

P R E S E N T E D A T

World Congress of Endourology

■ A N N U A L C O N G R E S S ■

September 12–16, 2017 ■ Vancouver, Canada

Presentation Title: IN VITRO COMPARISON OF A NOVEL SINGLE-PROBE DUAL-ENERGY LITHOTRIPTER TO CURRENT GENERATION DEVICES

Author Block: D Wollin, B Winship, W Tom, D Radvak, R Jiang, C Scales,
M Ferrandino, W Simmons, GM Preminger, M Lipkin
– Duke University Medical Center, United States

Introduction

Current lithotripters for percutaneous renal surgery include the ShockPulse (Olympus) and LithoClast™ Select (ElectroMedical Systems/Boston Scientific). These dual-energy lithotripters use a combination of ultrasonic fragmentation with impactor function to clear stones more efficiently. The LithoClast Trilogy (ElectroMedical Systems/Boston Scientific) is a novel single-probe, dual-energy lithotripter that utilizes ultrasonic vibration with suction capability along with an electromagnetically generated impact.

Objective

The objective of this study was to compare the stone clearance efficiency of these three devices in an *in vitro* setting.

Materials and Methods

1 cm³ cube-shaped BegoStone phantoms were created to a hardness that mimics calcium oxalate monohydrate stones (BegoStone-to-water ratio 5:1). A single stone was placed in a hemispherical silicone support in a water bath. Each lithotripter (ShockPulse, LithoClast Select – with or without pneumatic function – and LithoClast Trilogy) was utilized under direct vision to fragment and suction the phantom utilizing a 300cc/min constant suction rate and comparable fragmentation settings. The time to stone clearance for each trial was recorded; 10 trials were performed per device. Statistical analysis was performed with ANOVA.

Results

The LithoClast Select with pneumatic function had the longest clearance time of 138 seconds. The minimum clearance was 18 seconds with the LithoClast Trilogy. When comparing the four treatment methods, there was a difference between groups by one-way ANOVA ($F[3,36] = 53.00, p=2.75 \times 10^{-13}$). Post hoc tests showed that LithoClast Select with pneumatic was significantly slower than all other devices and LithoClast Trilogy was significantly faster than all other devices (all $p < 0.01$). LithoClast Select without pneumatic was similar in clearance time to the ShockPulse. (Figure 1).

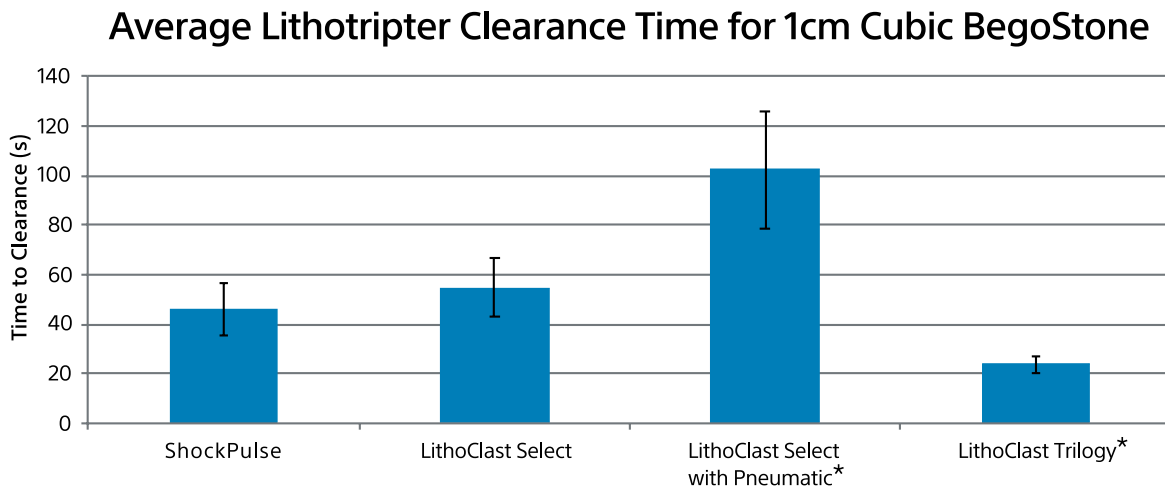


Figure 1: Average Lithotripter Clearance Time for 1cm Cubic BegoStone
(*, significantly different from all other devices, $p < 0.01$)

Conclusions

In an *in vitro* setting that mimics clinical percutaneous renal surgery, the novel single-probe, dual-energy LithoClast Trilogy was significantly more efficient than current generation dual-energy devices. However, further clinical testing is needed to ensure safety and efficacy in patients.

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URO-520111-AA FEB 2018 Printed in Germany by medicalvision.

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