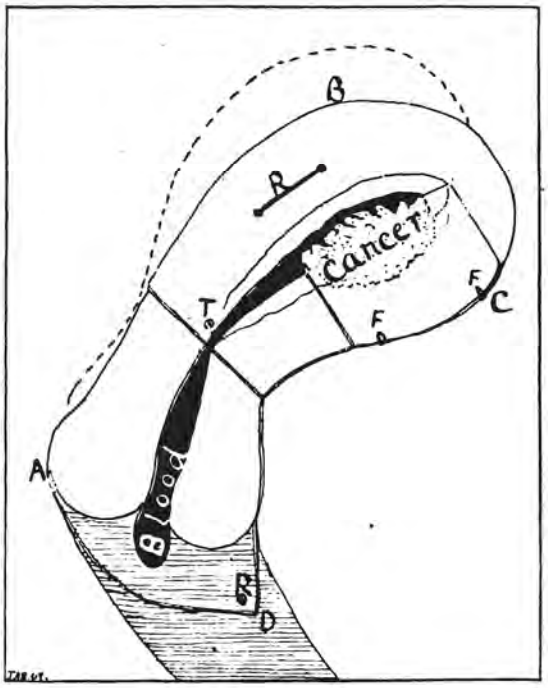

Fig. 12. Illustration of chart demonstrating the source of uterine bleeding in early cancer of the body of uterus.

The uterus and portions of vagina, A B C D, consist of two pieces of cardboard fastened together by a rivet (T) at the level of the internal uterine os. The cardboard uterus is attached to the chart by the rubber cords R R. The rivet and rubber cords permit the uterus to be moved about as occurs in straining, etc. The uterine cavity has been cut out as in the preceding illustration and the chart, just behind the portion that has been cut out (uterus in normal position), is colored to represent the uterine cavity, while just about this area the chart is colored red (black in illustration).

When the uterus is in normal position, as indicated by the dotted lines, there is no evidence of bleeding, but on pushing the uterus downwards and increasing the anteflexion, as may occur in straining, the uterus is displaced so that the red (black in illustration) appears in the uterine cavity and portion of the vagina which has been cut out and thus bleeding is indicated.

The chart is studied as the preceding ones. See Fig. 10. The piece of cardboard representing the cancer is held in place by two clips F F, and other pieces of cardboard may be substituted representing other conditions, as in the chart illustrated by Fig. 9.

examination in gynecology this year, for the senior class of the Albany Medical College, consisted of a life size representation (shown in sagittal section) of the conditions found in an actual case. The conditions present were a dermoid cyst of the right ovary situated anterior to the uterus and extending as high as the umbilicus; two cervical polypi were also present and the pelvic floor had been injured in childbirth with a resulting cystocele and rectocele. The members of the class were asked to solve the problem as indicated in Fig. 20.

The question naturally presents itself, What has been the result of this "problematic" method of teaching? I have used it for two years and feel that it is still in its experimental stage and is capable of greater development. I believe that I handled the subject better this year than last year and hope to improve it in succeeding years. The results of this method, at the end of the first year, encouraged me to place the illustrated problems in book form, so that the students might study them before discussing them in class and also that each one might have, at the end of the course, a book for future reference. Many of the illustrations in the book are reproductions of the illustra-

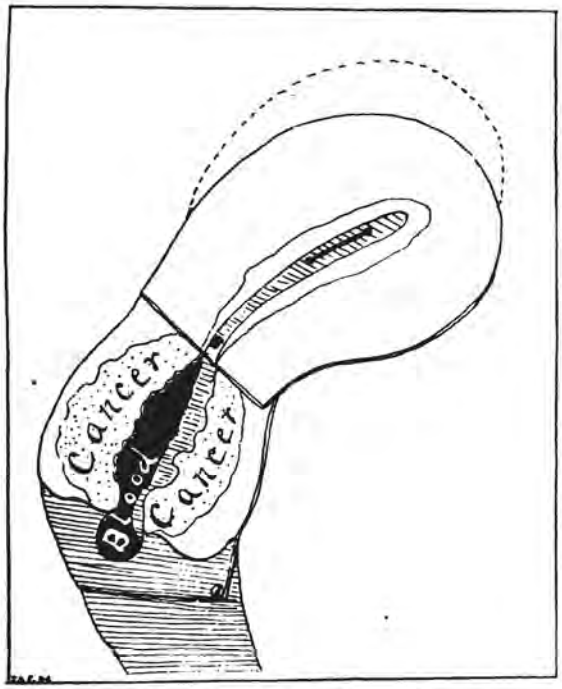

Fig. 13. Illustration of chart demonstrating the source of uterine bleeding in cancer arising in the cervical canal.

The chart is very similar to the one represented in Fig. 12, except that the uterine cavity has not been cut out but only the cervical canal and portion of the vagina.

When the uterus is in its normal position as indicated by the dotted lines there is not any evidence of bleeding, but when it is pushed downwards and its anteflexion is increased, as in straining, the uterus is so displaced that the red (black in illustration) appears in the cervical canal and portion of vagina which has been cut out. Bleeding then arises when the patient strains, thus bending and cracking the friable cancerous tissue.

The chart is presented and studied as the preceding ones. See Fig. 10.

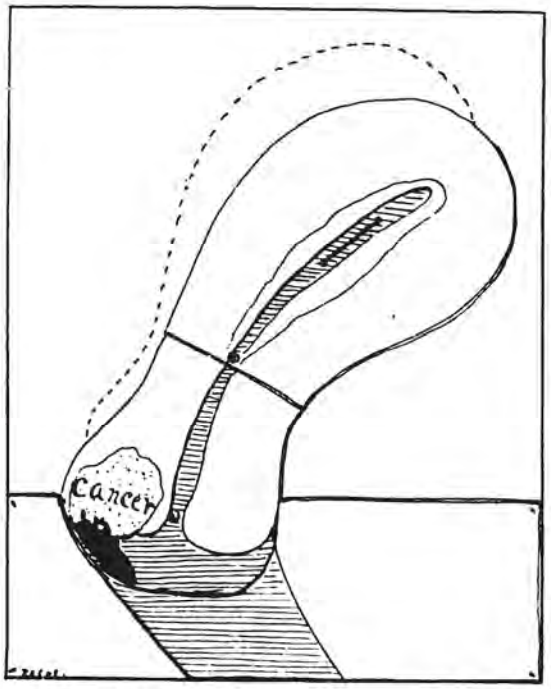

Fig. 14. Illustration of chart demonstrating the source of uterine bleeding in an early "inverting" cancer arising in the vaginal portion of the cervix.

The chart is very similar to the one represented in Fig. 13, except that only a small portion of the vagina is cut out as shown in the illustration by the black area.

When the uterus is in its normal position as indicated by the dotted lines there is no evidence of bleeding, but on pushing it downwards, red (black in the illustration) appears in the portion of the vagina cut out. This chart suggests that in this type of cancer the bleeding is apt to occur on straining when the cancer is injured by compressing it or forcing it against the posterior vaginal wall and it also suggests that the bleeding is slight and inconstant.

The chart is presented and studied as the preceding ones. See Fig. 10. Eversion of the cervical mucosa due to laceration, cervical polypi, and also other types and stages of cervical cancer can be presented in like manner.

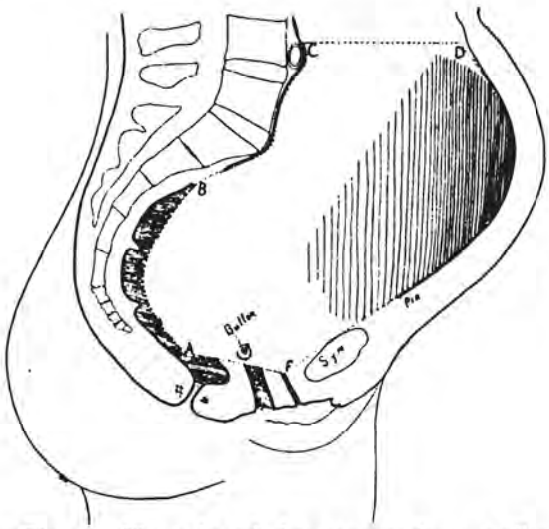

Fig. 15. Illustration of chart representing a median symmetrical abdominal pelvic tumor whose cause is not apparent.

The chart from which this illustration was made represents the lower abdomen and pelvis in sagittal section. As indicated in the illustration, a median abdominal pelvic tumor is present but the cause is not apparent. The area A B C D E F, which might be occupied by such tumors, has purposely been left vacant.

The class is asked what conditions, which they have studied, may give rise to such a tumor. Each of these conditions is studied by inserting a piece of cardboad representing the condition, which fills the area A B C' D E F, and thus completes the picture and gives the explanation of one cause of a tumor of this kind in this situation. See next illustration. The button, held in place by a rubber cord and the pin are for the purpose of holding the pieces of cardboard in place which are to complete the picture.

tions used in presenting the problems. Each illustration in the book bears an explanatory legend and is accompanied by questions which indicate how the problem should be solved. Space is left after the questions for answers and notes which, when filled, should constitute our present knowledge of the subject. It is not intended that the book should take the place of the charts and other methods of illustrating the problems, mentioned in this paper, but to supplement them. The subject-matter of the book has been so arranged that each advance is a natural outgrowth of what has preceded. As a result of the use of this book, each student will have studied and in a measure written and indexed a treatise in gynecology and one that he may not only use as a reference book but to which he may add new material at any time. I have called this work "Studies in Gynecology Presented in the Form of Illustrated Problems for Class-room Work." It is published by he Brandow Printing Company, of Albany, N. Y.

The remarks made in regard to the "problematic" method as a whole likewise apply to this book, i. e., it is in its experimental stage.

In closing, I wish to emphasize what seems to me to be the chief advantages of teaching gynecology along the lines which I have endeavored to present in this communication.

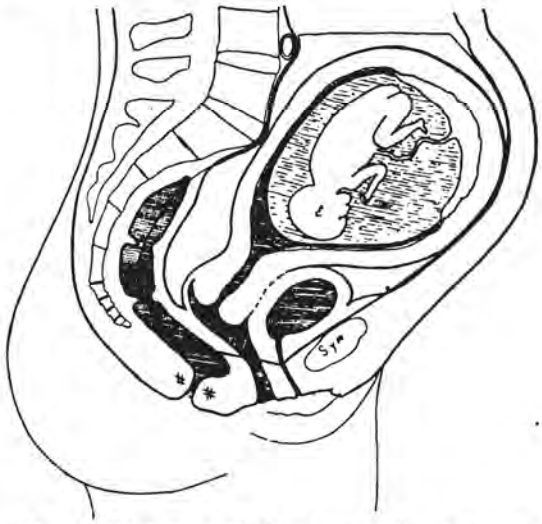

Fig. 16. Illustration of chart showing how pregnancy causes a median symmetrical abdominal pelvic tumor.

This is the same chart represented in the preceding illustration but the area A B C D E F has been covered by a piece of cardboard of the size and shape of the area and representing a pregnant uterus. This piece of cardboard is held in place by the button and pin mentioned in the previous illustration. The picture shown in the previous illustration is thus completed and demonstrates how pregnancy may give rise to a tumor in this situation. This chart was used in the study of pregnancy in the first phase of the work and then the problem, of pregnancy at this stage, was solved by asking such questions as these: 1. Describe the condition present? 2. Does it interfere with the function of any of the pelvic structures or with the general well-being of the individual? and if so, how? 3. What manifestations of altered anatomy and altered physiology may be noticed by the patient? i. e., what are the subjective symptoms? 4. What manifestations of altered anatomy and altered physiology may be detected by the physician? i. e., what are the objective symptoms? The chart demonstrates that one of the most important objective symptoms of pregnancy is the median symmetrical abdominal pelvic tumor.

The present problem of the significance of a median symmetrical abdominal pelvic tumor is now partly solved by asking such questions as these: 1. How does pregnancy cause a median symmetrical abdominal pelvic tumor? 2. What is the type of tumor, i. e., describe its physical characteristics? 3. How can a diagnosis be made?

1. By studying the subject in the three phases mentioned, the student should develop an excellent foundation for his future clinical work. In the first phase he learns how the normal becomes abnormal and studies the abnormal conditions of disease as seen in the pathological laboratory and sees how the various symptoms arise. In the second phase he studies the significance of the various symptoms caused by the abnormal conditions studied in the first phase and learns how these conditions may be differentiated. He is thus prepared to begin the third phase with a clearer understanding of the various causes of the symptoms he is about to learn the art of detecting and with a clearer insight into diagnosis and treatment, because he has a clearer conception of the conditions which may be present, how they arose, how they cause symptoms, and what these symptoms may be. In the third phase he should be taught the art or technique of physical examination, diagnosis, and treatment, by actual contact with the patient in the wards and dispensaries of our hospitals.

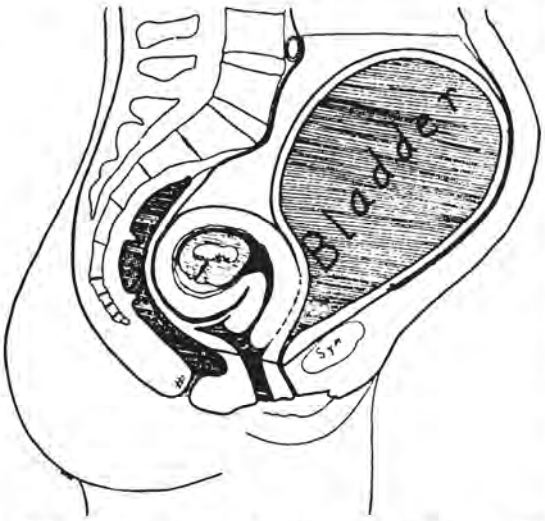

Fig. 17. Illustration of a chart showing how a full bladder causes a median symmetrical abdominal pelvic tumor.

This is the same chart represented in the preceding illustration except that the piece of cardboard, representing a normal pregnancy, has been replaced by one representing a full bladder caused by a retroflexed pregnant uterus (from an actual case). This completes the picture and shows how this condition causes a tumor in this situation.

This problem is presented and solved as was the preceding one.

Fig. 18. Illustration of a chart showing how a uterine myoma may cause a median symmetrical abdominal pelvic tumor.

This is the same chart represented in the preceding illustration, except that the piece of cardboard representing a full bladder has been replaced by one representing a myomatous uterus. This also completes the picture and shows how this condition causes a tumor in this situation (from an actual case). The chart thus completed was used in the study of uterine myomata in the first phase of the work and then the problem of this condition was solved by asking the questions asked in Fig. 2.

The present problem is now presented and solved as were the two preceding ones. See Fig. 16.

2. By working out, himself, the correlation between normal anatomy, normal physiology, and the manifestations of these on the one hand, and altered anatomy, altered physiology, and the manifestations of these on the other, he realizes that all symptoms of disease are but manifestations of normal anatomy and normal physiology as altered by some abnormal condition. He, therefore, knows when an abnormal manifestation is present that there is an abnormal condition causing it, and that it is the cause which demands his attention; and, furthermore, he knows that he should determine the cause from his knowledge of normal anatomy, normal physiology, the manifestations of these, and a knowledge of the changes caused in the above by the various pathological processes called disease.

3. By arranging the subject so that each step is but a further development of preceding ones and by showing how the various conditions, occurring in the course of each disease,

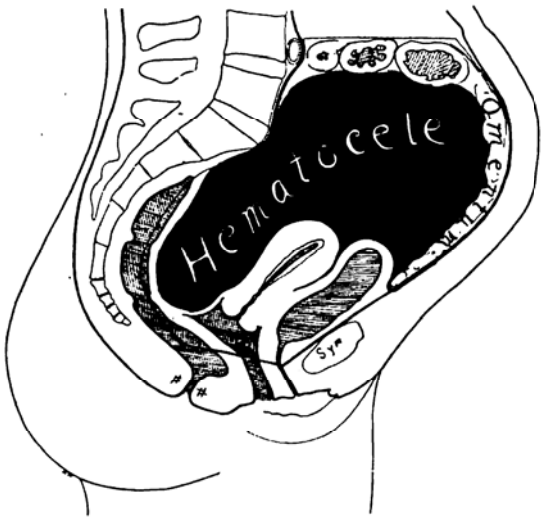

Fig. 19. Illustration of a chart showing how a hæmatocele may cause a median symmetrical abdominal pelvic tumor.

This is the same chart represented in the preceding four illustrations with a piece of cardboard representing a hæmatocele covering the area A B C D E F. This piece of cardboard completes the unfinished picture, shown in Fig. 15, and shows how a hæmatocele may give rise to a median symmetrical abdominal pelvic tumor (from an actual case). The chart thus completed was used in the study of this condition in ectopic pregnancy.

The problem is presented and solved as were the three preceding ones. See Fig. 16.

In like manner other causes of this symptom may be presented and solved, such as an ovarian cyst, pelvic abscess, abdominal pregnancy etc.

Similar charts may be used to study the significance of tumors in other situations.

arise and by presenting these conditions as *illustrated problems* which the student can see and touch, he is able to use these special senses, and with his knowledge of the subject he attempts to solve these problems himself. The students' answers corrected, when necessary, and supplemented by information which they cannot be expected to reason out, should constitute our present knowledge of the condition under discussion.

4. By means of special "mechanical" charts, the development of many abnormal conditions may be indicated, the conditions resulting may be shown diagrammatically and especially with a view to the explanation of how these conditions alter the manifestations of normal anatomy and normal physiology, i. e., how they give rise to symptoms and what these symptoms are.

5. By presenting these problems in book form the student is able to study them before coming to class and at the end of the course has a text-book for future reference.

6. By following out this general plan of instruction each student will have been taught to observe, to use what knowledge he already has in solving problems new to him, and will have studied and, with assistance, solved the various problems in gynecology instead of memorizing data obtained from didactic lectures and text-books. In addition, he will have written a text-book which he not only had for future reference but also one to which he may add new material at any time.

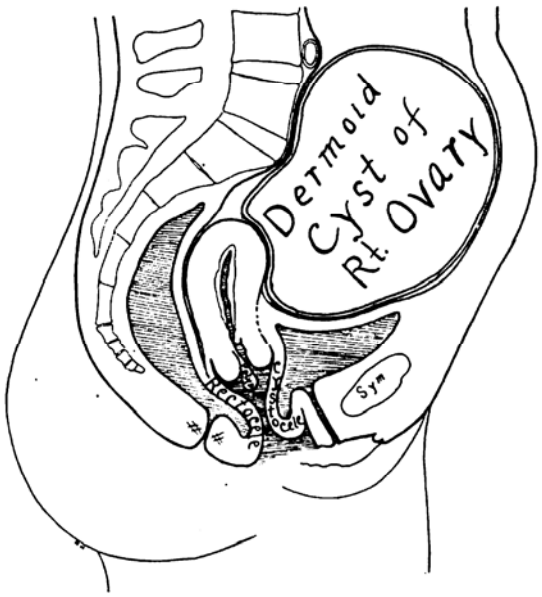

Fig. 20. Illustration of chart used in mid-year examination in gynecology.

The students were told the conditions present in an actual case and the case was presented to them as an illustrated problem which they were asked to solve by answering these questions:

1. How did the conditions present in this case probably arise?
2. What would be the probable subjective symptoms and their origin?
3. What should be detected on examining the patient?
4. What other conditions might simulate the ones shown here?

It may be seen that, in order to answer these questions, quite an extensive review of the subject of gynecology must be made and that the conditions presented were those found in an actual case and also those which will be encountered by the students in their future clinical work.