PRESENTATION TITLE

ERGONOMICS AND PROCEDURE TIME OF NOVEL RETRIEVAL DEPLOYMENT DEVICE FOR SINGLE SURGEON URETEROSCOPY

AUTHORS

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INTRODUCTION

Ureteroscopic stone manipulation and retrieval typically requires two experienced individuals: one to drive the ureteroscope and a second to manipulate the stone basket or grasper. Recently, a retrieval deployment device (RDD) has been developed that allows the primary surgeon to activate the stone basket while simultaneously controlling the ureteroscope. We performed a study to characterize the procedure time and ergonomics of this approach.

METHODS

We performed a three-arm evaluation of the ergonomics of flexible ureteroscopy utilizing a simulation model of stone retrieval. In Arm 1, two experienced operators performed stone manipulation and retrieval, one managed the ureteroscope and the other managed the retrieval tool. In Arm 2, a single operator managed both the ureteroscope and retrieval tool. In Arm 3, a single operator managed the ureteroscope conventionally, but utilized the novel RDD (LithoVue™ Empower, Boston Scientific, Marlborough, MA) to control the retrieval tool. Fifteen tasks were performed for each arm and median procedure time was calculated. Electromyography was used to compare and quantify cumulative muscular workload (CMW) and average muscular work per second (AWS) of the right and left thenar, flexor carpi ulnaris (FCU), extensor carpi ulnaris (ECU), biceps, triceps and deltoid muscles.
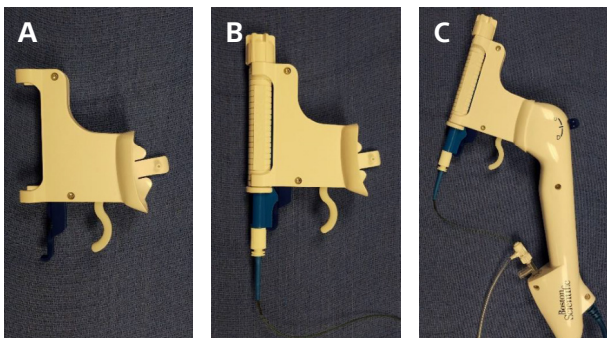

Figure 1: Images of the LithoVue Empower retrieval deployment device.

A – Device alone prior to basket or ureteroscope loading.

B – After loading of nitinol ureteroscopic retrieval device.

C – Complete configuration of device loaded with ureteroscopic basket and attached to the LithoVue Single-Use Digital Flexible Ureteroscope. Steady state exists in the closed state and upon pulling the trigger opens the basket that will close again upon release.

RESULTS

Median procedure time was significantly improved with the RDD when compared to single-surgeon URS (29.4 vs. 51.3 seconds, p <0.001) but unchanged compared to two-surgeon URS (29.4 vs. 27.9 seconds, p = 0.64). Two surgeon URS also was significantly faster than single-surgeon URS (27.9 vs. 51.3 seconds, p <0.001). CMW was similar between RDD and two-surgeon URS but both had decreased CMW across all muscle groups compared to single-surgeon URS (p < 0.01). AWS was overall similar between RDD and two-surgeon URS across all muscle groups. RDD had significantly improved AWS compared to single-surgeon URS specifically in the thenar, FCU and ECU muscles (<0.05) of the dominant arm.

CONCLUSIONS

The novel RDD, as tested, permitted a single-surgeon to perform flexible ureteroscopy with stone manipulation and retrieval using less muscular workload than single-surgeon URS and similar workload to two-surgeon URS. Task completion time was also improved with RDD over the single-surgeon model and similar to the two-surgeon model.

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Retrieval Deployment Device