Efficacy of Tilt Training for Recurrent Syncope

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Reflex (Neurally mediated) syncope

• The most common type of syncope
• Pathophysiological mechanism remain uncertain
• Orthostatic stress or emotional stress (vasovagal)
• Autonomic nervous system
Schematic practical decision pathway for the first-line management of reflex syncope

Reflex syncope

Education, life-style measures (Class I)

Severe/recurrent form

Low BP phenotype

Prodromes

Hypotensive drugs

Dominant cardioinhibition

Yes

No or very short

Younger

- Fludrocortisone
- Midodrine (Class IIb)
- Counter-pressure manoeuvre (Class Ila)
- Tilt training (Class IIb)

Older

ILR-guided management in selected cases (Class I); See section 4.2.4

Stop/reduce hypotensive drugs (Class Ila)

Cardiac pacing (Class IIa/IIb) See Figure 10

2018 ESC Guidelines for the diagnosis and management of syncope
Tilt Training

• Orthostatic self-training at home
  • Standing against a wall (20cm from the wall for 30 minutes)

• Tilt training by head-up tilt table in hospital
Orthostatic self-training protocol

• Objectives
  • Enhance orthostatic tolerance
  • Diminish excessive autonomic reflex activity
  • Reduce syncope susceptibility/recurrences

• Technique
  • Prescribed periods of upright posture against a wall
  • Start with 3~5 min BID
  • Increase by 5 min each week until a duration of 30 min is achieved
Tilt training by head-up tilt table

- **Technique**
  - Repeat head-up tilt test (one or two session per day)
  - Target (2~3 consecutive negative tilt response)
Usefulness of a Tilt Training Program for the Prevention of Refractory Neurocardiogenic Syncope in Adolescents
A Controlled Study

Enrico Di Girolamo, MD; Cesare Di Iorio, MD; Luigi Leonzio, MD; Panfilo Sabatini, MD; Antonio Barsotti, MD

• 47 consecutive adolescents with recurrent syncope
• Tilt training (24 patients) vs. control (23 patients)
• Follow-up tilt test after 1 month
• Follow-up duration: 15 months

<table>
<thead>
<tr>
<th></th>
<th>Controls</th>
<th>Tilt Training</th>
<th>$P$</th>
</tr>
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<tbody>
<tr>
<td>Tilt-induced syncope</td>
<td>73.9%</td>
<td>4.2%</td>
<td>&lt;0.0001</td>
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<tr>
<td>Spontaneous syncope</td>
<td>56.5%</td>
<td>0%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
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Circulation 1999;100:1798-1801
The Effect of Orthostatic Training in the Prevention of Vasovagal Syncope and Its Influencing Factors

Hui ZENG,¹ MD, Kanyi GE,¹ Weilun ZHANG,¹ Guang WANG,¹ MD, and Lijun GUO,¹ MD

- 125 consecutive patients with vasovagal syncope
- Tilt training (64 patients) vs. control (61 patients)
- Orthostatic training (6 days a week for at least 4 weeks)
- 1 year follow-up
  - No syncopal recurrence (72.6% vs. 36.1%, P< 0.05)

Home orthostatic self-training is an effective therapy for the prevention of vasovagal syncope
Efficacy of tilt training in the treatment of neurally mediated syncope. A randomized study

Giovanni Foglia-Manzillo\textsuperscript{a,*}, Franco Giada\textsuperscript{b}, Germano Gaggioli\textsuperscript{c}, Angelo Bartoletti\textsuperscript{d}, Gino Lolli\textsuperscript{e}, Maurizio Dinelli\textsuperscript{f}, Attilio Del Rosso\textsuperscript{g}, Mauro Santarone\textsuperscript{a}, Antonio Raviele\textsuperscript{b}, Michele Brignole\textsuperscript{h}

• 68 patients with recurrent neurally mediated syncope
• Tilt training (35 patients) vs. control (33 patients)
• Tilt training (6 days a week for at least 3 weeks)
  • Only 11 patients (34%) performed all the programmed sessions
• Follow-up tilt test
  • Positive rate (59% vs. 60%, $P = \text{ns}$)

No significant difference of tilt test after tilt training
Is Home Orthostatic Self-Training Effective in Preventing Neurally Mediated Syncope?

YOUNG KEUN ON, M.D., Ph.D.,* JUNGWAE PARK, R.N.,* JUNE HUH, M.D., Ph.D.,† and JUNE SOO KIM, M.D., Ph.D.*

From the *Division of Cardiology, Department of Medicine, and †Department of Pediatrics Cardiac and Vascular Center, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

- 42 patients with recurrent neurally mediated syncope
- Tilt training (16 patients) vs. control (17 patients)
- Tilt training (7 days a week for 4 weeks)
- Follow-up tilt test
  - Positive rate (56% vs. 53%, $P = 0.849$)
- 1 year follow-up
  - Syncope or presyncope (42.6% vs. 47.1%, $P = ns$)

Home orthostatic self-training was ineffective in reducing the positive response rate of HUT
The Role of Tilt Training in Preventing Recurrent Syncope in Patients with Vasovagal Syncope: A Prospective and Randomized Study

HAMZA DUYGU, M.D., MEHDI ZOGHI, M.D., UGUR TURK, M.D., SERDAR AKYUZ, M.D., FILIZ OZERKAN, M.D., AZEM AKILLI, M.D., UMIT ERTURK, M.D., REMZI ONDER, and MUSTAFA AKIN, M.D.

From the Medical Faculty, Department of Cardiology, Ege University, Izmir, Turkey

- 82 patients with recurrent vasovagal syncope
- Tilt training (41 patients) vs. control (41 patients)
- Tilt training
  - Every day for one month
  - Alternative day for next 2 months
  - 2 days a week after 3 months

- Follow-up duration (12 ±2 months)
Follow-up Results of Study Population

<table>
<thead>
<tr>
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<th>Group I (n = 41)</th>
<th>Group II (n = 41)</th>
<th>P Value</th>
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</thead>
<tbody>
<tr>
<td>Spontaneous syncope, n (%)</td>
<td>23 (56)</td>
<td>15 (37)</td>
<td>0.1</td>
</tr>
<tr>
<td>Spontaneous syncope recurrence according to the baseline syncope type, n (%)</td>
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<tr>
<td>Vasodepressor type, n (%)</td>
<td>13 (32)</td>
<td>4 (10)</td>
<td>0.04</td>
</tr>
<tr>
<td>Cardioinhibitory type, n (%)</td>
<td>6 (14)</td>
<td>7 (17)</td>
<td>0.6</td>
</tr>
<tr>
<td>Mixed type, n (%)</td>
<td>4 (10)</td>
<td>4 (10)</td>
<td>0.1</td>
</tr>
<tr>
<td>Time to first recurrence, days</td>
<td>50 ± 15</td>
<td>70 ± 20</td>
<td>0.09</td>
</tr>
<tr>
<td>Number of syncope</td>
<td>3 ± 1</td>
<td>2 ± 1</td>
<td>0.4</td>
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Home orthostatic self-training was unable to influence the spontaneous syncope recurrence except for vasodepressor type.
Long-Term Follow-Up Results of Tilt Training Therapy in Patients with Recurrent Neurocardiogenic Syncope

TONY REYBROUCK, HEIN HEIDBÜCHEL, FRANS VAN DE WERF, and HUGO ECTOR

From the Departments of Cardiology and Cardiovascular Rehabilitation, University Hospital Gasthuisberg and Department of Rehabilitation Sciences, University of Leuven, Leuven, Belgium

• 38 patients with recurrent syncope
• In-hospital tilt training by tilt table followed by orthostatic self training
• Follow-up duration: 43 ± 7.8 months
• 29 patients abandoned tilt training at the time of assessment
• 31 (82%) of 38 patients were free from syncope during follow-up
Repeated tilt testing in patients with tilt-positive neurally mediated syncope

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a Department of Cardiology, University Hospital Gasthuisberg, Leuven, Belgium
b Department of Cardiovascular Rehabilitation, University Hospital Gasthuisberg, Leuven, Belgium
c Department of Rehabilitation Sciences, University of Leuven, Leuven, Belgium

- 222 patients with neurally mediated syncope
- In-hospital tilt training by tilt table
- The HUT was repeated day after day (one session per day)
- The target was to obtain 2 consecutive negative tilt tests
- All 222 patients obtained a negative tilt test (mean 2.9 tilt session)
• Follow-up duration: 11.1 ± 10 months
• 163 (80.7%) patients remained free of any events

Repeated tilt testing and prolonged standing training are able to restore baroreflex activity to a level which prevents syncope.
• 119 patients with positive response to HUT
• In-hospital tilt training by tilt table
• The HUT was repeated day after day (two session per day)
• The target was to obtain 3 consecutive negative tilt tests
• Recurrence rate of syncope after In-hospital tilt training
  • 12.6% at 1 year
  • 21.0% at 3 years
  • 24.4% at 5 years

The mean follow-up duration was 22.5 months
Tilt training increases the vasoconstrictor reserve in patients with neurally mediated syncope evoked by head-up tilt testing

Bart Verheyden¹*, Hugo Ector², Andre E. Aubert¹, and Tony Reybrouck³

¹Division of Experimental Cardiology, University Hospital Gasthuisberg, O/N 1, bus 704, Herestraat 49, 3000 Leuven, Belgium; ²Division of Cardiology, University Hospital Gasthuisberg, Leuven, Belgium; ³Research Centre for Cardiovascular and Respiratory Rehabilitation, University Hospital Gasthuisberg, Leuven, Belgium

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• 17 patients with 2 consecutive positive tilt test was enrolled
• In-hospital daily repeated tilted training
• The target was to obtain 2 consecutive negative tilt tests
• Follow-up tilt test was performed at 6 weeks later
Tilt testing appears to restore orthostatic tolerance by increasing the amount of vasoconstriction
Tilt Training

• In highly motivated young patients with recurrent vasovagal symptoms triggered by orthostatic stress

• There is sufficient evidence from multiple trials that tilt training has little efficacy in reducing recurrence of syncope in young patients

• Further research is unlikely to have an important impact
Tilt Training

The usefulness of orthostatic training is uncertain in patients with frequent VVS (IIb, B-R)
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