INTRODUCTION

Ureteroscopy has gained widespread use for diagnosis and treatment of diseases of the upper urinary tract. Ureteroscopy came as an extension of cystoscopy and was based to a large extent on technologic advances in instrumentation. In 1912, Young and McKay passed a rigid cystoscope into the dilated ureter of a boy with posterior urethral valves (1). Since then, vast alterations in the concept and design of endoscopes occurred. Miniaturization of both rigid and flexible ureteroscopes was made possible mainly by fiberoptic imaging technology. Ancillary instruments for ureteral access, stone fragmentation and retrieval, and other diagnostic and therapeutic applications have also been developed. In this chapter, we review the technical aspects of ureteroscopy, including ureteral access and instrumentation available for endoscopic stone management.

ACCESS

A complete patient history, physical examination, laboratory tests, and upper tract imaging should be obtained in preparation for either diagnostic or therapeutic ureteroscopy.

Key Words: Ureter; nephrolithiasis; instrumentation; ureteroscope.
The procedure must be planned appropriately depending on the collecting system anatomy and the pathology in question. Previous pelvic surgery, radiation therapy, or trauma may lead to anatomical abnormalities of the upper tracts. Likewise, a urethral stricture or significant prostatic enlargement may make access difficult. An in-depth discussion of how to overcome a difficult access is presented in the Pearls and Tricks section at the end of this chapter. We routinely administer preoperative prophylactic antibiotics and use pneumatic compressive sleeves on the lower extremities to prevent deep venous thrombosis. Basic requirements to obtain ureteral access include a cystoscopy table, camera/video equipment, and a fluoroscopy unit (Fig. 1). The operating table must be radiolucent, equipped with stirrups, and allow for a drainage system. Occasionally, the position of the table must be altered to achieve better access to the ureter. A camera/video system allows the surgeon to operate in a comfortable position with the advantage of a magnified view. The assistant surgeon can follow the procedure simultaneously, and mentoring is likewise facilitated. Fluoroscopy is mandatory to obtain access and perform adequate tasks. All of the following maneuvers require fluoroscopic guidance, including retrograde pyelography, insertion of guidewires, stents, and balloon dilation. We do not recommend carrying out the procedure in a cystoscopy suite with overhead fluoroscopy, as this results in exposure of the urologist to excessive radiation. The use of an appropriately positioned C-arm allows the majority of the radiation to be absorbed by the patient.

The patient is positioned in dorsal lithotomy. All pressure points must be padded carefully. The leg ipsilateral to the ureter to be explored is slightly extended, lowered, and abducted. This position enhances maneuverability by straightening the distal ureter. General or regional anesthesia is preferred for therapeutic ureteroscopy, although deep sedation may be an option in selected cases. Access to the ureter begins by identifying the ureteral orifice. A rigid cystoscope with a 30° lens, or alternatively a flexible cystoscope, is introduced into the bladder. Once the ureteral orifice has been located, a guidewire is introduced gently (Fig. 2A). An open-ended ureteral stent is used to stabilize the wire and guide its entrance into the orifice. At this point, a retrograde pyelogram can be performed if necessary, using open ended or olive tip ureteral catheter.

![Fig. 1. Video/Camera equipment and portable C-arm fluoroscopy unit.](image-url)