Renal allograft biopsies: a guide of ins and outs for best results

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SUMMARY

Renal allograft biopsies remain the best diagnostic tool to investigate the type and degree of graft injury, provide therapeutic and prognostic information and to assess the extent of irreversible chronic organ damage – if done right. This review highlights pertinent aspects relevant not only for collecting optimal tissue samples but also for rendering diagnoses. Pathologists and clinicians are provided with "take home messages" and practical tips what to do, what to avoid and what to keep in mind.

Keywords: kidney allograft – kidney allograft biopsy – diagnostic approach

Biopsie renálních štěpů: průvodce spletitými detaily pro získání nejlepších výsledků

SOUHRN

Nejlepším diagnostickým nástrojem pro vyšetření typu a stupně poškození štěpu ledviny zůstává biopsie. Pokud je vyhodnocena dobře, poskytuje terapeutické a prognostické informace zhodnocením rozsahu nevratného chronického poškození tkáně. Tento přehled se soustředí na odpovídající aspekty ve vztahu k tomu, jak získat optimální bioptické vzorky, a také jak interpretovat diagnózu. Patologům a klinikům jsou k dispozici shrnující informace a praktické typy, jak co udělat a naopak čeho se vyvarovat a co mít na paměti.

Klíčová slova: štěp ledviny – biopsie štěpu ledviny – diagnostický přístup

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Biopsies remain the gold standard to determine the cause of graft dysfunction. Biopsies best distinguish acute rejection, acute tubular necrosis, infections such as polyomavirus nephropathy, thrombotic microangiopathy, recurrence of original disease, calcineurin inhibitor toxicity and chronic rejection (1-4). Thus biopsies give unique opportunities to "inspect" the condition of renal allografts, determine the degree of acute and chronic tissue injury including the potential reversibility of lesions, guide therapeutic interventions, and provide prognostic information. The overall "power" of information a biopsy can give on concurring disease processes, such as acute rejection superimposed on chronic pre-existing tissue injury, is unsurpassed (5). Neither blood nor urine based assays nor molecular testing rival the diagnostic yield of histologic studies. Biopsy findings change the clinical diagnosis in an average of 36 % of patients (27 – 46 %) and therapy in 59 %, with no obvious diminishing value in the last years (2,3,6-11). Biopsy results change therapy in both the early and late (> 1 year) post-transplant periods (9,10). Most importantly, biopsy findings lead to reduced immunosuppression in 22 % (19 – 39 %) of patients.

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Ideally allograft biopsies should be first obtained at time of implantation, i.e. so-called "zero-hour biopsies", to evaluate the condition of the donor organ and to assess the degree of pre-existing chronic parenchymal damage for subsequent comparative analyses (5,12). Subsequently early episodes of delayed or suboptimal graft function as well as unexplained graft failure with a sudden rise of serum creatinine by 15 % above baseline require a histologic diagnosis. The detection of proteinuria and/or hematuria raises suspicion of glomerular injury that might be rejection related, e.g. transplant glomerulitis or glomerulopathy often with subnephrotic range proteinuria, or it might be due to a de-novo or recurrent glomerulonephritis; a graft biopsy will provide accurate diagnostic information. Since serum creatinine or BUN levels only poorly reflect "intra graft" events, such as early phases of polyomavirus nephropathies, protocol biopsies performed on grafts with stable function can reveal unexpected lesions benefitting from therapeutic intervention (13,14).

TECHNICAL CONSIDERATIONS

Since renal allografts are typically placed into the iliac fossa, technical aspects of ultrasound guided biopsy procedures are usually not challenging. However, all biopsies are invasive and special efforts should be made to obtain optimal tissue (also see below: adequacy of a biopsy sample). The biopsy should provide proper diagnostic insight into the status of the transplant. Some pertinent aspects are important to consider.

1) All biopsies should be obtained with 15 or 16 gauge spring loaded so-called biopsy guns (15,16). The use of smaller needles, i.e. 18 or higher gauges or fine needle aspiration, is strongly discouraged (Fig. 1, 2 and 3). Two or better 3 biopsy cores of approximately 1.5 cm in length containing cortex and medulla should be collected.
2) Tissue should be immediately examined in the ultrasound