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Evolution of endourology and flexible ureterorenoscopy, can they be useful to urologists to clarify stone composition and morphology?

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ABSTRACT

Introduction: During the last two decades, there has been great advancement in the technology and performance of flexible ureterorenoscopy. Endoscopes are smaller and the new digital technology offers a fantastic endoscopic definition. This manuscript is a state-of-the-art describing the endoscopic equipment evolution and usefulness. Moreover, we raise the interest to perform a better description of the endoscopic stone appearance according to different stone compositions, in order to offer a better morpho-constitutional analysis.

Methods and results: A revision of the literature was performed to describe the evolution of the endoscopic equipment used in flexible ureterorenoscopy. Currently, there is no data that evaluate the usefulness of endoscopic stone pictures, video and description during flexible ureterorenoscopy to evaluate if there is an advantage in the final morpho-constitutional analysis.

Conclusion: Urologists should know the development in the field of flexible ureterorenoscopy and the equipment available to accommodate them during the procedures. Clinical trials are needed in order to evaluate the role of endoscopic evaluation or video during flexible ureterorenoscopy in determining the morpho-constitutional analysis of stones, which could be associated with specific metabolic anomalies.

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1. Introduction

The awareness of stone composition and a metabolic evaluation grants a better understanding of urolithiasis prognosis, recurrence risks, as well as improvements in their medical and surgical management. For instance, stone free rates regarding shockwave lithotripsy (SWL) rely on the stone burden and composition, with calcium oxalate monohydrate stones being the hardest and with less stone free rates [1,2]. Also within the same type of stone composition, the efficacy of different treatments can differ. Such is the case of cystine stones regarding its treatment with SWL or retrograde intrarenal surgery (RIRS) [3].

Flexible ureterorenoscopy (F-URS) has had significant advancements in the matter of technology and image quality during the last two decades. Today, more and more urologists have integrated this technique in their daily practice (Fig. 1).

The literature confirming the effectiveness and safety of F-URS in the treatment of renal stones is more and more abundant [4]. The smaller size, durability and maneuverability of the ureterorenoscope are continuing to evolve thus facilitating the operator to increase the effectiveness of this treatment. One of the limitations of F-URS is that the stone analysis is often performed only on a limited number of small fragments retrieved, without any information

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Fig. 1. Digital flexible ureterorenoscopy with an endoscopic high-quality vision of a kidney stone.

considering the location of these fragments within the stone. Considering that much of the stones have mixed compositions [5], important details of the stone composition could be missed if there are no more characteristics transmitted with the stone fragment.

In the near future, we hope that macroscopic stone evaluation during F-URS through the image quality could aid the assessment of stone composition, morphology and metabolic evaluation. The aim of the manuscript is to describe the advances in endourology and F-URS, and to discuss what is known on endoscopy per-operative evaluation of stones.

2. Advances in endourology and flexible ureterorenoscopy

2.1. Ureterorenoscopes

Bagley et al. described the first flexible ureterorenoscope in 1983. It consisted of a flexible tip endoscope with 160–90 degrees of maximum deflection [6]. Since that time, the technology advancement of the F-URS has progressed at a remarkable pace (Fig. 2).

2.1.1. Old generation flexible ureterorenoscope

Standard ureterorenoscopes (old generation) are 70 cm long with a disk-shaped distal extremity of 7.4 F, which progressively grows until 9 F on its proximal site. A working channel of 3.6 F will allow the use of instruments through it

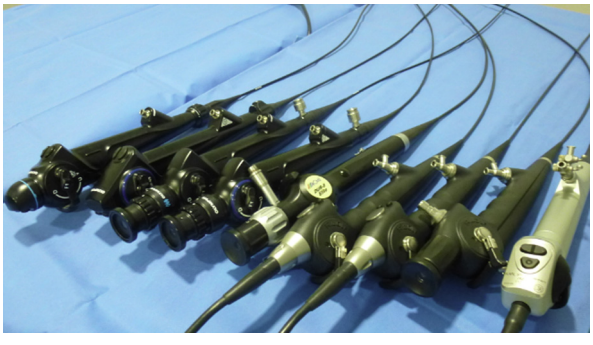

Fig. 2. Contemporary fiber optic and digital flexible ureterorenoscopes.

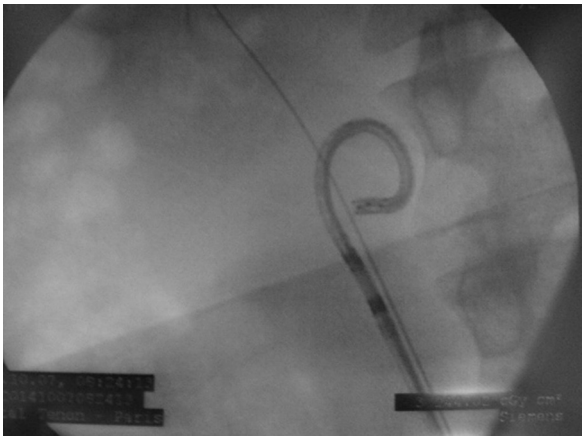

Fig. 3. Active 270-degree deflection during an F-URS of a complex lower renal pole in a horseshoe kidney patient.

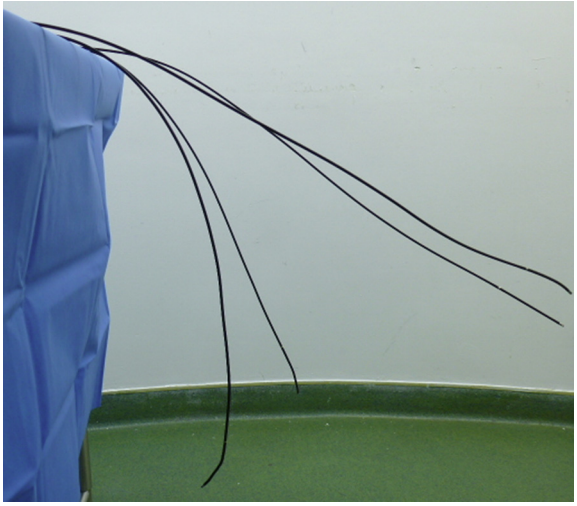

Fig. 4. "Semi-flexible" ureterorenoscopes' rigidity (top) compared to conventional flexible ureterorenoscopes (bottom).

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