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

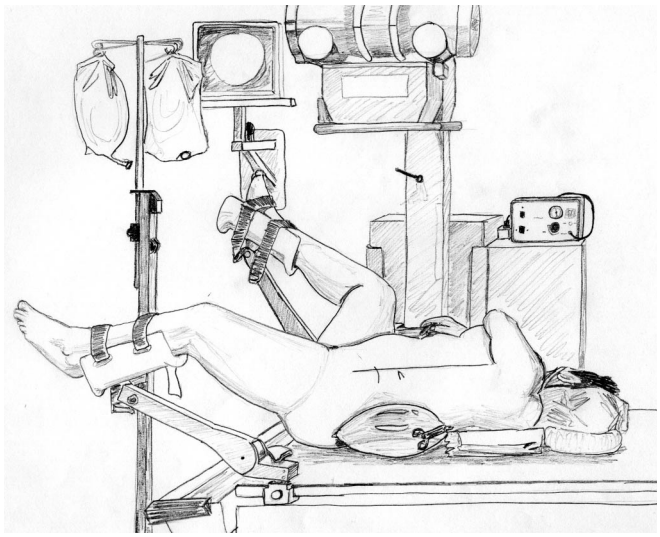

FIG. 2: Galdakao position.
For the resolution of complex endourological procedures, we have gradually adopted a new position which allows simultaneous transurethral access.
The ipsilateral leg extended and the contralateral one well abducted.

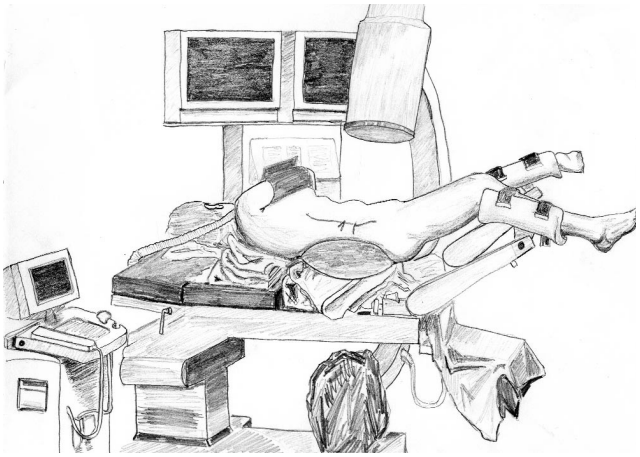

FIG. 3: A conventional operating room with a radiolucent table and a C-arm fluoroscopy unit is the ideal place for the practice of this procedure.
It is advisable to draw the reference lines on the skin before positioning the air bag.

FIG. 4: The objective is that two urologists may work simultaneously.
Two endoscopic equipments or at least two light sources are required.

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)

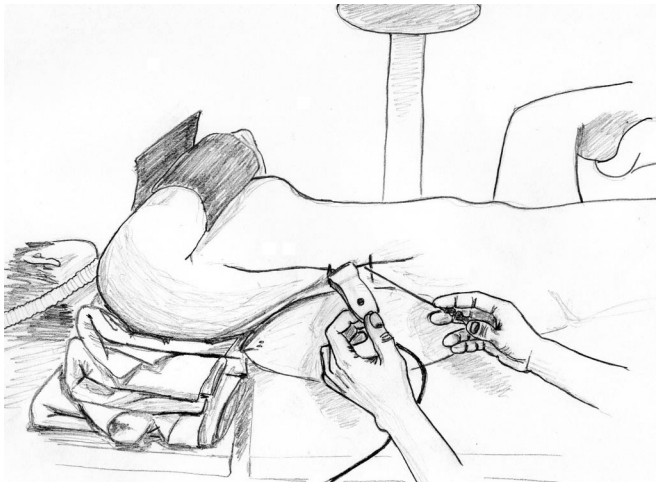

FIG. 5: The percutaneous puncture must be made as close as possible to the posterior axillary line without overpassing it ventrally.
The direction of the needle rises slightly up as we look at it horizontally and is directed in search of the desired calix, normally the lower one.

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)

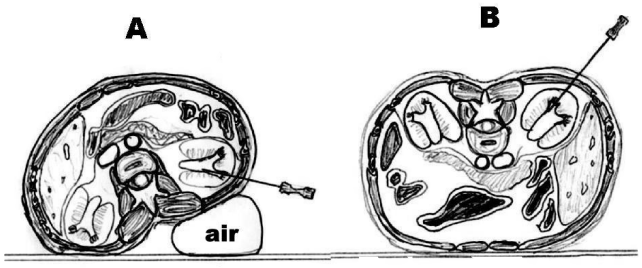

FIG. 6: A. In Valdiva position the direction of the needle rises slightly up which may surprise us at first, when we change from the prone position to the supine.
B. In the prone position the needle has an inclination of 45° with respect to the horizontal plane.

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)

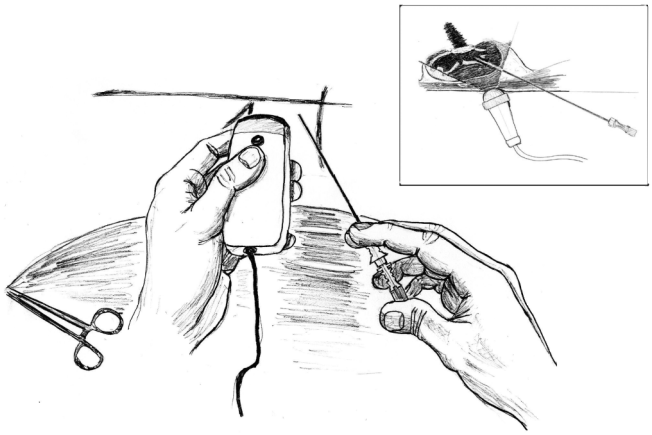

FIG. 7: The "freehand" ecoguided percutaneous puncture allows us to direct the needle at the most appropriate angle. The trick is to go after the ultrasonic beam with the needle.
It is the safest procedure since it permits the control of the structures located between the skin and the kidney.

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)

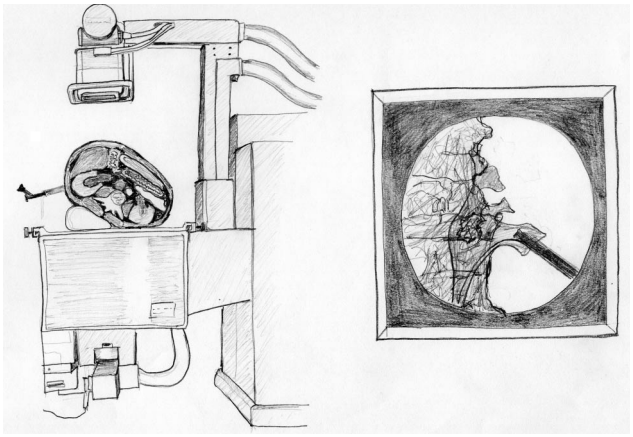

FIG. 8: Fluoroscopic tables from the 1980's, used especifically for endourology, present problems for this technique.
The patient can only be reached from one side and the x-ray projection is anteroposterior only, with which the kidney is on top of the backbone, difficulting the vision.

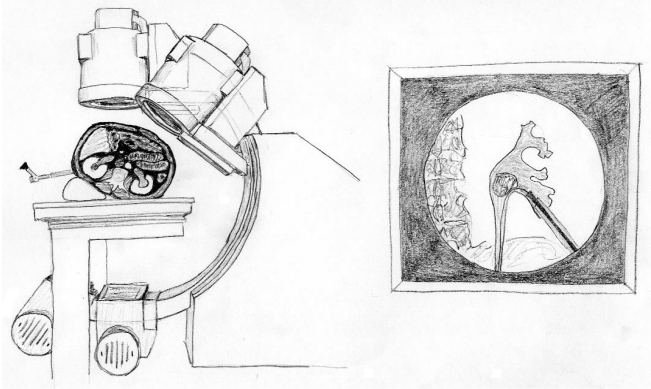

FIG. 9: The C-arm fluoroscopy unit permits anteroposterior projection of the abdomen, with which a perfect position is achieved.
The majority of modern extracorporeal shock wave lithotripsy tables come fitted with C-arm fluoroscopy units, which thus allow the most complex endourological procedures.

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)

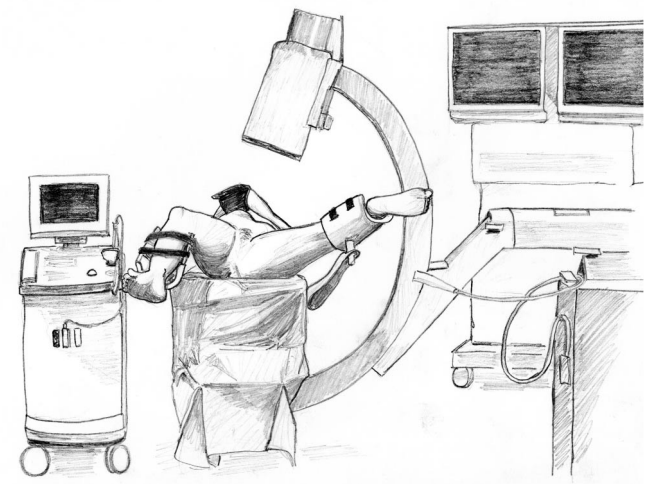

FIG. 10: Vision of the patient in the Galdakao position, seen from the transurethral access point. Clearly useful in ureteroscopies in which the need for a nephrostomy or a reconversion to percutaneous renal surgery is foreseen.

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)

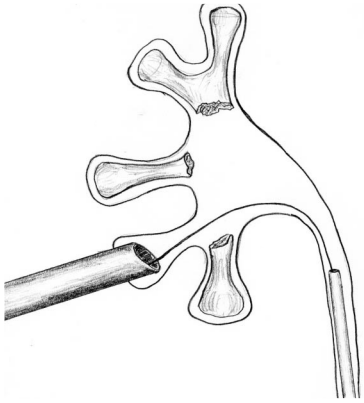

FIG. 11: The safest setup for the practice of endourology is to have a guide exiting from both the skin and the urethra.
This technique is especially useful in the treatment of complex renal lithiasis through just one percutaneous access point through the lower calix.

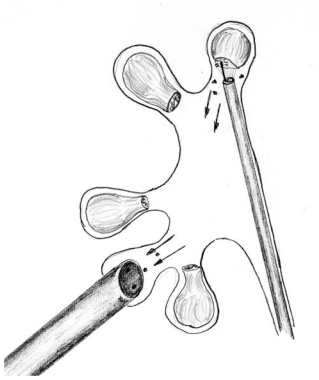

FIG. 12: Treatment of complex renoureteral lithiasis. Transurethral rigid instruments can be used for upper pole lithotripsy after the resolution of ureteral calculi.

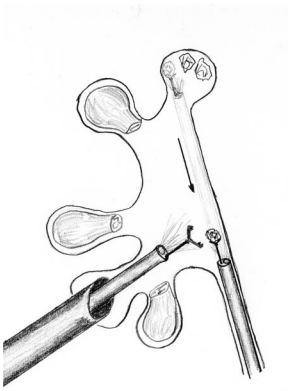

FIG. 13: Taking advantage of the Amplatz sheath to evacuate fragments by the fastest and easiest route.

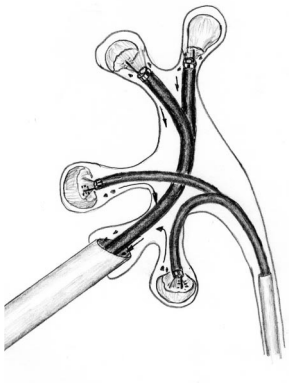

FIG. 14: With flexible instrumentation and Holium laser, access to all parts of the urinary tract is possible. The Amplatz and urethral access sheaths allow us to work at low pressures.
Irrigation fluid pumps must be used to stretch the urinary tract, improve vision and wash of fragments.

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.[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.

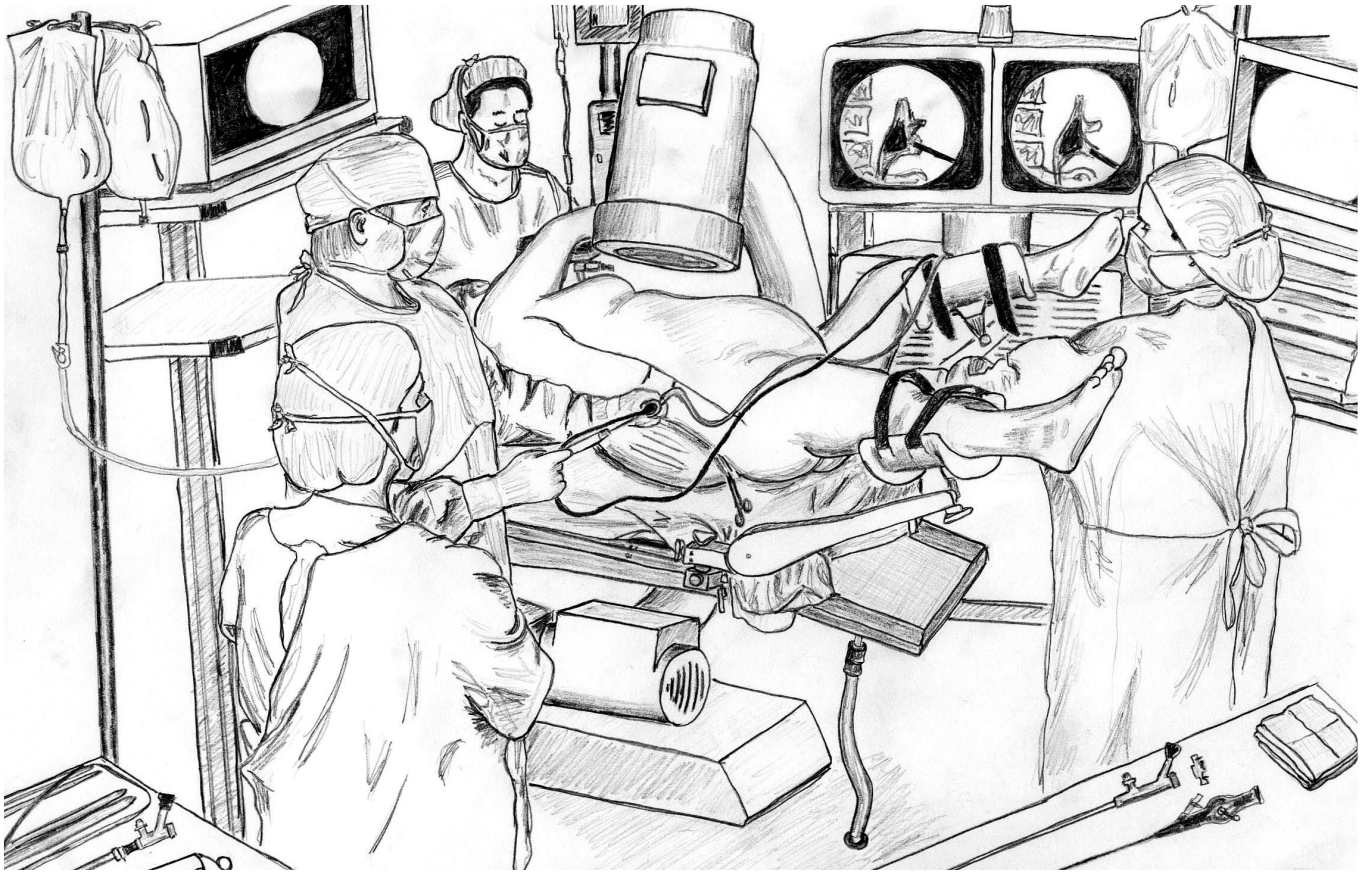

FIG. 15: General perspective of a complex endourological intervention.
1. The anaesthetist at the head of the patient is the one who is going to appreciate the position.
2. A nurse with two operative tables for PNL and URS.
3. Two urologists working simultaneously through both tracts with two separate endoscopic equipments.

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.[14]
7. Highly recommended for the treatment of stenosis of the ureterointestinal anastomosis or of the ureter that requires the combined action.[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.

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