Safety and Tolerability of Tilt Testing and Carotid Sinus Massage in the "Oldest Old"

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- Q' Guidelines for the diagnosis and management of syncope (version 2009)
 - The Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC)

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Tilt Table Test

Tilt Table Test (TTT) is the gold standard for the diagnosis of vasovagal syncope, if unexplained after initial evaluation

Guidelines for the diagnosis and management of syncope (version 2009)

The Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC)



TILT PHASE (upright position):

- Passive phase (unprovoked, 20-45 minutes)
- Provocation phase (15 minutes)



Brief history of TT ...

Head-up Tilt: a useful test for investigating unexplained syncope

Rose Anne Kenny, John Bayliss, Ann Ingram, Richard Sutton

Head-up tilt, a recognised stimulus to vasovagal syncope, was used to investigate syncope that remained unexplained despite full clinical and electrophysiological assessment in fifteen patients, mean age 65 ± 10 years, who had had 15 ± 19 episodes of unexplained syncope over periods of a week to 26 years. After overnight fast systolic blood pressure and heart rate were continuously monitored during 40° head-up tilt for 60 min. Ten control subjects with no history of syncope were studied similarly in ten patients (67%) and one control vasovagal syncope developed after 29 ± 19 min (p < 0.001). In symptomatic patients systolic blood pressure fell from 150 ± 32 to 56 ± 9 mm Hg (p < 0.001) and heart rate from 62 ± 9 to 38 ± 12 beats per min (p < 0.01). In each case symptoms during the test reproduced those previously experienced. No clinical findings predicted development of syncope during tilt. Baseline systolic blood pressure and heart rate did not differ significantly between patients and controls. Pacemakers were implanted in seven patients who have remained symptom-free since implant (follow-up 10 ± 3 mo).

The Italian Protocol...

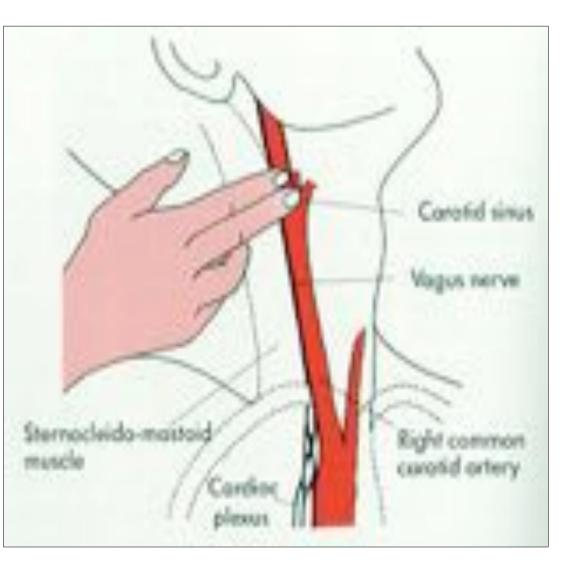
SYNCOPE

'The Italian Protocol': a simplified head-up tilt testing potentiated with oral nitroglycerin to assess patients with unexplained syncope

A. Bartoletti¹, P. Alboni², F. Ammirati³, M. Brignole⁴, A. Del Rosso⁵, G. Foglia Manzillo⁶, C. Menozzi⁷, A. Raviele⁸ and R. Sutton⁹

Chiara Mussi, MD,[‡] Niccolò Marchionni, MD,[†] Giulio Masotti, MD[†] and The Gruppo Italiano di Studio della sincope dell'anziano

Carotid Sinus Massage



Procedure

- ➤ 10 seconds pressure where the carotid artery bifurcates
 - both supine and in the upright position

Moya A. Eur Heart J, 2009 Parry SW. Heart, 2000

Carotid Sinus Massage ...

Responses

Positive response: reproduction of syncope in the presence of asystole longer than 3 seconds and/or a fall in systolic blood pressure > 50 mmHg

Positive responses

Cardio-inhibitory (asystole > 3 sec)

Vasodepressor (BP fall > 50 mmHg)

Mixed

Carotid Sinus Syndrome, CSS (Method of Symptoms): reproduction of syncope in the presence of asystole longer than 3 seconds and/or a fall in systolic blood pressure > 50 mmHg.

Carotid Sinus Hypersensitivity, CSH: asystole > 3 seconds and/or BP fall > 50 mmHg in the absence of symptoms

The diagnostic assessment of syncope is more difficult in elderly patients ...

Difficulties taking medical history and information concerning syncope/falls

Absence of prodromes or atypical presentation of syncope

> Frequent retrograde amnesia

TT and CSM in the elderly:

From Literature...

- TT and CSM have a good diagnostic yield in elderly patients (Ungar, 2006. Del Rosso, 2002)
- The Italian Protocol has been validated in geriatric patients (Del Rosso, 2002)
- TT is safe in older people (Del Rosso, 2002) and in patients with comorbidities (Gieroba, 2004)
 - TT is well tolerated in the elderly (Ungar, 2003. Del Rosso, 2002)
- The CSM is safe in the elderly (Walsh, 2006. Puggioni, 2002. Davies, 1998)

... no previous large studies evaluated TT and CSM in the "oldest old"

Tilt testing in elderly patients ... an old story

Geriatria Universitaria Ospedale Careggi June 1996

Mr. L.B., 93 yo
Two unexplained
syncopes

Head-up tilt test potentiated with glyceryl trinitrate

Was it safe ???



3 Syncope Units

Geriatric Cardiology and Medicine of the University of Florence, Italy Geriatric and Gerontology Institute, University of Modena and Reggio Emilia, Italy Department of Medical Gerontology, Trinity College of Dublin, Ireland

Safety and tolerability of TT and CSM in the oldest old

Aims

- To evaluate safety of TT and CSM in patients aged 80 and older;
 - To identify predictors of complications;
 - To evaluate the tolerability of the neuroautonomic evaluation in the oldest old.

1401 patients referred to our Syncope Units (Florence, Modena, Dublin) were enrolled,

)C

or

Certain o

- √707 < 80 years old (50.5%)
- \checkmark 694 ≥ 80 years old (49.5%)

Indications:

- Unexplained syncope and/or falls
- Differential diagnosis with epilepsy

Treatment

Treatment

Treatment

Outcomes of the neuroautonomic evaluation

	All patients (n=1401)	Age < 80 years (n=707)	Age ≥ 80 years (n=694)	р
Neurally mediated diagnoses, n (%)	852 (60.8)	422 (59.7)	430 (62)	Ns
Positive TT, n (%)	692 (49.4)	371(52.5)	321 (46.3)	0.02
Positive CSM, n (%)	147 (10.5)	68 (9.6)	79 (11.4)	Ns
CSH, n (%)	107 (7.6)	52 (7.4)	55 (7.9)	Ns
Orthostatic Hypotension, n (%)	458 (32.7)	134 (18.9)	324 (46.7)	< 0.0001

Tilt Testing results

Positive TT
$$52.5\% < 80 \text{ yo}$$
 49.4% (n=692) $46.3\% \ge 80 \text{ yo}$

$$p = 0.02$$

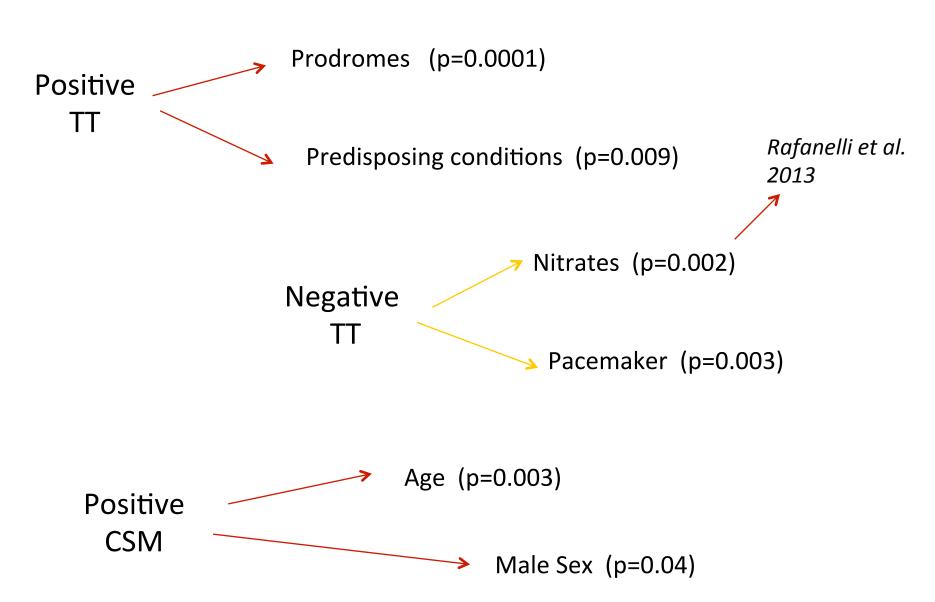
↓	Positive TT (n=692)	Positive TT, age < 80 years (n=371)	Positive TT, age ≥ 80 years (n=321)	p
VASIS I, n (%)	145 (21)	88 (4.0)	57 (4.8)	Ns
VASIS IIA, n (%)	23 (3.3)	14 (3.8)	9 (2.8)	Ns
VASIS IIB, n (%)	56 (8.1)	47 (12.7)	9 (2.8)	0.0001
VASIS III, n (%)	405 (58.5)	198 (53.4)	207 (64.5)	0.003
Exaggerated response to ntg, n(%)	6. (4.4)	28 (4.0)	33 (4.8)	Ns

CSM results

	All patients (n=1401)	Age < 80 years (n=707)	Age ≥ 80 years (n=694)	р
CSH, n (%)	107 (7.6)	52 (7.4)	55 (7.9)	Ns
CSS, n (%)	147 (10.5)	68 (9.6)	79 (11.4)	Ns
		CSS CSS, age	< 80 CSS, age ≥ 80	0 p

	CSS (n=147)	CSS, age < 80 (n=68)	CSS, age ≥ 80 (n=79)	р
Cardio-inhibitory CSS, n (%)	95(64.6)	46 (67.6)	49 (62.0)	Ns
Vasodepressive CSS, n (%)	33 (22.5)	13 (19.1)	20 (25.3)	Ns
Mixed CSS, n (%)	19 (12.9)	9 (13.2)	10 (12.7)	Ns

Multivariate analysis



Complications of neuroautonomic evaluation

CSM (Auscultation of the carotid arteries, eventually) carotid Doppler ultrasound)

no complications (0/1401)

> TT 3.3% of patients (46/1170)

-15 patients < 80 years (2.1%) 31 patients ≥ 80 years (4.5%)

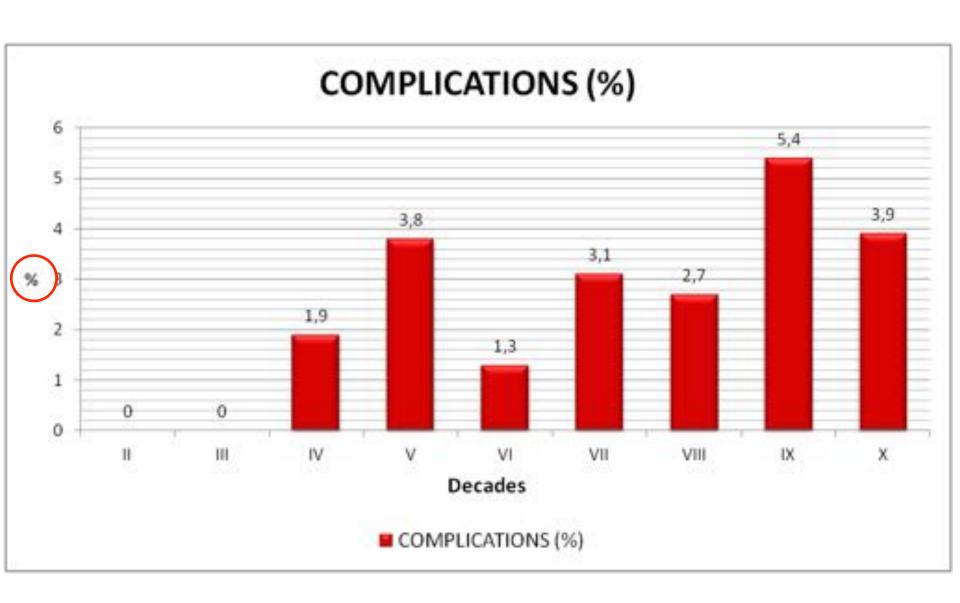
p = 0.01

Mean age 77.2 \pm 12.1 years (71.8 \pm 16.9 years, p=0.03) Orthostatic hypotension (50% vs 32.1%, p=0.01) Venous incompetence (47.8% vs 31.1%, p=0.02)

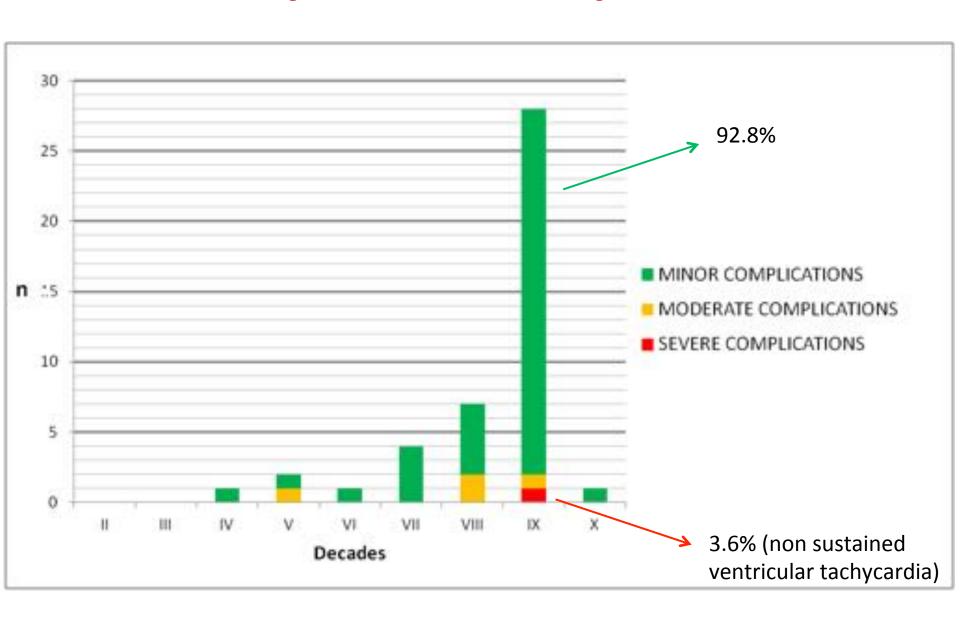
TT complications

Complications Patients with complications , n (%)			
Death	0 (0.0)		
TIA/Stroke	0 (0.0)		Severe
Non sustained ventricular tachycardia	1 (0.07)	_	Complications (0.07%)
Sustained ventricular tachycardia	0 (0.0)		
Ventricular fibrillation	0 (0.0)		
Bradycardia/Asistole (atropine)	2 (0.1)		Moderate
Atrial fibrillation	3 (0.2)		Complications (0.4%)
Mild prolonged hypotension	6 (0.4)]	,
Prolonged hypotension with fluid administration	15 (1.1)		Minor Complications
Minor side-effects	19 (1.4)		(2.9%)

TT complications in different decades



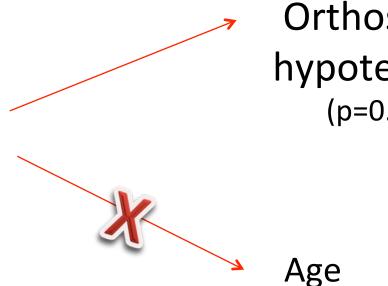
Analysis of TT complications



Predictors of complications

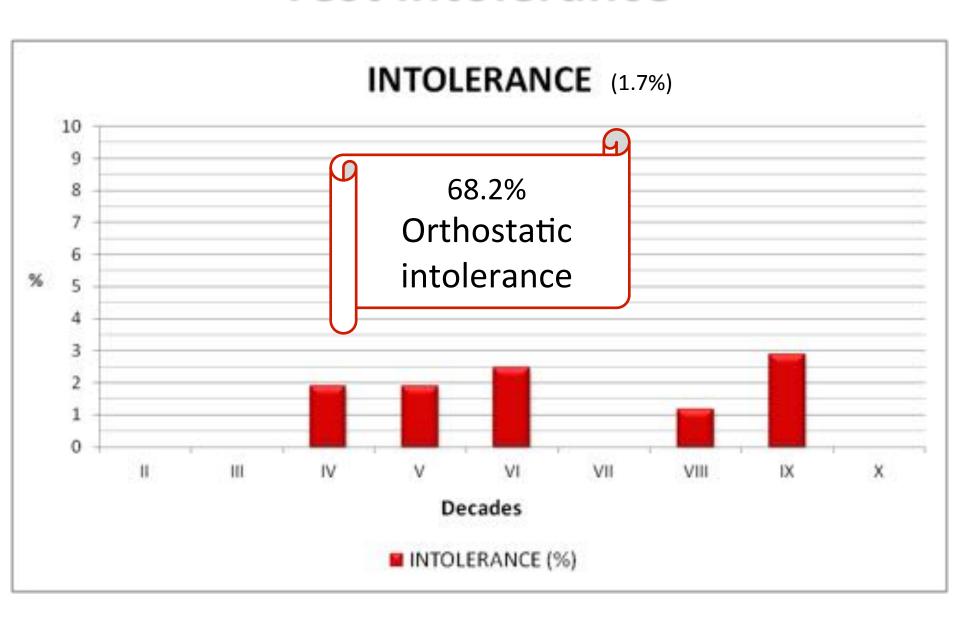
(Multivariate analysis)

TT complications



Orthostatic hypotension (p=0.03)

Test intolerance



Therefore ...

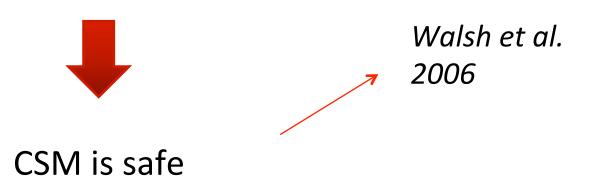


- Complications occurred in 3.3% of patients (86.9% minor complications)
- Minor complications were prevalent in older and younger patients (90% and 80%)
 - Orthostatic hypotension is a predictor of complications
 - 46.7% orthostatic hypotension in patients
 ≥ 80 years

Therefore ...



- No complications
- No neurological complications



Therefore ...



- Low % of intolerance in both groups
- Intolerance rate similar across the decades
 - Mainly due to orthostatic intolerance



Conclusion

- Tilt Testing and Carotid Sinus Massage have a good diagnostic yield in elderly patients
 - Tilt Testing and Carotid Sinus Massage are safe and well tolerated

in the **«Oldest old»**



The "Oldest old" should **NOT** be excluded from neuroautonomic evaluation

