

Appendix I

Summary of the Studies Evaluating Diagnostic Tests for the Diagnosis of UTUC.				
Author, Year Sample size Study Design RoB	Key Inclusion Criteria	Diagnostic test Reference standard	Diagnostic Accuracy Results	Harms
Dodd ¹⁹ , 1997 N=48 (63 brush cytology specimens) Retrospective [chart review] Moderate	UTUC (including CIS)	Test: Endoscopic brush cytology Reference: Histopathology (biopsy or final surgical)	Sensitivity: 72% Specificity: 94%	NR
Guarnizo ¹⁶ , 2000 N=38 (45 upper tract lesions) Retrospective [chart review] Moderate	Surgical resection; ureteropyeloscopic evaluation and biopsy	Test: Ureteroscopic biopsy with cold cup forceps or resection loop Reference: Surgical pathology	Per-lesion sensitivity: 89% (40/45) Per-patient sensitivity: 92% (35/38)	NR
Joseph ¹⁶¹ , 2020 N=42 Retrospective [chart review] Moderate	RNU and prior ipsilateral PCNB of upper tract lesion	Test: PCNB Reference: Surgical pathology of RNU specimen	Sensitivity ("histologic concordance" of PCNB with RNU pathology): 95.2%	Primary study endpoints: Minor AEs (flank pain; gross hematuria): 14.3%; Major AE (hemorrhage with clot obstruction of ureter): 2.4%; PCNB tract seeding at median 28.2 months: 0.0%
Kleinmann ¹⁷ , 2013 N=127 (303 biopsies analyzed) Retrospective [chart review] Moderate	Ureteroscopic procedures for UTUC (newly diagnosed or surveillance for previously diagnosed)	Test: Endoscopic biopsies using forceps or basket Reference: Pathology result	Forceps Sensitivity: 0.63 Tumors ≥10 mm, sensitivity: 0.80 Basket Sensitivity: 0.94 Tumors ≥10 mm, sensitivity: 0.94	NR
Low ²⁰ , 1993 N=11 Retrospective [chart review] Moderate	Ureteropyeloscopy with direct vision sampling of upper urinary tract lesions by brush biopsy, FNA, and forceps biopsy	Test: Ureteroscopic biopsy with forceps, brush or fine needle aspiration Reference: Pathological specimen from ureteroscopy	Sensitivity Forceps: 100% Brush: 83% FNA: 89%	One patient with iatrogenic distal ureteral stricture 7 months post-op
Sheline ²¹ , 1989 N=45 Retrospective [chart review] Moderate	Brush biopsy for suspected UTUC	Test: Fluoroscopically guided retrograde brush biopsy Reference: Surgical specimen or clinical follow-up	Sensitivity: 91% Specificity: 88%	NR
Vashistha ¹⁸ , 2013 N=93 (118 biopsies) Retrospective [chart review] Moderate	Ureteroscopic biopsy for UTUC	Test: Ureteroscopic biopsy Reference: Endoscopic impression and/or follow-up pathology	Sensitivity: 83% Specificity: 100% Sensitivity by region Ureter: 85.4% Renal pelvis: 77.8% Ureteropelvic junction: 100%	NR

Abbreviations: 5-ALA = 5-aminolevulinic acid; AE = adverse event; CI = confidence interval; CT = computed tomography; FISH = fluorescence in situ hybridization; FNA = fine-needle aspiration; IVU = intravenous urography; MDCTU = multidetector computed tomography urography; MR = magnetic resonance; NPV = negative predictive value; OR = odds ratio; PCNB = percutaneous image-guided core-needle biopsy; PPV = positive predictive value; RCC = renal cell carcinoma; RNU = radical nephroureterectomy; SU = segmental ureterectomy; US = ultrasound