AORTIC VALVE THERAPIES – Today and Tomorrow II
September 14, 2014

Neurocognitive Functional Assessment After TAVR: Methodologies and Clinical Importance

Ronald M Lazar, PhD, FAHA, FAAN
Division of Stroke and Cerebrovascular Disease
Tananbaum Stroke Center, Neurological Institute
New York Presbyterian Hospital/Columbia University Medical Center

Financial Disclosure

Affiliation/Financial Relationship	Company
Core Lab/Equity	Claret Medical, Inc

Cognition in Operational Terms

- Language
- Perception
- Attention and Concentration
- Memory
- Organization
- Calculation
- Abstraction
- Insight and Judgment
- Decision-Making

Vascular Cognitive Impairment[1]

Vascular Dementia ⟷ Vascular Mild Cognitive Impairment

No Stroke

Criteria[2]

- Must be based on Cognitive Testing: At least 4 domains
  - Language
  - Memory
  - Executive Function/Attention/Processing Speed
  - Visual-spatial Function
- Assumption of decline in at least 1 domain
- IADL's may be normal or mildly impaired

1.Marshall & Lazar, 2011, 2. Gorelick et al, AHA,2011

Vascular Cognitive Impairment

Cardiovascular Etiologies

- CABG[1]
- Atrial Fibrillation/Treatment[2]
- Congestive Heart Failure/Treatment[3]
- Carotid Artery Disease/Treatment[4]
- TAVI/TAVR (?)

1.Selnes et al, 2009. Roberts et al, 2010; 2. Elias et al, 2006, Knecht et al, 2008; 3. Vogels et al, 2007; Festa et al, 2011; 4. Heyer et al, 2002, Marshall et al, 2011.

Vascular Cognitive Impairment

Etiologies of Neurocognitive Dysfunction in Cardiac Disease[1]

- Small-Vessel Disease
- Silent Infarction
- Perfusion Failure/Hypoxia
- Systemic Sources: Inflammation

1. Gorelick et al, AHA, 2011

Impact of Cognitive Impairment

- Difficulty following instructions
- Unable to comply with a complex medical protocol
- Unable to provide informed consent for procedures
- Difficulty in reacting appropriately to a medical emergency

Consequences

- Risk for frank dementia
- Decreased Quality of Life
- Increased mortality

e.g., Memory Impairment highly correlated with 30-day re-admission in elderly with CHF (Ketterer, et al, 2014)

Does TAVI/TAVR Cause Cognitive Decline from Embolization?

(Kahlert et al, *Circulation* 2010)

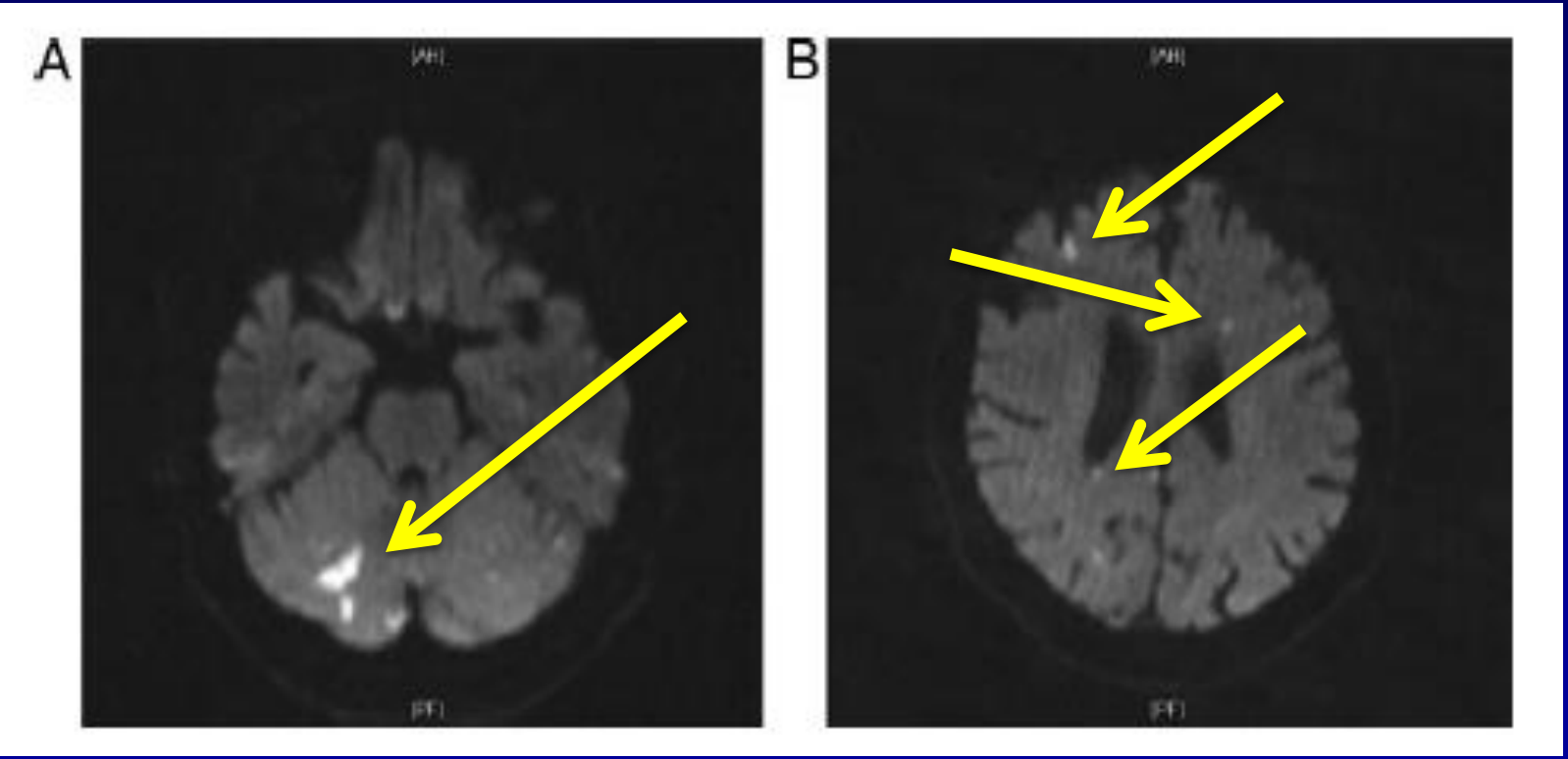
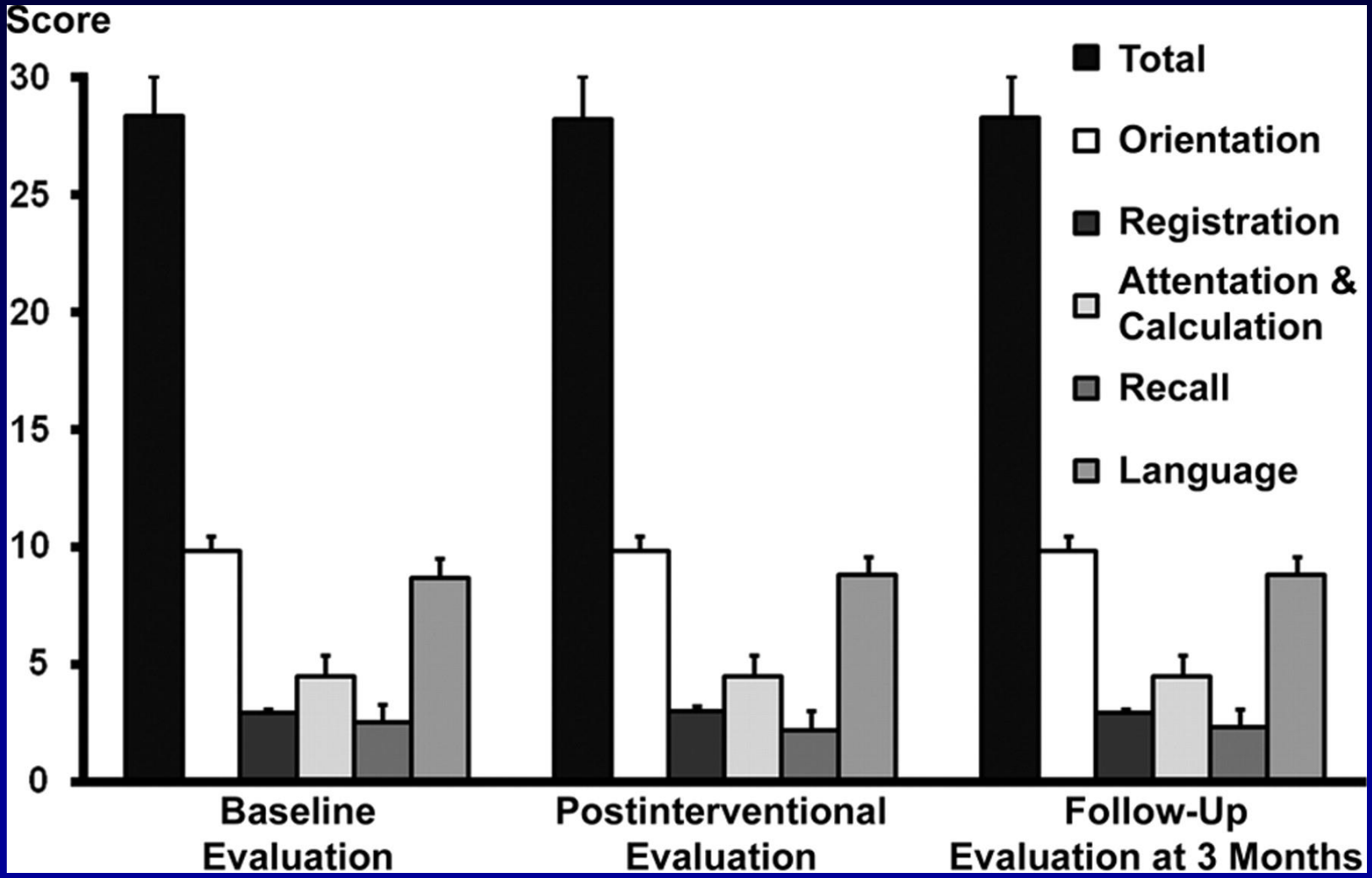


Figure 1. Detailed analysis of the MMSE results in TAVI patients.

N=32

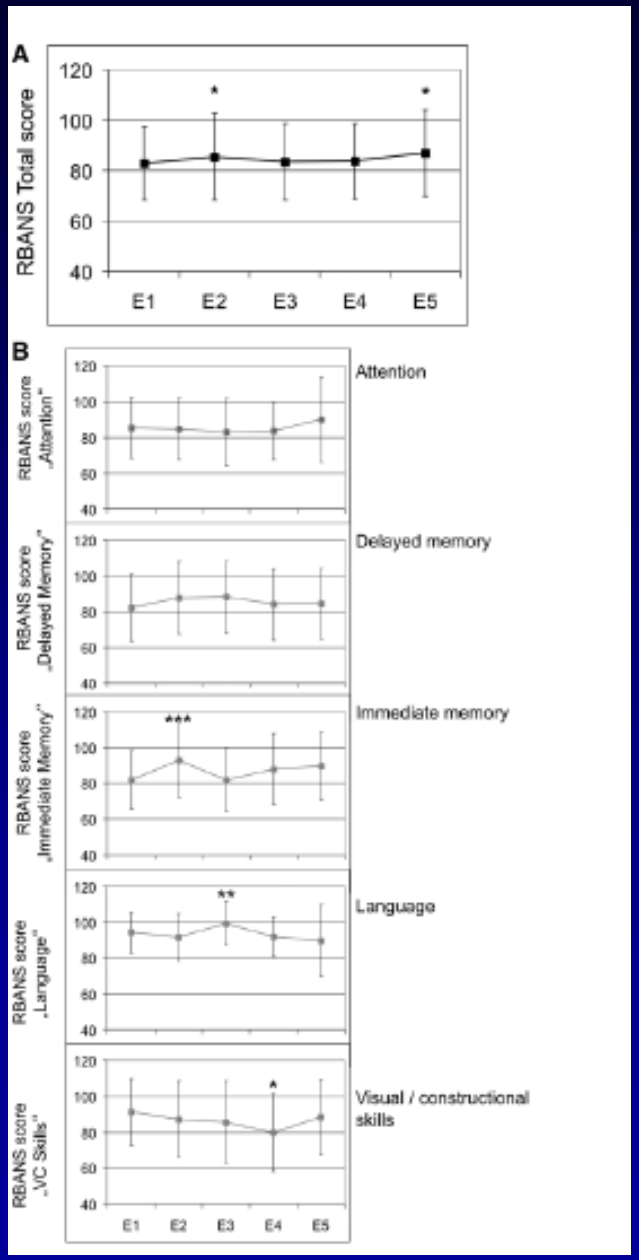


Kahlert P et al. Circulation 2010;121:870-878

Transcranial Doppler Blood Flow Assessment in Patients With Mild Heart Failure: Correlates With Neuroimaging and Cognitive Performance

Vogels et al, *Congestive Heart Failure*, 2008

Neuropsych Domain	HF (n=43)	Cardiac Controls (n=33)	Healthy Controls (n=22)	*P*
MMSE	27.6 (2.1)	27.5 (1.97)	28.1 (1.91)	.361
Language	–0.11 (0.77)	–0.04 (0.77)	0.35 (0.71)	.212
Visuospatial function	–0.10 (0.52)	0.15 (0.37)	0.25 (0.70)	.050
Memory	–0.23 (0.60)	0.10 (0.53)	0.27 (0.93)	.014
Executive function	–0.16 (0.56)	0.05 (0.54)	0.33 (0.64)	.029
Mental speed/attention	–0.12 (0.59)	0.08 (0.52)	0.24 (0.75)	.044
Overall cognitive score	–0.14 (0.44)	0.05 (0.38)	0.29 (0.60)	.003



Cognitive Trajectory After Transcatheter Aortic Valve Implantation

Ghanem et al, *Circ Cardiovasc Interv*, 2013

N=111
E1 = Baseline
E2 = 3 Days
E3 = 90 Days
E4 = 1 Yr
E5 = 2 Yrs
Cognitive Task: RBANS

RESULTS:

- No change in cognition over time
- No association with cerebral embolism on DWI.

COMMENT:

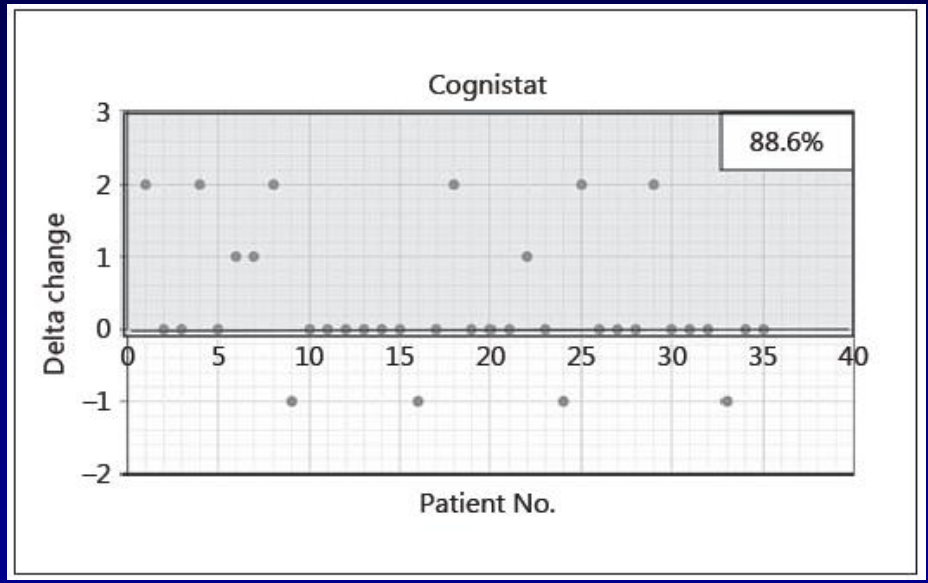
- Lack of Sensitivity and Specificity in RBANS
- Baseline significantly lower than normals (82)
- 27% with "MCI" (Mean = -2.33 SD)*
- No practice effect at 3 or 90 days

*AD Mean = -2.00 SD (RBANS manual)

Comprehensive Prospective Cognitive and Physical Function Assessment in Elderly Patients Undergoing Transcatheter Aortic Valve Implantation

Orvin et al, *Cardiology*, 2014

N=36/44
Mean Age = 82 years old
Exams: Baseline and 30 days



RESULTS:

- Improved functional status and valve hemodynamics
- No aspect of cognition or QoL worsened and some improved.

Comment:

- Post-TAVR improvement: Increase in CBF or Practice Effects?
- Cognistat: Less sensitive than full exam after stroke (Nøkleby et al, 2008)
- No imaging

Conclusions

- The questions regarding neurocognition after TAVR/TAVI remain unanswered.
- Neurocognitive batteries need to be comprehensive with good sensitivity and specificity to the underlying pathology.
- Imaging should take advantage of the more powerful 3.0 Tesla technology, both for DWI in the acute stage and FLAIR in the chronic period.
- Baseline assessments need to take into consideration the impact of the disease before treatment, including brain perfusion.