A0053 Ultrasound based CEUS-Bosniak classification for cystic renal lesions: An 8-year clinical experience

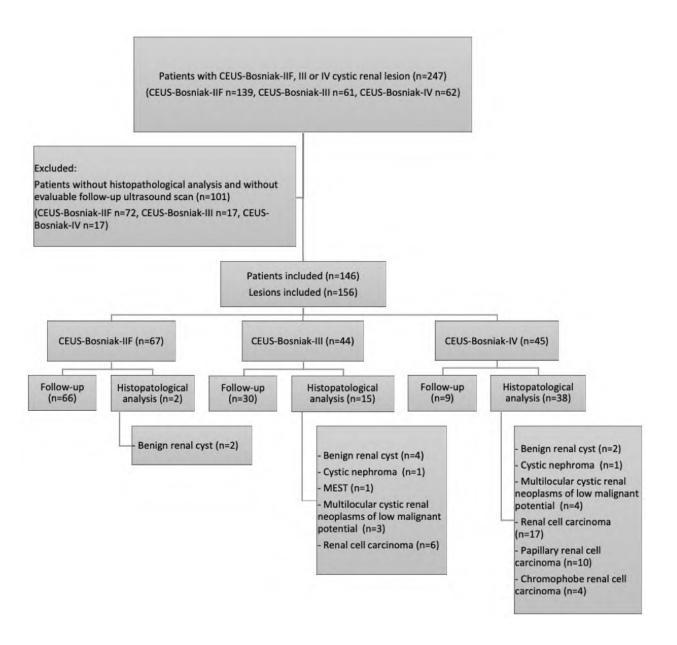Herms E.[1], Slotta-Huspenin J.[2], Gärtner A.[3], Preuss S.[1], Hauner K.[4], Heck M.[4], Autenrieth M.[4], Maurer T.[5], Kübler H.[6], Holzapfel K.[7], Sauter A.[8], Schwarz-Boeger U.[9], Wagenpfeil S.[10], Heemann U.[1], Stock K.F.[11]

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Introduction & Objectives: Cystic renal lesions are common findings in clinical imaging. Assessment of complex lesions is often challenging. Multimodal ultrasound techniques for the assessment of cystic renal lesions -including contrast-enhanced ultrasound (CEUS)- have been routinely used in only a few centers so far and will be evaluated in this retrospective analysis.

Materials & Methods: A database query at our tertiary referral institution identified 247 patients with CEUS-Bosniak-IIF, -III, or -IV lesions between August 2013 and August 2021. CT/MRI imaging of all lesions with histopathologic validation was retrospectively evaluated according to the CT/MRI-Bosniak classification and compared with the CEUS-Bosniak classification. Interobserver agreement was calculated according to Cohen's kappa. The final diagnosis was confirmed by histopathologic reports of resected lesions. Growth patterns of renal cystic lesions were analyzed based on ultrasound findings.

Patients with CEUS-Bosniak-IIF, III or IV cystic renal lesion (n=247)
(CEUS-Bosniak-IIF n=139, CEUS-Bosniak-III n=61, CEUS-Bosniak-IV n=62)

Excluded:
Patients without histopathological analysis and without evaluable follow-up ultrasound scan (n=101)
(CEUS-Bosniak-IIF n=72, CEUS-Bosniak-III n=17, CEUS-Bosniak-IV n=17)

Patients included (n=146)
Lesions included (n=156)

CEUS-Bosniak-IIF (n=67)

Follow-up (n=66)

Histopatological analysis (n=2)
- Benign renal cyst (n=2)

CEUS-Bosniak-III (n=44)

Follow-up (n=30)

Histopatological analysis (n=15)
- Benign renal cyst (n=4)
- Cystic nephroma (n=1)
- MEST (n=1)
- Multilocular cystic renal neoplasms of low malignant potential (n=3)
- Renal cell carcinoma (n=6)

CEUS-Bosniak-IV (n=45)

Follow-up (n=9)

Histopatological analysis (n=38)
- Benign renal cyst (n=2)
- Cystic nephroma (n=1)
- Multilocular cystic renal neoplasms of low malignant potential (n=4)
- Renal cell carcinoma (n=17)
- Papillary renal cell carcinoma (n=10)
- Chromophobe renal cell carcinoma (n=4)

Results: 146 patients with 156 renal cystic lesions were included. The evaluation of ultrasound follow-up scans was possible in 105/156 lesions. Histopathological diagnoses were available for 55/156 lesions. Malignancy was seen in 0/2 of CEUS-Bosniak-IIF lesions, 9/15 (60%) of CEUS-Bosniak-III lesions, and 35/38 (92.1%) of CEUS-Bosniak-IV lesions. CT/MRI images were available in 52 cases. Overall, CEUS-Bosniak classification agreed with CT/MRI-Bosniak classification in 58% (30/52). The agreement between the two classifications was fair (κ= 0.280). In 40% (21/52), CEUS resulted in an upgrade of the Bosniak classification. 89% (16/18) of cysts upgraded by CEUS to CEUS-Bosniak-IV showed malignant findings.

Conclusions: The use of the CEUS provides an important contribution to the diagnosis of complex cystic lesions and can thereby improve patient safety. Although not explicitly recommended by urologic guidelines, CEUS-Bosniak classification is an important tool in clinical practice for differentiation and monitoring of renal cystic lesions.