

Single-Use Flexible Ureteroscopes: The Death of Reusable Scopes

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Dr. Chi will discuss the economic arguments for a single-use flexible ureteroscope

- Those are the concerns of our hospital administrators
- What do we, as surgeons, care about?
 - Functionality
 - Ergonomics

Let's examine the literature of the modern, digital, single-use flexible ureteroscope with regards to functionality and ergonomics.

In Vitro Studies

Evaluation of a Novel Single-Use Flexible Ureteroscope

Joanne Dale, MD,¹ Adam G. Kaplan, MD,¹ Daniela Radvak,² Richard Shin, MD,¹
Anika Ackerman, MD,¹ Tony Chen,¹ Charles D. Scales Jr., MD,¹ Michael N. Ferrandino, MD,¹
Walter Neal Simmons, PhD,² Glenn M. Preminger, MD,¹ and Michael E. Lipkin, MD¹

- Study of LithoVue (Boston Scientific), Flex-Xc (Karl Storz), Cobra (Richard Wolf)
- Assessment of image quality, deflection, and irrigation flow

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Conclusions

The LithoVue Single-Use Digital ureteroscope has comparable optical capabilities, deflection, and flow, making it a viable alternative to standard nondisposable fourth-generation flexible digital and fiberoptic ureteroscopes.

Comparison of New Single-Use Digital Flexible Ureteroscope Versus Nondisposable Fiber Optic and Digital Ureteroscope in a Cadaveric Model

Silvia Proietti, MD, FEBU,^{1,2} Laurian Dragos, MD,² Wilson Molina, MD,³ Steeve Doizi, MD, MSc,²
Guido Giusti, MD,¹ and Olivier Traxer, MD²

- Comparison of LithoVue (Boston Scientific), URF-P5 (Olympus), URF-V (Olympus)
- Tested in human cadaveric model
- Assessment of ability to access entire kidney



- Navigation of renal collecting system
- Comparable performance among single-use and reusable

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**Which Flexible Ureteroscopes (Digital vs. Fiber-Optic)
Can Easily Reach the Difficult Lower Pole Calices
and Have Better End-Tip Deflection:
In Vitro Study on K-Box. A PETRA Evaluation**

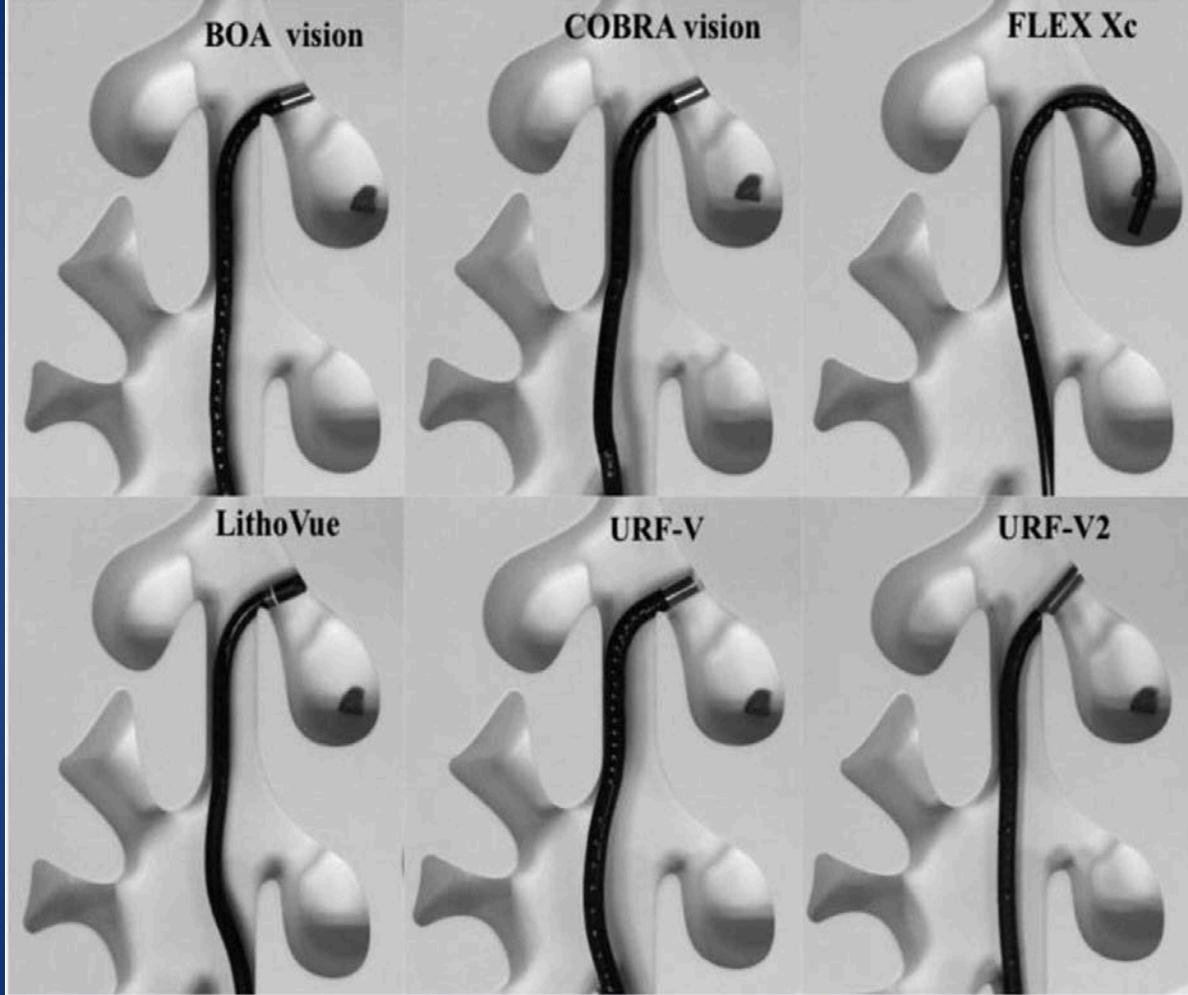
Laurian B. Dragos, MD,^{1,2} Bhaskar K. Somani, MRCS, FEBU, DM, FRCS (Urol),^{2,3} Emre T. Sener, MD, FEBU,^{2,4}
Salvatore Buttice, MD,^{2,5} Silvia Proietti, MD, FEBU,^{2,6} Achilles Ploumidis, MD, BSc, MSc, PhD, FEBU,^{2,7}
Catalin T. Iacoboae, MD,⁸ Steeve Doizi, MD, MSc,^{2,8,9} and Olivier Traxer, MD^{2,9}

- Assess ability of flexible ureteroscopes to enter sharply angled infundibulum in a training model
- Comparison of multiple reusable and one single-use flexible ureteroscopes

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Although this is not a quantitative measure, as it can be easily observed in the images (Fig. 7), the single-use LithoVue has the most rigid shaft. Despite this, from all the compared digital fURSs, its end-tip deflection was only clearly surpassed by FLEX X^c. LithoVue achieved better deflection than COBRA vision, URF-V, or URF-V2 and reached almost the same deflection as BOA vision for the first 3 cm, but it was superior to BOA vision in the final 4th cm (Table 2).

Next-Generation Single-Use Ureteroscopes: *An In Vitro* Comparison

Westin R. Tom, BA,¹ Daniel A. Wollin, MD,² Ruiyang Jiang, MD,² Daniela Radvak, BA,³
Walter Neal Simmons, PhD,³ Glenn M. Preminger, MD,² and Michael E. Lipkin, MD, MBA²

- Comparison of:
 - YC-FR-A (YouCare Tech, China); NeoFlex (Neoscope, USA); LithoVue (Boston Scientific, USA); Flex-Xc (Karl Storz, Germany); Cobra (Richard Wolf, Germany)

Next-Generation Single-Use Ureteroscopes: An *In Vitro* Comparison

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- Assess image quality, deflection, and irrigation
- In Vitro bench study findings:
 - Reusable scopes and LithoVue perform similarly

In Vivo Studies

First clinical evaluation of a new single-use flexible ureteroscope (LithoVue™): a European prospective multicentric feasibility study

Steeve Doizi^{1,2,3} · Guido Kamphuis⁴ · Guido Giusti⁵ · Kim Hovgaard Andreassen⁶ · Thomas Knoll⁷ · Palle Jörn Ooster⁶ · Cesare Scoffone⁸ · Daniel Pérez-Fentes⁹ · Silvia Proietti⁵ · Oliver Wiseman¹⁰ · Jean de la Rosette⁴ · Olivier Traxer^{1,2,3}

- Multi-center European study - evaluation of LithoVue (Boston Scientific)
- 40 procedures
 - 37 stone treatment
 - Laser lithotripsy in 30
 - Stone extraction in 4
 - Unable to access stone in 2 (failure due to extreme deflection (1) and vision loss (1))
 - No stone identified in 1
 - 3 upper tract tumor

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Conclusions

This study evaluated the first digital single-use FURS LithoVue™. The endoscope had good image quality, active deflection and maneuverability. Further evaluation of surgical outcomes and cost analysis will help delineate the position of this single-use FURS in current practice.

A Prospective Case–Control Study Comparing LithoVue, a Single-Use, Flexible Disposable Ureteroscope, with Flexible, Reusable Fiber-Optic Ureteroscopes

Manint Usawachintachit, MD,^{1,2} Dylan S. Isaacson, MPH,¹ Kazumi Taguchi, MD, PhD,^{1,3} David T. Tzou, MD,¹ Ryan S. Hsi, MD,^{1,4} Benjamin A. Sherer, MD,¹ Marshall L. Stoller, MD,¹ and Thomas Chi, MD¹

- Flexible ureteroscopy with:
 - LithoVue: 115 cases
 - Reusable fiber-optic: 65 cases
- Clinical outcomes assessed

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- No difference in demographics or stone parameters between two groups
- LithoVue procedures slightly quicker
 - 54.1 vs 64.5 minutes ($p < 0.05$)
- Scope failure less common with LithoVue
 - 4.4% vs 7.7% ($p = 0.27$)

What about the surgeon's
experience with a ureteroscope?

Hand Problems Among Endourologists

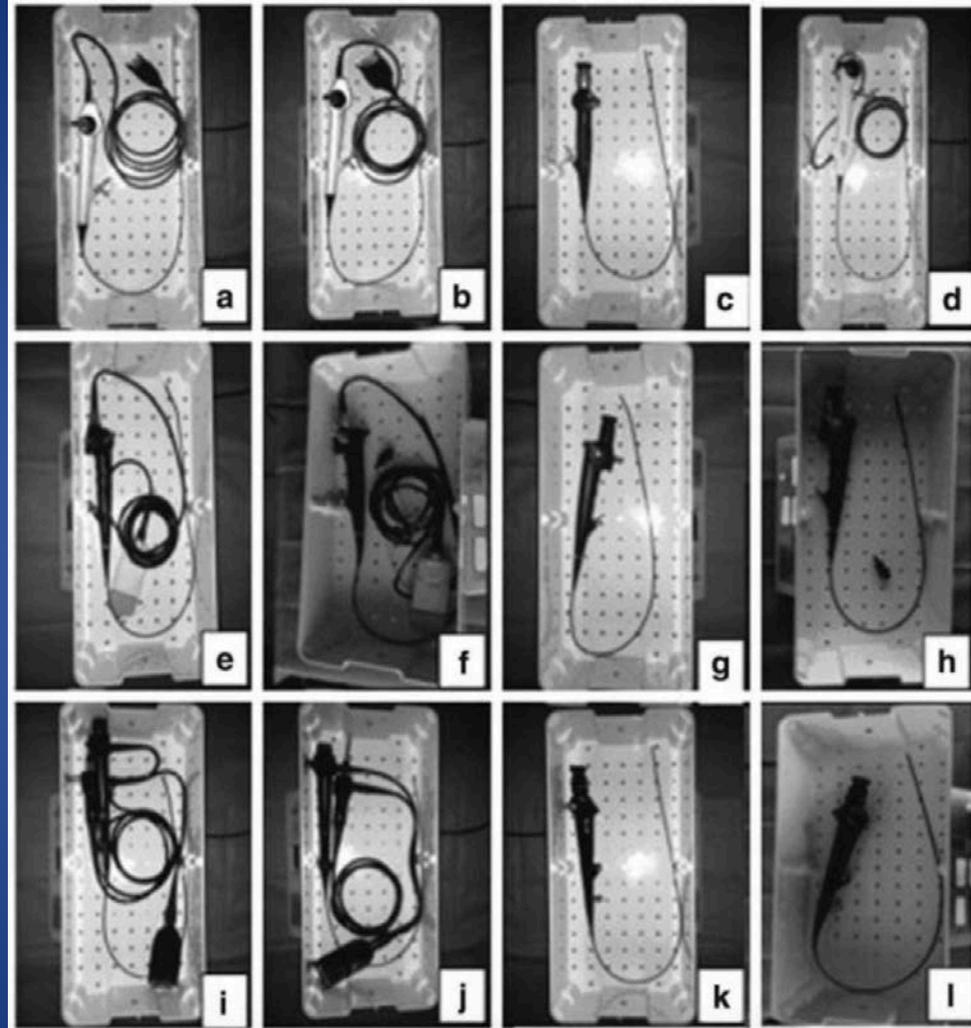
Kelly A. Healy, M.D.,¹ Raymond W. Pak, M.D.,² Ryan C. Cleary, M.D.,¹
Arturo Colon-Herdman, M.D.,³ and Demetrius H. Bagley, M.D.¹

Conclusions: Hand and wrist problems are very common among endourologists. Future studies are needed to develop more ergonomic platforms and thereby reduce the endourologist's exposure to these occupational hazards.

The “Body Mass Index” of Flexible Ureteroscopes

Silvia Proietti, MD, FEBU,¹ Bhaskar Somani, MRCS, FEBU, DM, FRCS (Urol),² Mario Sofer, MD,³
Amelia Pietropaolo, MD, FEBU,⁴ Marco Rosso, MD,¹ Giuseppe Saitta, MD,¹ Franco Gaboardi, MD,¹
Olivier Traxer, MD,⁴ and Guido Giusti, MD¹

Materials and Methods: Twelve different brand-new flexible ureteroscopes from four different manufacturers, along with eight camera heads and three light cables were evaluated. Each ureteroscope, camera head, and light cable was weighted; the total length of each ureteroscope, shaft, handle, flexible end-tip, and cable were all measured.



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Conclusions: Newer more versatile digital endoscopes were lighter than their traditional fiber optic counterparts in their entirety, with disposable endoscope having a clear advantage over other reusable ureteroscopes. Knowing the “BMI” of our flexible ureteroscopes is an important information that every endourologist should always take into consideration.

Evaluating the Ergonomics of Flexible Ureteroscopy

Wesley W. Ludwig, MD, MS,¹ Gyusung Lee, PhD,² Justin B. Ziemba, MD,¹
Joan S. Ko, MD,¹ and Brian R. Matlaga, MD, MPH¹

- Surface EMG measurement of biomechanical stresses of ureteroscopy workload
- Repeated tasks with training model
- Three scopes studied: reusable digital (Karl Storz Flex Xc), reusable fiber-optic (Karl Storz Flex X²), and single-use (Boston Scientific LithoVue)

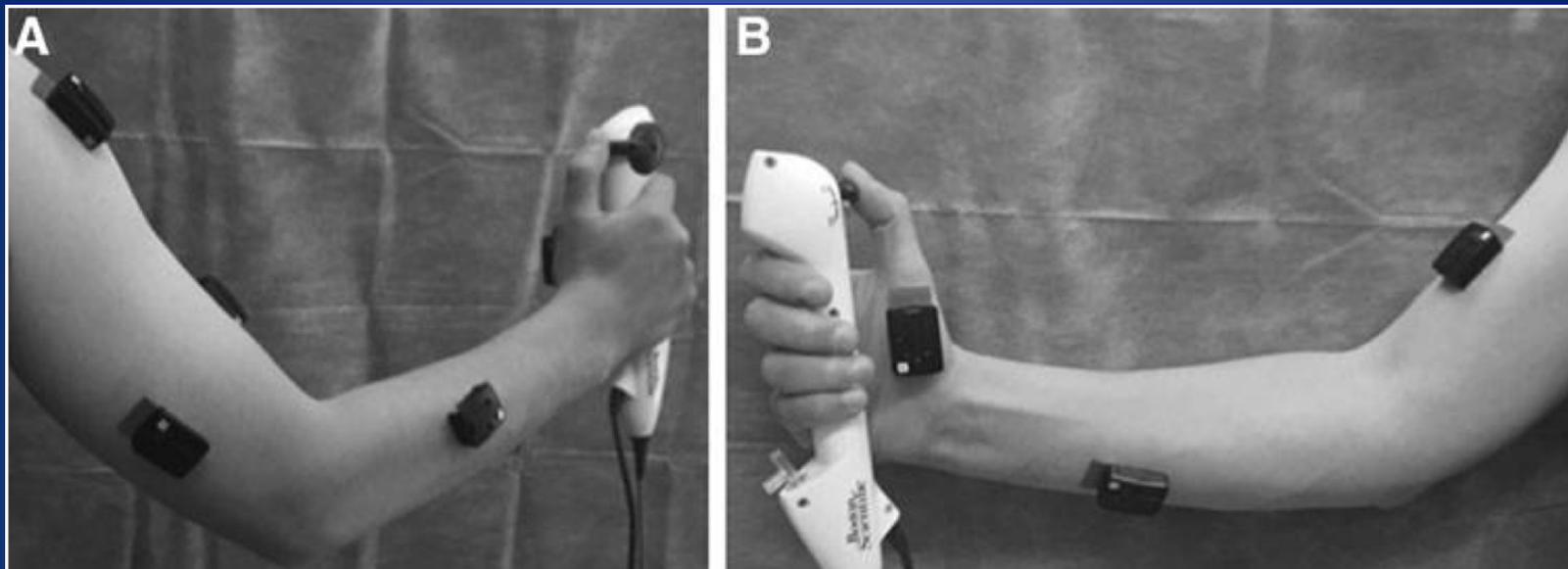


TABLE 1. MEDIAN CUMULATIVE MUSCULAR WORKLOAD AND STANDARD DEVIATIONS FOR NAVIGATIONAL TASKS

	<i>Right thenar</i>	<i>FCU</i>	<i>ECU</i>	<i>Biceps</i>	<i>Triceps</i>	<i>Deltoid</i>	<i>Left thenar</i>
LithoVue	227.0±65.6	72.6±26.7	305.7±83.2	20.6±5.2	12.8±2.9	20.6±4.7	133.9±39.9
Flex-X ^c	175.5±46.9	66.9±9.8	285.5±90.5	25.6±5.6	12.1±1.9	24.7±6.0	134.3±32.3
Flex-X ²	371.3±114.9	113.0±26.1	492.8±160.6	60.0±13.3	17.2±3.8	49.5±25.0	196.7±50.1

ECU=extensor carpi ulnaris; FCU=flexor carpi ulnaris.

So what does the literature suggest about single-use ureteroscopes?

- In vitro and in vivo analyses
 - Modern single-use ureteroscopes appear to have acceptable image quality and navigation capabilities
 - Certainly no different from reusable ureteroscopes
 - Ergonomic benefits with single-use devices
 - Less weight
 - May translate into reduced surgeon fatigue