



ORIGINAL ARTICLE

Super-mini percutaneous nephrolithotomy for renal stone smaller than 25 mm in pediatric patients: Could it be an alternative to shockwave lithotripsy?☆

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KEYWORDS

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Abstract

Aim: To evaluate the efficacy of 2 different techniques: shock wave lithotripsy (SWL) vs. super-mini percutaneous nephrolithotomy (SMP), in terms of success as well as complication rates in pediatric renal stones sizing <25 mm.

Patients and methods: A total of 219 children (aging between 1 and 17 years) undergoing 2 different treatment modalities (SWL vs. SMP) for kidney stones <25 mm were included. Depending on the type of the procedure applied, children were divided into 2 different groups: group 1 ($n=108$), children treated with SWL, and group 2 ($n=111$), children treated with SMP. All treatment related parameters (stone free rates, number of sessions, treatment duration, hospitalization, presence of the residual fragments, complications as well as the need for additional interventions) were noted and evaluated between 2 groups in a comparative manner.

Results: Evaluation of our data has clearly demonstrated that the percentage of residual fragments after SWL was significantly higher when compared with SMP. Although SWL required several sessions under general anesthesia in a certain per cent of the cases (54.6%), SMP was successful in one session in all of the cases. Last but not least, in addition to the similar minor complication rates observed in both group of cases, no major complication observed in any case and no case in both groups again required blood transfusion after these 2 procedures with no significant drop rates in hemoglobin levels.

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PALABRAS CLAVE

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Conclusions: Although SWL is still the preferred treatment modality for the majority of kidney stones in children due to its safe and non-invasive nature, SMP modality may be applied as a valuable alternative in this specific patient population for its excellent stone free rates obtained in a single session and acceptable complication rates in the minimal invasive management of stones <25 mm.

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Supermini nefrolitotomía percutánea para cálculos renales menores de 25 mm en pacientes pediátricos: ¿podría ser una alternativa a la litotricia por ondas de choque

Resumen

Objetivo: Evaluar la eficacia de 2 técnicas diferentes, la litotricia por ondas de choque (LOC) frente a la supermini nefrolitotomía percutánea (SMP), en términos de éxito y tasas de complicaciones en cálculos renales pediátricos de tamaño < 25 mm.

Pacientes y métodos: Se incluyeron un total de 219 niños (edades comprendidas entre uno y 17 años) sometidos a 2 modalidades de tratamiento diferentes (LOC vs. SMP) para cálculos renales < 25 mm. Dependiendo del tipo de procedimiento aplicado, los niños se dividieron en 2 grupos diferentes: grupo 1 (n=108), formado por niños tratados con LOC, y grupo 2 (n=111), integrado por niños tratados con SMP. Todos los parámetros relacionados con el tratamiento (tasas libres de cálculos, número de sesiones, duración del tratamiento, hospitalización, presencia de fragmentos residuales, complicaciones así como la necesidad de intervenciones adicionales) se observaron y evaluaron entre 2 grupos de forma comparativa.

Resultados: La evaluación de nuestros datos ha demostrado claramente que el porcentaje de fragmentos residuales fue significativamente mayor en los casos sometidos a procedimiento de LOC en comparación con SMP. Aunque LOC requirió varias sesiones bajo anestesia general en un cierto porcentaje de los casos (54,6%), SMP tuvo éxito en una sesión en todos los casos. Por último, pero no por ello menos importante, además de las tasas de complicaciones menores similares observadas en ambos grupos de casos, no se observó ninguna complicación grave y ningún caso requirió transfusión de sangre después de estos 2 procedimientos, sin tasas significativas de descenso en los niveles de hemoglobina.

Conclusiones: Aunque la LOC sigue siendo la modalidad de tratamiento preferida para la mayoría de los cálculos renales en niños por su naturaleza segura y no invasiva, la modalidad de SMP puede aplicarse como una alternativa valiosa en esta población específica de pacientes por sus excelentes tasas de ausencia de cálculos obtenidas en una sesión única y tasas de complicaciones aceptables en el manejo invasivo mínimo de cálculos < 25 mm.

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Introduction

Of the human population, 5–10% have stone disease during their lifetime, and of these cases only 2–3% are children.^{1,2} The incidence of the pathology has proved to show marked epidemiological variations between developed and developing countries, with a prevalence of 1–5% and 5–15%, respectively.³ Although the disease has been reported to be particularly rare in some countries, such as Scandinavia, it is still an endemic problem in countries such as Turkey, Iran, Pakistan and the Far East with reported high recurrence rates due to urinary tract infections, metabolic, and anatomical abnormalities.^{1–3}

Concerning the stone management in children, extracorporeal shock wave lithotripsy (SWL) has been commonly used in these patients following the first successful results reported by Newman et al. in 1986.^{4,5} Although this modality has not yet been approved by the Food and Drug Administration (FDA) in children, there are enough well

conducted studies demonstrating its effectiveness in this specific population.^{6–12} Currently, SWL is being applied not only in older children but also in infants in a safe and practical manner where the majority of renal stones up to 20 mm could be treated with considerably higher stone free rate (SFR).^{13,14}

On the other hand, as a result of the experience obtained in adult population, physicians began to apply percutaneous nephrolithotomy (PNL) also in children with meaningfully higher stone free rates in one session. However, despite the high efficiency in stone clearance even for larger stones, possible long-term renal damage due to the well-known serious complications particularly on the small size of the child kidney constituted the major concerns arising by the responsible physicians.¹⁵ The majority of the complications have been observed during the puncture of the kidney and the size of the nephrostomy tract was regarded as the major factor for PNL morbidity in these cases. Regarding this issue, as a result of the technological advancements in

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