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Martin I. Resnick

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Mechanism of Stone Formation

K.C. Balaji and Mani Menon

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This article reviews the physical principles involved in urolithiasis. For urinary stones to form, crystals must form first and they then should be retained in the urinary tract. These phenomena require the interaction between the forces of saturation, crystal inhibition, crystal nucleation, growth aggregation, and retention, which all occur in a complex solution. In the latter part of the article the authors review the relevance of these physical principles in the lithogenesis of the most common urinary stones.

Intracorporeal Lithotripsy: Instrumentation and Development

Joseph A. Grocela and Stephen P. Dretler

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This article describes the history of intracorporeal lithotripsy and the impact of previous techniques on modern devices. Technical and clinical specifics for several historical and current intracorporeal lithotripsy methods are described.

Ureteroscopy: Development and Instrumentation

Michael J. Conlin, Michael Marberger, and Demetrius H. Bagley

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Advances in ureteroscope and working instrument designs now allow the treatment of a variety of upper urinary tract disorders in a minimally invasive fashion. This field has benefited from the close cooperation between endourologists, engineers, and manufacturers. Continued cooperation should result in even further improvements in ureteroscopic instrumentation. This article also presents the development of flexible and rigid ureteroscopes and working instruments. Knowledge of these features can assist the urologist in choosing the most appropriate tool for different ureteroscopic tasks.

Percutaneous Nephrostolithotomy: What Is Its Role in 1997?

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J. Stuart Wolf, Jr and Ralph V. Clayman

Although extracorporeal shock wave lithotripsy achieves a high success rate in most patients with urolithiasis, percutaneous nephrostolithotomy (PNL) and other alternatives are required in some situations. This article outlines the indications for PNL, with special consideration of the size and location of calculi and the nature of the upper urinary tract. Staghorn calculi and calculi greater than 2 cm in diameter generally are best approached percutaneously. If composed of cystine or located in a lower pole calyx, smaller calculi sometimes also are treated best with PNL. There are several special situations, including abnormal renal anatomy, renal transplant kidneys, and upper urinary tract obstruction, in which PNL is the superior modality.

Contemporary Management of Ureteral Stones

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Rajiv K. Singal and John D. Denstedt

The management of ureteral stones has undergone revolutionary changes in the past 15 years. The parallel advances in extracorporeal shock wave lithotripsy, percutaneous and retrograde endoscopic access to the collecting system, and intracorporeal lithotripsy devices almost completely have supplanted the need for a traditional ureterolithotomy. The merits of the various technologies that are available are discussed as they apply to treating calculi in different ureteral segments.

Staghorn Calculi

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Joseph W. Segura

Staghorn calculi are challenging problems in all patients. The goal of treatment is to remove all the infected stones and to minimize the change of stone regrowth and persistent infection. Combined percutaneous stone removal and shock wave lithotripsy should be the first choice in most circumstances to achieve this goal.

Management of Calyceal Calculi

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Todd D. Cohen and Glenn M. Preminger

Management of calyceal calculi has changed dramatically during the past 20 years. Minimally invasive techniques virtually have replaced open surgical stone removal. Even large and complex calyceal calculi may be treated effectively with these minimally invasive techniques. Although open surgical stone removal is performed infrequently, a clear understanding of the subtle renal anatomy aids the urologist in more effectively treating patients with calyceal calculi and in limiting surgical complications.

Patient Evaluation: Laboratory and Imaging Studies

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Frank P. Begun, W. Dennis Foley, Ann Peterson, and Brad White

Renal calculus disease remains a significant health problem in our population. Improvement in our ability to treat patients with kidney stones has shifted the focus away from patient evaluation. The "modern stone age" has seen the development of endourologic techniques and shock wave lithotripsy, and many clinicians take a more cavalier approach to the identification of etiologic factors and to the development of preventative strategies. This article reviews the various laboratory and imaging modalities that are available and the rationale for their use.

Medical Therapy: Calcium Oxalate Urolithiasis

Lisa A. Ruml, Margaret S. Pearle, and Charles Y. C. Pak

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The development of diagnostic protocols that identify specific risk factors for calcium oxalate nephrolithiasis has led to the formulation of directed medical regimens that are aimed at correcting the underlying metabolic disturbances. Initiation of these treatment programs has reduced markedly the rate of stone formation in the majority of patients who form stones. This article discusses the rationale that underlies the choice of medical therapy for the various pathophysiologic causes of calcium oxalate nephrolithiasis and the appropriate use of available medications.

Uric Acid–Related Nephrolithiasis

Roger K. Low and Marshall L. Stoller

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Abnormalities in uric acid metabolism are associated with uric acid and calcium oxalate urolithiasis. Clinical stone formation depends on multiple identifiable risk factors that affect uric acid and calcium oxalate solubility. The understanding of urinary pH is critical to direct appropriate treatment of uric acid–related nephrolithiasis. Understanding uric acid metabolism and the pathophysiology of uric acid and calcium oxalate stone formation leads to a rational treatment approach to uric acid and hyperuricosuric calcium oxalate stone disease.

Treatment Options in Struvite Stones

Lester P. Wang, Hoo Yin Wong, and Donald P. Griffith

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The treatment of struvite calculi remains problematic. Without treatment, a vicious cycle of stone formation occurs. Multimodality therapy is key. The urologist must approach struvite staghorn calculi with a vast armamentarium of surgical and medical techniques.

Cystine Calculi: Diagnosis and Management

Scott D. Rutchik and Martin I. Resnick

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The genetics, pathophysiology, diagnosis, and treatment of cystinuria are discussed in this article. Newer chemotherapeutic and surgical options that are used to treat this disease process also are reviewed. The authors suggest a multimodal approach in the treatment of cystinuria and cystine calculi.

Pediatric Urolithiasis

R. Lawrence Kroovand

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Urolithiasis in childhood is of diverse causes that require carefully planned individualized diagnostic and management protocols. The efficiency in the diagnosis and management of urolithiasis in childhood follows a learning curve, especially when using the more recent technical innovations for management of urinary calculi. With current technical sophistication of transurethral and percutaneous techniques and extracorporeal shock wave lithotripsy, management of urolithiasis during childhood should be relatively straightforward.

Extracorporeal Shock Wave Lithotripsy: Development, Instrumentation, and Current Status

James E. Lingeman

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In this article, the author briefly reviews the early development of the lithotripter, provides a detailed review of lithotriptors that are currently

available, and gives an overview of the present extracorporeal shock wave lithotripsy indications and techniques. The author also presents a brief overview of the results that are produced by various lithotriptors.

Sandwich Therapy

Stevan B. Streem

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When applying new technology to the management of patients with complex stone disease (especially those with infection-related stones), multiple factors should be considered. The primary goals of intervention in this setting, however, should be to minimize the rates of residual and recurrent stones and infection and to preserve renal function. A sequential, combined approach using percutaneous nephrostolithotomy and extracorporeal shock wave lithotripsy has proved valuable in minimizing the complication rates and maximizing the stone-free rates compared with using either modality alone.

The Craft of Urologic Surgery

Orthotopic Bladder Substitution in Women Following Cystectomy for Bladder Cancer

Mohamed A. Ghoneim

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The feasibility of orthotopic substitution of the bladder after cystectomy for cancer has been realized. One must be careful about two potential drawbacks that may appear. Cases must be selected carefully and followed up to ensure that the adoption of such a procedure does not increase the risk of local recurrences. In the long term, if overcontinence proves to be a problem among a significant proportion of such cases, the logic of and the need for orthotopic substitution are lost. One then has to reconsider that intermittent catheterization of a continent cutaneous stoma provides a better alternative.

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