Role of visceral sensitivity in functional disorders

Irritable bowel syndrome: pathophysiology

The pathophysiology of functional digestive disorders is incompletely understood, despite significant advances in the recognition of aetiological factors and pathological mechanisms. Abnormal motility patterns observed in irritable bowel syndrome (IBS) are neither constant nor specific, and few data from the literature have shown a link between these patterns and pain episodes. Using current methodology, hypersensitivity ofafferent fibres is a frequent but not a constant finding among patients with IBS. Hypersensitivity amplifies the discomfort produced by abnormal gas transit. In terms of sensory disorders, patients typically present with impaired fundic relaxation, antral dilation and/or hypomotility, delayed gastric emptying, or small bowel dysmotility. These motor disturbances are possibly related to abnormal autonomic control, especially in patients with delayed gastric emptying and small bowel transit. In terms of sensory disorders, patients typically present with gastric hypersensitivity resulting from abnormal afferent function, or with gastro-gastric or duodenogastric reflex hyperactivity in which normal relaxation of the proximal stomach is impaired due to either afferent or efferent dysfunction.

Non-invasive measurement of gastric accommodation

The barostat is the most widely used method for measuring changes in intragastric pressure, volume, and sensation. It is the only technique that allows simultaneous measurement of gastric accommodation and sensation. However, the procedure itself alters the intragastric distribution of a meal and possibly exaggerates relaxation of the gastric fundus, making it difficult to measure accommodation in response to ingested foods.

Conventional two-dimensional ultrasound is used to measure antral and fundal diameter and area. This cheap and readily available technique is non-invasive and does not expose the patient to radiation. However, the results are highly user dependent and the procedure has technical limitations. It also fails to differentiate between food and gastric secretion, or between solid and liquid contents. Three-dimensional ultrasound provides much improved definition and facilitates volume assessment of the entire stomach. However, the procedure is technically demanding and is not widely available.

Single photon emission computed tomography is a non-invasive technique which allows assessment of the entire stomach and its contents. It also enables gastric accommodation to be studied. The main limitation is the high radiation exposure which restricts repetitive measurement making it unsuitable for clinical trial use.

Magnetic resonance imaging (MRI) is probably the only technique that allows the simultaneous measurement of gastric accommodation, gastric motility, and emptying. Measurement of gastric contents and air can also be assessed. However, the procedure is technically difficult, and the equipment expensive. Despite these constraints, MRI will probably pave the way for the future of neurogastroenterology by enabling the measurement of gastric emptying and secretion, and of gastroduodenal and pyloric motility.

Non-invasive techniques have the advantage of being less uncomfortable for the patient but the information provided does not necessarily replace that of the invasive techniques and for now, the barostat remains the standard for gastric accommodation measurement.

In addition to MRI, drug modelling and gastric accommodation studies are also possible goals for the future.

Functional dyspepsia: pathophysiology

The pathophysiological mechanisms responsible for functional dyspepsia include alterations in motility and visceral sensation, abnormal acid secretion, and Helicobacter pylori infection. Approximately 50% of patients with functional dyspepsia have motor disorders. These include impaired fundic relaxation, antral dilation and/or hypomotility, delayed gastric emptying, or small bowel dysmotility. These motor disturbances are possibly related to abnormal autonomic control, especially in patients with delayed gastric emptying and small bowel transit. In terms of sensory disorders, patients typically present with gastric hypersensitivity resulting from abnormal afferent function, or with gastro-gastric or duodenogastric reflex hyperactivity in which normal relaxation of the proximal stomach is impaired due to either afferent or efferent dysfunction.

The role of H pylori in functional dyspepsia is difficult to define and the literature yields inconsistent and often confusing results. The general consensus is that H pylori infection is not associated with impaired gastric emptying and that the abnormalities seen in H pylori positive patients coexist independent of their H pylori status. However, meta-analysis of seven controlled studies reported a non-significant odds ratio in favour of H pylori eradication therapy in patients with functional dyspepsia.

Further studies are needed to establish a clear causal relation between physiological dysfunction and specific symptoms of functional dyspepsia. Future therapeutic strategies should be aimed at reducing nociception as well as enhancing the accommodation response.