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INTRODUCTION

Renal tissue histopathological examination started in the 1950 with percutaneous renal biopsy, and it became an essential diagnostic utility for many kidney diseases. Percutaneous image-guided renal biopsy is a fast, relatively safe, high yield, and the gold standard for renal biopsies. However, the risk of hematoma increases to more than 70 % in high risk individuals who are on blood thinners. Hence transjugular renal biopsy was developed for high bleeding risk patients, since it decreases the risk of perirenal hematoma tremendously. The right kidney is preferred for biopsy due to favorable anatomy of the right renal vein. In case of single left kidney, or difficult right renal vein anatomy, the left kidney is biopsied.

- Acute renal failure of unknown origin
- Isolated microhematuria and intermittent proteinuria
- Renal involvement accompanying systemic diseases

Specific Indications of transjugular Biopsy [2–5]

- Known case of renal micro-aneurysms
- Morbidly obese patients
- Failed percutaneous biopsy
- Single functioning kidney
- Severe uncorrectable coagulopathy
- Uncooperative patients and patients on mechanical ventilation
- Acute renal failure patients undergoing placement of dialysis catheter
- When other diagnostic studies are needed, such as transvenous liver biopsy, and venography

COMMON INDICATIONS [1]

- Nephrotic syndrome
- Permanent proteinuria with or without microhematuria
- Rapidly progressive nephropathies
- Systemic lupus erythematosus

COMMON CONTRAINDICATIONS

Relative contraindications:

- Past history of allergy to intravenous contrast media
- Pregnancy
- Superior vena cava obstruction
- Congenital absence or occlusion of right internal jugular vein
- Inferior vena cava or renal vein thrombosis
- Recurrent course of the renal vein

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POSSIBLE COMPLICATIONS [5–7]

Access-site-related complications:

- Hemorrhage (*neck hematoma*)
- Accidental carotid puncture
- Transient Horner’s syndrome
- Cardiac arrhythmias
- Pneumothorax
- Contrast-induced allergic reaction
- Contrast-induced nephropathy
- Catheter or guidewire breakage
- Risks related to any minimally invasive procedure performed under conscious sedation (*e.g., allergy to medications*)

Procedure-specific complications:

- Transient microscopic hematuria
- Perforation of the renal capsule
- Perirenal hemorrhage
- Pelvicalyceal system hemorrhage
- Fistula between blood vessels and renal pelvicalyceal system
- Arteriovenous fistula
- Renal pseudoaneurysm

PREPROCEDURAL ASSESSMENT AND PLANNING [8–10]

- History, indications, and physical examination (*Appendix 1* in Chap. 149)
- Evaluation of diagnostic imaging studies and physiologic tests to determine the relevant vascular anatomy, anatomic relations, physiologic, and pathologic conditions
- Periprocedural management of coagulation status (*Appendices 2* in Chap. 150 and 3 in Chap. 151)
- Antibiotic prophylaxis: Not routinely recommended [8] (*Appendices 4* in Chap. 152 and 5 in Chap. 153)
- Imaging modality for guidance: Fluoroscopy; combined with ultrasound for venous access
- Positioning: Supine
- Venous access:
 - Transjugular route through the right internal jugular vein, for the majority of cases

- Left internal jugular vein, the external jugular veins, or femoral veins are rarely used

PROCEDURE NOTE

Procedure: Transjugular biopsy of the right/left kidney

Staff: []

Fellow: []

Resident: []

Clinical Information: Describe history and list indications

Allergies: None known/Allergic to [specify/type of allergy]

Anesthesia: Local anesthesia/Conscious sedation

Medications: List any relevant medications used

Contrast Used: () mL of [type] contrast media was used for venography

Field: Sterile

Procedure classification: Clean

Position: Supine

Monitoring: Intravenous access line was secured and vital signs were continuously monitored by nursing staff/anesthesia team throughout the procedure

Total fluoroscopy time: () minutes

Cumulative radiation dose: () mGy

Description of Procedure:

The risks, benefits, alternatives, and the procedure itself were explained to the patient/patient’s Power of Attorney/patient’s legal guardian, and informed written consent was obtained. The site of the puncture was identified and marked. Time out was performed to confirm the correct patient, procedure and site.

The skin of the neck was prepped and draped in the usual sterile fashion. The right internal jugular vein was located and the site of venous puncture was determined using combined information from palpation, ultrasound, and fluoroscopy. Local anesthesia was administered. Jugular venous access was obtained using a ()-gauge [type] needle and the Seldinger technique, under direct ultrasound visualization/by palpation with the table placed in a moderate Trendelenburg

position. Once good venous flow was detected, a ()-inch [type] guidewire was advanced through the needle under direct fluoroscopic visualization and a () French [vascular/type] sheath was placed into the right internal jugular vein in an antegrade fashion. Subsequently, a ()-inch [hydrophilic/type] guidewire was advanced through the sheath into the inferior vena cava. A ()-French, multipurpose curved [type] catheter was introduced through the sheath and guided into the right renal vein over the guidewire. The catheter was then manipulated into the posterior lower branch of the right renal vein.

The inserted hydrophilic wire was then exchanged for a ()-cm long, ()-inch [Amplatz Super-stiff/type] guidewire. Then a (7)-French, ()-cm long [type] catheter was advanced over the extra stiff guidewire into the right renal vein under fluoroscopic guidance. The transvenous ()-gauge [type] core biopsy needle was then advanced through the catheter gently as distally as possible into the cortical vein of the lower pole of the right kidney. () mL of contrast media was flushed into the catheter and optimal peripheral position was confirmed by enhancement of a wedge of the cortical parenchyma. The straight catheter was then withdrawn and (number) samples were obtained by releasing the fire mechanism of the core biopsy needle and sent for histopathologic interpretation. Venography was performed by the manual injection of () mL of contrast media through the catheter and showed no evidence of renal capsule perforation.

Following the procedure, the catheter and jugular sheath were removed and adequate hemostasis was achieved by () minutes manual compression. The patient was transferred to the floor/recovery room for close monitoring following the procedure in a stable condition. Staff was present and scrubbed for the entire procedure.

Intra-Procedure Findings: List all relevant findings.

Immediate Complications: None encountered during or directly after the procedure. List complications if any.

Post-Procedure Plan:

- Keep patient in complete bed rest for () hours.

- Check the right neck (*access site*) for any bleeding or hematoma formation every 15 min for 1 h, then every 30 min for 1 h, then every hour; inform interventional radiology team if any observed.
- Monitor vital signs every 15 min for 1 h, then every 30 min; notify interventional radiology team if systolic blood pressure < 95 mmHg, or heart rate > 110 beats/min.
- Resume diet and previous orders as needed and if otherwise not contraindicated.
- Continue adequate intravenous hydration and monitor fluid (intake–output) status.
- Check complete blood count, creatinine, and blood urea nitrogen on the day following the procedure or as clinically indicated.

Impression:

- Transjugular right/left renal biopsy, as described above.
- The patient tolerated the procedure well and left the interventional unit in a stable condition.
- The procedure was canceled/terminated prematurely.
- List any other relevant or important information/finding.

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