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"The feasibility of assessing Cerebrovascular Reactivity with Carotid Duplex ultrasound (Duplex-CVR)"

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Introduction:

The Internal Carotid Artery (ICA) could be a suitable location to assess cerebrovascular function. This study determined the feasibility of using Duplex ultrasound to assess Cerebrovascular Reactivity (CVR); the changes to blood flow that occur in response to a stimulus such as CO_2.

Methods:

CVR was assessed with Breath-Hold (BH) for up to 30 seconds and Rapid-Breathing (RB) for up to 60 seconds. Capnography monitored breathing rate and end-tidal CO_2 ($etCO_2$). Duplex ultrasound of the ICA measured blood flow velocity (BFV) and diameter of the artery (ø). The number of good quality Duplex (measurable change in BFV and ø) and $etCO_2$ (>10% change in $etCO_2$) recordings was used to determine the feasibility of each manoeuvre.

Results:

Fifty patients (15 female, 68 ± 13 years old) were recruited. During Resting, BH and RB, data recordings were of good quality (see table) in 96, 78 and 86% respectively. During BH and RB measurable and predicted changes occurred in BFV, ø, volume flow, pulsatility index and resistive index.

Conclusion:

Duplex-CVR can be performed in patients undergoing a routine carotid Duplex assessment and can provide high-resolution imaging of changes in BFV that occurs in relation to changes in $etCO_2$, which can then be used to provide indices of CVR.