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LETTER TO THE EDITOR

Multiple rapid swallowing in idiopathic achalasia: from conventional to high resolution manometry

Dear Editors,

Savojardo *et al.*[1] observed single swallows (SS) and multiple rapid swallowing (MRS) by conventional sleeve manometry in patients with achalasia. Similar MRS manoeuvres can be performed using high resolution manometry (HRM) to aid the diagnosis of swallowing problems. Clouse *et al.*[2] have shown that HRM is helpful in segregating aperistaltic disorders, such as achalasia and oesophageal spasm. The advantages of HRM are particularly evident during for assessment of pressure events during MRS.

Firstly, HRM is unaffected by axial movement of the sphincter relative to the catheter. Stable positioning in a dilated oesophagus is not easy, moreover, longitudinal muscle spasm with significant (>4 cm) oesophageal shortening in patients with achalasia can produce 'lower oesophageal sphincter (LOS) pseudorelaxation' despite the use of a sleeve sensor (figure 6, Fox *et al. NGM* 2004).[3] Although uncommon, these phenomena could have produced the partial, and occasionally complete, LOS relaxation seen by the authors on MRS in some patients.

Secondly, HRM with closely spaced (<2 cm) pressure sensors can be used to assess intra-bolus pressure (IBP) on swallowing and IBP gradient across the gastro-oesophageal junction (GOJ). Brasseur and Dodds[4] have shown that IBP, not contractile pressure, reflects the force that drives bolus movement through the oesophagus. The IBP depends on the driving force generated by oesophageal contraction and the resistance to bolus movement. The presence of a positive IBP gradient determines when flow will occur across the GOJ,[5,6] and is more reliable than 'point measurements' of LOS pressure in correctly discerning incomplete sphincter

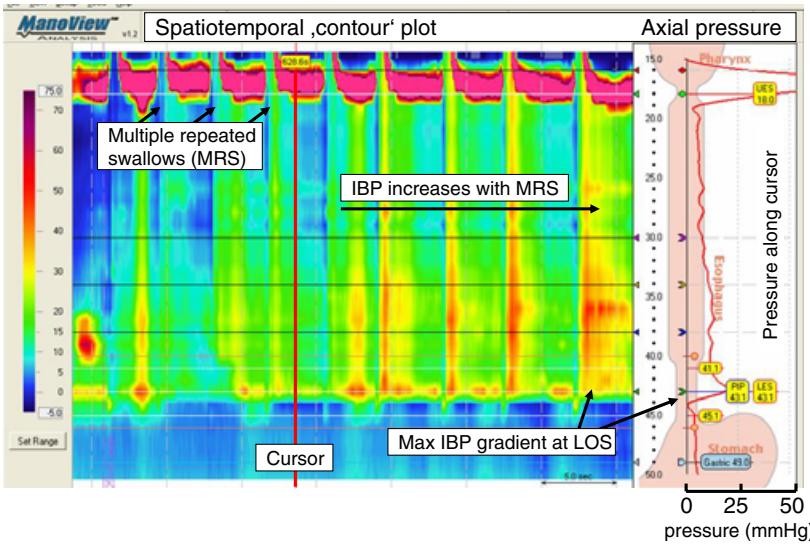

Figure 1 Multiple rapid swallowing in patient with achalasia with persistent dysphagia post-Heller's myotomy (seated position). Manometric data are presented as a spatiotemporal plot with time on the *x*-axis and distance from the nares on the *y*-axis. Pressure is indicated by the legend (left) and intra-bolus (intra-oesophageal) pressure in the right panel. Here, resting lower oesophageal sphincter (LOS) pressure is low with partial relaxation apparent on the first swallow; however, LOS pressure rises with intra-bolus (intra-oesophageal) pressure with each successive swallow. This indicates that fluid is building up within the oesophageal cavity and resistance to flow across the gastro-oesophageal junction. The sharp drop of intra-bolus pressure (IBP) (i.e. maximum IBP gradient) at this level confirms the functional significance of the pathology.

relaxation.[7] Moreover, the position of the maximum IBP gradient locates the point of maximum resistance to bolus transport.[8] Position, bolus volume and bolus consistency also affect these measurements.[8,9] Thus, in the upright position, the pressure gradient across the GOJ increases with bolus volume if there is resistance to flow at this level. This is not evident for small volume SS because the oesophageal body has a relatively large capacity (especially if dilated); however large volume MRS 'reveals' resistance to flow at the GOJ and can confirm the diagnosis of achalasia even in difficult cases (Fig. 1). This aspect of oesophageal physiology is not easy to appreciate using conventional manometry, although intra-oesophageal pressure is often observed to rise in achalasia as the patient ingests more fluid during the study. It would be interesting to know if the authors noted this effect and also whether any such effect was associated with clinical features or the oesophageal diameter on barium swallow.

Focusing on the assessment of IBP and IBP gradient, rather than the oesophageal contraction, represents an important shift in the approach to, and interpretation of, manometric data. HRM provides information that describes the forces acting on the bolus, and MRS helps to 'reveal' the location and determine the functional significance of any functional or structural resistance to flow within the oesophagus. This is important in clinical practice because oesophageal symptoms and mucosal disease are more closely related to disturbed bolus transport and impaired clearance than oesophageal dysmotility *per se*.[10]

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REFERENCES

1 Savojardo D, Mangano M, Cantu P, Penagini R. Multiple rapid swallowing in idiopathic achalasia: evidence for patients' heterogeneity. *Neurogastroenterol Motil* 2007; **19**: 263–9.
2 Clouse RE, Staiano A, Alrakawi A, Haroian L. Application of topographical methods to clinical esophageal manometry. *Am J Gastroenterol* 2000; **95**: 2720–30.
3 Fox M, Hebbard G, Janiak P *et al.* High-resolution manometry predicts the success of oesophageal bolus transport and identifies clinically important abnormalities not detected by conventional manometry. *Neurogastroenterol Motil* 2004; **16**: 533–42.
4 Brasseur JG, Dodds WJ. Interpretation of intraluminal manometric measurements in terms of swallowing mechanics. *Dysphagia* 1991; **6**: 100–19.
5 Ghosh SK, Kahrilas PJ, Zaki T, Pandolfino JE, Joehl RJ, Brasseur JG. The mechanical basis of impaired esophageal emptying postfundoplication. *Am J Physiol Gastrointest Liver Physiol* 2005; **289**: G21–35.
6 Pandolfino JE, Ghosh SK, Zhang Q, Jarosz A, Shah N, Kahrilas PJ. Quantifying EGJ morphology and relaxation with high-resolution manometry: a study of 75 asymptomatic volunteers. *Am J Physiol Gastrointest Liver Physiol* 2006; **290**: G033–40.
7 Staiano A, Clouse RE. Detection of incomplete lower esophageal sphincter relaxation with conventional point-pressure sensors. *Am J Gastroenterol* 2001; **96**: 3258–67.
8 Pal A, Williams RB, Cook IJ, Brasseur JG. Intrabolus pressure gradient identifies pathological constriction in the upper esophageal sphincter during flow. *Am J Physiol Gastrointest Liver Physiol* 2003; **285**: G1037–48.
9 Fox M, Fried M, Menne D, Stutz B, Schwizer W. The effect of tegaserod on esophageal function: a randomized controlled trial in healthy volunteers. *Aliment Pharmacol Ther* 2006; **24**: 1017–27.
10 Tutuian R, Castell DO. Combined multichannel impedance and manometry clarifies esophageal function abnormalities: study in 350 patients. *Am J Gastroenterol* 2004; **99**: 1011–19.