

## **Abstract**

### **Contrast-enhanced voiding uro-sonography (ce-VUS) in childhood: when and how.**

#### Introduction:

Indications for assessment of vesico-ureteric reflux (VUR) have changed and are handled much stricter than a decade ago. However, there are still indications for VUR tests and voiding cysto-urethrography (VCUG) remained one of the most common fluoroscopic examinations in pediatric radiology. Besides the invasiveness due to the necessary catheterism the radiation exposure poses a risk to the affected children. With the advent and approval of an ultrasound (US) contrast agent (UCA, Sono Vue®, Bracco) for VUR assessment a new modality is now available for broad use promising to reduce the number of ionizing investigations in early childhood.

#### The method:

Ce-VUS with Sono Vue has been established over nearly two decades with a high sensitivity and specificity for depicting VUR; furthermore an extremely good safety profile has been observed with practically no reported reactions to this application – discomfort and symptoms, which have been reported, are probably due to the catheterism and not the UCA. The indications are generally as for VCUG – however the restricted access to the ureters, sometimes late posing small diverticula, or the more difficult assessment of the urethra have to be acknowledged as well as the fact, that this method is not applicable in patients where for which ever reason the bladder and both kidneys cannot be sufficiently visualized. In general, girls as well as screening and follow-up exams are recommended for ce-VUS, also bedside examinations. In skilled hands with routine in perineal urethral imaging also boys including the suspicion of a posterior urethral valve can nicely be assessed. To address the restrictions of ce-VUS a conventional radiographic VCUG should however be performed before any surgery.

The procedure has been standardized and is relatively simple; besides the UCA, saline solution in a plastic bag, and the necessary catheterism (with a proven sterile urine) is a proper US device with contrast specific imaging options and age-adequate transducers and frequencies are necessary; as with VUG cyclic filling should be performed to increase the yield and also to have a separate cycle for urethral assessment.

There are other possible application of the UCA into various cavities; furthermore (as an off-label use presently in Europe) the UCA can also be administered intravenously, e.g. for lesion detection and characterisation typically in abdominal parenchymal organs. These aspects will not be addressed in detail.

#### Conclusion:

This presentation will up-date you on the technique, the indications and the typical findings in ce-VUS in children after the recent approval of SonoVue® for use in the pediatric bladder by the EMA.