

# Dynamic Autoregulation in Infants Undergoing Cardiac Surgery

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## Background

- Cerebral autoregulation is the process of maintaining stable cerebral blood flow during changes in cerebral perfusion pressure
- The process that counteracts rapid changes is known as dynamic autoregulation
- We aimed to evaluate dynamic autoregulation in infants undergoing cardiac surgery with cardiopulmonary bypass

## Methods

- NeoDopper, a transfontanellar ultrasound system, was used to continuously monitor cerebral blood flow velocities (CBFV) in 15 infants (age: eight days to nine-month-old) during cardiac surgery for congenital heart defects (Figure 1)
- The mean flow index (Mxa) was calculated as the moving Pearson correlation between BP and CBFV with 10 second averages calculated over 300 seconds, to evaluate dynamic autoregulation.
- Two levels of impaired autoregulation were defined ( $Mxa > 0.3/0.45$ ) and percentage of time above these limits were calculated.

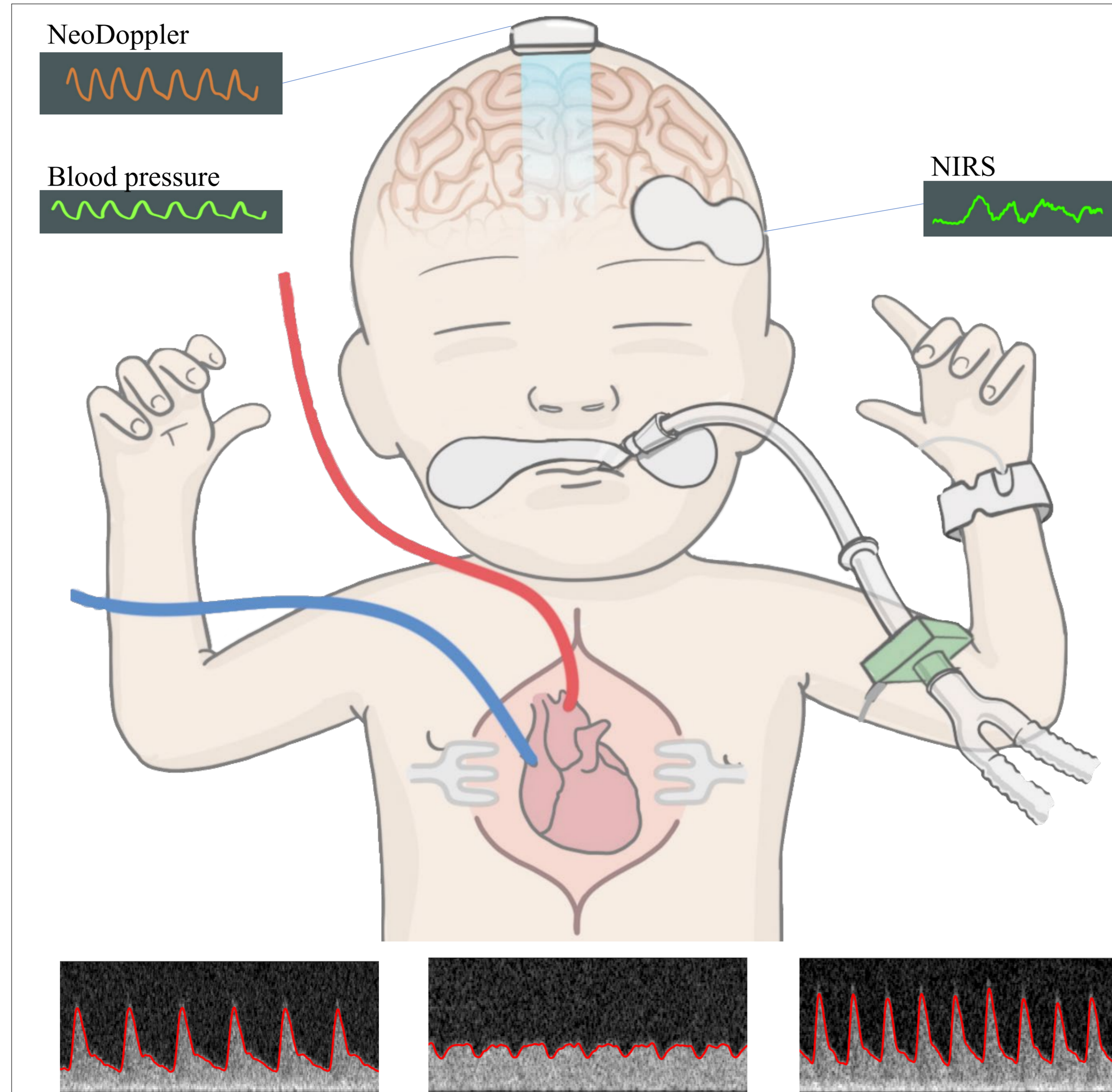
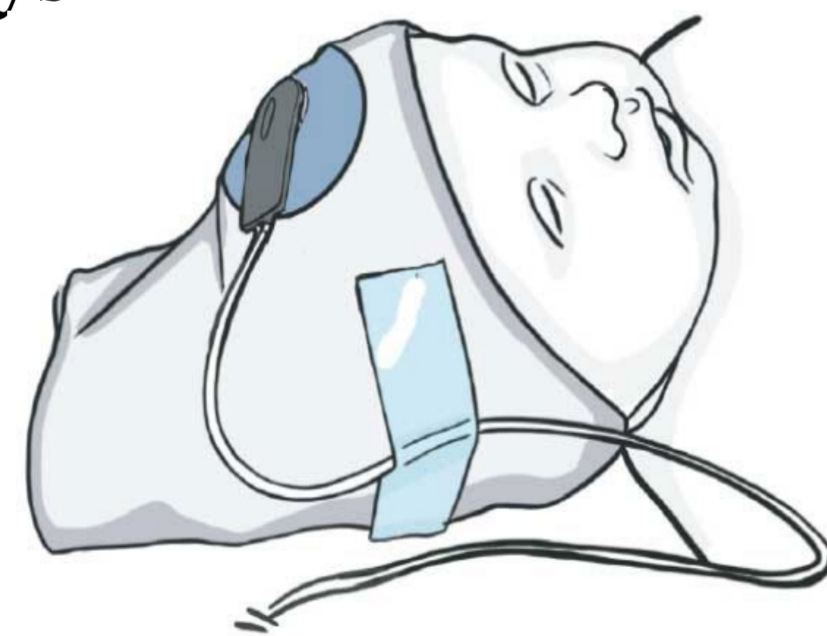


Figure 1. Research setup and examples of Doppler spectrograms.

## Results

- All patients exhibited a high percentage of time with impaired dynamic autoregulation
- $Mxa > 0.3$  and  $0.45$ :  $73.71\% \pm 9.06\%$  and  $65.16\% \pm 11.27\%$  respectively

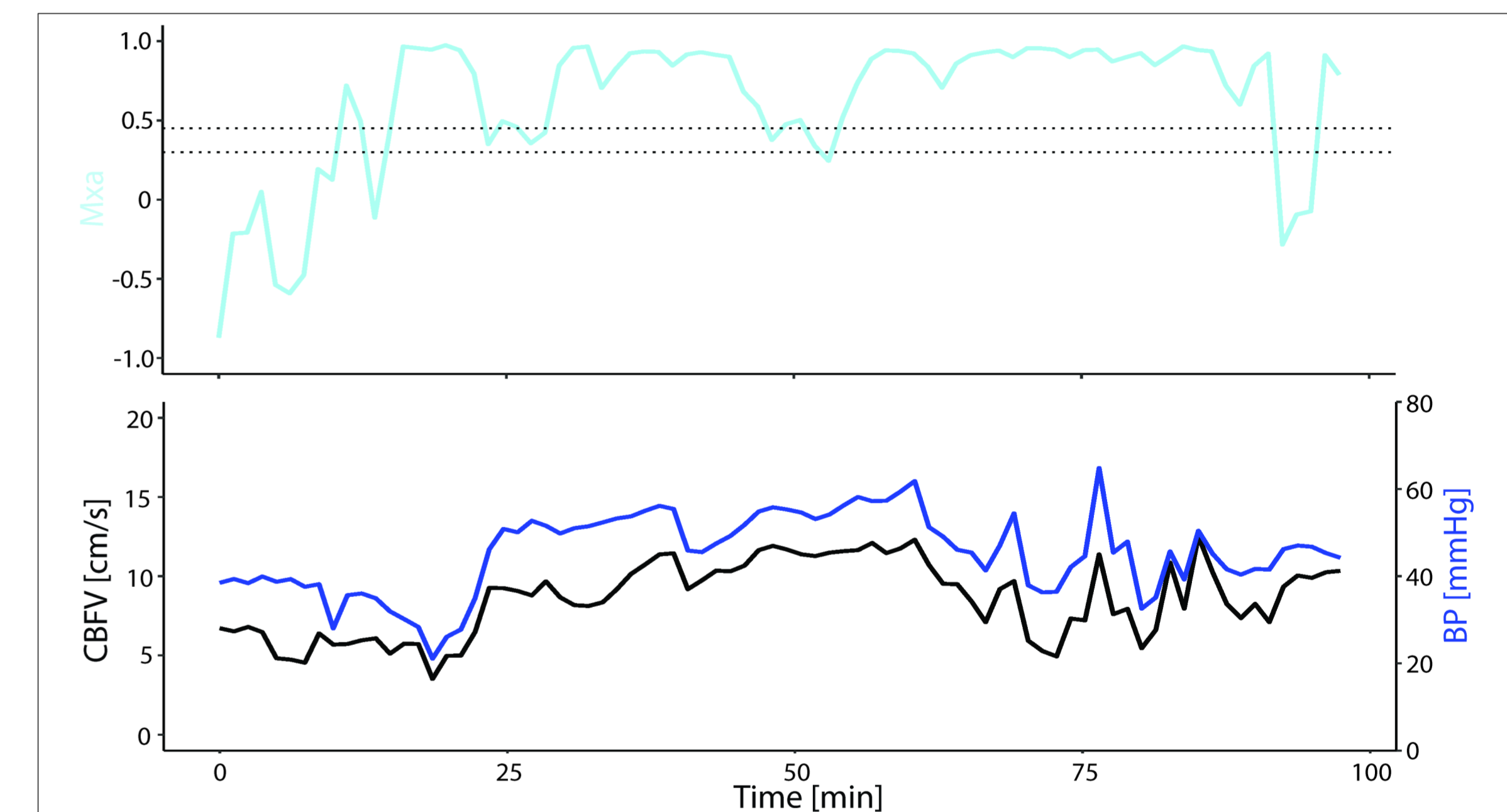


Figure 2. Dynamic autoregulation in a patient with complete atrioventricular septal defect. Mean flow index (Mxa), cerebral blood flow velocity (CBFV) and blood pressure (BP) during surgery

## Conclusions

- Infants undergoing cardiac surgery with cardiopulmonary bypass demonstrated a high proportion of time with impaired dynamic autoregulation based on Mxa.
- Continuous measurement of CBFV could enhance cerebral monitoring and management in this population.