Flow assessment of lower extremity endovascular interventions: A feasibility study using quantitative Digital subtraction angiogram analysis

DR Rajesh B Dharmaraj
National University Health System
Singapore
Disclosure

Speaker name: Rajesh B Dharmaraj

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
Questions

Conventional angiogram is a two dimensional study of flow of contrast thru a vessel. Interpretation is subjective.

Is there a way we can measure flow quantitatively during angiogram?
syngo iFlow (Siemens Healthcare)
Quantitative DSA software
syngo iFlow Clinical Results
Pre and Post Procedural Comparison
syngo iFlow
Color-coded DSA => Quantitative DSA

Time Attenuation Curve
Our Study

• 41 lower limb interventions included

• Pre and post intervention foot angiogram study and a area was chosen on foot pedal vessel to compare

• Time attenuation curves studied for all cases pre and post intervention and compared to ABPI/TBI
Time Attenuation Curve Analysis
Wash-In and Wash-Out

Wash-In manly influenced by contrast injection
Wash-Out mainly influenced by vessel patency
=> Ignore Wash-In
Time Attenuation Curve Analysis
Comparison of Pre- and Post-Intervention

Wash-In often comparable between Pre and Post.

Wash-Out significantly slower in Pre.

How to quantify?
Time Attenuation Curve Analysis
Quantification of Wash-Out Phase
Time Attenuation Curve Analysis
Quantification of Wash-Out Phase
Time Attenuation Curve Analysis
Quantification of Wash-Out Phase

Time it takes for contrast attenuation to return to a certain level after peak
“Half-life”
Shorter is better
Time Attenuation Curve Analysis
Quantification of Wash-Out Phase
Time Attenuation Curve Analysis
Quantification of Wash-Out Phase

Level that contrast has returned to X seconds after peak.
Lower is better
Results

- Image analysis performed pre- and post intervention DSA for 41 patients
- Wash-Out TAC of pre- and post series compared quantitatively
Results

- Change in curve parameters between Pre- and Post-series was correlated with change in Ankle brachial pressure index and Toe brachial index.
- Change in contrast decay 3 seconds after peak showed highest correlation with change in ABPI / TBI values (R=0.43).
Outlook

- DSA today is gold-standard to assess success of intervention. This is however purely qualitative and subjective.

- Described method allows for quantitative assessment

- Study was performed retrospectively. Establish workflow to integrate results for endpoint-determination of revasc procedures
Acknowledgements

Dr Evangelos Papadimas
National University Health System Singapore

Mr Philipp Wolber
Siemens Healthcare Pte. Ltd.
Singapore
Flow assessment of lower extremity endovascular interventions: A feasibility study using quantitative Digital subtraction angiogram analysis

DR Rajesh B Dharmaraj
National University Health System
Singapore