

ABDOMINAL 'VISCERAL' SENSATION IN HUMAN TETRAPLEGIA

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INTRODUCTION

WENGER (1950) writing on 'Emotion and Visceral Action', states: 'In spite of the fact that afferent fibres from most of the viscera are relatively few in number and that the sense of pain is largely absent from many visceral organs, we, as introspecting organisms, know that we experience many rather vague internal sensations. Because they are vague and probably subject to wide individual differences, our terminology for them is not precise, but we try in many ways to describe them. Such terms as "lumps in the throat", "sinking feeling", "butterflies in the stomach", "feeling of heaviness or lightness", and many others attest to afferent action from the viscera.' The correlation of such feelings with specific visceral action patterns, Wenger concludes, remains a major research project for the future. Other internal or visceral sensations, such as hunger and nausea, also seem to have eluded, thus far, attempts to establish the path by which they reach consciousness.

Some authors, for example (Wright, 1965), state that the results of vagotomy prove that the vagi do not carry afferent fibres from the alimentary canal since the threshold of pain is unchanged and the patient can experience hunger and fullness; whilst others (*e.g.* James, 1957) quote those who have recorded afferent impulses in the vagus which originate in the stomach, although admitting that there is a conflict of evidence on sensation caused by mechanical distortion of that viscus, *e.g.* by balloons. Grossman and Stein (1948) appear to establish clearly on clinical grounds that the splanchnic nerves are the afferent pathways for the 'pangs' associated with gastric hunger contractions; but according to James's review, the relationship between stomach contractions and hunger pains (or pangs) certainly still seems unsettled. As far as nausea is concerned, James, like Hunt (1959), quotes those who consider that this visceral sensation is caused by excitation of duodenal receptors rather than gastric ones. (Bors, 1951, refers to pelvis phantoms, but not feelings from the abdomen proper.)

The purpose of this study was to try and determine the difference, if any, in abdominal sensations which result from complete spinal cord lesions at the cervical level.

METHOD

One of us (J. P. C.) interviewed the relevant population of patients currently in the Spinal Injuries Centre of Stoke Mandeville Hospital, whilst the other (H. L. F.) assessed the level and completeness of the spinal lesion in each patient. An element of blindness was thus introduced into the project, to counter in part the difficulties associated with introspective testimony of the kind on which the interviews relied, difficulties which are discussed more fully below.

Interview. Each patient was given a brief preamble for purposes of gaining their consent and to orientate them towards the introspective nature of the inquiry. They were told whereas much attention had been given to how they felt externally, *e.g.* with pin prick etc., the present study was an attempt to assess how they felt internally, *e.g.* with such sensations as hunger, and that this might be related to their digestive processes (and even the gastro-colic reflex) which inevitably loom somewhat larger in the daily hygiene of their post-injury lives. They were also instructed that the inquiry would be divided into two parts, namely how they felt before and after their accident, all three questions below being asked about the former state first, and then the latter:

1. When hungry what did they feel and where did they feel it?
2. If familiar with abdominal dread, *e.g.* butterflies in the stomach or sinking feelings, what did they feel and where did they feel it?
3. When nauseated, as before vomiting, what did they feel and where did they feel it?

To reinforce the distinction between pre- and post-injury experience, each patient was asked together with each question to give either specific or kinds of instance in which they had experienced these three feelings, both before and after their injury. They were given ample opportunity to indicate whether they felt hunger, dread and nausea elsewhere than in the abdomen, to make sure they had really grasped the nature of the injury. With these safeguards and the interviewer's awareness of the ways in which motivation may lead to inaccurate or distorted recall in testimony of even objectively observable events, the reliability of such introspection was considered adequate on criteria similar to those adopted by Evans (1962) when studying disturbances of the body image in paraplegia, *i.e.*:

1. The patient's thoughtful manner and 'Aha'! effect on comprehension and successful recall.
2. The nature and variety of occasions described on which each visceral sensation was felt rang true to life.
3. The pre- and post-injury similarities in some instances, yet differences and individual expression in others, also gave a convincing over-all picture.

Some attempt was also made to assess each patient's educational background, life experience, personality and nervous history, as far as these might have some bearing on their skill in the relevant areas of recall concerned.

Only responses on abdominal localisation of each of the three 'visceral' sensations were analysed, and recorded as epigastric, hypogastric and umbilical (including unlocalised or generalised).

MATERIAL

Only patients with traumatic spinal cord injuries were included. There were 66 patients with cervical lesions, and 23 patients from the same wards with low thoracic, lumbar or sacral cord injuries (grouped together as 'low'). Forty-two of the 'high' group had clinically complete lesions, and 24 incomplete. Both 'high' and 'low' groups seemed to come from a wide range of social, educational and occupational background. There were 11 females and 55 males in the 'high' group, with 9 females and 14 males in the 'low' group. The distribution by age and duration-since-injury in both groups were comparable.

TABLE I

Age	Cervicals; Incomplete or complete	Duration	Abdominal hunger	Abdominal dread	Abdominal nausea
30	C	5 months	Low, lost	Centre, unchanged	Unlocalised, doesn't rise
19	I	6 weeks	Low, unchanged	Unlocalised, no occasion since	Never felt it
52	C	10 weeks	High, unchanged	Sides, no longer in abdomen	Never felt it
31	I	17 months	High but no longer in abdomen	High, unchanged	High, bloated not empty
21	C	23 months	High, unchanged	Low, unchanged	Unlocalised, unchanged
61	I	27 months	High, unchanged	Not abdomen	Low pain now, never before
64	I	6 years	Unlocalised, unchanged	Not abdomen	Unlocalised, Unchanged
65	I	5 years	Never felt it	Never felt it	High, unchanged

RESULTS

Table I shows the recording of the results in the first nine cervical patients interviewed, the remaining results were recorded similarly. Because of the inexactness of the techniques used it is not possible or justifiable to analyse all the results numerically.

TABLE II

	Abdominal hunger pangs present		Abdominal hunger pangs absent
Complete cervicals	38	Unchanged 24 Changed 14	4
Incomplete cervicals	21	Unchanged 13 Changed 8	3
Low lesions	20	Unchanged 10 Changed 10	3

TABLE III

	Abdominal dread present		Abdominal dread absent
Complete cervicals	33	Unchanged 20 Changed 9 No occasions 4	9
Incomplete cervicals	16	Unchanged 8 Changed 3 No occasions 5	8
Low lesions	19	Unchanged 13 Changed 3 No occasions 3	4

However, an attempt has been made to do this with sensations of abdominal hunger and abdominal dread. Table II shows the results for abdominal hunger. In the first column are the number of patients in each group who claimed to have experienced abdominal hunger pangs before their injury. The third column shows the number of patients in each group who denied feeling abdominal hunger pangs before the injury. None of these subsequently experienced abdominal hunger pangs. The second column shows the numbers in each group who had originally experienced hunger pangs and separates those in whom sensations of hunger were unchanged from those in whom hunger pangs disappeared or were altered following

the injury. There is no significant difference in the complete cervicals, incomplete cervicals or the low lesions in this respect.

Table III is similarly constructed to Table II but shows the incidence of abdominal dread before injury in the first column, and the absence of abdominal dread in the third column (none of these subsequently experienced abdominal dread). The second column shows the number in each group in whom the abdominal dread was unchanged following the accident, those in whom it disappeared or changed in some other way, and also the patients who claimed that since their accident they as yet had no occasion to feel dread. There is no significant difference between complete cervicals, incomplete cervicals or the low lesions in this respect.

It was not considered justifiable to analyse the results about the question of abdominal nausea because the answers from both before and after the accident were too vague. It is interesting to record that 16 patients claimed that they had never experienced nausea either before or after the accident.

DISCUSSION

Since a high proportion of the complete cervical lesions reported no change in their post- from pre-injury abdominal visceral sensations, and those who did report changes in such sensations after their injuries were at least as common in the 'low' group, it seems reasonable to conclude that the changes were not due to cutting off of sympathetic afferents from the abdomen proper. A corollary would appear to be that the vagus must mediate afferents from the area, conveying sensations of hunger (Paintal, 1954) and dread.

It will be interesting in the future to carry out a similar study with regard to sensations of thirst and to try and find a group of patients with cervical cord lesions where the injury was sustained in childhood before any learning had occurred.

SUMMARY

Sixty-six patients with cervical, called 'high' lesions, were compared with 23 low thoracic, lumbar or sacral cord lesions (due in all cases to accidental spinal trauma) as to their awareness of abdominal hunger, abdominal dread and abdominal nausea before and since their injury. The changes reported suggest that such visceral sensations from the abdomen proper are mediated by the vagus and not the sympathetic supply.

RÉSUMÉ

66 malades avec des lésions cervicales ou dites 'hautes' ont été comparés avec 23 lésions médullaires dorsales basses, lombaires ou sacrées (tous les cas étaient d'origine traumatique), par rapport à leurs faims, craintes et nausées abdominales avant et depuis leur traumatisme. Les variations observées suggèrent que de telles sensations viscérales d'origine abdominale ont comme médiateur le nerf vague et non la suppléance sympathique.

ZUSAMMENFASSUNG

66 Patienten mit traumatischen Cervikalläsionen wurden mit 23 Thorakal-Lumbar oder Sakralläsionen hinsichtlich ihrer Wahrnehmung von abdominalem Hungergefühl, abdominalen Unbehagen und abdominaler Übelkeit vor und nach ihren Unfall verglichen. Es wird auf Grund der Beobachtungen angenommen, dass diese abdominalen Sensationen vom Vagus und nicht vom Sympathicus geleitet werden.

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