

## **Staghorn Calculus: A Comprehensive Review of Epidemiology, Clinical, Diagnosis and Treatment**

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### **ABSTRACT**

Staghorn calculus is a urological condition characterized by the presence of large, branching kidney stones in the renal collecting system. Although it is a relatively uncommon entity, its high recurrence rate and associated complications represent a significant clinical challenge. In this article, a comprehensive review of the epidemiology, clinical, diagnostic, and treatment of chorioriform lithiasis is performed. Risk factors, clinical manifestations and associated complications are discussed. In addition, the different diagnostic tools are described in detail, from clinical history and physical examination to urinalysis and imaging studies. Regarding treatment, therapeutic options such as antibiotic therapy, endourological techniques and correction of underlying metabolic disorders are discussed. The importance of long-term follow-up and regular monitoring to prevent recurrence and complications is emphasized. In conclusion, this article provides a comprehensive overview of chorioriform lithiasis, providing health care professionals with up-to-date guidance for the successful management of this complex urologic condition.

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### **INTRODUCTION**

Staghorn calculus is one of the most severe forms of urinary lithiasis. A coraliform stone is defined as one that has a central body and at least one caliceal branch. Coraliform stones are so called because they occupy most of the collecting system and resemble sea coral or deer antlers. They usually form a renal lithiasic mass that occupies the infundibulum, most of the calyces and the pelvis en bloc or in an articulated manner. It is classified into two types: partial and complete. It is classified as a partial calculus if it only fills part of the collecting system, and complete when it fills all the calyces and the renal pelvis. In general, it is associated with infection of the urinary tract by ureolytic germs (Proteus, Pseudomonas, Ureaplasma...), although there are also other factors that favor its formation (neurogenic bladder, spinal cord paralysis, infected urinary catheter, urethral stenosis).<sup>1,2</sup>

It is a type of renal lithiasis that forms in the renal pelvis, large and can cause obstruction of urinary flow, usually formed by calcium oxalate, but may also contain other compounds such as uric acid, cystine and struvite.<sup>2</sup>

They are more common in people diagnosed with diabetes mellitus, repeated (chronic) urinary tract infections or abnormalities in renal anatomy, as well as those with a family history.<sup>2</sup>

### **RELEVANCE**

The clinical relevance of coralliform lithiasis lies in its association with a high risk of complications, including urinary tract obstruction, recurrent urinary tract infections, progressive deterioration of renal function and increased risk of chronic renal failure. These stones can occupy and distend the renal pelvis and calyces, adversely affecting adequate urine drainage and causing long-term structural damage to the renal parenchyma.<sup>3</sup>

The formation of coral stones is associated with several risk factors, including chronic or recurrent urinary tract infections, anatomical abnormalities of the urinary tract, metabolic diseases such as hyperparathyroidism, and genetic disorders that predispose to kidney stone formation, such as cystinuria. The presence of coralline stones may indicate a complex clinical condition and require a thorough evaluation to

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identify and treat the underlying causes.<sup>3</sup> On the other hand, infection-associated lithiasis, mostly constituted by struvite and *Proteus Mirabilis* being the most common germ, especially when bilateral and growing in the form of coralline stones, is the most frequent cause of urolithiasis associated with ESRD.<sup>2</sup> This type of stone, without treatment, eventually destroys the kidney and can cause a potentially life-threatening septic condition.<sup>4</sup>

### EPIDEMIOLOGY

From an epidemiological perspective, choriiform lithiasis is relatively uncommon, but is considered one of the most severe and complex forms of kidney stones. It primarily affects adults, with a higher prevalence in men than in women. Genetic, metabolic, and environmental factors are believed to contribute to the development of choriiform calculi.<sup>4</sup> Infectious stones comprise about 15% of urinary calculi; they are mostly composed of struvite or apatite carbonate. The main clinical association for the formation of coral stones is urinary tract infection by urease-producing bacteria, the most important associated being *Proteus*, *Klebsiella*, *Pseudomonas* and *Staphylococcus*. Among the local risk factors for urinary tract infection and the development of infectious calculi are congenital or acquired malformations that cause urinary stasis and retention of mucoproteins and crystals. The female sex is the most affected, having a ratio of 2:1 in relation to the male sex, due to a greater susceptibility to present urinary tract infection.<sup>13</sup>

### CLINIC

The clinical presentation of choriiform lithiasis is varied and often complex, due to the presence of large, branching kidney stones that occupy the renal collecting system. This condition is associated with a number of symptoms and signs that can significantly affect the patient's quality of life.<sup>5</sup>

One of the most common symptoms of coralliform lithiasis is lumbar or abdominal pain, which may be intermittent or constant. This pain may radiate to the groin region or to the thigh, and its intensity may vary from mild discomfort to acute, disabling pain. The pain is usually associated with body movements and may be accompanied by tenderness in the affected area.<sup>5</sup>

The presence of blood in the urine, known as hematuria, is another characteristic clinical finding of choriiform lithiasis. Hematuria may manifest as visible blood in the urine with the naked eye, or it may be microscopic and detected only by laboratory analysis. The amount of blood can vary from small amounts to significant hemorrhage.<sup>5</sup>

Recurrent urinary tract infections are a frequent complication in cases of choriiform lithiasis. This is due to the presence of stones that act as reservoirs for bacteria, facilitating their proliferation and the development of infections. Symptoms of urinary tract infection include increased urinary frequency, urgency to urinate, burning sensation during urination and fever.<sup>6</sup>

Urinary flow obstruction is another important clinical manifestation of choriiform lithiasis. Due to the size and location of the stones, they may partially or completely block the flow of urine from the kidney to the bladder. This can lead to a range of symptoms, such as difficulty urinating, a feeling of incomplete bladder filling, severe pain and even acute renal failure in severe cases.<sup>6</sup>

In addition to the above symptoms, patients with choriiform lithiasis may experience fatigue, loss of appetite, nausea and vomiting. These symptoms may be related to the presence of chronic infections, urinary obstruction and the generalized inflammatory response that occurs as a result of the interaction between the stones and renal tissues.<sup>6</sup>

In summary, the clinical presentation of choriiform lithiasis is characterized by the presence of lumbar or abdominal pain, hematuria, recurrent urinary tract infections, urinary flow obstruction and general symptoms such as fatigue and loss of appetite. Early recognition and appropriate treatment are critical to avoid serious complications and improve the patient's quality of life.<sup>6,7</sup>

### DIAGNOSIS

The diagnosis of choriiform lithiasis is established through a comprehensive and accurate evaluation involving a variety of clinical approaches and diagnostic tools. Careful medical data collection as well as specific tests are required to confirm the presence of large, branching kidney stones in the renal collecting system.<sup>8</sup>

The patient's medical history is a fundamental component in the diagnosis of choriiform lithiasis. Detailed information is sought on the patient's symptoms, such as low back or abdominal pain, presence of blood in the urine, recurrent urinary tract infections, and family history of kidney stones. Possible risk factors such as anatomical malformations of the urinary system and underlying metabolic disorders are also explored.<sup>9</sup>

Physical examination may reveal important findings related to choriiform lithiasis. The physician may palpate tenderness or pain in the lumbar or abdominal area, as well as distention of the urinary tract due to the presence of large stones. In addition, signs of urinary tract infection, such as fever or tenderness in the bladder area, may be identified.<sup>9</sup>

Laboratory tests play a crucial role in the diagnosis of Staghorn calculus. Urinalysis can detect the presence of blood in the urine (hematuria) and provide clues to possible urinary tract infections, such as the presence of leukocytes and bacteria in the sample. In addition, chemical analyses can be performed to assess the concentration of minerals and compounds that may be related to stone formation, such as calcium, uric acid or phosphate.<sup>9</sup>

Imaging studies are essential to confirm and characterize choriiform lithiasis. Computed tomography (CT) is considered the method of choice because of its high resolution and ability to detect and evaluate kidney stones in detail. CT can provide information on stone size, location,

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shape and composition, as well as assess renal involvement and detect possible complications.<sup>10</sup>

Renal ultrasound is also used in the diagnosis of chorionic lithiasis, especially when there are contraindications to CT or as a follow-up tool. Ultrasonography can provide information on the approximate size and location of stones, although its detection and characterization capabilities may be limited compared to CT.<sup>10</sup>

In selected cases, other imaging studies, such as intravenous urography, cystography or renal scintigraphy, may be used to assess renal function, detect abnormalities in the urinary system or rule out other conditions that may occur in conjunction with chorioriform lithiasis.<sup>10</sup>

### TREATMENT

Treatment of chorioriform lithiasis involves a multidisciplinary and personalized approach to address large, branching kidney stones that occupy the renal collecting system. Due to the complexity of this condition, treatment may require the combination of several therapeutic strategies.<sup>11</sup>

First, treatment of chorionic calculi may include antibiotic therapy targeting urease-producing bacteria, such as *Proteus mirabilis*, which are frequently responsible for urinary tract infections associated with this condition. Antibiotics are prescribed to control the infection and prevent its spread, as well as to reduce the bacterial load and prevent the formation of new stones.<sup>11</sup>

Removal of kidney stones is an essential component of the treatment of chorionic lithiasis. Several endourologic techniques can be employed to achieve this goal. Extracorporeal shock wave lithotripsy (ESWL) uses externally generated shock waves to fragment stones into smaller particles that can be passed naturally through the urine. Recently with the development of flexible ureteroscopy and endoscopic lithotripsy with Holmium-YAG laser, a new combined treatment method is being applied in Staghorn calculus retrograde ureteroscopy and extracorporeal lithotripsy.<sup>15</sup>

Ureteroscopy, on the other hand, involves the use of a flexible endoscope to visualize and fragment stones in the upper urinary system. In more complex cases, percutaneous nephrolithotomy may be necessary, which involves making a small incision in the skin and kidney tissue to directly access and remove the stones.<sup>11</sup>

Correction of underlying metabolic disorders is also an important part of the treatment of chorionic calculi. This involves identifying and addressing any disturbances in mineral metabolism, such as hyperoxaluria or hypocitraturia, which may contribute to stone formation. Specific medications may be prescribed to control urinary mineral levels and reduce the risk of new stone formation. In addition, dietary and lifestyle changes may be recommended to prevent stone recurrence.<sup>11</sup>

It is important to note that the treatment of chorioriform lithiasis is an ongoing, long-term process. Regular patient follow-up is required to assess the effectiveness of treatment, monitor for stone recurrence, and make therapeutic adjustments as necessary. In addition, urinalysis and imaging studies may be performed periodically to monitor renal function and detect possible complications.<sup>11,16</sup>

Treatment of chorionic calculi involves a combination of antibiotic therapy to control associated infections, endourologic techniques to remove kidney stones, and correction of underlying metabolic disorders to prevent recurrence. The therapeutic approach is tailored to the individual characteristics of each patient and may require long-term follow-up to achieve optimal results.<sup>11,16</sup>

### CONCLUSIONS

In conclusion, chorioriform lithiasis is a complex and serious urological condition characterized by the presence of large, branching kidney stones in the renal collecting system. Although relatively uncommon from an epidemiologic perspective, it represents a significant clinical challenge due to its high recurrence rate, associated complications, and difficulty in treatment.

Accurate diagnosis of chorioriform lithiasis requires a comprehensive evaluation including detailed clinical history, physical examination, urinalysis and imaging studies such as computed tomography and renal ultrasound. These tools make it possible to confirm the presence of large, branching stones, determine their size, location and composition, and assess renal involvement and the presence of associated complications.

The treatment of chorioriform lithiasis is multidisciplinary and is based on the individualized therapeutic approach. It involves the combination of antibiotic therapy targeting urease-producing bacteria, endourological techniques such as extracorporeal shock wave lithotripsy, ureteroscopy or percutaneous nephrolithotomy to remove the stones, and correction of underlying metabolic disorders to prevent recurrence.

It is important to note that treatment of choriorrhoea lithiasis is an ongoing process that may require long-term follow-up. Regular monitoring of renal function, evaluation of stone recurrence and adaptation of the therapeutic approach are essential to achieve optimal results and prevent long-term complications.

In summary, chorioriform lithiasis is a complex urological condition that requires a comprehensive approach to its diagnosis and treatment. Although it presents significant clinical challenges, a multidisciplinary and personalized approach can help improve the quality of life of patients affected by this condition and prevent long-term complications.

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