Review Article

The Use of Internal Stents in Chronic Ureteral Obstruction

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Abbreviations and Acronyms

BUO = benign ureteral obstruction

CUO = chronic ureteral obstruction

DES = drug eluting stents

MUO = malignant ureteral obstruction

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Purpose: Despite the lack of a well delineated definition, chronic ureteral obstruction imposes significant quality of life loss, increased pathological morbidity and risk of mortality as well as substantial economic burden. Ureteral stenting serves as an important therapeutic option to alleviate obstruction. Thus, we assessed the recently published literature on chronic ureteral obstruction; treatment options; types, benefits and shortcomings of current ureteral stents; as well as outcomes and complications of chronic ureteral stenting, with the goal of providing concise management guidelines.

Materials and Methods: A systemic literature review was performed on Embase™, PubMed®, Cochrane Controlled Trials Register and Google Scholar™ on ureteral obstruction and internal ureteral stents. Relevant reviews, original research articles and their cited references were examined, and a synopsis of original data was generated on a clinically oriented basis.

Results: Chronic ureteral obstruction can be classified into compression that is either intrinsic or extrinsic to the ureteral wall, or obstruction that is of a benign or malignant origin. Patients with malignant ureteral obstruction generally have a poor prognosis and are often difficult to treat. The aim of stenting is to adequately drain the upper urinary tracts while minimizing hospitalization and the negative impact on quality of life. Facing the challenge of chronic ureteral obstruction, novel stents with new compositions, materials, coatings and designs have been developed. Metallic stents are emerging as efficacious and financially viable alternatives. Early stent related complications include iatrogenic injury, stent migration or patient discomfort, while late complications include infection, difficulties with stent exchange, hardware malfunction, infection and stent encrustation.

Conclusions: Stenting in chronic ureteral obstruction is a complex and challenging problem. Much work is being done in this area and many options are being explored.

Key Words: ureteral obstruction, stents

SINCE its first description by Zimskind in 1967, the ureteral stent has undergone a plethora of evolutionary changes to become the ubiquitous tool urologists use today.[1] Although the stenting algorithm for relief of acute obstruction is intuitive to most, management of chronic obstruction

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presents a far more complicated decision making process. The term "chronic ureteral obstruction" itself lacks a well delineated definition, either depending on an arbitrarily assigned period or referring to the need for repeated stenting procedures when definitive treatment is not possible. The nomenclature in CUO is further muddled by opposing classification systems, dividing disease by anatomical location (intrinsic vs extrinsic) or etiology (benign vs malignant).

These patients, regardless of etiology, present with upper urinary tract obstruction that symptomatically decreases quality of life, and pathologically adds morbidity and potentially increases mortality.[2] The goal of treatment is to improve both parameters, if only from a genitourinary standpoint. The need for such treatment options will only become more pressing as treatments for life limiting diagnoses continue to improve.

The practitioner must consider the various success rates and complications associated with each stent type in the currently available armamentarium. Although we have come a long way from the initial straight Zimskind silicone catheter, with advances in anchoring devices, composition and coatings, we still strive to find the ideal stent. With each new iteration we seek to decrease stent related symptoms, difficulty with replacement and frank stent failure. However, potential improvements must be weighed against known limitations and patient specific factors.

In this update we address the broad divisions in types of CUO, as well as the disease and patient specific considerations for management options. We then present the various available types of stents and compare benefits and shortcomings. We review techniques for placement for particular stents that may be novel for some urologists, and discuss the outcomes and complications seen in the setting of treating this heterogeneous disease state.

METHODS

A systemic literature review was performed on Embase, PubMed, Cochrane Controlled Trials Register and Google Scholar. Keywords included ureteral obstruction and internal ureteral stents. Relevant reviews, original research articles and their cited references were examined, and a synopsis of original data was generated on a clinically oriented basis.

CUO CAUSES, PROGNOSIS AND MANAGEMENT OPTIONS

Two classification systems are generally used to describe the etiology of CUO. The first relates to the anatomical relationship of the obstruction to the ureteral wall, either intrinsic or extrinsic. The second relates to whether the obstructing process is of a benign or malignant origin.

Intrinsic obstruction describes obstruction within the lumen of the urinary tract due to ureteropelvic junction stenosis, stone, ureteral stricture or secondary to genitourinary malignancies.[3] Extrinsic obstruction is defined as that due to a benign or malignant process originating outside the urinary tract.

Malignant Ureteral Obstruction

The actual incidence of malignant ureteral obstruction is unknown.[4] MUO can arise from intrinsic urological malignancy, most commonly urothelial carcinoma, or extrinsically from another primary, most commonly gynecologic or colorectal. For nonurological primary malignancies the obstruction is due to direct invasion, nodal disease or involvement in an inflammatory process. Given that only approximately 21% of patients will have a urological primary, a multidisciplinary approach to the patient is critical.

Management of this population can be difficult as patients with MUO generally have a poor prognosis. The quoted overall survival rates range from approximately 2 to 15.3 months.[5,6] Early studies by Zadra et al showed the worst outcomes in patients with MUO secondary to metastatic breast cancer (3.74 months, range 0 to 11) compared to MUO secondary to other malignancies such as cervical cancer (11.29 months, range 0 to 60).[7] Disease stage or grade (other than metastases for breast cancer), age and degree of renal impairment had no effect on prognosis. The recommendation was that those with metastatic breast cancer, rapid disease progression or those in whom no further anticancer treatment was feasible should not be diverted. There is some evidence to suggest that those with MUO secondary to prostatic malignancy have better survival and, thus, warrant more aggressive approaches to ureteral stenting.[8] Further work by Ganatra[9] and Shekarriz[10] et al suggested that baseline creatinine may be a poor prognostic indicator.

Contemporary modern studies have proposed prognostic groups to more accurately predict overall survival and guide decision making.[6,8,11] Izumi et al considered a series of patients with gynecologic and colorectal cancer with an overall median survival of 228 days.[6] The 4 prognostic factors of pre-diversion creatinine greater than 1.2 ng/ml, availability of cancer therapy, location of primary malignancy and presence of bilateral obstruction allowed ranking into prognostic groups of good (0–2), intermediate (3–4) or poor (5–7) outcomes with median survival of 403, 252 or 51 days. Of note, this study contradicted earlier data regarding the