

BASICS IN PERCUTANEOUS NEPHROLITHOTOMY

WHAT IS A PERCUTANEOUS NEPHROLITHOTOMY?

It's an urological surgery that consists in creating a percutaneous tract for the treatment of kidney stones bigger than 2cm and usually placed in inferior or mid calyceal groups.

PATIENT'S SELECTION AND PREOPERATIVE IMAGING

There are no contraindications based on the physical complexion of the patient or previous abdominal surgeries.

All patients must have an abdominal CT as a preliminary study, preferably with an excretory phase to observe the anatomy of the renal calyces and their relationship with the rest of structures.

PATIENT'S POSITIONING

Complete Supine/Dorsal Position



Valdivia supine position



Galdakao modified Valdivia position



Supine positions are better option for obese patients. They allow a simultaneous endoscopic access.

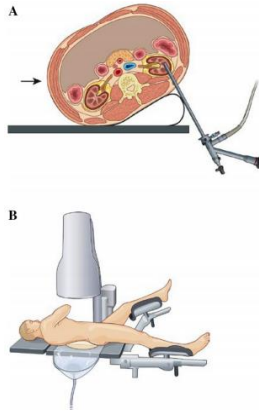


Fig. 1 a and b Patient positioning for modified lithotomy position (drawing courtesy of Dr. Andras Horvack, Paris)

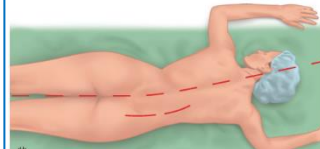
Prone/Ventral Position

Original position described.

It requires previous lithotomy for catheter placement and retrograde pyelography.

Similar results compared with supine combinations.

Ideal positioning remains a controversial topic. Depends on the surgeon preference.



Images from:
 Melo PAS, Vicentini FC, Perrella R, Murta CB, Claro JFA. Comparative study of percutaneous nephrolithotomy performed in the traditional prone position and in three different supine positions. Int Braz J Urol. 2019 Jan-Feb;45(1):108-117.

Drawings from EMC - Urología 1: Nefrolitotomía percutánea. Volume 45, n°4. Diciembre 2013

It is advisable to mark the posterior axillary line of the patient with a marker pen in supine position. After final positioning, the edge of the last rib and the iliac crest are marked.

URETERAL CATHETER PLACEMENT AND RETROGRADE PYELOGRAPHY

- A 7Ch straight ureteral stent is placed, preferably in upper calyceal group after opacification of the renal cavities with radiological contrast
- The ureteral catheter allows the cavities to be filled with slightly diluted contrast, perfused in Y with physiological saline in which two ampoules of methylene blue are diluted according to surgeon preference
- The ureteral catheter is attached to the urinary catheter with a silk thread.



KIDNEY PUNCTURE AND TRACT DILATION

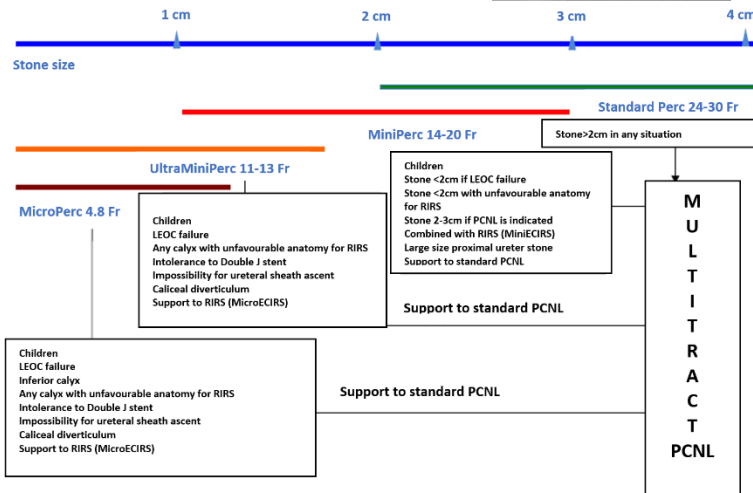
Puncture should be performed if possible in the centre of the calyx (in avascular zone called Brodel space, between the anterior and posterior divisions of the renal artery). Skin incision should be sufficient. It is important to memorize the axis of dilation to avoid progressive axis change during these maneuvers. After observing methylene blue leak, a stiff guidewire is passed to the calyx down to ureter if possible

DILATION WITH SEQUENTIAL DILATORS

It has the advantage that it can be performed even when the stone forms a mould at the bottom of the calyx. sequential dilators must be pushed by giving them a slight rotation effect. Subsequently, the amplatz sheath is placed under fluoroscopy control

HIGH PRESSURE BALLOON DILATION

The shape of balloon makes dilation more delicate if the stone forms a mould in the bottom of calyx. The amplatz sheath should be placed on the rod proximally before dilation. After placement, the assistant must hold the balloon during inflation with diluted contrast to prevent it from moving. The amplatz sheath is then placed under fluoroscopic control.



STONE FRAGMENTATION

Image modified from J.H. Amón Sesmero, M. Cepeda Delgado, B. de la Cruz Martín, et al. Nefrolitotomía percutánea de calibre reducido (NLP-CR). Algoritmo de decisión terapéutica. Actas Urol Esp. 2017;41(9):552---561

PNEUMATIC

It projects fragments into all cavities. It is effective in the treatment of the hard stones. Tangential percussion, which dislodges stones should be avoided.

ULTRASONIC

Best device for intrarenal work. A portion of the fragments is aspirated directly. Very effective for stones considered friable, such as struvite stones.

HOLMIUM LASER

An alternative solution that allows the fragmentation of most stones whatever their composition. The rules for using the laser are very similar to those of the pneumatic lithotripter.

TUBELESS?

Nephrostomy tube:
 Classically 20-22Ch. Drains cavities and ensure hemostasis. Currently, the tendency is to reduce the caliber or not to leave it.
Ureteral stent:
 It can be removed immediately or the day after surgery.
Bladder catheter:
 In some cases, it is removed after removal of nephrostomy.