

Monitoring of cerebral high intensity transient signals during catheter interventions and surgery for congenital heart disease in infants using NeoDoppler

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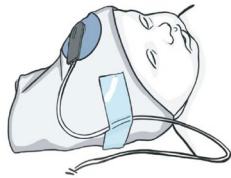
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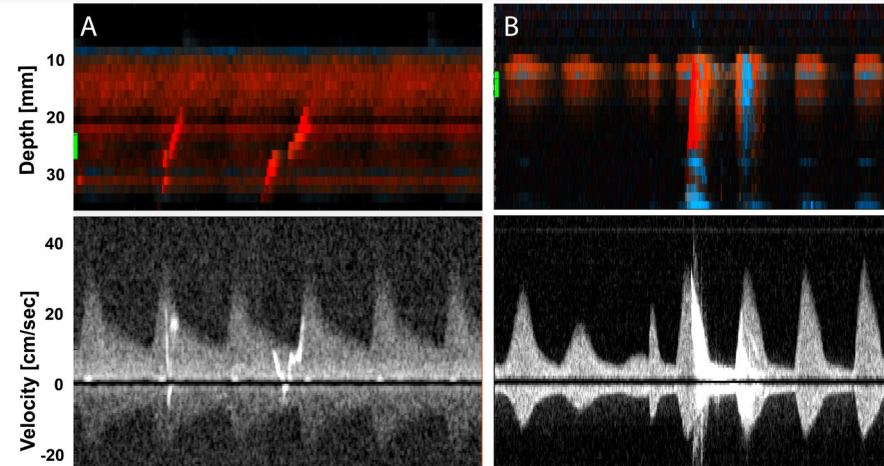
Introduction

- There is a risk of gaseous and solid micro embolus formation during transcatheter procedures (CATH) and surgery in children with congenital heart disease (CHD)
- NeoDoppler is a non-invasive transfontanelar ultrasound system for continuously monitoring cerebral blood flow
- Gaseous and solid micro emboli passing through the ultrasound beam create High Intensity Transient Signals (HITS) in the Doppler signal



Purpose

- We aimed to study the amount of HITS during CATH and surgery in infants using NeoDoppler.



The picture shows examples of single HITS (panel A) and HITS with curtain effect (panel B). One can appreciate the embolic trajectory pattern with change in depth over time in the color M-mode Display.

Methods and Materials

- The NeoDoppler probe is based on plane wave transmissions, operates at 7.8 MHz and covers a wide cylindrical area
- The system displays high frame rate color M-mode Doppler and a spectrogram
- Infants (n=28, age: 3-240 days) with CHD were monitored during CATH (n=15) and cardiac surgery (n=13)
- HITS were defined as high intensity skewed lines in the CMD with corresponding high intensity signal in the spectrogram.
- HITS were grouped into single HITS and HITS with curtain effect

Results

- HITS were detected in 13/15 patients during CATH with a total of 392 HITS and in all surgical patients with a total of 772 HITS. Table shows HITS per patient.

Procedure	Single HITS Median (Range)	HITS with curtain effect Median (Range)	Total HITS events Median (Range)
CATH (n=15)	12 (0-149)	0 (0-14)	12 (0-149)
Surgery (n=13)	41 (11-150)	12 (0-7)	45 (11-150)

Conclusions

- NeoDoppler enables detection of frequent HITS and could become a useful tool to guide modifications of procedures