Supine And Modified Lithotomy Position
For Simultaneous Antegrade And Retrograde
Endourological Access

GASPAR IBARLUZEA, M.D., MIKEL GAMARRA, M.D., JOSE ANTONIO GALLEGO, M.D.,
ANDER ASTOBIETA, M.D., JOSE GREGORIO PEREIRA, M.D., ASIER LEIBAR, M.D.,

Urología Clínica Bilbao.
Bizkaia. Basque Country (Spain)

ABSTRACT

Occasionally the simultaneous antegrade and retrograde access to the urinary tract is necessary to solve both renal and ureteral pathologies. This report details step by step the surgical technique used in our department during the last ten years for the treatment of percutaneous nephrostomies, percutaneous renal surgery and complex ureteroscopies. Key points include positioning the patient supine with an air bag underneath the operating flank combined with a modified lithotomy position, and the ultrasound-directed percutaneous puncture that allows better control of structures located between the skin and the kidney. The most complex endourological procedures can be performed in a safe, comfortable and easy way by skill team of endourologists.

INTRODUCTION

In 1987, Gabriel Valdivia, M.D., from the Department of Urology, Hospital Clínico Universitario, Zaragoza, Aragón (Spain) described a percutaneous nephrolithotomy technique in the supine position with a 3 litres serum bag below the ipsilateral flank.1-3

Ten years later he presented 557 consecutive percutaneous nephroscopies performed in this way. He demonstrated the surgical and anaesthetic advantages of the procedure with no increase in risk for the patient.4 (Fig.1)

Surprisingly, few authors have subsequently published articles about their experiences with the adoption of this position.5-6

Surgical skills and technological improvements have allowed complex urological procedures to take place thanks to the simultaneous use of percutaneous renal surgery and ureteroscopy (URS). Different working groups have described various modifications of this procedures, all of them based on the prone position.7-12

Here we will describe the position we have been using for the last ten years to perform complex endourological procedures, a position that we not only consider safer for the patient, easier for the anaesthetist and more comfortable for the urologist, but also allows a simultaneous percutaneous and transurethral access to the whole urinary tract.

This position is Valdivia supine combined with a modified lithotomy one.

OPERATIVE TECHNIQUE

General measures

Two urologists and a theatre nurse are enough for the most complicated procedures.

The standard conditions for the practice of percutaneous surgery and ureterorenoscopy are applied.

The procedure is usually done under general anaesthesia.
Patient Positioning

The patient is placed in the supine position.
The following landmarks for the percutaneous puncture are drawn on the skin:
- Posterior axillary line
- Iliac crest
- Last rib

A 3 litres irrigation bag full of air is placed underneath the operating flank and clamped with a Köcher forceps. This allows the bag to be deflated until we are pleased with the position.

The legs on the stirrups with the ipsilateral leg extended and the contralateral one well abducted.

The ipsilateral arm lies crossed over the chest.
(Fig. 2-3-4)

Percutaneous puncture:

Once the patient has been positioned, we explore by ultrasounds the area within the reference lines in order to identify the puncture direction. (Fig. 5)

The puncture is always made as close as possible to the posterior axillary line without overpassing it ventrally. The tract goes within the horizontal plane slightly up, this may disorientate those who have been using the prone position for years. (Fig. 6)

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Percutaneous renal access is achieved using an 18 gauge needle through which a 0.038-inch guidewire is passed.

The ultrasound-guided puncture is performed “free-hand”, guided by the ultrasonic bundle. This allows us to move the needle in the desired direction and angle, which is
not always possible when ultrasound puncture devices are used. (Fig. 7)

The performance of the puncture under fluoroscopy guidance is also possible if contrast material is injected to visualise the renal cavities and the rest of the steps of the technique are followed. (Fig. 8-9)

We routinely use only lower renal pole access and in practically all cases it is possible to complete the procedure with just one percutaneous renal access.

**Tract dilatation:**

The percutaneous tract is dilated with a high pressure balloon.

When smaller sheaths are to be used we use the Amplatz set of dilators.

**Percutaneous nephroscopy:**

Normally rigid 19F nephroscopes are used joined to 24 to 30F Amplatz sheath that allow us to work with low intrarenal pressure.

An irrigation fluid pump is used, especially when flexible nephroscopes are involved, thus allowing good vision and washing of fragments in intracorporeal lithotripsy.

**Transurethral access:**

At the same time this procedure is being performed, it is possible for another urologist to work through the transurethral tract. (Fig. 10)

This opens a wide range of possibilities:

Retrograde instillation of saline and contrast material to facilitate the percutaneous puncture.

Retrograde passage of an ureteral catheter or balloon occlusion catheter to prevent stone fragment migration.
Placement of a 14 F ureteral access sheath that expedites through and through wire placement and providing a whole access to the urinary tract. (Fig. 11)

Use of ureteroscope to simultaneously treat ureteral pathology, with the use of different intracorporeal lithotripsy techniques. (Fig. 12)

To help with the clearance of the superior calyx from staghorn calculi by using pneumatic lithotripsy with the rigid ureteroscope, and offering the fragments to the nephroscope for their extraction by the Amplatz. (Fig. 13)

Usage of flexible ureteroscope to access calices which are impossible for the nephroscope to reach, residual fragments being treated by Holmium laser lithotripsy, or extracted with nitinol basket Zerotip. (Fig. 14)

**FIG. 11:** The safest setup for the practice of endourology is to have a guide exiting from both the skin and the urethra. This technique is especially useful in the treatment of complex renal lithiasis through just one percutaneous access point through the lower calix.

**FIG. 12:** Treatment of complex renoureteral lithiasis. Transurethral rigid instruments can be used for upper pole lithotripsy after the resolution of ureteral calculi.

**FIG. 13:** Taking advantage of the Amplatz sheath to evacuate fragments by the fastest and easiest route.

**FIG. 14:** With flexible instrumentation and Holium laser, access to all parts of the urinary tract is possible. The Amplatz and urethral access sheaths allow us to work at low pressures. Irrigation fluid pumps must be used to stretch the urinary tract, improve vision and wash of fragments.

**SURGICAL EQUIPMENT**

Conventional operating room
Radiolucent table
C-arm fluoroscopy unit
Ultrasound
Two endoscopic equipments or at least two light sources
The standard instruments used for percutaneous nephrolithotomy and transurethral ureteroscopy
Flexible endoscopes and Holmium laser are required for complex procedures
ROLE IN UROLOGICAL PRACTICE

We have described the position we have been using during the past ten years for the treatment of complex endourological procedures.\textsuperscript{13} (Fig. 15)

The Lithotripsy unit of Galdakao Hospital covers an area of two million inhabitants.

An average of 1000 patients are treated annually. Approximately 1200 SWL sessions, 100 percutaneous nephrostomies and 80 transurethral URS are performed. We also carry out 30 PNL each year, most of them on complex renal lithiasis.

Endourology has been practiced in the unit since 1985, the Valdivia position having been adopted in 1993.

Since then, we have gradually modified the technique until adopted the one that allow us the percutaneous and transurethral access to the whole urinary tract.

Complications

We have not found disadvantages or increase in risks due to this position, in fact, we have minimised them.

Looking at intestinal injuries we must say that after 1083 consecutives percutaneous drainage nephrostomies carried out supine over the last ten years not a single colon injury has been produced. In 339 consecutives percutaneous renal surgeries performed in supine, and most of them combined with the modified lithotomy position described, we have had no problems related to the position.

Indications

Based on our experience over the past ten years we highly recommend the use of this position for the following reasons:

1. It represents the position of maximum safety for endourological procedures.
2. It permits simultaneous percutaneous and transurethral access to the whole urinary tract for both rigid and flexible instruments.
3. Treatment of complex renal lithiasis through just one percutaneous access.
4. Treatment of renal and ureteral calculi in one surgical act.
5. Complex URS which may require unload nephrostomies or reconversion to percutaneous surgery can be performed.
6. Proven safety in endopyelotomy and endourological surgery in the urothelial carcinomas of the upper urinary tract.\textsuperscript{14}
7. Highly recommended for the treatment of stenosis of the ureterointestinal anastomosis or of the ureter that requires the combined action.\textsuperscript{15-17}
CONCLUSIONS

The supine position with an air bag underneath the operating flank combined with the modified lithotomy is a safe and comfortable position which allows simultaneous percutaneous and transurethral access.

It offers obvious advantages from the point of view of the comfort of the patient and anaesthetic management.

Complex renal and ureteral calculi can be solved with a single percutaneous access in a single surgical intervention.

Current technological developments with this surgical procedure permit access to the whole urinary tract announcing a promising future for percutaneous renal surgery and for endourology in general.

REFERENCES


Address reprint requests to:
Gaspar Ibarluzea, M.D.
Urología Clínica
Clinica Virgen Blanca
C/ Maestro Mendiri, 2
48006 Bilbao - Biscaya
Basque Country (Spain)
www.urologiaclinicabilbao.com
e-mail: gibarluzea@urologiaclinica.biz