Renal Applications of Ultrasound Microbubbles

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Renal Contrast Dynamics

- 25% cardiac output
- cortex 90% medulla 10%
- cortical enhancement 10-15s after injection
  - lasts 20-40s
  - medullary phase lasts 45-120s
- exam time 2 mins
- 1-1.5mL SonoVue
Normal Kidney
Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) – Update 2008

EPUSUMB study group


Affiliations

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Key words
- contrast agent
- liver
- urinary
- v. uncinus reflux
- pancreatic
- trauma
- transcranial US

Thematic groups composition

Introduction
D. H. Boas

1. General considerations
2. Liver
2.1 Characterization of focal liver lesion
2.2 Detection of focal liver lesion
3. Kidney
4. Reflux
5. Pancreas
6. Blunt abdominal trauma
7. Transcranial US
8. Technical appendices

Chairpersons

Ultrasound (US) contrast agents (UCAs), in conjunction with contrast specific imaging techniques, are increasingly accepted in clinical use for diagnostic imaging and post-interventional workup in several organs. To those not intimately involved in the field, the rapid advances in technology and techniques can be difficult to follow. In March of 2003, at the EUROSON Conference in Copenhagen, it was agreed that it would be useful to produce a document providing a description of essential technical requirements, proposed investigator qualifications, suggested study procedures and steps, guidance on image interpretation, recommended and established clinical indications and safety considerations. Initially a set of guidelines for the use of ultrasonic contrast agents in the liver alone were developed. These were presented and discussed in detail at an EPUSUMB special consensus meeting held in Rotterdam in January 2004. The resulting consensus document was published in the August 2004 edition of Ultrasci in der Medizin-European Journal of Ultrasound, and has also been published in French [1] and Chinese [2]. Time has however moved on, and EPUSUMB and the group of experts who developed these first guidelines took the view in 2006 that they should be revisited and expanded to include recommendations for applications in the kidney, in veno-arterial reflux, in the pancreas, in trauma and in the cerebral circulation. In order to facilitate the production of these new guidelines and recommendations a further two meetings of experts were held, the first in Bologna in September 2006 in conjunction with the EUROSON/EPUSUMB meeting, the second immediately following the European Symposium on Ultrasonic Contrast Agent Imaging in Rotterdam in January 2007.

As previously these guidelines are based on comprehensive literature surveys including results from prospective clinical trials. On issues where no significant study data were available, evidence was obtained from expert committee reports or was based on the actual consensus of experts in the field of US and contrast enhanced ultrasound (CEUS) during the consensus conferences. During the meeting of experts in Rotterdam many additional new and exciting developments were discussed, and whilst some are quickly entering clinical practice, it was felt too early to include them in the current recommendations. These guidelines and recommendations provide general advice for the use of UCAs. They are intended to create standard protocols for the use and administration of UCAs and improve the management of patients. Individual cases must be managed on the basis of all clinical data available for that specific case. This second version will be subject to change to reflect future advances in scientific knowledge and the rapidly evolving field of US technology.
EFSUMB RECOMMENDATIONS

• anatomic variations mimicking a renal tumor ("pseudo-tumor")
• complex cystic lesions, suspect cystic RCC
• thrombus in renal vein and vena cava
• follow up after RFA
Pseudotumour (cloisson)
**EFSUMB RECOMMENDATIONS**

- angiomyolipoma to rule out large aneurysms.
- vascular disorders: RAS, renal infarction
- minor renal trauma (children) and follow up (renal impairment)
- infections: abscesses/complicated pyelonephritis
- contraindications to CT or MR contrast agents
Renal Cell Carcinoma
Cystic RCC

Courtesy Dr P Sidhu
Atrophic RK in ESRF
Angiomyolipoma
Cystic Carcinoma

Courtesy Dr P Sidhu
Inflammatory Mass
Radiofrequency Ablation

• assess vascularity prior to RFA
• monitor ablation immediately
• → immediate retreatment
• follow up of previous RFA
• guide needle in poorly visualised lesion on B-mode
Radiofrequency Ablation RCC

Courtesy: Dr Sidhu
Renal Transplants

- perfusion
- arterio-venous shunts
- incidental lesions
  - tumour
  - recurrent disease
Infarction
Mass on Transplant

![Ultrasound Image](image_url)
Conclusions

• renal CEUS improves on B-mode US in native and transplant kidneys
  • by revealing microcirculation
    • better determination of lesion vascularity
    • developmental anomalies
    • complex cysts
    • focal therapy
  • not reliable for benign/malignant differentiation
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