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Research Article

Ureteral obstruction: New trends in management

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Abstract

Ureteral obstruction is blockage in one or both of the tubes (ureters) that carry urine from the kidneys to the bladder which is a potential common cause of reversible renal injury. It can be caused by benign or malignant pathologies. Decompression of the obstruction is considered a vital step in management. Percutaneous nephrostomy (PCN) and ureteral stenting are the two common diversion surgical techniques used for the treatment of obstruction. In cases of benign ureteric obstruction, the choice between PCN or stenting is highly arguable among urologists and is dependent on factors such as the cause, severity of obstruction availability of treatment modalities, and surgeon experience, and both techniques are considered similar successful in treating such case. For ureteric stones, urologists typically try stenting first and resort to PCN if stenting fails. The choice between the two is dependent on the availability of resources and surgical experience. On the other hand, PCN is the preferred initial method in cases of malignant obstruction because of high late failure rates in cases of ureteral stenting. Percutaneous nephrostomy cases had the drawback of the need for a collection instrument placed externally which impacted the patient's life.

Keywords: Malignant Obstruction, Percutaneous Nephrostomy, Ureteric Obstruction, Ureteric Stenting, Ureteric Stones

Introduction

The kidneys and ureters are essential components of the urinary system, responsible for filtering and excreting waste products from the body. They play a crucial role in maintaining overall health and well-being (Ogobuiro and Tuma, 2023). By definition, ureteral obstruction is a blockage in one or both of the tubes (ureters) that carry urine from the kidneys to the bladder (Celano, 2022). Ureteral obstruction can be caused by a multitude of benign and malignant

etiologies (Kachrilas et al., 2013). It can be categorized into congenital and acquired causes, intrinsic or extrinsic causes (Chen, 2009; Zhu et al., 2021). It is considered one of the common reversible causes of obstructive kidney disease which accounts for 8% of both acute and chronic renal disease (Makris and Spanou, 2016; Chen et al., 2019a). Decompression of the obstruction is considered a vital step in management (Kulkarni, 2014).

Aim

This article will focus on the management of ureteral obstruction. We will discuss the roles of PCN and retrograde ureteral stenting for upper obstructive uropathy, as well as review the most up-to-date evidence on minimally invasive approaches to surgical repair. Our discussion will also include specific concerns relevant impact on post-operative quality of life in terms of dysuria or other features.

Epidemiology

Urologists commonly encounter ureteral obstruction, which affects approximately 8% of the population, making it a prevalent renal problem (Makris and Spanou, 2016). It affects both genders and is distributed among various age groups (Chen et al., 2019b). It is highly encountered during the third decade of affected people's life (Alelign and Petros, 2018).

Etiology

The etiology is tremendously variable. Congenital causes include duplicated ureter, ureterocele, and retroperitoneal fibrosis (Jain and Chen, 2019). Acquired causes can be either intrinsic or extrinsic causes (Ganzer et al., 2015; Borin, 2017). The most common cause is ureteric stone which is an intrinsic factor (Iravani et al., 2014). Other causes include ureteric stricture from previous surgery or irradiation, compressive benign or malignant lesions, infectious causes such as TB, vascular causes such as aneurysms, and traumatic or malignant bleeding around the ureter (Goel A, 2008, Corcoran et al., 2009).

Pathophysiology

Untreated obstruction can lead to severe consequences such as renal parenchymal scarring and end-stage renal disease (ESRD), which are considered unfavorable outcomes (Martínez-Klimova et al., 2019). The obstruction initially will result in an increased pressure proximal to the obstruction site, this will lead to stretch in the smooth muscles and hydronephrosis (Jackson et al., 2018). This raised pressure will result in a decrease in the glomerular filtration rate with

subsequent ischemia (Munshi et al., 2011). As a result, electrolyte imbalance will occur as a result of damaged renal cortex/medulla (Basile et al., 2012). These pathways are dependent on size of stenosis, the time of stenosis, and the overall condition of the patient (Al Aown et al., 2010; Irdam et al., 2021). Research has indicated that when a blockage occurs the kidney can endure damage, for a maximum duration of 28 days (Textor et al., 2009).

Clinical presentation

The presenting clinical features are widely variable and are dependent on the severity and the cause of obstruction (Esparaz et al., 2015). Pain, nausea, and vomiting are among the most common presenting features (Esparaz et al., 2015; Flores-Mireles et al., 2015). Urinary tract infections are often seen as a typical presentation, but they can also reveal signs of an underlying cause, including possible malignant factors (Flores-Mireles et al., 2015). Also, hypertension, uremia, and electrolyte disarrangement may occur acutely or progressively (Esparaz et al., 2015).

Management

Urine analysis with metabolic test panel should be initially ordered for the patients putting emphasis on the renal function test (Shehab et al., 2013). The easiest and non-invasive tool is ultrasound should be done immediately to evaluate the obstruction, hydronephrosis as well and a possible cause of obstruction (Nuraj and Hyseni, 2017). The next radiological test to be ordered is a Computed Tomography scan of the pelvis and the abdomen in order to visualize any tumor (Caraiani et al., 2020). Magnetic Resonance Imaging (MRI) is another option in case of diagnosis is still suspicious (Hiorns, 2011). An intravenous pyelogram or renal nuclear scan could be ordered accordingly (Esmaeili et al., 2016).

When ordering these investigations, it is important to make sure that the patient receives appropriate medical care, which may include being admitted to the hospital, and that a nephrologist is actively involved in their treatment and overall care (Pietropaolo et al., 2022). Correction of any electrolyte imbalance is mandatory (Mercimek and Ender, 2015). After stabilization of the patient, the obstruction is treated surgically (Pietropaolo et al., 2022). There is a wide debate regarding the proper surgical method which will be discussed next.

Surgical management

The PCN and ureteral stenting are widely argued among urologists in the management of ureteral obstruction. We will discuss the difference between these two methods in the management of benign and malignant ureteric obstruction.

Ureteral stenting

This surgical technique is done under general anesthesia, and it involves the insertion of a guide wire into the kidney plus a ureteral catheter to collect urine for urinalysis. This step is followed by an appropriate stent of variable length chosen based on pathology and length of obstruction (Makramalla and Zuckerman, 2011; Pavlovic et al., 2016).

Percutaneous nephrostomy.

Local anesthetic block and sedative is routinely used in cases of percutaneous nephrostomy. The percutaneous catheter is placed under the supervision of an interventional radiologist or by a urologist using an ultrasonography guide according to the availability of resources (Dagli and Ramchandani, 2011; Li and Regalado, 2012).

Benign ureteric obstruction.

The choice between percutaneous nephrostomy (PCN) or stenting is highly arguable among urologists and is dependent on factors such as the cause, severity of obstruction availability of treatment modalities, and surgeon experience (Goldsmith et al., 2013). High success rates have been recorded in previous studies (Hsu et al., 2016). In the case of ureteric stones, most urologists go for stenting with the diversion to percutaneous nephrostomy in case of unsuccessful stenting (Mokhmalji et al., 2001). In the case of percutaneous nephrostomy, patients had only longer hospital stays in comparison to stenting according to Goldsmith et al. This study also showed that the choice of the decompression approach will modify the choice of stone management (Goldsmith et al., 2012). Definitive stone management percutaneously will usually be the choice for cases of percutaneous nephrostomy while ureteroscope management will be selected over PCN in case of initial stenting (Wang et al., 2016). Pearle et al. showed that both methods were equally effective in managing ureteric stones (Pearle et al., 1998). On the other hand, Mokhmalji et al. showed that percutaneous nephrostomy was more successful than stenting (de Sousa Morais et al., 2019).

Joshi et al. have found that patients with stenting had more complaints in terms of pain and dysuria while PCN cases needed daily care of the nephrostomy. This study validates that there is no superiority of either method in terms of patient comfort (Joshi et al., 2021).

Malignant ureteric obstruction.

The choice of modality in cases of malignant obstruction is different from benign causes. Stenting is considered far less successful than PCN due to late failure plus technical difficulties during the surgery (Sountoulides et al., 2014). Choudhury et al. (Choudhury et al., 2020), Chen

et al. (Chen, 2009), Cheung et al. (Cheung et al., 2016), and Yosspeowitch et al. (Song et al., 2012) have shown that late failure due to stenting ranged from 11% to 45% respectively and cases were treated later by PCN. Even though stenting had higher failure rates, there was no statistical difference rate in terms of survival rates between the two groups of PCN or stenting (Pandey et al., 2018). PCN cases had the drawback back of the need for a collection instrument placed externally which impacted the patient's life (New et al., 2021).

Conclusion

Both diversion techniques can be used in cases of ureteric obstruction. The choice between the two depends mainly on the etiology of obstruction. In cases of malignant obstruction, percutaneous nephrostomy is preferable over stenting due to the higher late failure rate in the latter. Both methods are equally effective in terms of benign ureteric obstruction in terms of success rate.

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