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**Can high resolution manometry parameters for achalasia be obtained by conventional manometry?**

Herbella FAM *et al.* High resolution *vs* conventional manometry

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**Abstract**

High resolution manometry (HRM) is a new technology that made important contributions to the field of gastrointestinal physiology. HRM showed clear advantages over conventional manometry and it allowed the creation of different manometric parameters. On the other side, conventional manometry is still wild available. It must be better studied if the new technology made possible the creation and study of these parameters or if they were always there but the colorful intuitive panoramic view of the peristalsis from the pharynx to the stomach HRM allowed the human eyes to distinguish subtle parameters unknown or uncomprehend so far and if HRM parameters can be reliably obtained by conventional manometry and data from conventional manometry still can be accepted in achalasia studies. Conventional manometry relied solely on the residual pressure to evaluate lower esophageal sphincter relaxation while HRM can obtain the Integrated Relaxation Pressure. Esophageal body HRM parameters defines achalasia subtypes, the Chicago classification, based on esophageal pressurization after swallows. The characterization of each subtype is very intuitive by HRM but also easy by conventional manometry since only wave amplitudes need to be measured In conclusion, conventional manometry is still valuable to classify achalasia according to the Chicago classification. HRM permits a better study of the LES.

**Key words:** Achalasia; Esophagus; High resolution manometry; Conventional manometry; Lower esophageal sphincter; Esophageal body; Chicago classification

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**Core tip:** High resolution manometry is a new technology with clear advantages over conventional manometry. It is unclear; however, if new parameters created after this technology can be obtained by conventional manometry especially in achalasia cases. We found that conventional manometry is still valuable to classify achalasia according to the Chicago classification but high resolution manometry permits a better study of the lower esophageal sphincter.

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High resolution manometry (HRM) made important contributions to the field of gastrointestinal physiology. HRM, in comparison to conventional manometry, not only brings more comfort and speediness to the test[1], a more intuitive comprehension of the plots compared to tracings[1] even for beginners[2], and a lesser degree of interobserver and intraobserver interpretation variability[3] but also HRM proved to be advantageous in the following parameters: (1) evaluation of gastric motility[4]; (2) the correct evaluation of the lower esophageal sphincter (LES) relaxation and esophagogastric junction flow avoiding movement artifacts and correlating it temporally with swallowing[5]; (3) the identification of segmental defects of peristalsis not covered by the spacing of sensors in conventional systems[6], and (4) the motility and temporal correlation of the pharyngo-upper esophageal complex due to the rapid response and circunferentiality of the solid-state sensors, and compensation for movement artifacts[7].

The detailed view provided by HRM permitted the creation of new manometric parameters and a new classification of motility disorders, the Chicago classification[8], recently simplified and reviewed in his 3.0 version[9] with a 4.0 version under creation to incorporate intraluminal impedance as well. The Chicago classification made 3 major contributions: (1) defined an objective parameter to measure LES relaxation, the integrated relaxation pressure (IRP); (2) classified achalasia in 3 distinct subtypes; and (3) showed a prognostic value of manometry parameters[10].

It is still elusive; however, if the new technology made possible the creation and study of these parameters or if they were always there but the colorful intuitive panoramic view of the peristalsis from the pharynx to the stomach HRM allowed the human eyes to distinguish subtle parameters unknown or uncomprehend so far (see examples on Figure 1). This lead to questioning if HRM parameters can be obtained by conventional manometryand data from conventional manometry still can be accepted in achalasia studies since HRM is not wildly available due to the high cost of the system and catheters.

Achalasia is a rare primary esophageal motor disorder characterized by aperistalsis and absent or incomplete relaxation of the LES[13]. Dysphagia and regurgitation are common symptoms of the disease that in association with a dilated esophagus on the barium esophagram makes the diagnoses of this disease not difficult[14]. Esophageal manometry; however, is useful not only for the diagnosis in difficult cases, especially without esophageal dilatation, but it seems to predict therapeutic outcomes[10], usually accomplished via endoscopic forced dilatation of the cardia or surgical Heller’s myotomy and fundoplication[15].

Conventional manometry relied solely on the residual pressure to evaluate LES relaxation[16]. IRP (Integrated Relaxation Pressure - the average minimum esophagogastric junction pressure for 4 sec of relaxation within 10 s of swallowing) is virtually impossible to be calculated in conventional tracings.

Esophageal body HRM parameters define achalasia subtypes, the Chicago classification, based on esophageal pressurization after swallows. The characterization of each subtype is very intuitive by HRM but also easy by conventional manometry since only wave amplitudes need to be measured (Figure 2). In fact, some well-known papers successfully applied the classification in patients submitted to conventional manometry[17,18]. Moreover, type III corresponds to the old terminology “vigorous achalasia”[8].

Different studies showed that achalasia type II shows the best response and type III the worst response to either Heller´s myotomy or endoscopic pneumatic dilatation[19]. The prognostic value of manometric parameters to define therapy outcomes is; however, not new to HRM. Long before Chicago classification, some Brazilians surgeons noticed poorer results for patients with lower amplitudes of the simultaneous waves observed at the conventional manometry (< 20 mmHg) precluding the choice of a Heller myotomy opting for an esophagectomy in these cases[20]. Very interestingly too, some authors found prognostic value for the basal pressure of the LES at conventional manometry[21], but this was never tested for HRM.

In conclusion, conventional manometry is still valuable to classify achalasia according to the Chicago classification. HRM permits a better study of the LES.

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**Figure 1 Example of high resolution parameters identifiable at the conventional manometry.** A: The peristaltic gap at transition zone (change from striated to smooth muscle in the proximal esophagus - arrow) has been fully explored with high resolution manometry[11] but it was well-known and identifiable as low amplitude waves at the proximal esophagus (arrow), although the clinical significance not comprehended, by conventional manometrists (B)[12]; C: The contractile deceleration point (CDP) represents the inflexion point in the contractile front propagation velocity in the distal esophagus representing the motility of the ampulla (arrow). Conventional manometry neglected time and privileged only amplitudes. A progressive latter onset of the distal wave (CDP) can be noticed from 3 to 1 cm above the lower esophageal sphincter upper border (D-F).



**Figure 2 Chicago classification subtypes at the light of high resolution manometry (left) and conventional manometry (right).** Type I (no distal pressurization), type II (panesophageal pressurization), and type III (premature spastic contractions).