POSTOPERATIVE ABDOMINAL AUSCULTATION

By James E. King, M.D., Buffalo, N. Y.

In 1819 Laënnec published his work on auscultation for the diagnosis of pulmonary disease, and since that time the stethoscope has become indispensable to every practicing physician. Its value and use have broadened, and today we find it an aid to the diagnosis of many other conditions besides that for which it was first proposed. Its use in abdominal diagnosis, however, has found small place in medicine and still less in surgery. The chief reason for this lies in the fact that peristaltic sounds, even under normal conditions, vary greatly with the intake of food and the stage of digestion. It is therefore impossible to define exactly the sounds associated with normal intestinal movement. It is also impossible to determine by its character the particular point of origin of the peristaltic contraction, although one may differentiate between small intestine and colon. In the light of our present knowledge abdominal auscultation can distinguish only two conditions, the absence of peristalsis, or its abnormal activity.

The x-ray plate, the fluoroscope, and the moving picture have destroyed many cherished views regarding intestinal activity. They have shown that an enema administered through the colon tube is no different in effect than an enema through the rectal tip. They have taught us much else of value concerning the behavior of the digestive tract in health and disease. Perhaps in the future some patient worker may be able to correlate those known intestinal movements with the sounds produced. There are also great possibilities for the painstaking clinician who will study intestinal sounds in connection with the clinical manifestations of abdominal disease. For the present, however, the value of abdominal auscultation is confined almost entirely to the province of the abdominal surgeon.

A large number of abdominal operations are associated with some postoperative disturbance of intestinal peristalsis, either as a result of perverted nerve impulses or as a direct effect of a complication. To him who becomes familiar with the postoperative behavior of the intestines as revealed by auscultation, the stethoscope will contribute much to a better understanding of these clinical conditions, and it will sometimes render valuable aid in the early diagnosis of certain postoperative complications.

The most common intestinal disturbance following laparotomy is the so-called "gas pains." Under this term the surgeon is content to classify most of the postoperative abdominal pain and discomfort. There has been much written in explanation of this troublesome con-

dition. Two outstanding clinical features are that it appears from twenty-four to seventy-two hours after operation, and that the type of operative procedure seems to have little to do with its occurrence or severity. A comparatively simple operation for retroversion may be followed by marked intestinal disturbance, while one involving separation of extensive intestinal adhesions may pursue a placid postoperative course. It is not within the province of this paper to discuss at length the causes; suffice it to say that in the large majority of instances "gas pains" may be regarded as a disturbance of normal motility of the intestine arising from a perversion of the innervation. The clinical types that are encountered are difficult to classify, for they present varying degrees of distention and pain, sometimes associated with equally varying degrees of nausea and vomiting; and the many possible combinations offer great variation in the clinical picture. If, however, one will approach such postoperative manifestations as being possibly due to disturbed intestinal innervation, the stethoscope will afford a basis for classifying these cases within certain limits.

The postoperative disturbed nerve impulses may be regarded as producing in the intestinal tract three results: inhibition, overstimulation, and reverse peristalsis. The question as to whether these states are produced reflexly, as a result of the abdominal incision, or whether they follow manipulation of the intestines and originate in the sympathetic system will not be discussed here. It may also be urged that the anodyne required after most abdominal operations is a large factor in producing the intestinal disturbance. That it has some influence may be granted, although in patients where anodynes have not been given gas pains sometimes occur. In a practical clinical approach to the subject, however, it makes little difference whether anodynes are or are not a factor, as relief of pain caused by the operation itself must be afforded.

The course of events in the majority of laparotomies is as follows: For a variable period auscultation shows a much diminished peristalsis. Peristalsis increases during the next twenty-four to forty-eight hours, and the pain associated with it bears a relation to the severity of the contractions. A cathartic and enema at this stage result in expulsion of gas and a bowel movement, following which normal peristaltic action is apparently reestablished. The first stage may be regarded as the stage of inhibition, the second as one of spastic contraction. The difference in intensity and duration of these two stages, often with the addition of distention and vomiting, gives the variation in the clinical picture. With distention that appears early after operation, there is practically always associated a marked decrease in peristalsis. An occasional gentle peristaltic wave is heard, but colon peristalsis is absent and no flatus is passed. If an enema be

given during this stage of inhibition, it is not successful and usually has to be syphoned back. As soon as colon gurgling appears, however, an enema may be given with confidence that it will be successful. Until this occurs efforts to relieve the distention will be of little avail. If, in such a case, vomiting adds to the discomfort of the patient, it will be found as a rule to be the result of duodenal regurgitation, as evidenced by the character of the material vomited. I have never been able to distinguish any characteristic sounds associated with this type of vomiting. Whether it is due to a true reverse peristalsis or merely to a seeping back of duodenal contents through a relaxed pylorus, is difficult to decide. The use of the stethoscope in such postoperative states of course is not essential to the safety of the patient, but it does give to the surgeon a certain confidence and satisfaction in the thought that he has some knowledge of what is transpiring in the abdomen and suggests a rational plan of treatment. The degree of inhibition varies up to the point of what might be regarded as true paresis, a condition which will be discussed later.

The spastic stage following the stage of inhibition produces the pain we designate as "gas pains." The term is appealing, although not entirely accurate, as frequently severe pain of this stage is not associated with distention. On the other hand, however, the degree of distention often bears a relation to the severity of the pain. The stethoscope during this stage shows marked peristalsis of the sudden forceful type. There may be continuous pain with exacerbations cramp-like in character, coinciding with the peristaltic sounds. They may be heard all over the abdomen, although occasionally they seem to be confined to certain areas. In some instances it has seemed that the cause of these forceful contractions was due to the fact that stimulation returned first to certain segments only, and that a part of the tube was still under the influence of inhibition. Another occasional manifestation of this stage is a constant pain in the midline above the umbilicus, referred through to the back. It comes on rather suddenly and may last for several hours. The patients describe it as a continuous griping cramp, and auscultation does not show the usual forceful peristalsis. Possibly here we have a spasmodic contraction of the duodenum.

We may now pass to a consideration of the more serious postoperative abdominal complications. The most important and frequent are peritonitis and obstruction, and for a third may be added intestinal paresis, or paralytic ileus, known to the laity as "paralysis of the bowels." In a consideration of these conditions in connection with the value of auscultation, no attempt is made to discuss the well-known clinical aspects. It is obvious, however, that the stethoscope is of value only when the auscultatory findings are appraised in their relation to the clinical evidence.

The classification of peritonitis by the older surgeons into plastic and septic is not a strictly accurate one, for the plastic peritonitis is associated with sepsis, and the septic is associated with plastic adhesions. As a clinical grouping it is convenient, as it implies in the one the action of the less virulent bacteria, such as the colon bacillus, and in the other invasion by the more virulent streptococcus. Perhaps the most typical illustration of the use of the stethoscope in peritonitis is found in the ruptured appendiceal abscess. Naturally, the diagnosis of ruptured abscess is almost never in doubt, as the physical findings and clinical evidence are sufficient for the surgeon of experience. It is interesting to observe, however, how promptly the inhibition of peristalsis appears. Almost directly there is a marked decrease in intestinal movements. There may be heard at intervals a gentle, quickly subsiding movement, as though an isolated intestinal coil were making a feeble attempt to resist the inhibition placed upon it. Usually, however, by the time the patient is seen by the surgeon, peristalsis has ceased. Following the operation the distention increases and no peristaltic sounds are heard, and the silence may be disturbed only by the boom of the heart clearly transmitted. Our house surgeons like to characterize this as the "graveyard belly," a term which unfortunately may have a double significance. This state of affairs persists for three days, four days, or perhaps a week, and then one day a gentle sound is heard and after an interval another, which relieves uncertainty. It is a welcome sound. At this stage the opium is decreased, for it is assumed that the Alonzo Clark treatment has been employed. During the next twenty-four hours peristalsis has become more general, a small enema may bring gas, and the patient may be considered then as entering the stage of convalescence. The inexperienced surgeon has great difficulty in leaving these patients alone. If vomiting is a marked feature, and the distention is great, instead of employing the stomach tube and opium, he adds distress and increased danger to the patient by the use of cathartics and various enemas. He may seek to relieve the distention by pituitrin or may even consider intestinal drainage. Every surgeon of experience has been asked to see such cases, and to pass upon the advisability of drainage on the assumption of obstructed bowel. The stethoscope under these circumstances is a great comfort, and makes it possible to take a firm stand on diagnosis and treatment, and helps in determining the prognosis.

A plastic peritonitis that follows an operative procedure is first indicated also by the absence of peristalsis. In cases where from the nature of the operation peritonitis may be anticipated, it is found that peristalsis disappears in from twelve to twenty-four hours. After this, the course is similar to that as outlined above.

The septic form of peritonitis will give early the same evidence on

auscultation as the plastic type. Naturally, one will not be able, by the stethoscope, to differentiate between the plastic and septic forms. I have sometimes noted early in the septic form a continuous, gentle peristalsis heard all over the abdomen as though the entire intestine were in a state of gentle purposeless movement. This, however, is transient and is followed by a complete absence of peristalsis. The greater virulence of the septic peritonitis is indicated by the clinical picture and death occurs without peristalsis being reestablished. In these cases the stethoscope offers nothing of value except its aid in early diagnosis.

Postoperative obstruction of the bowel is dreaded by every surgeon. Its early recognition is essential for successful treatment. The diagnostic criteria furnished by the average textbook are often those of an advanced stage. Vomiting and cramp-like pain are the two clinical indications of the greatest importance. Postoperative vomiting that persists after twenty-four hours, or vomiting that begins two or three days after operation, calls for careful analysis in its relation to the general clinical picture, together with the evidence obtained by abdominal auscultation.

Obstruction following pelvic surgery, in the majority of instances, has its origin in the small bowel, the last two feet of the ileum being the most frequent location. By far the greatest number of these obstructions will be found as angulations due to an intestinal loop becoming adherent to a denuded surface or line of suture. Such a case should present little difficulty in early diagnosis. Vomiting begins promptly if the obstruction has occurred directly after operation, but during the period of usual postoperative peristaltic inhibition it may be infrequent. At the end of forty-eight hours vomiting increases in frequency, and is accompanied by peristaltic pain. Auscultation at this time gives evidence of forceful intestinal contraction, distention progresses, and the vomited material consists of duodenal contents. The question now is, whether one is dealing with an obstruction, or an aggravated case of spastic peristalsis. The stethoscope demonstrates active peristalsis, and one is justified in expecting, if the case is not one of obstruction, that an enema will bring gas. If repeated effort in this direction fails and if at the same time there is increasingly violent peristalsis, a diagnosis of obstruction is justified. In my own series of cases this diagnostic criterion has been most reliable, and I have come to depend more and more upon auscultation in establishing an early diagnosis. One must remember, however, that with the higher obstructions the first enema or two may bring away some flatus that lies below the obstruction. This should not be misleading, for if auscultation shows violent peristalsis we have reason to expect very soon a corresponding satisfactory response from the colon. There is a great difference in the interval between the painful peristaltic con-

tractions. Early they may be rather infrequent, increasing in frequency as the condition progresses. Later, when distention is marked, there comes a time when the edematous bowel can no longer contract so completely; and one hears the tinkle and gurgle of shifting fluid and gas in the distended bowel. As the end draws near, the migration of bacteria and absorption of toxins may abolish peristalsis and the patient dies, the picture of peritonitis.

In the less common types of obstruction, auscultation is also of great advantage. One sees occasionally instances in which the bowel is obstructed perhaps in two places with several feet between the two points of obstruction. Or it may happen that following operation a considerable portion of collapsed bowel has prolapsed into the pelvis and become adherent. In these circumstances there may be very moderate distention, and peristalsis becomes more or less localized. This has been noted a number of times.

Perhaps one of the greatest values of the stethoscope is in the early differentiation between obstruction and peritonitis. I have never known it to lead one astray if the evidence obtained by auscultation has been carefully considered in connection with the clinical evidence.

Whether or not the so-called postoperative paralytic ileus should occupy a place as a surgical complication is difficult to decide. The possibility of its occurrence, theoretically at least, cannot be denied, as a somewhat comparable condition is seen in acute dilatation of the stomach. It must be extremely rare, although one hears not infrequently of a postoperative death due to this cause. A death from "paralysis of the bowels," however, is attended by far less embarrassment to the surgeon than a death from peritonitis. It is a diagnosis that apparently has been handed down from the early days of abdominal surgery when peritonitis was far more common and far less understood. If such a condition does exist, certain it is that there is no well-defined clinical data that establishes a diagnosis. Whether auscultation offers any aid is a question that cannot be answered. Extreme postoperative inhibition continuing for several days with great distention, vomiting, absence of peristalsis, where cathartics and enemas are futile, presents a clinical picture that suggests the propriety of regarding it as a paralytic condition of the bowel. If one wishes to regard it as such, there can be no quarrel. If, however, one has studied by auscultation a series of patients showing operative intestinal disturbance, he is convinced that in these extreme instances he is not dealing with a difference in kind but one of degree.

Like all specialized procedures in diagnosis, abdominal auscultation requires study and personal observation. The results are obviously not as definite and convincing as those obtained in pulmonary and cardiac disease. No attempt here has been made to describe the sounds

produced by peristalsis. They are too varied. A large number of patients following operation will show no deviation from normal. In the study, however, of patients showing disturbance the stethoscope will reveal much of interest and value. I believe that we should eliminate the term "gas pains" from our discussions and leave it, together with "paralysis of the bowels," to those members of the laity who find it desirable to embellish the recital of their surgical experience.

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DR. J. E. KING, Buffalo, N. Y., read a paper entitled **Postoperative Abdominal Auscultation.** (For original article see page 273, February issue.)

DISCUSSION

DR. E. J. ILL, NEWARK, N. J.—It is apparent that Dr. King does not make auscultation per se the beginning and end of his knowledge of bowel contractions. His very careful study can be taken with considerable seriousness and shows much careful observation. Those of us who have for a long time used the stethoscope for auscultatory symptoms of the bowel will surely have derived a lot of personal comfort when after eighteen to twenty-four hours one begins to hear moderate rhythmical signs in the abdomen. It is safe to say that in another twelve or eighteen hours the patient will have passed gas to everybody's satisfaction and comfort. However, when these gurgles immediately start with loud and irregular noises, our anxiety of what may happen will oblige us to watch the patient with anxiety. It has been my experience with the cases of kinked bowels, which, however, I rarely see, or with nonoperative obstruction, there is a sudden loud roaring noise, which immediately dies down to recur at shorter or longer intervals. If we carefully go over the ground we may often enough find just where such obstructive symptoms are loudest, much to our relief when operative interference becomes indicated.

DR. F. S. WETHERELL, SYRACUSE, N. Y.—Dr. King has brought out that we are still physicians even though we are surgeons, that we may carry a stethoscope.

If a surgeon is seen in our city with a stethoscope in his hand, he is looked at with suspicion that he may be going back into general practice. Even the obstetrician has to wear his stethoscope on his forehead.

I consider this an opportunity for clinical research. A busy man can always do clinical research and check on his findings. The one important thing, brought out to me at least, was the colon sound. If, by examining many cases, we can accustom our ears to know that we are hearing a colon gurgle, it means that we will have added a good deal to our postoperative treatment by knowing whether we are going to get good results from an enema. We know that often an enema is given without results. Of course, distention is often above the umbilicus, where a stomach tube rather than an enema tube should be used; but if we can find out when the time is ripe for an enema, we will have accomplished a good deal.

DR. GORDON K. DICKINSON, JERSEY CITY, N. J.—I have for a number of years been teaching internes in the hospitals that it is very, very important that they should auscultate every abdomen until they get sufficiently well acquainted with the sounds which exist and conditions which produce those sounds. I much prefer that they should first use their ears, then if necessary after that make use of the stethoscope.

For twenty years I have had experience with tuberculosis, being Director of a very large hospital and clinic. It is demanded there in making the examination for tuberculosis that after everything possible has been learned from percussion and clinical history that the examiner must listen first with his ear and then with his stethoscope and I think every young man should be taught to listen to the sounds in the abdomen with his ear and then with his stethoscope, so that later in life he will recognize the regular and irregular sounds, and have a proper sensory touch.

Another point: I do not like enemas, for I think they only touch the surface. Dr. Kemp, a gastroenterologist, some years ago introduced what he called the double current rectal irrigation. I do not hear it talked about and do not find many men who know anything about it but if you give a double current rectal irrigation with water of a temperature of 120° F. for twenty minutes you will find it will do more good than an enema. It will stimulate the sympathetics. One of the great dangers is progressive tympany. By stimulating the sympathetics one will bring about a peristaltic wave which will bring down gas from higher up than any enema could reach. You will stimulate the small intestine and the solar plexus and the kidneys within twenty minutes. At the end of twenty minutes at least you will have a stimulation of heart action, a breaking out in perspiration, all of which is followed by improvement in general condition. You cannot acquire all of that through an enema.

This paper was also discussed by Drs. Hadden and Babcock.

DR. KING (closing).—I am thoroughly convinced that abdominal auscultation is a distinct aid where there is definite evidence of postoperative intestinal disturbance. The ordinary house surgeon is a rather practical individual. It is surprising how these young men, after having interest aroused in this subject, will pursue it without any further suggestion and will take it to the other services.

Unfortunately one cannot make positive or satisfactory classification of intestinal sounds as they vary so under varying conditions, but if one will make a systematic study of the postoperative abdomen by auscultation critically, carefully, and understandingly, it will prove to be of much help.

I have never seen a case of postoperative ileus. I have had every misfortune that could befall a surgeon and yet I have never seen a case that I thought might properly be regarded as a paralytic postoperative ileus. It is a term that has been handed down to us just as we have many other terms in medicine, and we continue to use it because we do not know how to get rid of it.