

# **Destruction of Pyelic Stones with the Lithoclast® A Ureteroscopic and Nephroscopic Combined Approach**

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## **Abstract**

**Introduction and Objectives:** Ureteroscopic lithotripsy with the Lithoclast may be indicated to destroy the pyelic portion of staghorn calculi or hard pyelic stones. This method, which the authors have already used in 16 patients, is less aggressive than the percutaneous nephrolithotomy, but can be associated with extensive steinstrasse. To avoid this inconvenient, the authors developed a combined novel approach not yet described, which is presented in this video

**Methods:** The patients are placed in the lithotomy position, with the body tilted sideways to form a 45° angle in relation to the horizontal plane of the operation table. This position allows the introduction of a 22F Amplatz nephrostomy sheath along with the performance of ureteroscopy, without changing the patient's position. The Amplatz sheath may be introduced under simultaneous ecographic and ureteroscopic control. The lithotripsy is then performed with the Lithoclast, through the ureter, whereas the Amplatz sheet merely allows for the continuous washout of the fragments.

**Results:** In four patients, with voluminous pyelic cistine stones the lithotripsy was easily done, with a clear view and washout of fragments during all the procedure. Without complications, the blood loss was minimal. No steinstrasse occurred. ESWL were required to get a complete clearance of the fragments in all patients.

**Conclusions:** This method proved to be safe, easy to perform and effective in the destruction of difficult pyelic stones. It combines the advantages of both ureteroscopic lithotripsy and percutaneous lithotripsy, while avoiding some of their drawbacks.

**Key words:** Percutaneous Nephrolithotomy; Ureteroscopic lithotripsy.

## Resumo

**Introdução e Objectivos:** a litotricia de contacto ureteroscópica com o Lithoclast, pode estar indicada nos cálculos piélicos muito duros ou da porção piélica de cálculos coraliformes. Este método é menos agressivo do que a Nefrolitotomia Percutânea, mas origina com frequência extenso Steinstrasse. Para evitar este inconveniente, os autores usaram uma técnica combinada original e que é apresentada neste artigo.

**Métodos:** O doente é colocado em posição de litotomia, mas com o corpo inclinado lateralmente, formando um ângulo de cerca de 45° em relação ao plano horizontal da mesa operatória. Esta posição permite a introdução dum bainha de Amplatz para nefroscopia e, simultaneamente, uma abordagem ureteroscópica, sem necessidade de mudar a posição do doente. A colocação da bainha de Amplatz é controlada por ecografia e ureteroscopia. A litotricia é então executada com o Lithoclast através do ureter, enquanto a bainha de Amplatz serve quase exclusivamente para lavagem do bacinete e drenagem contínua dos fragmentos do cálculo.

**Resultados:** em quatro doentes, com volumosos cálculos piélicos de cistina resistentes à litotricia extracorpórea, conseguiu-se a sua destruição total por esta técnica combinada, com um campo visual límpido e uma contínua drenagem dos fragmentos. Não houve qualquer complicação e a hemorragia foi mínima. Pequenos fragmentos residuais foram posteriormente destruídos por LEOC, obtendo-se em todos os casos uma cura completa sem resíduos.

**Conclusões:** este método mostrou-se rápido e eficiente na destruição de cálculos piélicos duros. Combina as vantagens da litotricia por ureteroscopia e por nefrostomia percutânea, evitando alguns dos seus inconvenientes.

## Introduction

It is the authors experience to treat most cases of staghorn calculi and pyelic stones with ambulatory ESWL, obtaining good results.<sup>1</sup> However, in very hard stones like the cistine ones, too many ESWL sessions may be needed to debulk the pyelic portion of a staghorn calculi or to destroy a solitary pyelic stone. To overcome this inconvenient, the authors started using, in 1995, the ureteroscopic lithotripsy with the Lithoclast®<sup>2</sup>. Despite being less aggressive than the percutaneous nephrolithotomy, this technique has some disadvantages. The first and most important one, is the common occurrence of massive steinstrasse around the double J stent catheter often requiring a nephrostomy to facilitate the elimination of the fragments. The occasional improper visualization of the pyelic stone, either due to the clouding of the irrigation fluid by stone powder or because it is out of the field of view of the ureteroscope due to the pyelocalicial morphology, are other significant disadvantages. To overcome this limitations, the authors developed a novel combined approach, not yet described, which is presented in this paper.

## Methods and Patients

After general anesthesia induction, the patients were placed in a modified lithotomy position, with the trunk tilted sideways to form an 45 degree angle to the horizontal plane of the operation table, using for that a bag below the ipsilateral flank. The contralateral leg can be flexed in the horizontal plane of the table as shown the fig. 1. This position allows the performance of a nephrostomy tract under simultaneous ecographic and ureteroscopic control. After placing a 22 Fr Amplatz sheath, the destruction of the pyelic stones or the pyelic portion of the staghorn calculi was performed through the ureter with the Lithoclast®, using an irrigation flow at a pressure of about 200 mmHg. With this technique, the operative field is kept always clean, as the small fragments are continuously washed out from the kidney trough the Amplatz sheath during the lithotripsy. (fig. 2) After completing the procedure, a 7 Fr double J stent catheter was placed in the ureter, and a 18 Fr Malecot catheter was left in the nephrostomy tract until the urine became completely clear.

Four patients (two males and two females) with ages between 19 and 43 years were submitted to this



**Fig. 1** – Patient position for a combined ureteroscopic and nephroscope approach.

combined approach to destroy voluminous renal cistine stones (30x20 mm the biggest and 25x20 mm the smaller). One of the patients had 2 stones in the same kidney, one in a calyx and other in the renal pelvis. In three patients, a nephrostomy 9 Fr catheter had been placed one week before the procedure.

## Results

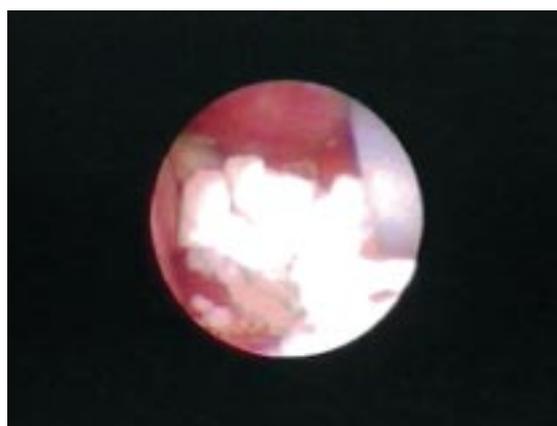
The combined lithotripsy technique was easily performed in all four patients, taking 60 to 120 minutes to be completed. In the patient with two stones, the caliceal stone was dislodged to the pelvis through the Amplatz sheath and destroyed through the ureteroscopy. No accidents occurred during or after the procedures. Blood loss was minimal, as confirmed by the absence of significant variation on the hemoglobin concentration. The patients left the hospital on the third day with the nephrostomy catheter. One to three sessions of ESWL were performed in each patient to destroy small residual fragments less than 10 mm in size, five to 10 days after the initial procedure. The nephrostomy catheter was extracted one week after the ESWL in two patients, and two weeks after in the two other patients. The double J stent catheter was left in place during one month in all patients.

## Discussion

“Guide lines” for treatment of stones with more than 500 mm<sup>2</sup> favour percutaneous nephrolithotomy (PNL) in monotherapy or followed by ESWL.<sup>4,5,6,7,8,9,10,11,12,13,14</sup> However, PNL is an aggressive technique, its



**Fig. 2** – fragments of the stone washed out through the Amplatz sheath.



**Fig. 3** – The ureteroscopic view of stone fragments washed out through the tip of the Amplatz Sheath inside the pelvic cavity.

most relevant complication being the blood loss which promotes the need of a high rate of transfusions (0.3 to 50%).<sup>3,4,6,7,8,9,10,13,15,16</sup> This is too high for a technique which pretends to be minimally invasive, specially when AIDS and hepatitis infections are a latent danger and a cause of concern for patients and surgeons alike. Alternative options aiming to reduce the rate of blood transfusions must be welcome, even if the final results are no better than the standard ones. This was one of the goals that the authors pursued when developing this combined approach. Any urologist with experience in the renal surgery knows how fragile is the renal tissue, prone to suffer important lacerations even during delicate manipulations. When performing PNL, even small amplitude movements in the external tip of the Amplatz sheath (necessarily a large one to cope with the operative nephroscope) translate into wide movements in the tip that is cross-

sing the kidney, since the axis of the movement is closer to the external tip of the Amplatz sheath than to the internal one. Even taking into consideration the great mobility of the kidney, the manipulation of the Amplatz sheath can result in severe renal lacerations with rupture of major blood vessels. With the combined technique proposed by the authors, the destruction of the stone is performed through the ureteroscope, and the smaller 22 Fr Amplatz sheath is kept steady most of the time, since its main purpose is to evacuate the irrigation fluid and the fragments that result from lithotripsy. However, the manipulation of the Amplatz sheath can sometimes be necessary to move a caliceal fragment into the field of view of the ureteroscope. This maneuver can be performed with the 8 Fr rigid ureteroscope or the flexible nephroscope. Other not negligible advantages of this technique, are the continuous visual control of the tip of the Amplatz sheath during the lithotripsy, allowing it to be put in the best position for the drainage of the fragments, and the possibility of irrigating at high pressures without damaging the kidney, enhancing the clarity of the visual field.(fig.3). Additionally, as the Amplatz sheath is not occupied by the nephroscope, it is not necessary a fine fragmentation since almost all fragments with up to 5 mm pass easily through it.

It is recognized that a previous nephrostomy may facilitate the dilatation of the tract in the day of operation. However, the performance of the nephrostomy tract in the operating room, under general anesthesia and after the introduction of the ureteroscope has some advantages. On one hand, the ultrasound guided puncture of the inferior calyx is facilitated by the ureteroscope irrigating fluid that promotes a detectable dilatation of the pyelocaliceal system. On other hand, the ureteroscopy allows a better control of the wanted puncture site. This was possible in our one case that didn't have a previous nephrostomy, but more cases are necessary to attest if this control is always feasible. The sideway tilting of the trunk, as used here, had already been used by others for PNL.<sup>16</sup> However, this position associated with the lithotomy position, seems better for the performance of combined ureteroscopic and nephroscopic procedures than the reverse one proposed by other authors.<sup>17</sup> This technique presents some advantages over the use of Holmium Laser with flexible nephroscope, including the price (ten times lower) and the much better image.

## Conclusions

This method proved to be safe, easy to perform and effective in the destruction of difficult pyelic stones. It combines the advantages of both ureteroscopic lithotripsy and percutaneous lithotripsy, while avoiding some of their drawbacks.

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