Abstracts

33rd World Congress of Endourology & SWL, 1-4 October 2015, London

Moderated Poster Session 41 / Stones: SWL

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In-vitro comparative assessment of clinical shockwave lithotripsy technologies

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Introduction:
Extra-corporeal Shock Wave Lithotripsy (ESWL) is a common procedure for the treatment of renal stones. At present there are few comparative assessments of the range of clinical devices currently in use. This in-vitro configuration provides a platform to test the hypothesis that machines vary in their ability to fragment urinary calculi.

Materials and Methods:
An in vitro test configuration was used to fragment standardised synthetic Urocal-30 Gypsum (U.S. Gypsum, Chicago, Illinois) stones using the Sonolith i-sys (EDAP TMS, France), Modulith SLX F2 (Storz Medical AG, Switzerland) and Piezolith 3000 (Richard Wolf GmbH, Germany) SWL devices. Using typical clinical settings stones were treated with 250, 500 or 1000 shocks. The residual mass following passage through a 2 mm wire mesh was measured and compared using ANOVA and the Tukey-Kramer HSD test.

Results:
For 250 and 1000 shock treatments there was no statistically significant difference between the Modulith SLX F2 and Piezolith 3000 devices (p = 0.34 and 0.31 respectively). The Sonolith i-sys was significantly less effective than the other devices. Performance of the Sonolith i-sys decreased beyond a threshold generator probe age of 6000 shocks. 1000 shock treatments above and below this threshold showed a mean difference in mass reduction of 93.9mg (95% CI 54.9 to 133.0 mg).

Conclusions:
There is considerable variability in the ability of ESWL devices to fragment synthetic urinary calculi. This in-vitro study provides an objective, repeatable means of assessing this variability. The Modulith SLX F2 and Piezolith 3000 yielded greater stone mass reduction than the Sonolith i-sys. The performance of the Sonolith i-sys deteriorates with increasing generator probe age beyond a threshold of 6000 shocks.

Source:
**Background and objective**

Extra-corporeal Shock Wave Lithotripsy (ESWL) is a common procedure for the treatment of renal stones. At present there are few comparative assessments of the range of clinical devices currently in use. This in-vitro configuration provides a platform to test the hypothesis that machines vary in their ability to fragment urinary calculi.

**Methods**

An in vitro test configuration was used to fragment synthetic Urocal-30 Gypsum (U.S. Gypsum, Chicago, Illinois) stones (mean mass 299 ± 16 mg) using the Sonolith i-sys (EDAP TMS, France), Modulith SLX F2 (Storz Medical AG, Switzerland) and Piezolith 3000 (Richard Wolf GmbH, Germany) ESWL devices. Stones were treated with 250, 500 or 1000 shocks. The residual mass following passage through a 2 mm wire mesh was measured and compared using ANOVA and the Tukey-Kramer HSD test.

**Results**

The Piezolith 3000 demonstrated the most favourable stone mass reduction at 250, 500 and 1000 shocks (82.0 ± 33.6 mg, 187.4 ± 45.2 mg and 257.5 ± 55.0 mg respectively). For 250 and 1000 shock treatments there was no statistically significant difference between the Modulith SLX F2 and Piezolith 3000 devices (p = 0.34 and 0.31 respectively).

The Sonolith i-sys was significantly less effective than the other devices. Performance of the Sonolith i-sys decreased beyond a threshold generator probe age of 6000 shocks. 1000 shock treatments above and below this threshold showed a mean difference in mass reduction of 93.9 mg (95% CI 54.9 to 133.0 mg).

For 1000 shock treatments, both the Modulith SLX F2 and Piezolith 3000 significantly outperformed the Sonolith i-sys, which correlated with the age of the generator probe – beyond 6000 shocks, the Sonolith i-sys failed to produce a statistically significant mass reduction.

**Conclusion**

There is considerable variability in the ability of ESWL devices to fragment synthetic urinary calculi. This in-vitro study provides an objective, repeatable means of assessing this variability. The Modulith SLX F2 and Piezolith 3000 yielded greater stone mass reduction than the Sonolith i-sys. The performance of the Sonolith i-sys deteriorates with increasing generator probe age beyond a threshold of 6000 shocks.