Actas Urol Esp. 2017;41(9):552–561

Actas Urológicas Españolas

www.elsevier.es/actasuro

REVIEW ARTICLE

# Small-caliber percutaneous nephrolithotomy (SC-PCNL). Therapeutic decision algorithm☆

J.H. Amón Sesmero[a,*], M. Cepeda Delgado[a], B. de la Cruz Martín[a], J.A. Mainez Rodriguez[a], D. Alonso Fernández[a], V. Rodriguez Tesedo[a], D.A. Martín Way[b], J. Gutiérrez Aceves[c]

[a] *Servicio de Urología, Hospital Universitario Río Hortega, Valladolid, Spain*
[b] *Servicio de Urología, Hospital Universitario Virgen de la Nieves, Granada, Spain*
[c] *Department of Urology, Wake Forest Baptist Medical Center, Winston Salem, NC, USA*

Received 23 August 2016; accepted 21 November 2016
Available online 5 September 2017

**KEYWORDS**
Percutaneous nephrolithotomy;
Minipercutaneous;
Micropercutaneous

**Abstract**
*Introduction:* The progressive reduction in the caliber of the tract in percutaneous kidney surgery to the point of miniaturization has expanded its use to smaller stones that until now have been treated with extracorporeal shock wave lithotripsy (ESWL) and retrograde intrarenal surgery (RIRS).
*Objective:* To provide an update on the various techniques of small-caliber nephrolithotomy (SC-PCNL) analyze their efficacy, safety and indications and determine their degree of implantation at this time.
*Material and methods:* We performed a review in PubMed of Spanish and English medical literature on the various techniques of SC-PCNL.
*Results:* The use of SC-PCNL has reduced the morbidity associated with standard PCNL, particularly bleeding, and has enabled tubeless nephrolithotomy with greater safety. There are various techniques with blurred terminology (Miniperc, Microperc, Mini-microperc, Ultraminiperc), which differ in terms of gauge employed and in certain technical aspects that require their indications be specified. Currently, SC-PCNL competes with techniques that are less invasive than standard PCNL such as ESWL and the RIRS in treating small stones, but the role of SC-PCNL is still not sufficiently understood and continues to be the subject of debate.
*Conclusions:* The indications for PCNL are expanding to small stone sizes due to the miniaturization of the technique. PCNL competes in this field with ESWL and RIRS. Larder studies are needed to establish the specific indications for PCNL in treating nephrolithiasis.


☆ Please cite this article as: Amón Sesmero JH, Cepeda Delgado M, de la Cruz Martín B, Mainez Rodriguez JA, Alonso Fernández D, Rodriguez Tesedo V, et al. Nefrolitectomía percutánea de calibre reducido (NLP-CR). Algoritmo de decisión terapéutica. Actas Urol Esp. 2017;41:552–561.

* Corresponding author.
*E-mail address:* amonsesmero@gmail.com (J.H. Amón Sesmero).

2173-5786/

**PALABRAS CLAVE**
Nefrolitectomía percutánea;
Minipercutánea;
Micropercutánea

## Nefrolitectomía percutánea de calibre reducido (NLP-CR). Algoritmo de decisión terapéutica

### Resumen

*Introducción:* La progresiva reducción del calibre del tracto en cirugía percutánea renal, hasta alcanzar la miniaturización, ha expandido su utilización a litiasis de menor tamaño que hasta ahora se trataban mediante litotricia extracorpórea por ondas de choque (LEOCH) y cirugía retrógrada intrarrenal (CRIR).

*Objetivo:* Realizar una puesta al día de las diferentes técnicas de nefrolitectomía de calibre reducido (NLP-CR) analizando su eficacia, seguridad e indicaciones, así como su grado de implantación en la actualidad.

*Material y métodos:* Realizamos una revisión en PubMed de la literatura en castellano e inglés sobre las diferentes técnicas de NLP-CR.

*Resultados:* La NLP-CR ha disminuido la morbilidad asociada a la NLP estándar, particularmente el sangrado, y ha posibilitado la nefrolitectomía *tubeless* con mayor seguridad. Existen diferentes técnicas con confusa terminología (miniperc, microperc, mini-microperc, ultraminiperc) que se diferencian en el calibre que emplean y en determinados aspectos técnicos que hacen que sus indicaciones deban ser precisadas. Actualmente, la NLPCR compite con técnicas menos invasoras que la NLP estándar, como la LEOCH y la CRIR en el tratamiento de las litiasis de pequeño tamaño, pero todavía su papel no está suficientemente esclarecido y es aún motivo de debate.

*Conclusiones:* Las indicaciones de la NLP se están expandiendo a tamaños litiásicos más pequeños debido a la miniaturización de la técnica, compitiendo en este campo con LEOCH y CRIR. Precisamos mayores estudios para establecer sus indicaciones precisas en el tratamiento de la litiasis renal.



## Introduction

Percutaneous nephrolithotomy (PCNL) is currently considered the standard treatment for renal calculi larger than 2 cm[1,2] but also for lithiases of 1–2 cm located in the renal lower pole with unfavorable factors for extracorporeal shock wave lithotripsy (ESWL), as recommended by the European guidelines on urolithiasis.[3] Since its initial description by Fernström,[4] PCNL has undergone significant changes in various aspects that have increased its efficacy and safety. Different patient positions have been described in the literature,[5–7] as well as new energies of fragmentation have emerged,[8] different ways of dilating the tract[9] and various calibers have been arisen. All those different approaches to treat PCNL have had a varying degree of acceptance among the urological community. The reduction of the caliber of the tract has had a great importance in percutaneous kidney surgery for the possibility of reducing complications inherent to dilatation. In addition to this, it is possible to reduce nephrostomy tube caliber or prevent it, and consequently improve the postoperative comfort of the patient.[8]

In 1998, Jackman[10] described a mini-percutaneous nephrolithotomy (m-PCNL) procedure in order to adapt the technique used in adults to the anatomy of the child. Subsequently, the m-PCNL technique was used successfully in adults.[11–13] Later on, advances in endoscopic technology and energy-based fragmentation have brought along substantial reductions in caliber, namely, 'microperc',[14] 'mini-microperc'[15] and 'ultra-miniperc',[16] which have miniaturized percutaneous nephrolithotomy and have expanded the role of PCNL in the treatment of lithiasis.

At present, m-PCNL competes with techniques that are less invasive than standard PCNL, such as ESWL and retrograde intrarenal surgery (RIRS) in treating small stones. However, the role of m-PCNL is still not sufficiently understood and continues to be a subject of debate.

Our objective is to evaluate the scientific evidence that would answer the following questions: 1) is the reduction of the tract beneficial? 2) what calibers are currently in use in PCNL?; and 3) in which cases are the use of calibers recommended?

## Evidence acquisition

A literature review was performed using the PubMed database between 1975 and 2016 that included keywords from the Medical Subject Headings: percutaneous nephrolithotomy, minipercutaneous nephrolithotomy, ultraminipercutaneous nephrolithotomy and micropercutaneous nephrolithotomy. A total of 6199 articles were found, of which 250 were selected from studies of both experimental animals and humans, conducted in adults and pediatric, and published in English. Of these, 93 articles were selected that analyzed the different calibers used in the percutaneous renal surgery for the treatment of renal calculi. We examined the results and complications of those studies to determine the most optimal indications for percutaneous renal surgery depending on the factors that define successes and side effects reactions.