

A COMPARISON OF DIAGNOSTIC METHODOLOGIES FOR SMALL INTESTINAL BACTERIAL OVERGROWTH: ASPIRATE CULTURE, BREATH TESTING AND THE ATMO CAPSULE

Ayesha Shah

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Abstract

Discussion Forum (0)



Background: The diagnosis of small intestinal bacterial overgrowth (SIBO) is challenging due to limitations in currently available diagnostic methods. Glucose or lactulose breath hydrogen testing, although widely used, lacks sensitivity and specificity, whereas the culturing of small intestinal aspirate, considered to be the gold standard, is invasive, requiring endoscopy and has several methodological limitations. Without validated and accepted diagnostic tests, SIBO is difficult to diagnose and treatment is often based on a trial-and-error approach. The Atmo Capsule, a noninvasive ingestible device measuring gaseous by-products (H_2 and CO_2) across the gastrointestinal (GI) tract, offers a potential diagnostic modality to overcome the limitations of existing methods. We aimed to, in a proof-of-principle study, compare luminal gas measures obtained with the Atmo Capsule during gastrointestinal transit with existing diagnostic methods.

Methods: Patients with unexplained upper GI symptoms, recruited across two sites in Australia and India, underwent upper GI endoscopy as part of routine diagnostic work up. Prior to the procedure, patients provided a baseline breath sample and swallowed the Atmo Capsule. During the endoscopy, duodenal aspirates were collected for culture and 75g glucose injected into the stomach and duodenum. If found in the stomach, the Atmo Capsule was endoscopically moved into the duodenum. Breath samples were collected every 15min for the next 2h after the procedure, and data from the Atmo Capsule were collected until body exit. Positive SIBO diagnoses for incumbent methods were bacterial density of aspirate culture $\geq 10^3$ CFU (considered the gold standard) or rises in breath $H_2 \geq 20$ ppm over baseline. Results from the 3 modalities were compared.

Results:

135 procedures were undertaken in 110 patients (56% female, mean age 41 years; 95% with either functional dyspepsia and/or irritable bowel syndrome). Duodenal aspirate were positive in 46/135 (34%) patients and breath tests positive in 12/135 (9%). Compared with duodenal culture, breath testing demonstrated 63% diagnostic accuracy (9% sensitivity, 91% specificity; **Table 1**). From the Atmo Capsule: H_2 was detected in the small bowel in only one patient, while small bowel CO_2 tended to be higher and colonic H_2 tended to be lower in aspirate-positive patients (**Fig 1**). A model with multiple Atmo Capsule measures (small bowel CO_2 and colonic H_2) demonstrated 77% diagnostic accuracy (61% sensitivity, 87% specificity; AUC: 0.75) compared with aspirate diagnosis (**Table 1**).

Conclusion: Compared with the gold standard, the Atmo Capsule offers higher sensitivity and specificity than glucose breath testing for the diagnosis of SIBO. The absence of H_2 detected by the Atmo Capsule in the small bowel suggests luminal CO_2 is a more suitable diagnostic analyte for SIBO.