

## THE LOSS OF THE ABDOMINAL REFLEXES IN AFFECTIONS OF THE ABDOMEN.

By GWYNNE WILLIAMS, LONDON.

It is difficult to find any mention in the literature of changes in the abdominal reflexes as a result of intra-abdominal disease. It is well known that they disappear in affections of the central nervous system, mainly in those conditions affecting the pyramidal tract, where their disappearance is frequently coincident with the change in the plantar reflex from flexor to extensor. I cannot find any explanation of their disappearance in these conditions, and it is certainly curious that one superficial reflex should disappear while another alters its mode of response.

I have been able to find two papers on the disappearance of the reflexes in abdominal conditions; the first is by Rolleston<sup>1</sup> on their condition in enteric fever, and the following were his conclusions:—

1. The abdominal reflex is affected in a very large number of cases of enteric fever, the percentage of cases in which it is entirely lost exceeding those in which its normal activity is diminished only.

2. From its absence under the age of fifty being confined to certain nervous diseases and acute abdominal conditions, notably appendicitis and enteric fever, the absence of the abdominal reflex in a given case of continued pyrexia in any patient below the age of fifty is of considerable value in diagnosis.

3. The comparatively transient nature of the affection of the abdominal reflex is in striking contrast to the more chronic affection of the knee- and ankle-jerks in diseases associated with peripheral neuritis, e.g., diphtheria.

4. Return of a lost reflex and the resumption of its normal activity are valuable indications of commencing convalescence, and often correspond with lysis and characteristic changes in the fæces and urine.

5. The objective sign of return of the reflex is often associated with the return of the subjective feeling of ticklishness normal to the individual.

6. In re-appearance of pyrexia in convalescence, the condition of the reflex is a valuable index of the nature of the pyrexia.

7. No constant relation exists between the condition of the abdominal reflexes and that of the tendon reflexes.

8. The frequency, degree, and duration of the impairment of the abdominal reflex are, as a rule, in direct proportion to the age of the patient.

The suggestion of these conclusions is that the disappearance of the reflexes is due to toxic causes, though not quite clearly a definite neuritis.

Jamin,<sup>2</sup> in the same year, describes their local disappearance over the areas affected by appendicitis and cholecystitis, and ascribes this disappearance to the influence of the sympathetic on the spinal reflex centres.

Before considering the state of the reflex, it may be well to consider briefly what other changes in the neuromuscular mechanism of the abdominal wall have been recognized.

**Rigidity.**—It is well known that, apparently as a measure of protection, the abdominal wall can become rigid over an area that is inflamed; for instance, in appendicitis, rigidity may appear over the right iliac fossa while the rest of the abdominal wall remains relatively lax; it may be assumed for the present that this is due to pain, possibly from inflammation of the underlying parietal peritoneum, and that the rigidity is an attempt to prevent movement of the part of the abdominal wall overlying the inflamed part.

## LOST REFLEXES IN ABDOMINAL AFFECTIONS 321

**Hyperæsthesia.**—The change in the sensory condition of the skin of the abdominal wall is not quite so clearly defined, or perhaps it may be said that it is more difficult to estimate. Head drew attention to hyperæsthesia of the area of skin corresponding to the segmental position of the organ affected. That hyperæsthesia over certain areas does occur may be allowed, though the explanation of the phenomenon as evidenced by abdominal disease is not quite satisfactory. In appendicitis, Head stated that there was hyperæsthesia over an area of the anterior abdominal wall lying somewhere between the umbilicus and the right anterior superior iliac spine in cases in which the serous covering of the appendix was stretched, and that this hyperæsthesia disappeared when the tension was relaxed by perforation of the appendix. This phenomenon is certainly not of much value in the diagnosis of the condition of the appendix, but one case may be mentioned which showed it :—

The patient was a woman who had attacks of abdominal pain which came on quite suddenly, lasted a few hours, and then gradually died away ; these attacks had no relation to food, and there was some question as to their cause. When seen immediately after an attack, she had an area of hyperæsthesia in the position described by Head. Operation showed that she had an appendix partially distended beyond a kink ; and there was little doubt that the attacks were due to an acute distention of the appendix brought about by some temporary complete occlusion of its lumen at the kink.

It is difficult to see why the appendix, which is developmentally a middle-line structure, should give rise to a phenomenon situated on the right side, if this hyperæsthesia is to be associated with its segmental position ; and it seems possible that it may really be a phenomenon associated with its present position in the body rather than with its past history, and that it is a local phenomenon of the same class as the rigidity. Unfortunately in this case there is no record of the state of the abdominal reflexes.

It seemed that the abdominal reflexes might throw some further light on these phenomena. These reflexes may be regarded as being four in number—an upper and lower on each side. They are best elicited by lightly scratching the skin with a blunt pin or with a pencil. In young adults they are almost invariably present under normal circumstances, but in old people and those with lax abdominal walls they are frequently difficult to elicit.

The first case to be mentioned is one of appendicitis :—

A woman, age 20, who had been ill for twenty-four hours. The right lower reflex was absent ; there was no rigidity. On operation the appendix was kinked half way along its length, and gangrenous beyond the kink.

It seemed that the absent reflex might indicate inflammation of the area deep to it, and that this absence might be of value in localizing intraperitoneal inflammation. But this idea was soon destroyed, as shown by the next case :—

■ A boy, age 11, with forty-eight hours' history. He was blue, the abdomen was distended, all the reflexes were present, the muscles were rigid all over the abdomen, and on operation there was pus free in the peritoneum, with appendix in a gangrenous condition behind the terminal portion of the ileum.

The next type of case noticed was that in which an appendix abscess, well defined and therefore some days old, was associated with the presence of all the reflexes. These cases served finally to dispose of the idea that the state of the reflexes was dependent on underlying inflammation.

The following case was very striking :—

A woman, age 25, who was seized with acute abdominal pain twelve hours before I saw her. On admission, the house surgeon found her in great pain and the abdomen rigid all over, and she looked very ill. Three-quarters of an hour after, she appeared quite comfortable and in no pain, in spite of the fact that no morphia had been given. It seemed difficult to believe the previous statement as to her condition. On examination, all her abdominal reflexes were absent, and there was no rigidity beyond some slight resistance in the right iliac fossa. Operation showed free turbid fluid in the peritoneal cavity, with an acutely swollen and inflamed appendix.

This case suggested that the absence of the reflexes was in some way or other dependent on rigidity, and that it might be a phenomenon of fatigue; and the next question was whether it was associated from the beginning with the rigidity, or merely a sequel to this condition. In this connection attention must be drawn to a case of perforated duodenal ulcer seen within two hours of the perforation.

A boy, age 17, who had been seized with acute abdominal pain two hours before admission. When seen he was in considerable pain, and the abdomen was absolutely rigid, but all the reflexes were present. Operation showed fluid in the peritoneal cavity, and a perforated duodenal ulcer.

So far it seems that the disappearance of the reflexes is an indication of a previous rigidity—and, if this be the case, any condition leading to rigidity would give rise to disappearance of the reflex—and that it could not be a phenomenon associated only with affections of the peritoneum. The examination of renal colic demonstrated this to be the case, since it showed that as a rule the upper and lower reflexes were lost on the side of the affected kidney.

One case of renal colic, due to a small stone in the renal pelvis, showed both rigidity and loss of the reflexes after twenty-four hours of pain.

**Reappearance of the Reflexes.**—A few observations on cases of appendicitis which have been operated upon show that the reflexes reappear in from twelve to twenty-four hours after the operation, provided that the case goes well, and in this respect the following case must be mentioned :—

Male, age 30, operated upon for perforated duodenal ulcer twelve hours after onset. The day after the operation all the reflexes reappeared, but on the second day the lower reflexes again disappeared, and the patient died on the fourth day from general peritonitis, which the post-mortem examination suggested had resulted from a spread from the pelvis rather than from the upper abdomen.

The general indication from these observations seems to be that, as a result of some process within the abdominal area, a process that is usually associated with pain, the abdominal reflexes may disappear for a period of at least twenty-four hours, and that, generally speaking, the reflexes disappear over that part of the abdominal wall which lies over the affected organ. The process producing the change is not necessarily one of inflammation, and not necessarily associated with peritoneum-covered organs, e.g., the reflex disappears in renal colic.

The only change of the parietes which seems to be connected with it is rigidity of the abdominal muscles; but these changes are not completely coincident, the loss of the reflex being, as a rule, later in its incidence than the rigidity.

There are two possible explanations which may be considered, inhibition and fatigue of the reflex; since there is no reason to suppose that the path of the reflex is blocked by any organic change. With regard to inhibition, it might be conceived that it was an attempt to prevent a reflex contraction of the abdominal wall over the painful or diseased part, though it is difficult to see why, if this be the case, the loss of the reflex should not be absolutely coincident with the rigidity, which itself may also be supposed to be protective. Turning to the fatigue of the reflex, the difficulty of finding anything analogous to the loss of a reflex for such a prolonged period is met with. The fatigue of the spinal reflexes investigated by Sherrington<sup>3</sup> showed very short periods, and it was difficult to increase this period by very prolonged stimulation of the reflex. The abdominal reflexes are not purely spinal-cord reflexes; they are lost in lesions affecting the pyramidal tract without loss of the voluntary power over the abdominal muscles; hence it is clear that the reflex path is dependent on a connection with the cerebrum. It is possible that the fatigue of a reflex involving the cerebrum may not show the same laws as those involving the spinal cord alone, and that such a reflex may show a longer period of fatigue than a purely spinal reflex. The difficulty is that it cannot be known whether the stimulus is still present or not, unless the presence of pain is to be regarded as the stimulus. If it is, the fatigue of the reflex certainly lasts some time after the disappearance of the pain.

## LOST REFLEXES IN ABDOMINAL AFFECTIONS 323

No relation between the intensity of the pain and the loss of the reflex could be found in the cases observed ; but when the difficulty of measuring pain is taken into account, it is improbable that any such relation would be found.

The question as to where, on the path of the reflex, the fatigue takes place cannot be settled until the path has been defined, and investigations on this point are certainly needed.

### CONCLUSIONS.

1. The loss of the abdominal reflexes in abdominal conditions may be regarded as a phenomenon of fatigue of the reflex, this fatigue being due to a previous stimulation of the reflex by a painful affection in the abdominal area ; and it is suggested that the fatigue of the reflex may be cerebral rather than spinal.

2. The local loss of the reflex, e.g., the right lower reflex in appendicitis, or the general loss of all four reflexes in a patient whose abdominal wall is in good condition, is of considerable clinical value ; but its value is not absolute, and it must be determined together with the other features which go to make up the picture of the case.

---

### REFERENCES.

<sup>1</sup> ROLLESTON, *Brain*, 1906.

<sup>2</sup> JAMIN, *Neurologisches Centralblatt*, 1906, 678.

<sup>3</sup> SHERRINGTON, *Integrative Action of the Nervous System*, 219.