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Letter to the Editor

The Differential Outcomes of Peroral Endoscopic Myotomy and Pneumatic Dilatation Upon Subtypes of Achalasia Indicate Pathophysiological Differences in Morphological Change of Esophageal Body

TO THE EDITOR: The article entitled "Morphologic changes in esophageal body movement during bolus transport after peroral endoscopic myotomy in type III achalasia" authored by Kim et al[1] published in your esteemed journal has been reviewed and discussed with great interest. This study presents that the different subtype of achalasia has different morphological abnormality in muscle contour at esophageal body that could be as one of the rationales when considering whether peroral endoscopic myotomy (POEM) or pneumatic dilatation (PD) could be a better way to the specific subtype of achalasia.

The evaluation was classified by Kim et al[1] as shown in Figure 1. The impedance and intraluminal ultrasound images at distal esophagus were assessed from both of health subjects and patients whom underwent POEM or PD at pre- and post-procedure. Particularly, the internal systematical comparison among subtypes of achalasia under POEM was detailed respectively in Table.

As exampled in Figure 2, the outcomes of POEM and PD versus to achalasia subtypes shows great differences. POEM has better efficacy than PD for achalasia type III; whereas PD is better than POEM in type II, and both are not achieved an ideal improvement in type I. Our interpretation for these differential outcomes is that achalasia type III is likely in part caused by reduction in nitrergic nerves, instead from myogenic or cholinergic neural excitation impairment. Therefore, the restoration by POEM can be effective, except PD. During achalasia II, both of cholinergic and nitrergic ganglia are progressively lost, the mechanical dilation stretches interstitial cells of Cajal for pacemaking with a forcefully propagation, ie, elevation of contractility. Whilst achalasia type I, ie, loss of both ganglia and interstitial cells of Cajal in lower esophageal sphincter, neither POEM nor PD are capable to enhance the contractility.

In conclusion, many other reports aimed to compare the outcomes of different treatments such as laparoscopic Heller myotomy, POEM, and PD,[2,3] and found limitations due to "heterogeneity" among the studies. Differently, Kim et al[1] by pathophysiological methods, reveals that the morphological structure alteration is explainable to functional impairment from the different subtypes of achalasia, therefore efficacy of POEM and PD is different across

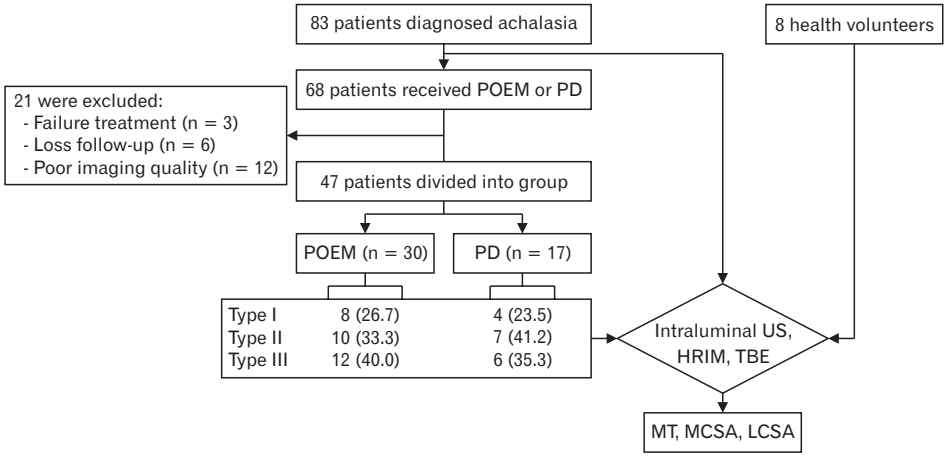

Figure 1. Study flowchart. Study selection, subject distribution, and procedure performance is outlined. POEM, peroral endoscopic myotomy; PD, pneumatic dilatation; US, ultrasound; HRIM, high-resolution impedance manometry; TBE, timed barium esophagography; MT, muscle thickness; MCSA, muscle cross-sectional area; LCSA, lumen cross-sectional area.

Table. The Comparisons of Achalasia Subtypes Under Peroral Endoscopic Myotomy

A. Summary of Manometrics, B-mode Ultrasound Images and Clinical Findings From Subjects of Control, I, II, and III of Achalasia

Achalasia subtype	Manometric and B-mode US images findings				Clinical findings	
	IRP (mmHg)	CI	DI	BI (Ω)	BM	Eckardt
I	32.15 ± 13.97	0.09 ± 0.06	1.14 ± 0.11	168.68 ± 33.14	20.12 ± 1.82	6.93 ±1.19
II	30.28 ± 13.05	0.43 ± 0.10	1.16 ± 0.15	211.07 ± 88.10	20.56 ± 2.02	7.00 ±1.54
III	37.30 ± 13.82	0.65 ± 0.33	2.17 ± 0.68	1747.19 ± 461.58	24.50 ± 4.04	6.78 ±1.48
Control		0.84 ± 0.32	4.24 ± 0.62	921.75 ± 118.82	23.66 ± 1.88	
P-value	0.300	< 0.001	< 0.001	< 0.001	< 0.001	0.900

The measurement of integrated relaxation pressure (IRP) from manometry is elevated in the order of achalasia subtype III > I > II, indicating the obstructive processes and extent at the esophagogastric junction. In B-mode ultrasound (US) images, the contractility index (CI), and distensibility index (DI) are impaired in the order of I > II > III, referenced to the control (the health subject). The order of baseline impedance (BI) are III > control > II > I. In evaluation of body mass index, all groups are at normal weight range though patients of type I and II are statistically lower than type III. The nutritional risk, ie, Eckardt scores ae not statistically different among groups from one to another.

B. Intraluminal Ultrasound Imaging Findings

Achalasia subtype	Muscle thickness (mm)			Muscle CSA (mm^2)			Lumen CSA (mm^2)		
	Baseline	Distension	Contraction	Baseline	Distension	Contraction	Baseline	Distension	Contraction
I	1.49 ± 0.33	1.37 ± 0.21	1.51 ± 0.32	113.84 ± 4.00	139.63 ± 10.92	118.18 ± 17.81	625.86 ± 145.97	700.37 ± 106.27	620.03 ± 77.91
II	2.08 ± 0.31	2.42 ± 0.53	2.77 ± 0.63	230.95 ± 54.99	342.87 ± 70.73	226.66 ± 79.96	597.31 ± 129.40	683.90 ± 109.51	428.26 ± 95.52
III	4.62 ± 1.21	4.08 ± 1.35	4.77 ± 1.20	249.28 ± 115.48	369.19 ± 184.53	282.41 ± 109.63	59.93 ± 1.99	147.38 ± 6.12	51.05 ± 5.51
Control	1.75 ± 0.22	1.45 ± 0.11	2.38 ± 0.41	124.37 ± 14.51	153.07 ± 10.10	85.52 ± 8.04	75.93 ± 7.30	321.00 ± 47.97	48.89 ± 5.77
P-value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Of 47 patients who received procedures of pneumatic dilatation or peroral endoscopic myotomy and 8 health volunteers were underwent catheter-based high-frequency intraluminal ultrasound imaging. Overall, including baseline, distension and contraction, the muscle thickness is in the order of type III > II > control > I, indicating an anatomically based etiology for esophagogastric junction obstruction occurred in type III and II. In measurement of muscle/lumen cross-sectional area (CSA), the order of muscle CSA is type III > II > control > I at statuses of baseline and distension, and the order as of type III > II > I > control at contraction. The orders of lumen cross-sectional area at baseline and distention are type I > II > control > III, and type I > II > III > control at contraction. As such, luminal increasing may be a cause or consequence of circular muscle dysfunction.

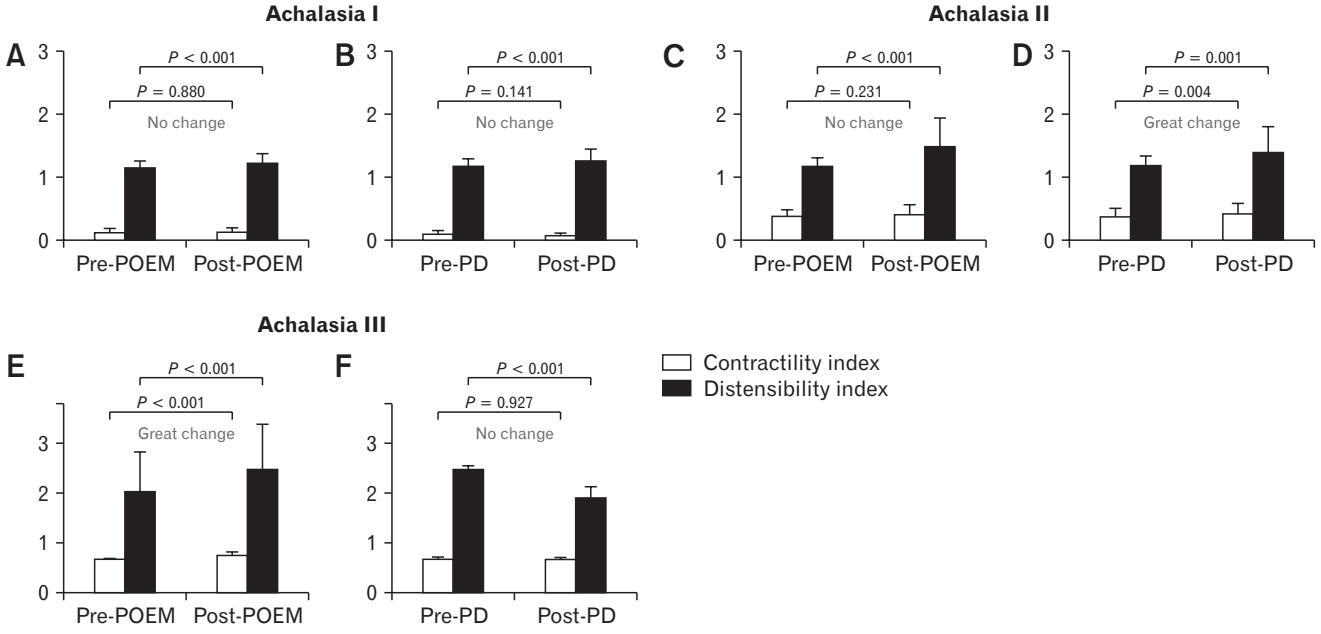

Figure 2. Comparison of the contractility index and the distensibility index before/after peroral endoscopic myotomy (POEM) or pneumatic dilatation (PD) among achalasia subtypes. The contractility index: PD in type II achalasia increased significantly; POEM in type III achalasia increased significantly. The distensibility index: POEM in type I, II, and III achalasia significantly increased; PD in type I and II achalasia increased significantly.

to the different subtype of achalasia. In other words, given that the different subtype of achalasia exists with the different etiology and pathophysiology, then, it is not logical for 1 therapeutic procedure to treat all different achalasia situations.

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