

# Urinary stone management during the COVID-19 pandemic: a suggested approach and review of literature

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**Abstract:** COVID-19 is now the major health concern of the century in many countries. Prolonged homestay has various undesirable consequences for people, such as physical inactivity and weight gain, which potentially could put people at risk of urinary stone formation. With regard to the prevention and treatment strategy for urinary stones during this COVID-19 pandemic period, patients can be divided into two groups. The first group comprises those for whom urological intervention is not indicated and where general dietary and lifestyle recommendations are helpful. The second group comprises those patients where urological intervention is indicated. This group can be divided into emergent and nonemergent subgroups. Patients with urinary stones and concomitant uremia, sepsis, anuria, or refractory pain and vomiting make up the emergent group, where intervention is necessary. The preferred option during the novel coronavirus crisis for these patients is percutaneous nephrostomy tube insertion under local anesthesia. The second subgroup is made up of those patients with asymptomatic and noncomplicated renal and ureteral stones where urologic intervention is indicated in the usual time scale. However, we suggest conservative treatment for 3 months during the COVID-19 outbreak after which re-evaluation of the patient should be carried out. Thus the operation could be chosen carefully based on the patient's and urologist's preference and the rate of infection in that center.

**Keywords:** COVID-19, nephrolithiasis, urinary calculi

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## Introduction

COVID-19 is now the major health concern of the century in many countries.<sup>1</sup> According to official data, up to 10 April 2020 there was more than 1.5 million COVID-19 cases around the world and there were 66,220 cases and 4110 deaths in Iran.<sup>2</sup> Many countries have used a lockdown strategy to control this outbreak, which has included complete closure of schools, universities, and political, social, and religious activities to deal with the spread of the disease.<sup>3</sup> Governments have encouraged people to stay home and in some countries have passed strict laws to forbid unnecessary outdoor activities. Although The Islamic

Republic of Iran had several serious problems with this disease, World Health Organization representatives stated that they were impressed by the knowledge of Iranian medical personnel and physicians. Despite recent economic issues Iran has performed well in implementing national health programs and may even serve as a role model for other countries. The most important reasons for this success can be attributed to the efforts and perseverance of the Iranian people and their high level of social fortune.<sup>4</sup>

Many hospitals became dedicated to these patients and changed their usual activities to

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ensure adequate hospital beds for patients with COVID-19. Many surgical departments including urology wards postponed surgeries to accommodate infected patients.<sup>3</sup> With regard to urinary stones, currently operations are limited to urological emergencies and almost all major centers have suspended nonemergent urinary stone surgeries, including percutaneous nephrolithotripsy (PCNL), extracorporeal shock wave lithotripsy (ESWL), retrograde intrarenal surgery (RIRS), and transurethral lithotripsy (TUL).

On the other hand, prolonged homestay has various undesirable consequences for people, such as physical inactivity and weight gain,<sup>5</sup> which potentially could put the general population at risk of urinary stone formation.<sup>6</sup> In addition, fear and anxiety of COVID-19 can lead patients to avoid presenting at outpatient clinics and this may be harmful, especially for those who have previously been operated on and have permanent ureteral stents, such as the short-term double J (DJ) stents. As the reported risk of DJ encrustation after 12 weeks is 76.3%,<sup>7</sup> there is a major concern that the lockdown period could cause encrustation in this group of patients.

### Prevention

Staying home for a long time has various undesirable consequences, such as immobility and obesity,<sup>4</sup> which potentially could facilitate urinary stone formation.<sup>6</sup> This concern is greater in patients at risk because of a history of metabolic diseases related to urinary stones, such as cystinuria and hypercalciuria, stone passage, or stone-related operations in the past, and a family history of nephrolithiasis. General dietary and lifestyle recommendations during the homestay period are necessary not only for people at risk but for all individuals as well. These recommendations include consuming more than 3 L of water and beverages every day, restricting the use of salt and protein,<sup>8</sup> and taking exercise at home more than three times a week. Due to the effects of immobility and weight gain on stone formation, ultrasonography is suggested for the at-risk population once there is a decline in the COVID-19 outbreak.

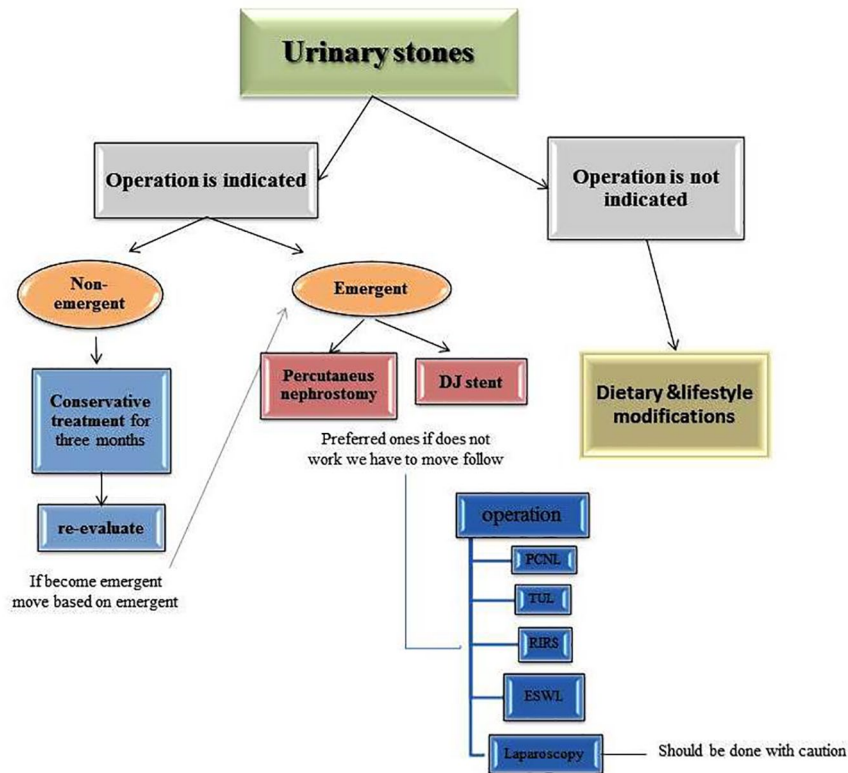
### Treatment strategy

With regard to treatment, patients can be divided into two groups. The first group comprises those for whom urological intervention is not indicated. In this group of patients, general dietary and

lifestyle recommendations are helpful. European urology guidelines recommend conservative treatment for non-struvite, non-cystine renal stones smaller than 7 mm, with no anatomic abnormalities,<sup>8</sup> so in this group of patients dietary and lifestyle modifications are also indicated. As immobility and weight gain in the homestay period could boost stone growth, performing ultrasonography after cessation of the COVID-19 pandemic is suggested.

The second group comprises those patients in whom urological intervention is indicated. They can be divided into emergent and nonemergent subgroups. The emergent group includes those patients with urinary stones and concomitant uremia, sepsis, anuria, or refractory pain and vomiting for whom intervention is necessary. The preferred option during the novel coronavirus crisis in these patients is percutaneous nephrostomy (PCN) tube insertion under local anesthesia. This method is less invasive and the health provider has less exposure to the patient compared with DJ stent insertion. If DJ insertion is elected for patients, it should be preferably performed under regional anesthesia (spinal or epidural), and the stent should be changed after 2–3 months in order to prevent encrustation.

In the event that PCN or DJ insertion is not successful, an operation will be suggested for emergent patients. The reported mortality was 20% for patients who were operated on during the incubation period of COVID-19 and 44% of these patients were admitted into an intensive care unit.<sup>9</sup> Therefore the operation should be chosen carefully based on the patient's and urologist's preference and the rate of infection in the center. Recommended viral protection for surgical and anesthesia teams should be observed and the surgery should preferably be performed in noninfected centers. A COVID-19 polymerase chain reaction test is suggested 48 h before surgery.<sup>10</sup> All methods of urological operations such as PCNL, ESWL, RIRS, or TUL could be elected if indicated, however, we do not recommend laparoscopic stone removal due to the obligatory general anesthesia requirement and consequently the risk of transition of COVID-19 to medical personnel as well as harm to the patient.<sup>11</sup> One of advantages of ESWL over other modalities is that it is performed with local anesthesia and consequently there is a lower risk of complications, however, from our point of view, in spite of the pandemic, it should be carried out only when indicated.



**Figure 1.** Approach to treating urinary stones in the COVID-19 era.

DJ, double J; ESWL, extracorporeal shock wave lithotripsy; PCNL, percutaneous nephrolithotripsy; RIRS, retrograde intrarenal surgery; TUL, transurethral lithotripsy.

The second subgroup includes patients with asymptomatic and noncomplicated renal and ureteral stones for which urologic intervention is usually indicated. However, we suggest conservative treatment for 3 months during the COVID-19 outbreak and after that a re-evaluation of the patient should be carried out. Patients with ureteral stones should be warned about red flags such as fever, severe nausea and vomiting, shortage of urinary output, and severe pain and refer to emergency departments. As no one knows exactly when this pandemic will be eliminated, the patient should be visited after 3 months and the decision made at that time. Figure 1 illustrates all stages of this approach.

## Discussion

COVID-19 is a new virus and all aspects of the pandemic are not yet known, and the exact time when this crisis will be shut down is not clear, so there are therefore no clear guidelines for managing urinary stones in this era. However, a few authors have tried to suggest some approaches. Stensland *et al.* suggested that endourological

stone interventions during the COVID-19 outbreak should be limited to obstruction and infection. They also suggest bedside nephrostomy tube or DJ insertion under local anesthesia and if neither option is possible in cases of emergency situations, intervention will be required.<sup>12</sup>

Carneiro *et al.* reviewed urology practice in Brazil. They believe that all operations to treat urolithiasis should be suspended, unless they are emergencies. If the ureteral lithiasis is associated with fever or other signs of infection, there is an absolute indication for urinary drainage and antibiotic therapy. They chose the passage of a ureteral stent under spinal anesthesia (or even local anesthesia). Unlike us, they chose bedside ultrasound guided PCN as an alternative. Similar to our view, they mentioned that in the case of lithiasis with contaminant urinary tract infection, bilateral obstruction in a solitary kidney, or acute loss of renal function and refractory pain the operation should not be postponed. They similarly think that if a surgical procedure is indicated, the problem should be resolved to reduce the number of emergency operations. As a result, instead of just

draining the urinary tract, our tendency is to perform ureterolithotripsy whenever possible and safe. They recommended managing the cases of renal colic with medical expulsive therapy and pain control, and those who already have a double J stent should remain with the stent for as long as possible. Intervention may be indicated in cases of extreme ureteral stent discomfort.<sup>10</sup>

When it comes to laparoscopy, Puliatti *et al.* mentioned some concerns.<sup>11</sup> There are reports about hepatitis B virus, papillomavirus, and HIV virus in the surgical smoke during laparoscopic and robotic surgeries through evaporation from electrocoagulation. On the other hand, transmission of COVID-19 by aerosol should not be neglected as it is viable in aerosols for up to 3 h. They recommended the use of the lowest intra-abdominal pressure for the pneumoperitoneum, use of devices capable of filtering the aerosolized particles from the exhaust produced during surgeries, using a lower power setting for electrocautery, and complete and adequate desufflation of the pneumoperitoneum. They also recommended that surgeons wear goggles or sealed masks with careful sterilization of the head support of the console between patients. They also mentioned that robotic surgical procedures should be performed by an experienced robotic surgeon in order to minimize the utilization of medical resources.<sup>11</sup> However, to date there is no evidence for the presence of covid-19 aerosol in the surgical smoke of laparoscopic surgeries and the guidelines were based on the fact that this novel virus may share characteristics of other detected viruses.

Finally, Goldman and Haber classified urological operations during the COVID-19 era into five tiers. In their stratification groups 0 and 4 consist of emergent and non-essential surgeries, respectively. Even though asymptomatic ureteral stone is in group 1 which means intervention could be scheduled, other urinary tract stones are in group 3, which means intervention should be delayed for 3 months.<sup>13</sup> However, we believe that unless the situation is harmful, intervention for ureteral stones should be postponed for 6–12 weeks.

### Conclusion

Even though there is little evidence on the management of kidney stones during the COVID-19 pandemic and there are many questions and controversies, we have tried to suggest a novel approach to managing these patients, We believe

that all at-risk patients should be evaluated for urinary stones with ultrasonography after the lockdown period.


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