# ADVANCES IN GERD

Current Developments in the Management of Acid-Related GI Disorders

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## High-Resolution Manometry: Is It Better for Detecting Esophageal Disease?

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**G&H** How does high-resolution manometry differ from conventional manometry?

**JP** High-resolution manometry is an adaptation of conventional manometry, in which the data interpretation and analysis have a level of sophistication that is quite advanced. With high-resolution manometry, the pressure sensors are placed closer together (usually approximately 1 cm apart), and the overall number of pressure sensors is increased. With these modifications, much more information can be acquired, as data are not lost in the gaps that are typically present in a conventional catheter, which has sensors placed 3–5 cm apart. However, the real advantage of high-resolution manometry is not the improved acquisition of data, but the method of displaying and analyzing the data using esophageal pressure topography plots, which were originally devised by Dr. Ray Clouse. Now it is possible to have a seamless, dynamic representation of the entire pressure pattern and pressure dynamics throughout the entire esophagus, thus obtaining information regarding anatomy and pressure gradients, along with the contractile activity. This new context improves the ability to diagnose esophageal motor disorders because it reduces movement artifact and improves the detail of the acquired information.

**G&H** Are there any other advantages of using high-resolution manometry rather than conventional manometry for detecting esophageal disease?

**JP** As mentioned above, one of the most important developments in high-resolution manometry is the increase in detail, which allows gastroenterologists to classify diseases into clinically relevant subtypes and remove normal variants from pathologic classification. This improvement is noteworthy because it avoids the past problem of assigning a specific diagnosis to a patient who actually has fairly normal peristaltic function upon evaluation. This detail has been one of high-resolution manometry's major advantages over the conventional technology, in addition to its ease of interpretation, ease of use, and shorter duration.

**G&H** Which esophageal diseases can high-resolution manometry be used to detect?

**JP** Although high-resolution manometry has not been available for as long as conventional manometry, it has been shown to improve outcomes in achalasia, one of the most important esophageal disorders. In conjunction with esophageal pressure topography, high-resolution manometry can break down this classic esophageal motor disorder into 3 relevant clinical subtypes based upon the visible contractile activity and pressurization patterns. These pressurization patterns can be used to predict disease outcome, which allows gastroenterologists to inform patients of their likely outcome in advance much more effectively than with conventional manometry. This information helps patients understand what to expect after surgery and also allows gastroenterologists to potentially alter their treatment plans.

High-resolution manometry has also been useful in distinguishing clinically relevant subtypes of Nutcracker esophagus and distal esophageal spasm. Many patients may be labeled with one of these abnormalities; however, high-resolution manometry analysis using pressure topography can clearly show us when these findings are within normal range and when a patient's symptoms are unlikely to be a manifestation of the mild pressure abnormalities.

**G&H** Is high-resolution manometry starting to replace conventional manometry in the average gastroenterology practice or is it still used only rarely?

**JP** Even though high-resolution manometry is a relatively new technology, it is much easier to use for locating the lower esophageal sphincter or esophageal gastric junc-

tion for placement of the catheter because of its advanced ability to perform manometric studies and its increased number of sensors. In addition, the analysis is much more intuitive. Several recent studies, both in abstract form and in full studies published in the literature (including one by Dr. Geoff Hebbard) have demonstrated that reproducibility with high-resolution manometry is much better. This improvement is likely due to the new presentation of data, in a format akin to imaging, rather than in a line-tracing format. Gastroenterologists appreciate these advances and are able to make better diagnoses with this technique. Thus, many of the existing esophageal laboratories in the community setting, not just university centers, have adopted this technology. Currently, over 250 centers (most of which are in North America) have the high-resolution capacity.

### **G&H** How do the 2 manometric systems compare in terms of cost?

**JP** The main disadvantage of high-resolution manometry is that it can be much more expensive than conventional manometry. Interestingly, the upfront cost does not differ much between the 2 systems, though the high-resolution manometric system is slightly more expensive. The high cost associated with high-resolution manometry comes from the fact that it requires the purchase of an entirely new system even though the gastroenterologist likely already has a conventional system. In addition, the catheters are much more expensive—each catheter costs approximately $8–9,000 at the current market price—though they are reusable and have a fairly good longevity (up to 200 studies). Obtaining 200 studies with a catheter fits in well with the way this technique is billed and the amount that would be reimbursed on a normal procedure; obviously, if using the system were too expensive and gastroenterologists lost money every time a procedure was performed, the system would likely not be used.

In my opinion, the improvements provided by high-resolution manometry are worth the cost. Some gastroenterologists—likely those who have not used the technology themselves—have assumed that it is an overpriced tool that does not add much to conventional manometry. However, any individual who criticizes a technology without having utilized it surely does not stand on firm ground when judging whether it is useful. Valuable judgments come from individuals who have actually used both technologies and have then compared and analyzed their observations. I do not foresee any individuals, particularly those in research or clinical practices specializing in esophagology, deciding to leave behind high-resolution manometry to return to conventional manometry. In addition, it may be useful to look at the trend of the manufacturers who have been producing this equipment for the last 20 years; they are almost uniformly promoting high-resolution manometry as the optimal technique.

### **G&H** How does high-resolution manometry compare to standard manometry in terms of ease of use and patient satisfaction?

**JP** High-resolution manometry is much easier for motility technicians or nurses to use. It is also much easier in terms of catheter placement, as the landmarks noted with esophageal pressure topography, which are shown in real time on the computer screen during the procedure, are much easier to interpret, thus allowing for good positioning and likely reducing the manometric procedure by approximately 10–20 minutes. From the patient's perspective, reducing the duration of the procedure by 10–20 minutes is a significant benefit—it means having a catheter positioned through their nose for a shorter amount of time. In addition, with this more advanced system, it is much easier to determine whether the patient takes a good swallow, whether the study is of sufficient quality, and whether the landmarks are correct. All of these benefits are very helpful. Thus, in terms of performing the test, high-resolution manometry certainly appears to be much more patient-friendly as well as technician/nurse-friendly than conventional manometry.

In addition, esophageal pressure topography is akin to imaging, and Dr. Geoff Hebbard has shown that this technique is easier to teach to new trainees than the line tracings utilized with conventional manometry.

### **G&H** Is high-resolution manometry purely a diagnostic tool or are there any systems that combine it with therapeutic techniques?

**JP** Currently, there is no technology that combines high-resolution manometry with therapeutic techniques; it is purely a diagnostic tool. However, it may be used to stratify risk in specific disease subtypes and could potentially be used in the operating room to determine whether an adequate myotomy or fundoplication is being performed.

### **G&H** What recent advances have been made in the development of this technology?

**JP** Recently, there have been 2 important advances in high-resolution manometric systems. One is the incorporation of impedance, which allows the gastroenterologist to view the bolus transit along with the high-resolution manometry. The second is a concept called 3-dimensional high-resolution manometry. Instead of obtaining a very detailed, axial description of esophageal motor function

up and down the esophagus, this technology allows visualization of the intricacies and variability along the radial plane. This is extremely important when evaluating the upper and lower esophageal sphincters because both of these particular muscles are asymmetrical. This is a significant benefit when dealing with diseases that do affect the upper and lower esophageal sphincters, specifically in individuals experiencing oral pharyngeal dysphasia who may have cricopharyngeal bars or relaxation issues possibly related to fibrosis. Of course, it may also improve the ability to accurately define mechanical versus other functional obstructions, which may be more amenable to dilation.

Future studies will hopefully demonstrate that both of these technologies may be extremely helpful. It is possible that high-resolution manometry with impedance may help better predict who will develop post-fundoplication dysphagia. Additionally, it is possible that 3-dimensional high-resolution manometry may help predict the propensity to reflux and also define the length of myotomy in achalasia.

## Suggested Reading


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