

MALFORMATIONS, INJURIES, AND DISEASES OF THE STOMACH AND INTESTINE.

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CHAPTER XII.

EXAMINATION OF THE STOMACH AND INTESTINE.

METHODS OF EXAMINATION OF THE STOMACH AND INTESTINE.

THERE are certain diseases of the stomach and intestine the treatment of which is sometimes medical, sometimes surgical. If a patient who is suffering from one of these affections is not seen by a surgeon until medicinal treatment has proved useless, the most favorable time for surgical treatment will have passed. There are other reasons which make it desirable that a surgeon should be consulted early in the disease. For example, the exact relation of an ulcer or tumor to the surrounding organs may not signify much to the physician, but it may be of the greatest importance to the surgeon in view of possible operation. On the other hand, it is of great importance that the surgeon should be well informed in the differential diagnosis of these diseases, and hence the general points in their pathology and symptomatology are here given as well as the principles of their surgical treatment.

Inspection.—The characteristics of the abdomen which may be determined by inspection are configuration; meteorism; dilatation of veins and other changes in the skin; local swelling due either to tumor or a local meteorism; movements of the tumor due to respiration, peristaltic action of the stomach or of the intestine, etc.

Slight differences in configuration in the right and left side of the abdomen are best recognized if the patient lies in dorsal decubitus and the surgeon stands at some little distance from the patient exactly in the median line.

If there is a possible affection of the large intestine, the two lumbar regions should be compared while the patient stands or sits or lies prone upon his face. Differences in distention in the ascending and descending colon may account for differences in appearance of the right and left lumbar regions; and if percussion confirms the testimony

of the eye, the existence and seat of some obstruction will be rendered probable.

Palpation.—While palpation is perhaps the most valuable method of examination for the surgeon, it is a difficult method of examination and requires much practice. It is usually of little service unless the abdominal muscles of the patient are relaxed. The best position to accomplish this end is dorsal decubitus with the head slightly raised, and in some cases the mouth open and the thighs flexed. While the patient breathes deeply the surgeon makes use of the relaxation of the muscles occurring during inspiration to carry out his examination. This is especially true of the deep inspiration which follows protracted crying in children. Palpation may also be carried out with a patient lying upon his side, or crouching on his knees and elbows, or lying on his back with the pelvis elevated. Under some circumstances it is of advantage to palpate the patient in a sitting or standing posture, or lying in a warm bath. The examining hand may be placed flat upon the abdomen or the fingers may be slightly flexed. In mapping out the border of a tumor the fingers should be flexed still more, so that their tips may press against the abdominal wall. Sometimes both hands are placed side by side, or, if firm pressure is required, one may be placed on the other. The upper hand then exercises most of the pressure while palpation is made with the lower. In most cases a light pressure will reveal more of the intra-abdominal condition than firmer pressure, since the latter easily excites muscular contraction. In some cases it is of advantage to place one hand in the lumbar region and the other on the front of the abdomen. This bimanual examination is spoken of in connection with renal tumors.

Palpation differentiates well-defined tumors from an indefinite resistance such as is due to intra-abdominal inflammation or local contraction of the abdominal muscles over a sensitive portion of the peritoneum. Such a local contraction occurs often in disease of the stomach or intestine and can easily lead to a mistaken diagnosis. If a tumor is present, palpation should show its size, shape, and possible changes in shape (tumors of hollow organs, fecal tumors), relation to the surrounding parts, surface, consistence (fluctuation), creaking (echinococcus), density, pulsation (not to be confounded with transmitted aortic pulsation), etc. It is most important to determine the possible motion communicated to a tumor by respiration, or by palpation (passive motion), or by distending the stomach and intestine. Any region of especial tenderness or contraction or gurgling should also be noted. The usual sites of hernia are to be palpated, and if there exists a wide umbilical or ventral hernia it may be possible to pass the fingers through the ring and so palpate with unusual distinctness many of the abdominal organs.

If a patient is thin and has relaxed abdominal walls, the cæcum and a portion of the ascending colon, a portion of the descending colon, and sigmoid can be readily palpated even though empty. The empty transverse colon is not so readily felt. When the colon is distended, it is

often palpable throughout its whole length with the exception of the right and left flexures and the lower portion of the sigmoid flexure. If the colon is full of fecal matter, it is so easily felt in places that it has often been mistaken for a tumor. Therefore in case of doubtful diagnosis the colon should be thoroughly emptied before palpation.

In case of any affection of the lower portion of the abdomen examination should also be made through the rectum and vagina. It is of advantage to carry out such an examination bimanually. Diffuse peritonitis causes the anterior wall of the rectum to arch forward.

Percussion.—By percussion one may ascertain the presence of circumscribed and free peritoneal exudates, and the existence of a tympanic area due to local or general meteorism, or to free gas. Percussion is also serviceable in mapping out the artificially distended stomach and intestine. By percussion upon the pleximeter a single distended loop of intestine may sometimes be mapped out.

If a patient whose stomach is empty stands upright and percussion shows that there is no dull area in the situation of the stomach, the greater curvature of the organ may often be determined by allowing the patient to drink one or two glasses of water. There will then be produced a well-marked area of dulness the lower border of which will correspond to the greater curvature. This dulness will disappear when the patient lies down. This test is not sufficiently reliable to serve as a determination of the size and position of the stomach unless it is confirmed by other methods of examination.

Auscultation.—Auscultation is generally of service in determining the presence or absence of intestinal gurgling. Splashing is usually heard in case of dilated and relaxed stomach. It also occurs above a stenosis of the intestine, but it may also occur in a normal stomach or in a normal intestine. Stenosis of the intestine frequently produces characteristic murmurs.

Artificial Distention.—The stomach may be artificially distended in order to show its position, size, and outline. This test is also of service in determining the site of a tumor of the stomach or some neighboring organ, and it may demonstrate possible incontinence of the pylorus.

The stomach may be distended with carbon dioxide gas by giving the patient first a teaspoonful of sodium bicarbonate and then half a teaspoonful of tartaric acid, each dissolved in 50 to 100 c.c. (3 or 4 ounces) of water. By this means the patient may be spared the unpleasant introduction of a stomach-tube. The method is somewhat questionable since it may not distend the stomach sufficiently, while in other cases the distention is too great and causes the patient pain. Indeed, such distention has been followed by rupture of a stomach which was contracted and weakened as a result of ulceration. Therefore a stomach-tube ought always to be at hand so as to relieve any possible excess in the distention of the organ. The stomach may be distended with air pumped into it after the passage of a stomach-tube. The degree of distention is then easily varied by pumping more air into the stomach or allowing some to escape.

When the stomach is thus distended, its outlines below the ribs are plainly seen, and may also be shown by percussion. Sometimes a pathological outline—for instance, that of an hour-glass stomach—can be recognized. This method of examination may fail either because the abdominal wall is well developed, or because the pylorus or cardia is incontinent, or because the patient is unable to endure sufficient distention to make the outline of the stomach clear. The stomach should never be distended in the case of recent hemorrhage or injury, and it should only be distended with great care through a stomach-tube if there is a suspicion of ulceration.

The intestine may be distended with air or water. The outline of the large intestine may thus be shown with more or less distinctness as far as the cæcum. Distention with air is simpler than that with water, and if there is a suspicious area which is dull on percussion, distention with air makes the intestine tympanitic and is therefore a greater help in diagnosis. Air more than water brings out murmur due to stenosis of the intestine. But distention with water has also certain advantages. The intracolonic pressure which is thereby produced is equal in all directions and is absolutely under the control of the operator, who can raise or lower the vessel from which the water flows, and if necessary can allow water to escape from the intestine. When air has been injected into the intestine, it does not exert everywhere an equal pressure and the pressure is less under the control of the operator. Water possesses another advantage over air in that its repeated injection breaks up fecal masses and thus permits the fluid to reach higher up in the intestine. Not infrequently it will pass the ileocæcal valve.

Intestine distended with air gives a tympanitic note on percussion, while that which is distended with water gives a dull note. Under certain circumstances one may be preferable to the other. If water is used, the quantity which can be injected is easily measured and the capacity of the intestine thereby indicated. This is not true if air is used for distention. The ampulla of the rectum holds about 0.5 litre of water (1 pint) if fully distended. As a matter of fact, contraction of its muscles will force the water either upward or downward before this quantity is injected. The rectum and sigmoid colon together hold about 1.5 litres (1.5 quarts), and the whole large intestine up to the ileocæcal valve about 3 litres (3 quarts) or even more. If this quantity is injected easily, it is fair to assume that any suspected obstruction is situated higher up. This is at best an inexact test. If the abdominal walls are for any reason contracted, water is injected with difficulty. Furthermore, the first portion of water which is injected may stimulate the muscular coat of the intestine to active contraction so that further injection is interfered with.

On account of its simplicity the injection of water is the usual method of distending the large intestine. In especial cases water should have the preference on account of safety if there is risk of perforation. It should also be used if the large intestine contains much fecal matter or if stenosis exists.

A short soft rubber tube is well lubricated and inserted into the rectum while the patient lies upon his back. There is a mistaken notion that if the tube can be inserted high up in the intestine, a greater quantity of water can be injected. The use of a long rubber tube has nothing to recommend it, for a soft tube may bend upon itself and close its own lumen, while a long stiff tube exposes the patient to the risk of perforation.

If water is employed for distention of the intestine, the pressure at which it is injected should be slight—about 20 to 50 cm. (8 to 20 inches) of water are sufficient. In rare cases 80 cm. (32 inches) may be employed. Such a pressure should only be used for a short time. For diagnostic purposes one will seldom need more than 3 litres (3 quarts) of water. This method of examination is unsuccessful if the sphincter is incontinent or very weak, as may be the case in aged individuals.

Injection of water for therapeutic purposes (colonic irrigation) is similarly carried out. This simple measure has many times sufficed to save the life of a patient, and before performing an operation for obstruction it is well for the surgeon personally to supervise its employment. One may overcome an attack of ileus in this manner after all other attempts have failed. When water is employed for therapeutic purposes even more than when it is employed for diagnostic purposes, it should be injected at a low pressure. It will often require from thirty minutes to an hour to irrigate the large intestine properly. More than 3 litres (3 quarts) may be injected, and the procedure will have to be many times repeated. If the intestine is atonic, the injection of water may be preceded by an injection of two or three spoonfuls of castor oil, which, driven up by the subsequent injection of water, may act upon the upper portion of the intestine and bring about the wished-for result. Sometimes a firmly contracted sphincter ani is found an obstacle to the complete emptying of the intestine. Under such circumstances two fingers should be introduced and separated so that the fluid may escape between them.

Examination with the Stomach-tube.—The stomach may be examined with a soft rubber tube measuring 14 mm. (0.6 inch) or less in diameter. Information thus obtained may be classified as follows: 1. The presence of stenosis of the cardia, a diagnosis which ought to be confirmed by the introduction of olive-tipped or other solid bougies. 2. The motility of the stomach. 3. The character of the gastric contents which can be removed through the tube for analysis. 4. The size of the stomach, and especially the situation of the greater curvature as shown by palpation of the end of the tube, or by the x-ray after the lower portion of the tube has been filled with shot. The use of the tube is counterindicated by recent gastric hemorrhage and a feeble condition of the patient from whatever cause.

The introduction of the stomach-tube if properly performed is not so dangerous a procedure as many suppose. Thus it may be employed with perfect safety in the presence of a fresh ulcer, or in the first days after

major operations upon the stomach. Indeed, in many cases of gastric hemorrhage it seems wise to introduce the tube in order to evacuate the blood and allow the stomach to contract. Certainly suspicion of an ulcer or of carcinoma cannot be considered a counterindication to the use of the tube. When the tube is in place, gastric contents may be obtained by pressure or by siphonage. It is usually unnecessary to aspirate by means of the Wulff bottle or a suction ball. Pressure may be dangerous if there is risk of hemorrhage from the stomach or other organ (lungs, brain). The quantity of fluid remaining in the stomach after it has been emptied by siphonage may be determined, according to Mathieu and Rémond, as follows: A certain quantity of water—for example, 100 c.c.—is introduced and immediately mixed with the residual fluid in the stomach by shifting the position of the patient forward and backward and from side to side. The fluid is then siphoned off and its acidity (a_1) is compared with the acidity of the gastric fluid (a) before dilution. The quantity of residual fluid in the stomach is $x = \frac{a_1 \cdot 100}{a - a_1}$. In every case in which simple siphonage fails water should be injected and drawn off several times until the stomach is proved to be empty. The motor power of the stomach may be estimated by comparing the quantity of fluid in the stomach with that contained in a normal stomach under similar conditions.

Analysis of the gastric contents shows their appearance, odor, microscopical characteristics, acidity, digestive power, etc. The details of such analysis are given in text-books upon gastric diseases.

The secretion of the intestine may also be examined macroscopically and microscopically, and under certain conditions chemically. The presence of pus, blood, mucus, and fragments of tumor, evidences of delayed digestion or stenosis, biliary calculi, or other foreign bodies, are some of the results to be thus determined.

Other Methods of Examination.—In 1881 Mikulicz inspected the gastric mucous membrane with a gastroscope, an instrument similar to the cystoscope. Since that time this instrument has been improved by others, but it has not come into general use for two reasons: considerable special skill is required for its use, and a patient with suspected carcinoma in the early stages often feels so well that he will not consent to such a severe method of examination, while in the later stages the symptoms produced by carcinoma near the pylorus are sufficiently well marked to make the use of the gastroscope superfluous.

The œsophagoscope makes it possible accurately to diagnose carcinoma of the cardia at a time when a certain diagnosis cannot otherwise be made. Furthermore, a portion of the tumor may be removed through the instrument and submitted to microscopical examination. This method of procedure is regularly carried out in the Breslau clinic.

Illumination of the stomach by means of an electric light passed within it, and examination of the stomach by means of the *x*-ray are

methods which as yet have little value in connection with the early diagnosis of diseases of the stomach and intestine. The *x*-ray is a great help in the recognition of many foreign bodies in the stomach and intestine.

Rectoscopy consists in direct inspection of the rectum by means of suitable specula.

Exploratory puncture and exploratory incision as a means of diagnosis of the condition of the stomach and intestine will be described elsewhere.

THE LOCAL SYMPTOMS OF ABDOMINAL TUMORS.

The difficulty which one often experiences in determining the origin and character of an abdominal tumor makes it desirable to consider such tumors as grouped in the various regions in which they are found. For the purpose of differential diagnosis all kinds of tumors will be thus considered, and not merely tumors of the stomach and intestine.

Abdominal tumors may produce general symptoms, symptoms of disturbed function, and local symptoms.

General Symptoms.—General symptoms are due to the effect which the tumor has upon the general system. Such effects are not necessarily different from those produced by tumors in other parts of the body. Fever usually indicates an inflammatory process which in the abdomen may closely simulate a tumor, and, indeed, a tumor may produce fever either because of resorption of products of degeneration going on within the tumor or for some unknown reason. For example, malignant lymphoma, icterus, or the presence of biliary pigments in the urine indicates that the trouble is situated in the liver or biliary passages, or their neighborhood. Glycosuria suggests disease of the pancreas; leukaemia, disease of the spleen. Emaciation with decrease of fluid in the tissues of the body suggests a tumor of the pylorus or duodenum producing stenosis. In general, tumors of the intestinal canal affect nutrition more rapidly than tumors elsewhere. The presence of indican in the urine suggests a tumor of the lower portion of the small intestine, while a tumor of the kidney may give rise to albumin or blood in the urine. This brief statement is sufficient to show how important it is to examine thoroughly the whole body whenever a diagnosis of abdominal tumor is made.

Symptoms of Disturbed Function.—Symptoms of disturbed function may be closely related to the general symptoms—for example, icterus; or they may be confined to the particular organ affected. Sometimes a special examination is necessary to prove that disturbances of function exist. This is often the case in pyloric tumor with stagnation of the gastric contents and altered gastric juice. Peristaltic action of the intestine may be abnormal. There may be constipation or diarrhoea in case of intestinal tumor with stenosis. The urine may be altered in character or micturition disturbed in case of tumors of the kidney or bladder. Disease of the pancreas may interfere with the digestion of

fat. Interference with the portal circulation or disease of the peritoneum may produce ascites or œdema. Tumors of the uterus may give rise to irregular hemorrhage, etc. It is unnecessary to take up these various symptoms in detail since they are considered in connection with the diseases of the different organs. In some cases disease of an organ exists without producing any disturbance of function of that organ.

Local Symptoms.—The local symptoms which are shown by palpation, percussion, auscultation, and the various methods of inspection of the bladder, œsophagus, etc., by means of instruments, and also by means of the *x*-ray, give the surgeon a fair knowledge of the changes which have taken place in the affected organ. The existence of pain either spontaneous or due to pressure is a valuable symptom. Most local symptoms may exist without the presence of a palpable tumor, and, indeed, may not be due to a tumor at all. This fact renders differential diagnosis much more difficult. In the case of superficially placed tumors of considerable size the results of inspection and percussion possess a greater value. If a tumor is large, and especially if it displaces the diaphragm upward, it may be clearly shown by the *x*-ray, but in general the most valuable method of abdominal examination is palpation.

The term tumor as used in abdominal surgery signifies a palpable structure situated in any portion of the abdomen which does not conform in shape and consistence to an organ normally situated in that location. Thus, a wandering kidney may properly be spoken of as a tumor until one is absolutely certain of its true nature. Other surgeons extend the term tumor to embrace the products of acute inflammation. The difficulties of abdominal palpation are sufficient excuse for this. Thus an acute inflammation about the appendix or stomach may give the impression of a diffuse tumor; while an abscess of the liver may easily be confounded with a tumor of the liver. Such an inflammatory swelling is therefore spoken of as an inflammatory tumor. It is even difficult at times to differentiate between swelling due to marked inflammation and a new growth. For example, tuberculosis of the ileocæcal region may so closely resemble cancer of the cæcum that a diagnosis cannot be made with certainty even after the abdomen is opened. The same may be true of ulcer of the stomach, which may give rise to a swelling not to be distinguished from sarcoma until the tissue has been examined microscopically. Further illustrations are distention of the gall-bladder, retention-cyst of the pancreas, hydro-nephrosis, intussusception, and the so-called fecal tumor. Even a pregnant uterus has frequently been mistaken for a tumor, and has more than once led to laparotomy.

The presence or absence of fever is sometimes of no aid in distinguishing a chronic inflammatory swelling from a true new growth. Some of these inflammatory processes are not accompanied with fever, and sometimes, as stated above, new growths of the abdomen may be accompanied with fever, or they may become infected, or may ulcerate and thus produce fever secondarily.

It is naturally impossible in many cases to differentiate between a benign and a malignant tumor of the abdomen by any external examination. The size, shape, consistence, and mobility of a tumor are not sufficient data upon which to make such differentiation; while the patient may easily be mistaken in the length of time a tumor has existed, for unless it causes pain or some disturbance of function it may escape notice until it reaches a considerable size.

The term resistance also needs definition. By it is meant abnormal resistance. That is to say, the palpating finger is more impeded at a given point than it is at the surrounding points, or than it is at the corresponding point of the other side of the abdomen. Such resistance may be due to a variety of causes. The abdominal wall itself may be the seat of an inflammatory process or a diffuse new growth. The resistance may also be due to a tumor beneath the abdominal wall. This again may be a diffuse inflammation. Even a local peritonitic process which may disappear entirely in a few days may yet give while it lasts a well-marked increased resistance on palpation. Examples of this are appendicitis, perigastritis, and pericholecystitis.

Another cause of resistance which may or may not be associated with an underlying inflammatory process is contraction of a portion of the abdominal muscles. Such local contraction is an attempt of the body to protect some hypersensitive organ beneath. It is therefore a symptom of importance, but it cannot, of course, be called a tumor.

The terms tumor and resistance are not synonymous. Every tumor is a resistance, but every resistance is not a tumor. One should be careful therefore not to use the term tumor when his examination has simply shown that increased resistance exists.

Palpation alone is calculated to show two things in respect to a tumor: first, its peculiarities irrespective of its seat; and second, its position in the abdominal cavity and its relation to neighboring organs. Such relations can often be made out without moving the tumor. At other times it will be necessary to move the tumor about, and in all cases such motions should be attempted in order to establish the relation of the tumor with a greater degree of certainty. It is, of course, of the greatest importance for the surgeon to know from what organ the tumor springs.

In examining an abdominal tumor the thickness of the abdominal wall always lies between the tumor and the palpating fingers. Therefore the characteristics of the tumor are more or less obscured. Occasionally the abdominal wall is so thin and flexible, as in a woman who has borne many children, that one can feel the tumor almost as distinctly as though the abdominal cavity were open. Under ordinary circumstances, if the tumor is situated deeply in the abdominal cavity, or, wherever situated, if the muscles of the abdominal wall are contracted, palpation is very difficult. Some help will be obtained by changing the position of the patient, or by examination while the patient is lying in a warm bath, or by percussion. Still in many cases the results of examination will be far from definite, and even if the mechanical results

of palpation are sufficiently clear one may be in doubt how to interpret what he feels.

The size of a tumor is usually underestimated for the reason that the minor portion of it is accessible to the touch, while the larger part is inaccessible owing to its deep situation.

The surface of a tumor may feel smooth because it is covered with the thick abdominal wall when in reality it may have an uneven or even pebbly surface; hence one should not conclude from the results of surface palpation alone that a tumor is or is not malignant. Indeed, many malignant tumors of the abdomen, carcinoma as well as sarcoma, have a smooth surface for a long time, due to distention of the capsule and the peritoneum of the affected organ.

If the abdominal walls are lax and a tumor is movable, palpation may indicate clearly the outline of the growth. If a tumor has the normal outline of the kidney, it is probably growing in this organ. If it has a sharp lower border, it is probably of hepatic origin; whereas an oval tumor in the lower edge of which there are two or three notches is probably in the spleen. Tumors of the gall-bladder, and especially cystic tumors, are frequently pear-shaped. Tumors of the lesser curvature or pylorus of the stomach, or of the intestine, are often cylindrical or sausage-shaped. However, tumors of all organs may assume various shapes, so that too much stress must not be put upon the outline of a tumor as an indication of its origin.

Even the consistence of the tumor is determined with difficulty. A small and movable mass always gives the impression that it is harder than it really is. If a tumor is as large as a fist or larger, lies superficially, and is either firmly adherent or may be fixed by the surgeon in some situation, its consistence can be readily determined, and the presence or absence of fluctuation may also be known. Even fluctuation is at times a misleading sign, for large rapidly growing tumors may fluctuate if they are surrounded by a firm capsule. Thus the differential diagnosis between echinococcus and sarcoma of the liver, between a cyst of the pancreas and sarcoma of the retroperitoneal glands, cannot always be made even though the tumor is large and can be readily felt. The rarely occurring retroperitoneal lipoma may also fluctuate. If fluctuation is plainly present, the tumor probably springs from some organ in which cystic tumors are commonly found—for example, the liver, gall-bladder, kidney, or pancreas, but not the stomach or intestine.

A tumor of board-like consistence and ill-defined border is likely to be an infiltration of the abdominal wall itself, possibly an actinomycosis or some other inflammatory process.

If a tumor can be indented, it is probably made up of feces. Such fecal tumors occur only in the large intestine. Gersuny calls attention to a symptom of fecal tumors produced by firm pressure of the finger which he calls the "sticky symptom." When the finger is slowly removed, the mucous membrane which has been pressed against the fecal mass may be felt to pull away from it. The most definite symp-

tom of a fecal tumor is its disappearance after the repeated administration of laxatives.

Percussion of a small tumor gives no certain result. If a tumor is large and lies in contact with the anterior abdominal wall, percussion may show the existence of an area of dulness which may be merely relative if the tumor is growing from the stomach or intestine, and absolute if the tumor grows from some solid organ. Percussion is chiefly valuable as confirming the results of palpation, and as a means of examination when palpation is unsatisfactory on account of pain, muscular contraction, etc. There are rare instances of tumors and abscesses which contain gas (see page 389). Of more importance clinically is the distention of certain intestinal coils as a result of stenosis, etc. In this manner a tumor having a fairly definite outline and giving a high tympanitic note may be produced.

The movements which may be communicated to a tumor are due in part to the mobility of the organ from which it develops as well as to the character of the attachment between the tumor and such organ. A tumor which is situated within an organ and attached to it by a broad base has no mobility excepting the mobility of the organ itself, although this mobility may have been increased or diminished by the presence of a tumor. Fecal tumors have naturally a mobility independent of the organ from which they spring. The mobility may be variously altered and limited by adhesions between the tumor and other abdominal organs. These various movements may be divided into three classes: respiratory movements; movements due to distention of the hollow organs—stomach, intestine, bladder, etc.; and passive movements produced by the hands of the surgeon or by changes in posture.

RESPIRATORY MOVEMENTS.—As the ribs are lifted outward and upward during inspiration the anterior abdominal wall, and especially the upper portion of it, follows them. The descent of the diaphragm during inspiration crowds downward the abdominal organs. These two movements are in opposite directions. In thoracic breathing the effects of the former motion are more prominent, while in abdominal breathing the effects of the latter motion are more prominent. In inspiration these motions are naturally reversed.

Tumors of the abdominal wall and tumors which are adherent to the abdominal wall are so plainly affected by respiration that their movements can often be followed by the eye. Furthermore, tumors which are attached to the skin or the various subcutaneous tissues superficial to the transversalis fascia become more prominent when the abdominal muscles are contracted, while tumors of the transversalis fascia or parietal peritoneum become less prominent. All tumors of the abdominal wall in whatever layer they may be situated become fixed by muscular contraction. Such contraction is best effected by directing the patient, when lying on his back, to raise his head from the table.

Whether an abdominal tumor is affected by respiration will depend upon its distance from the diaphragm, upon its position, and upon its