The Usefulness of Baseline Impedance Level Measurement for the Diagnosis of Gastroesophageal Reflux Disease in Endoscopy-negative Patients with Esophageal or Supraesophageal Symptoms

Kwang Jae Lee, Jae Eun Lee, Chung Kyun Noh
Department of Gastroenterology, Ajou University School of Medicine, Suwon, Korea

BACKGROUND & AIMS

- The baseline impedance level is determined by the intrinsic electrical conductivity of the surrounding esophageal wall.
- Impedance baseline measurements can be used to evaluate changes in the integrity of the esophageal mucosa, and baseline impedance is found to be correlated with transepithelial resistance.
- Distal baseline impedance levels in GERD patients are markedly lower than those in healthy volunteers. (Kessing BF, et al. AJG 2011)
- A negative correlation between esophageal acid exposure time and distal baseline impedance (Kessing BF, et al. AJG 2011)
- Lower impedance values indicate impaired mucosal integrity (Martinucci I, et al. NM 2014).

Aims : To evaluate whether baseline impedance levels are related to symptoms or reflux-related parameters such as pathologic acid reflux and pathologic non-acid bolus reflux, or esophageal hypersensitivity to reflux in endoscopy-negative patients with esophageal and supraesophageal symptoms, and the usefulness of distal esophageal impedance values in the diagnosis of GERD-related symptoms.

METERIALS & METHODS

- Consecutive endoscopy-negative patients with heartburn with or without regurgitation (group A), chest pain without typical GERD symptoms (group B), or globus without typical GERD symptoms (group C) who underwent 24h esophageal multichannel intraluminal impedance-pH (MII-pH) monitoring off PPI therapy
- Patients were excluded if they were taking medication which could influence esophageal motor function or gastric acid secretion, if they had erosive esophagitis or other abnormalities explaining symptoms on endoscopy, or if they had a history of upper GI surgery. Cardiac causes were excluded in patients with chest pain.
- Baseline impedance values were manually determined at 6 time points with 3 hour intervals, excluding reflux episodes, swallows, meal periods, and pH drops, in the distal 2 sites and the proximal 2 sites.

RESULTS

- A total of 104 patients were included (57 M and 47 F, mean age 47.9 ± 13.9; range, 20-74 years) in the study.

	Heartburn (n=39)	Chest pain (n=28)	Globus (n=37)	*P* value
Gender (M/F)	23/16	15/13	19/18	
Mean age (years)	46.8±14.5	50.9±13.4	46.9±13.5	0.410
Pathological acid exposure, n (%)	14 (35.9)*	7 (25.0)$^{+}$	0 (0)	< 0.001
Pathological bolus exposure, n (%)	6 (15.4)	7 (25.0)	13 (35.1)	0.139
Hypersensitive esophagus, n (%)	9 (23.1)^	4 (14.3)	1 (2.7)	0.034
GERD-related, n (%)	29 (74.4)$^{+}$	18 (64.3)^	14 (37.8)	0.004

- *P < 0.001, compared with globus by Pearson Chi-Square or Fisher's Exact Test
- ^{+}P < 0.01, compared with globus by Pearson Chi-Square or Fisher's Exact Test
- ^P < 0.05, compared with globus by Pearson Chi-Square or Fisher's Exact Test

	Mean proximal basal impedance (Ω)	Mean distal basal impedance (Ω)
Pathological acid reflux (n=21)	2392.9±769.7	1365.1±478.9*
Pathological non-acid bolus reflux (n=26)	2339.7±627.6	2160.3±863.5
Hypersensitive esophagus (n=37)	2541.7±379.8	2532.7±700.7
Non-GERD (n=43)	2312.0±750.9	2359.5±747.9
P value	0.742	< 0.001

- *P<0.001, compared with pathological non-acid bolus reflux, hypersensitive esophagus, and non-GERD by ANOVA with LSD post-hoc tests

ROC curve for the diagnosis of pathological acid reflux

1700 Ω
: sensitivity 83.1%, specificity 76.2%

Area Under the Curve

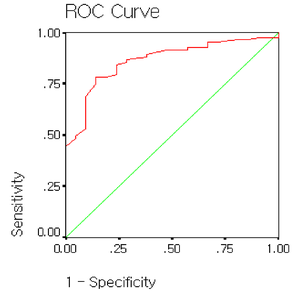
Test Result Variable(s): DIMAVER

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.862	.040	.000	.784	.940

The test result variable(s): DIMAVER has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5



ROC curve for the diagnosis of GERD

1700 Ω
: sensitivity 86.0%, specificity 61.0%

Area Under the Curve

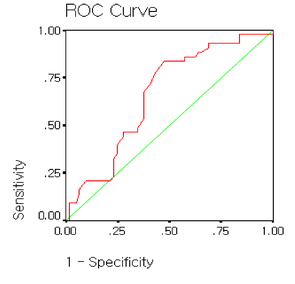
Test Result Variable(s): DIMAVER

Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.660	.054	.006	.555	.765

The test result variable(s): DIMAVER has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5



CONCLUSIONS

Reduced baseline impedance values are associated with pathological acid exposure. The measurement of baseline impedance levels in the distal esophagus may be useful in the diagnosis of pathological acid exposure and GERD-related symptoms in endoscopy-negative patients with esophageal and supraesophageal symptoms.