

Renal biopsies in special situations

R. Peces¹, E. de Sousa¹, C. Peces²

¹ Nephrology Department. La Paz University Hospital, IdiPaz, Madrid, Spain

² Information Technology Department. SESCAM, Toledo, Spain

Nefrología 2011;31(6):627-9

doi:10.3265/Nefrologia.pre2011.Jun.10925

Renal biopsies are immensely valuable tools for the diagnosis, prognosis, and treatment of kidney disease patients. The first mention of a percutaneous renal biopsy is from 1950, and was published by the Cuban doctor Antonio Pérez Ara in a local journal.¹ In Spain, the first communications of renal biopsies date from 1958. Since then, this practice has been extended to many hospitals in Spain and all over the world.¹ A cost-benefit analysis of renal biopsies yields very positive results since this procedure allows the identification of a wide range of renal anomalies. Among the situations for which renal biopsies provide particular advantages are renal diseases of unknown origin, glomerular proteinuria and haematuria, urine sediment abnormalities, interstitial diseases, and transplant-related pathologies. However, it is an invasive examination procedure, and should only be indicated on an individual basis, depending on the patient characteristics and after careful consideration of the risks and benefits for each particular case.² Apparently simple renal diseases can sometimes turn to be complex situations in which several diseases can be associated. This is the case in autosomal dominant polycystic kidney disease (ADPKD), which is associated with a nephrotic syndrome. Only a histological study is capable of determining the presence of apparently pathogenic glomerular damage independent of the primary process, which corresponds to degenerative cystic changes in the renal parenchyma.³

Percutaneous renal biopsies are well established as a safe and effective technique for obtaining samples of renal parenchyma.^{4,5} With the appearance of new technologies, such as the use of real-time ultrasonography (US) for guiding the procedure and the use of automatic biopsy needles, the success rate has improved to 95% of cases.⁵ US allows for localising the lower pole of kidney, determining the size of the kidney, and detecting the presence of large cysts that may require the use of the contralateral kidney. Computerised tomography (CT)-

guided percutaneous renal biopsy is an alternative when the kidneys cannot be properly visualised, such as in the case of obesity or small and echogenic kidneys. Complications, although rare, are associated with haemorrhages in the majority of cases. However, absolute and relative contraindications for the percutaneous approach do exist: single kidney, uncontrolled arterial hypertension, haemostasis disorders, aneurysms in the renal artery, Jehovah's witnesses, failed percutaneous needle biopsy, morbid obesity, and non-compliant patients. Recently, the results from a study of 867 US-guided renal biopsies in native kidneys over 18 years were published, with one retrospective group of 797 biopsies and a prospective group of 70 biopsies performed over the course of one year.⁶ This study reported a rate of major complications of 1.4%, and 2% for minor complications. The most common major complications were related to patients with a predisposition to bleeding and those with hepatopathies.⁶ The cumulative experience gained in recent decades has demonstrated that percutaneous renal biopsy is a safe technique in the majority of cases, except in obese patients, which constitute an increasing percentage of the population in developed countries. Obese patients are at a greater risk for complications such as haemorrhage, failure of the technique, severe respiratory difficulties, and poor visualisation of the kidneys due to large body mass.⁷ Alternative methods have been attempted for obtaining samples of kidney tissue samples in patients with contraindications for the percutaneous approach. In these situations, an open renal biopsy through a posterior or flank (lumbotomy) incision is a viable option. Since multiple bilateral renal cysts are a relative contraindication for the percutaneous approach due to the risk of complications and the difficulty in obtaining adequate tissue samples, the majority of patients with ADPKD are eligible for the open approach.⁸⁻¹⁰ Only isolated references exist of renal cysts in the medical literature, with no studies or clinical trials published on the subject. Only a few cases of ADPKD have undergone US- or CT-guided biopsies without complications.¹¹ The experience with this technique is very limited, hindering its regular use as a safe option.

Correspondence: Ramón Peces

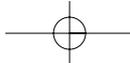
Servicio de Nefrología.

Hospital Universitario La Paz, IdiPaz, Madrid. Spain.

cpeces@varnetmail.com

Although open or surgical renal biopsies have been performed for over 40 years as a standard procedure in patients





with contraindications for the percutaneous approach, there are other less invasive alternatives.^{4,12-16} Transvenous biopsies use native vessels as an alternative route for arriving at the organ in question. The tissue sample is obtained by passing a needle through the wall of the vein into the adjacent parenchyma.¹²⁻¹⁵ The most common indications for performing a transjugular renal biopsy are patients with haemostasis disorders and those under anticoagulant treatment, in whom a histological diagnosis is necessary for determining the proper course of treatment.¹⁷ The theoretical advantages are that bleeding occurs within the interior of the vein, the needle avoids the larger vessels of the organ instead of being directed towards them, and there is a reduced probability of capsular perforation. The disadvantages include a small tissue sample size (which in turn reduces the possibility of obtaining a histological diagnosis) and the limited availability of this technique due to the absence of sufficiently trained medical personnel. The transjugular approach (as well as the femoral one) is a procedure that cannot be considered a routine approach due to limitations in infrastructure, personnel, costs, and time.^{15,17} The transurethral approach is little more than an anecdotal alternative.¹⁶ Laparoscopic renal biopsies can be performed using a retroperitoneal (retroperitoneoscopy)¹⁸⁻²⁰ or transperitoneal²¹ approach. These biopsy methods provide advantages, as they allow for identification of the kidney,

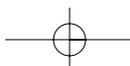
and the biopsy and haemostasis can be performed under direct visualisation. Additionally, the retroperitoneal laparoscopic approach is minimally invasive, with very short patient recovery and convalescence times in the majority of cases.^{18,20,22} Furthermore, it can be performed as an outpatient procedure in most cases. For these reasons, the retroperitoneal laparoscopic approach has gained popularity in Spain and the rest of the world, and is indicated in paediatric cases.^{23,24} The retroperitoneoscopy or transperitoneal renal biopsy is in fact the currently recommended procedure for paediatric cases.²⁵ Recently, a technique has been proposed that combines the laparoscopic approach with a percutaneous needle biopsy.²⁶ This approach combines the advantages of the percutaneous biopsy with the minimal trauma and low morbidity associated with laparoscopic procedures. Although laparoscopic surgery is highly effective and is associated with high success rates and minimal morbidity in the treatment of cystic kidney diseases,²⁷ a literature review only found a few publications of patients with multiple bilateral renal cysts that had undergone a laparoscopic renal biopsy. In conclusion, the laparoscopic approach offers a good cost-benefit ratio for complex cases that require a renal biopsy. Using this technique, direct access to the organ allows for a direct selection of the tissue to be taken for biopsy as well as protection against damage to surrounding structures during the procedure, thus ensuring haemostasis.

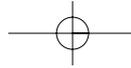
KEY CONCEPTS

1. There are several absolute and relative contraindications for percutaneous renal biopsies, such as single kidney, uncontrolled arterial hypertension, haemostasis disorders, aneurysms in the renal artery, Jehovah's witnesses, failed percutaneous needle biopsy, morbid obesity, and non-compliant patients.
2. In complex situations requiring a renal biopsy (e.g., kidneys with multiple cysts), the laparoscopic approach allows for allows for a direct selection of the tissue to be taken for biopsy as well as protection against damage to surrounding structures during the procedure, thus ensuring haemostasis.
3. Renal biopsies using the retroperitoneoscopy technique are the current procedure of choice in paediatric patients.

REFERENCES

1. García Nieto V, Luis Yanes MI, Ruiz Pons M. En el cincuentenario de las primeras biopsias renales percutáneas realizadas en España. *Nefrología* 2009;29:71-6.
2. Rivera Gorrin M. Ultrasound-guided renal biopsy. *Nefrología* 2010;30:490-2.
3. Peces R, Martínez-Ara J, Peces C, Picazo M, Cuesta-López E, Vega C, et al. Nephrotic syndrome and idiopathic membranous nephropathy associated with autosomal-dominant polycystic kidney disease. *The Scientific World Journal* 2011;11:1041-7.
4. Jackman SV, Bishoff JT. Laparoscopic retroperitoneal renal biopsy. *J Endourol* 2000;14:833-8.
5. Whittier WL, Korbet SM. Renal biopsy: update. *Curr Opin Nephrol Hypertens* 2004;13:661-5.
6. Toledo K, Pérez MJ, Espinoza M, Gómez J, López M, Redondo D, et al. Complications associated with percutaneous renal biopsy in Spain, 50 years later. *Nefrología* 2010;30:490-2.
7. Gesualdo L, Cormio L, Stallone G, Infante B, Di Palma AM. Percutaneous ultrasound-guided renal biopsy in supine antero-lateral position: A new approach for obese and non-obese patients. *Nephrol*





- Dial Transplant 2008;23:971-6.
8. Contreras G, Mercado A, Pardo V, Vaamonde CA. Nephrotic syndrome in autosomal dominant polycystic kidney disease. *J Am Soc Nephrol* 1995;6:1354-9.
 9. Hiura T, Yamazaki H, Saeki T, Kawabe S, Ueno M, Nishi S, et al. Nephrotic syndrome and IgA nephropathy in polycystic kidney disease. *Clin Exp Nephrol* 2006;10:136-9.
 10. Wan RK, Kipgen D, Morris S, Rodger RSC. A rare cause of nephrotic syndrome in autosomal dominant polycystic kidney disease. *Nephrol Dial Transplant PLUS* 2009;2:136-8.
 11. D'Cruz S, Singh R, Mohan H, Kaur R, Minz RW, Kapoor V, et al. Autosomal dominant polycystic kidney disease with diffuse proliferative glomerulonephritis-an unusual association: a case report and review of the literature. *J Med Case Rep* 2010;4:125.
 12. Stiles KP, Yuan CM, Chung EM, Lyon RD, Lane JD, Abbott KC. Renal biopsy in high-risk patients with medical diseases of the kidney. *Am J Kidney Dis* 2000;36:419-33.
 13. Misra S, Gyamlani G, Swaminathan S, Buehrig CK, Bjarnason H, McKusick MA, et al. Safety and diagnostic yield of transjugular renal biopsy. *J Vasc Interv Radiol* 2008;19:546-51.
 14. See TC, Thompson BC, Howie AJ, Karamshi M, Papadopoulou AM, Davies N, et al. Transjugular renal biopsy: our experience and technical considerations. *Cardiovasc Intervent Radiol* 2008;31:906-18.
 15. Bilbao JI, Arias M, Herrero JI, Iglesias A, Martínez Regueria F, Alajandre PL, et al. Renal biopsy with forceps through femoral vein. *Cardiovasc Intervent Radiol* 1995;18:232-6.
 16. Leal JJ. A new technique for renal biopsy: the transurethral approach. *J Urol* 1993;149:1061-3.
 17. Meyrier A. Transjugular renal biopsy. Update on hepato-renal needlework. *Nephrol Dial Transplant* 2005;20:1299-302.
 18. Giménez LF, Micali S, Chen RN, Moore RG, Kavoussi LR, Scheel PJ. Laparoscopic renal biopsy. *Kidney Int* 1998;54:525-9.
 19. Gupta M, Haluck RS, Yang HC, Holman MJ, Ahsan N. Laparoscopic-assisted renal biopsy: an alternative to open approach. *Am J Kidney Dis* 2000;36:636-9.
 20. Shetye KR, Kavoussi LR, Ramakumar S, Fugita OE, Jarrett TW. Laparoscopic renal biopsy: a 9-year experience. *BJU Int* 2003;91:817-20.
 21. Anas CM, Hattori R, Morita Y, Matsukawa Y, Komatsu T, Yoshino Y, et al. Efficiency of laparoscopic-assisted renal biopsy. *Clin Nephrol* 2008;70:203-9.
 22. Uppot RN, Harisinghani MG, Gervais DA. Imaging-guided percutaneous renal biopsy: rationale and approach. *AJR Am J Roentgenol* 2010;194:1443-9.
 23. Luque Mialdea R, Martín-Crespo Izquierdo R, Díaz L, Fernández A, Morales D, Cebrián J. Renal biopsy through a retroperitoneoscopic approach: our experience in 53 pediatric patients. *Arch Esp Urol* 2006;59:799-803.
 24. Caione P, Micali S, Rinaldi S, Capozza N, Lais A, Matarazzo E, et al. Retroperitoneal laparoscopy for renal biopsy in children. *J Urol* 2000;164:1080-3.
 25. Jesus CM, Yamamoto H, Kawano PR, Otsuka R, Fugita OE. Retroperitoneoscopic renal biopsy in children. *Int Braz J Urol* 2007;33:536-41.
 26. Bastos Netto JM, Portela WS, Choi M, Filho MF, De Toledo AC, Figueiredo AA. Laparoscopic-percutaneous kidney biopsy in children-a new approach. *J Pediatr Surg* 2009;44:2058-9.
 27. Agarwal MM, Hemal AK. Surgical management of renal cystic disease. *Curr Urol Rep* 2011;12:3-10.

