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Letter to the Editor

Airway foreign body removal by a home vacuum cleaner: Findings of a multi-center registry in Japan

To the Editor,

Foreign body airway obstruction (FBAO) is a major public health concern. Bystander foreign body (FB) removal has better survival outcome.[1] However, the efficacy of standard interventions such as the abdominal thrust are unclear. Home vacuum cleaner use for FB removal has been reported but its frequency, efficacy and safety are largely unknown.

We searched the Multi-center Observational Choking Investigation retrospective registry (MOCHI-retro) from 2014 to 2019 for cases with reported vacuum cleaner use. The registry was created as a part of the preparatory work for the ongoing nationwide prospective study[2] and recorded characteristics of airway FBs and excluded patients who presented with aspiration of sputum or gastric contents, unwitnessed cardiac arrest, or loss of consciousness before FBAO. Our primary and secondary outcomes were successful removal of FB and favorable neurological outcome at discharge defined as Cerebral Performance Category 1 or 2.

Of the 386 patients in the registry, we identified eight patients (2.1%) for whom a bystander attempted to remove a FB with a vacuum cleaner (Table 1). All patients suffered from FBAO from food. Four patients (50.0%) experienced cardiac arrest. All patients, except one, received at least one standard FB bystander removal maneuver prior to vacuum cleaner use. FBs were successfully removed in three patients (37.5%) who survived to discharge with favorable neurological outcome. All eight patients received a thorough oropharyngeal examination and seven (87.5%) patients had CT imaging of chest and abdomen that did not reveal any major injuries.

To our knowledge, there is only one case report in Japanese medical literature that described vacuum cleaner use for FBAO. In the case report, Yamazaki *et al.*[3] reported a case of a 57 year-old male who had out-of-hospital cardiac arrest due to choking on a piece of bread. Although the FB was successfully removed with a vacuum cleaner, the authors noted that “the inside of the buccal cavity was considerably damaged”.

One of the potential benefits of using a vacuum cleaner is that it does not require much strength. We found that most of the patients were elderly and incidences of choking were often witnessed by family members. Those family members are often also elderly and may lack the strength to produce enough pressure to dislodge the FB. Takei *et al.*[4] have previously found that increasing bystander age was associated with poorer quality of chest compressions suggesting a need for further study of removal of FBAO by elderly bystanders.

Despite the lack of evidence, two types of suction nozzles compatible with home vacuum cleaners have been designed for airway FB removal[5] and one of those devices has been approved as a “general medical device” by the Japanese Ministry of Health, Labour and Welfare. However, we are not aware if any such devices were used in our eight cases.

In a multi-center registry of FBAO, FB removal with a vacuum cleaner was successful in about one-third of patients. A larger cohort study should be conducted to determine whether it is safe and more effective than other maneuvers.

Table 1 – Demographics and outcomes of vacuum cleaner use in eight patients.

Case	Age (years)	Sex	Choking incident location	Did the witness attempt to remove the foreign body?	Foreign body type	Other FB removal maneuver by bystander	Who used the vacuum cleaner?	Successful removal with vacuum cleaner?	MOCHI classification (Location of FB)	OHCA	Survival to discharge	CPC at discharge
1	35	M	Home	Yes	Bread	No	Family member	No	1	Yes	No	5
2	79	M	Home	Yes	Bread	Manual removal	Family member	No	1	Yes	No	5
3	89	F	Group home	Yes	Rice Cake	Back blow, Chest thrusts/compression	Facility staff	Yes	1	No	Yes	2
4	70	M	Restaurant	Yes	Meat	Manual removal	Family member	Yes	1	No	Yes	1
5	69	M	Home	Yes	Meat	Back blow, Chest thrusts/compression	Family member	No	1	Yes	No	5
6	75	F	Nursing home	Yes	Meat, Rice, Vegetable	Abdominal thrusts, Manual removal	Facility staff	No	1	No	Yes	3
7	88	M	Home	Yes	Rice	Chest thrusts/ compression	Family member	No	3	Yes	No	5
8	70	M	Home	Yes	Meat	Back blow, Chest thrusts/compression	Emergency physician	Yes	1	No	Yes	1

CPC, Cerebral Performance Category:
OHCA, Out-of-hospital Cardiac Arrest: FB, Foreign Body: MOCHI, Multi-center Observational Choking Investigation. MOCHI classification: (1) Oral cavity, pharynx, or larynx, (2) Trachea above carina, (3) Bronchi and bronchioles.

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Conflicts of interest

None.

Patient consent for publication

Not required.

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