



LETTER TO THE EDITOR

The Effects of Imidapril Hydrochloride on Aspiration and Velopharyngeal Regurgitation

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Aspiration is the main cause of pneumonia in the elderly, especially in those with cerebrovascular disease [1,2]. Angiotensin-Converting Enzyme (ACE) inhibitors are known to prevent aspiration [3,4], especially in Asian populations [5], and their suggested mechanism of action involves the promotion of the release of substance P from the glossopharyngeal and vagal nerves, resulting in an improvement in impaired swallowing processes and the cough reflex [2,5,6]. The patients with aspiration often suffer from velopharyngeal regurgitation; i.e., the reflux of oral contents into the nasopharyngeal space, during food intake [7]. We experienced cases in which velopharyngeal regurgitation and aspiration were both improved by the administration of imidapril hydrochloride (an ACE inhibitor).

From 2007 April to 2012 March, among the patients that were followed up as out patients by the pulmonology department of the National Hospital Organization Disaster Medical Center, 20 patients (females: 5, age range: 56~83 yo, median age: 75) who suffered symptomatic aspiration at least once a week were recruited for the study. Other eligibility criteria were stable medical conditions and medication for 4 weeks before the study. Seven patients had co-existing velopharyngeal regurgitation (33.3%). Imidapril hydrochloride 2.5 mg once a day was prescribed and was withdrawn within 1 to 3 weeks in 4 patients (due to hypotension in 3 patients and nausea in 1 patient). The remaining 16 patients (females: 4, age range: 56~83 yo, median age: 74), including 5 with velopharyngeal regurgitation (31.3%), continued taking the drug for more than 4 weeks. Ten

patients underwent Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) brain scans, and old infarctions were found in 3 patients. Of these, 1 patient was neurologically symptomatic. The 6 patients that did not undergo brain CT or MRI examinations were neurologically asymptomatic. Two patients suffered episodes of aspiration pneumonia. After 4 weeks' treatment, the aspiration had completely disappeared in 2 patients (12.5%) and reduced in frequency less than half in 10 patients (62.5%). As for velopharyngeal regurgitation, it disappeared completely in 4 patients (2 patients whose aspiration disappeared and 2 patients whose aspiration improved) and reduced in frequency less than half in 1 patient, whose aspiration also improved.

Park JW, et al. reported that velopharyngeal regurgitation is closely related to aspiration and that impaired upper esophageal sphincter relaxation is associated with velopharyngeal regurgitation combined with normal velopharyngeal function [7]. Thus, in our subjects the ACE inhibitor might have ameliorated the discoordination of the initiation of the esophageal phase, which should follow the pharyngeal phase of swallowing. Another possibility is that ACE inhibitors directly influence impaired velopharyngeal function. The esophageal phase of swallowing involves the pharyngoesophageal nerve, superior laryngeal nerve, and recurrent laryngeal nerve, which are branches of the vagus nerve located in the upper esophagus [8], and the soft palate is innervated by the pharyngoesophageal nerve [9]. Thus, the nerves running from the velopharynx to the upper esophagus share common pathways that pass through

the vagus nerve, and ACE inhibitors might improve their functions by promoting the release of substance P from these nerves.

Patients with aspiration often accompanied by velopharyngeal regurgitation and suffer from discomfort during food intake, and controlling this condition would contribute to improving the quality of life of such patients. Although the effectiveness of imidapril hydrochloride was assessed based on the patients' subjective judgment and the number of subjects was quite limited, our experience suggests that further studies should investigate the impact of ACE inhibitors on velopharyngeal regurgitation.

Disclosure Statement

The authors declare that no conflicts of interest exist.

Authors' Contributions

Mitsuhiro Kamimura, MD, contributed to study conception and design, data acquisition, manuscript writing, editing and approval; Atsuto Mouri, MD, contributed to data acquisition and critical appraisal; Tatsuya Ibe, MD, contributed to data acquisition and critical appraisal; Munehisa Hukusumi, MD, contributed to data acquisition and critical appraisal; Yoichiro Hamamoto, MD, contributed to data acquisition and critical appraisal; All authors read and approved the final manuscript.

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