

## Bravo<sup>®</sup> Capsule Based pH Monitoring

### Bravo pH Monitoring



### Title

#### Wireless pH Capsule - Yield in Clinical Practice

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### Key Points

1. Bravo capsule-based pH monitoring allows for extended recording times - up to 96 hours - which significantly improves the diagnostic yield of detecting reflux by distinguishing day to day variability. Extended recording also allows for evaluation of patients both on and off PPI therapy, which is clinically beneficial in patients with refractory GERD.
2. Successful capsule placement occurs in 85% to 97% of patients. Detachment usually occurs between two days and two weeks. No major complications have been reported in cases where endoscopic removal is necessary due to prolonged attachment.
3. When comparing Bravo to conventional pH testing, it was found that the correlation was generally good. Conventional pH tests overestimated esophageal acid exposure while Bravo underestimated exposure; however, this had few consequences on total acid exposure.
4. pH monitoring may be cost effective, in that increased use of this test has the potential to lead to fewer unnecessary uses of PPI's.
5. In terms of tolerability, Bravo is the preferred method of choice by the majority of patients.

## Abstract:

Wireless pH monitoring is one of the recent technologies that focus on improving the diagnosis of gastroesophageal reflux disease (GERD). The capsule, which is fixed within the esophagus, transmits data via telemetry to an external receiver. The capsule is usually inserted 6cm above the squamocolumnar junction during an upper endoscopy. The standard recording duration is 48 hours but this can be extended to 96 hours. The wireless capsule has been shown to be at least as accurate as the conventional catheter for the monitoring of esophageal pH. Normal pH values have been established in three different series. The use of a wireless capsule provides an increased diagnostic yield for GERD compared with the conventional catheter. The increased yield is the result of higher sensitivity to detect both abnormal acid esophageal exposure and positive symptom-reflux association. This may be related both to the prolonged recording duration and to fewer dietary modifications and restrictions on activities. Several studies have shown that the pH capsule was better tolerated by patients than the conventional pH catheter. Mild-to-moderate chest pain represents the main side effect of the pH capsule: severe chest pain requiring endoscopic removal of the capsule is rare. The main indication for wireless capsule application is monitoring of distal esophageal pH for diagnostic purpose, particularly in patients with a normal endoscopic examination. The capsule technique has some limitations: costs are higher than conventional pH monitoring, misplacement may occur, and the sampling rate is lower. Finally, compared with pH-impedance monitoring, only acid reflux events can be evaluated.

**Table 1** Normal values for 48-hour recordings with wireless pH capsule.

Study	Capsule location	No. of controls	Median % total time with pH <4 (95th percentile), %	Median no. of acid reflux events (95th percentile)
Pandolfino et al., 2003 [3]	6 cm above SCJ	39	2.0 (5.3)	–
Wenner et al., 2005 [17]	6 cm above SCJ	48	0.8 (4.4)	26 (93)
Ayazi et al., 2009 [16]	5 cm above proximal border of LES	50	1.40 (4.85)	37 (104)

LES, lower esophageal sphincter; SCJ, squamo-columnar junction.

**Table 2** Comparison between the wireless pH capsule and conventional pH catheter. Percentage of total time with pH 4 is expressed as the median.

Study	Study design	% of total time with pH <4, median %		P value
		Wireless capsule	Conventional pH catheter	
Bruley des Varannes et al., 2005 [34]	Simultaneous recording (n = 33 patients)	2.4	3.6	P < 0.001
Pandolfino et al., 2005 [35]	Simultaneous recording (n = 22 controls)	1.76 (1.15 after calibration correction)	3.40 (0.90 after calibration correction)	P < 0.05 (n.s. after calibration correction)
Håkanson et al., 2009 [37]	Simultaneous recording			
	1 <sup>st</sup> series (26 patients, 27 controls)	Patients: 3.2 Controls: 1.1	Patients: 6.8 Controls: 2.1	P < 0.001 P < 0.001
Schneider et al., 2007 [42]	Simultaneous recording			
	10 controls 43 post-360° floppy Nissen Cohort of patients with esophagitis: wireless capsule (n = 68 patients) or conventional catheter (n = 55 patients)	0.8 0.9 14	1 1.2 12	P = 0.1 P = 0.9 P = 0.8
Sweis et al., 2009 [9]	Cohort Wireless capsule (n = 134 patients) or conventional catheter (n = 110 patients)	6.9	4.1	P = 0.001
Wong et al., 2005 [7]	Randomized study Wireless capsule (n = 25 patients) or conventional catheter (n = 25 patients)	7.8	10.2	P = 0.78
Wenner et al., 2007 [40]	Randomized cross over study (n = 31 patients)	7.3	6.3	P = 0.837