Use of an antiretropulsion device to prevent stone retropulsion significantly increases the efficiency of pneumatic lithotripsy: an in vitro study.

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Abstract

OBJECTIVE:
To compare the efficiency of pneumatic lithotripsy with and without the Accordion antiretropulsion device (PercSys, Palo Alto, CA, USA).

MATERIALS AND METHODS:
The study comprised two in vitro experiments: in experiment 1, 10 trials were conducted using stone phantoms (6 x 6 x 10 mm), placed in a horizontal acrylic tube submerged in normal saline. Pneumatic lithotripsy was applied using a Swiss LithoClast (Boston Scientific Corporation, Natick, MA, USA). Each phantom was hit with repeated single firings of the LithoClast until it had travelled 20 cm (control group). The same experiment was then repeated with the Accordion antiretropulsion device positioned proximal to a new stone phantom. In experiment 2, stone phantoms (5 x 5 x 5 mm) were placed in a model ureter made of silicone and submerged in normal saline. Pneumatic lithotripsy was applied continuously on 10 stones for 20 s (200 strikes) without the Accordion device (control group) and on 10 stones with the Accordion device in place (experimental group). The distance of retropulsion was recorded. All stone phantoms were weighed before and after pneumatic lithotripsy.

RESULTS:
In both experiments the Accordion group had a significantly greater percentage weight loss than the control group (experiment 1; 11% vs 3%; experiment 2, 53% vs 16%, both P < 0.001).

CONCLUSIONS:
The Accordion device significantly increased the fragmentation efficiency in both in vitro models. Preventing retropulsion and increasing fragmentation efficiency has the potential to increase the success rate, decrease secondary procedures for migrated stones, and shorten operative times.

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