Antroduodenal manometry: experience from a tertiary care center

Uday C Ghoshal, Maneesh Paliwal, Kshaunish Das, Surender K Yachha, Sanjeev Sachdeva, Asha Misra

Departments of Gastroenterology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

Background: Though antroduodenal manometry (ADM) is an important research tool, experience on its clinical utility is scanty.

Methods: All ADM performed as a clinical service, using an 8-channel water perfusion system were retrospectively analyzed. Impact on clinical management was classified as: (1) new diagnosis made, (2) change in management (new drug, decision regarding surgical treatment), (3) further special investigation done, (4) referral to another specialty.

Results: ADM was successful in 32/33 (97%) patients (age 30 years [range 8-71]); 6 patients were <12 years old. Clinical impression before ADM was: chronic intestinal pseudo-obstruction (CIPO) in 16 (50%), suspected gastroparesis in 11 (34.3%), dyspepsia in 5 (15.6%). Consequent to ADM in patients with CIPO, a new diagnosis was made in two (intestinal neuronal dysplasia and celiac disease), new drugs were started in five, surgery was performed in three and specific referral was sought in three. ADM confirmed gastroparesis in 9 of 11 patients. A new diagnosis was made in three patients, new drugs were started in three, and three were referred. In five dyspeptic patients, ADM was normal and no therapy was suggested. Overall, eleven patients with CIPO and four with gastroparesis benefited after ADM.

Conclusion: ADM was found useful in CIPO and gastroparesis, helped in decision making regarding surgery; however in nonspecific indications its utility was limited.

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Episodic, severe pain not localized to the epigastrium was classified as unexplained abdominal pain.

**Antroduodenal manometry**

ADM was done after overnight fast using a water perfusion manometry system and a low-compliance polyvinyl manometry catheter (RedTech, Calabasas CA, USA) by methods described previously. ADM signals were analyzed after preprocessing to remove artifacts as described previously and were classified based on standard criteria described previously.

**Impact of ADM on clinical management**

Impact of ADM on clinical management was classified into four categories as described previously, (1) new diagnosis made, (2) change in management (new drug therapy or decision concerning surgery), (3) resulted in further specialized investigations, (4) referral to another specialty. Overall utility of ADM was taken as the total number of patients who were benefited after the procedure.

**Statistical analysis**

Categorical data were analyzed by chi-square test with Yates’ correction as applicable. More than two continuous variables were evaluated by Kruskall Wallis H test. P values less than 0.05 were considered significant.

**Results**

**Clinical and demographic parameters**

Predominant symptoms for which ADM was performed included unexplained vomiting in 12 patients (37.5%), chronic constipation in nine (28%), unexplained abdominal pain with distension in seven (22%), and dyspepsia not responding to conventional treatment in five (15.6%). The clinician’s impression was chronic intestinal pseudo-obstruction (CIPO) in 16 (50%), gastroparesis in 12 (36.3%) and dyspepsia in five (15.6%).

Patients of CIPO were symptomatic for a median duration of 83 (1-432) months; the former group of patients was more often investigated and required hospitalization (Table 1). Six patients with CIPO underwent multiple laparotomies and six had received multiple courses of anti tubercular drugs.

ADM could be successfully performed in 30 at first attempt; catheter placement was successful at second attempt in two patients, and unsuccessful in one patient. Thus ADM was successful in 32 of 33 (97%) patients.

**Impact of ADM on clinical management** (Table 2)

Among 16 patients with CIPO (13 idiopathic, one each secondary to mixed connective tissue disease, diabetes mellitus and Parkinsonism), ADM was abnormal in 8/16 (50%). In 4/8 patients with abnormal ADM, small bowel barium series was normal. Of the remaining 8 patients with normal ADM, in three a normal result helped in taking decision for colectomy.

Consequent to ADM, two new diagnoses were established, four patients received new drugs, three underwent surgical treatment and three patients were referred. One patient on further evaluation was diagnosed as having intestinal neuronal dysplasia type b. This patient was previously operated for small bowel obstruction caused by intestinal malrotation. He developed unexplained gastric and small bowel dilation and ADM was abnormal (Figure). Resected specimen of small bowel showed giant ganglion in myenteric plexus. The second patient presented with recurrent colicky abdominal pain with distension, he had normal ADM and further evaluation proved celiac disease.

| Table 1: Symptoms and prior interventions done in patients undergoing antroduodenal manometry |
|-----------------------------------|-------------------|-------------------|-------------------|
| Parameter                        | Pseudo-obstruction | Suspected gastroparesis | Other indications |
| Number                           | 16                | 11                | 5                 |
| Duration of symptoms (months)*   | 83 (1-432)        | 12 (4-48)         | 8 (2-24)          |
| Nature of symptoms (n)           |                   |                   |                   |
| Recurrent vomiting with nausea   | 0                 | 11                | 0                 |
| Chronic constipation             | 9                 | 0                 | 0                 |
| Abdominal pain with distension  | 7                 | 0                 | 0                 |
| Dyspepsia                        | 0                 | 0                 | 5                 |
| Investigations (n)               |                   |                   |                   |
| Upper gastrointestinal endoscopy | 21**              | 12                | 10                |
| Radiological (barium, CTT#)      | 16, 2#            | 11                | 1                 |
| Manometry (esophageal, rectal)   | 2, 8              | 0                 | 0                 |
| Scintigraphy                     | 1                 | 6                 | 0                 |
| Total number of investigations   | 48                | 29                | 11                |
| Hospitalization (n [number of hospitalization]) | 16 (44) | 6 (6) | 2 (2) |
| Laparotomy (n [number of times]) | 7 (14)           | 0                 | 0                 |

*Data are as median (range). **Colonoscopy also performed; #CTT: colonic transit studies
Medication was changed in 4 patients: cisapride (10 mg thrice daily) plus octreotide (100 µg subcutaneously thrice daily) in one, neostigmine (2 mg injection for acute episodes and 15 mg tablet thrice daily during follow up) in two, neostigmine plus octreotide in one patient not responding to neostigmine alone and octreotide plus cyclic antibiotic in one, respectively. Total abdominal colectomy with ileorectal anastomosis was done in two patients and one underwent left hemicolectomy. All these three patients had normal ADM, but experienced severe recurrent symptoms. We referred one patient each to pediatric gastroenterology, neurology and genetics department.

Eleven patients with suspected gastroparesis (5 with diabetes mellitus, 5 with no obvious cause and one patient of facial dysmorphism) underwent ADM. All of them had continued to experience severe symptoms while receiving prokinetic drugs. ADM revealed marked antral hypomotility suggestive of myopathic form of gastroparesis in nine (82%). Radionuclide gastric emptying for solid meal was prolonged in all 6 patients in whom it was done.

After ADM, new diagnoses were established in three patients, three received new drugs, new investigations and specific referral was sought in two patients each. One patient was diagnosed as gastroparesis by ADM, and was later found to have distal cholangiocarcinoma causing gastroparesis as a paraneoplastic manifestation. Two children with persistent vomiting were diagnosed as having cyclical vomiting syndrome based on normal ADM, which was further confirmed by normal results in gastric scintigraphy for solid emptying (t1/2: 83 ±13 minutes). Both responded to treatment with propranolol and withdrawal of prokinetics. Another patient with gastroparesis was given erythromycin, to control refractory symptoms. All the other patients with gastroparesis were advised to eat frequent, small, low fiber meals and prescribed a combination of two or more prokinetics.

Five patients with refractory dyspepsia had normal ADM and we did not suggest further therapy for them.

**Follow up**

Two patients of CIPO, who initially responded to neostigmine injections, had frequent recurrence of symptoms. One patient underwent left hemicolectomy. The other patient was started on injection octreotide, with which her symptoms resolved. The other patients who received drug therapy and those who underwent surgery were symptom free and maintained normal nutritional status. All the patients with CIPO and gastroparesis were given dietary advice. During follow up, all diabetic patients and two patients of the idiopathic group were asymptomatic.

**Discussion**

The present series showed that if undertaken with appropriate clinical indications such as suspected gastroparesis or CIPO, ADM is an important tool in diagnosis of these disorders. However, in most patients with difficult-to-treat dyspepsia, ADM was not very useful in diagnostic work-up and therapeutic decision making.

Most previous studies on ADM addressed either its technical aspects or physiology of gastroduodenal motility. There are limited data on clinical utility of ADM and the results of these studies have been contradictory. Whereas some authors felt that ADM has not yet been standardized to be of significant clinical utility, others feel that it is of considerable clinical importance. Conditions such as mild gastroparesis or gut neuromyopathy may present like dyspepsia and functional constipation, at least in early stage and may respond to prokinetics. Since mild symptoms are easily treated with prok-
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netics and laxatives, the need to make a specific diagnosis is often underestimated. There are several specific treatment options such as intra-pyloric injection of botulinum toxin\textsuperscript{21} for gastroparesis, and parenteral neostigmine\textsuperscript{22} or octreotide\textsuperscript{23} and surgery\textsuperscript{24} for intestinal neuromyopathy. However, these therapeutic options would be considered, only if a specific diagnosis is made. Therefore, patients with suspected gastroparesis and CIPO should be evaluated using protocols which include ADM.\textsuperscript{14} Furthermore, non-responsive patients with chronic colonic motor disorders before undergoing colectomy would be benefited by demonstration of normal small bowel motility.\textsuperscript{25} We referred patients for colectomy for non-responsive chronic colonic motor disorder only after showing normal ADM. In patients in whom diagnosis of gastroparesis has already been established by radionuclide scintigraphy, ADM helps differentiate between neuropathy or myopathy. In patients with advanced neuropathic disease, ADM may show markedly reduced contraction amplitude, which is characteristic of myopathic disorder.\textsuperscript{14}

AD motility can be evaluated for short-period using water perfusion system as has been done by us, or can be studied over 24-h using ambulatory solid state system. The former has disadvantage as the recording is for a short period of time and is less physiological. However, the solid-state system has less recording sites and is more expensive. Most studies that addressed the issue of clinical utility of ADM have used the water-perfusion system.

Gastroparesis and CIPO are groups of disorders that result from gastrointestinal neuromyopathy but the underlying causes of these disorders are protean.\textsuperscript{2} In fact, diagnosis of gastroparesis or CIPO should alert the physician to undertake further work-up for its etiology.\textsuperscript{14} One of our patients presenting with recurrent colicky abdominal pain and distension in absence of a mechanical cause had normal ADM and was found to have celiac disease on further investigations. Since, a normal ADM excludes CIPO,\textsuperscript{26} further attempt to work-up for celiac disease was made in this patient even in absence of diarrhea. Though this patient had normal ADM, abnormal ADM has been reported in patients with celiac disease.\textsuperscript{3} It is noteworthy that a proportion of patients with CIPO received multiple courses of antitubercular drugs with mistaken diagnosis of intestinal tuberculosis, a practice quite common in India.

In summary, ADM is technically successful in high percentage of patients and help in establishing diagnosis in gastroparesis and CIPO. It also helped in knowing the functional state of small intestine before undertaking resectional surgery in patients with chronic gut neuromyopathy.

References

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Correspondence to: Dr Ghoshal, Associate Professor, Department of Gastroenterology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Raebareli Road, Lucknow 226 014, India. Fax: 91 (522) 440 017
E-mail: ghoshal@sgpgi.ac.in

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