Postural hypotension in the mechanism of transient ischaemic attacks

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Introduction

- Systemic hypotension is generally accepted as a mechanism for boundary zone (or watershed) stroke
Introduction

- **BUT it is not considered to be important** in the pathophysiology of transient ischaemic attacks (TIAs)
Physiologists have long known that transient hypotension may cause impairment of collateral flow distal to a significant stenosis, resulting in focal ischaemia.
Current teaching is that nearly all TIAs are secondary to emboli from arterial or cardiac sources

And

That spontaneous or provoked systemic hypotension usually produces symptoms of global cerebral ischaemia rather than focal neurological deficits
Introduction

- BUT is this really true?
Pilot Study

- **Jardine et al** recently published a case series
- 8 elderly patients with postural hypotension who presented with TIAs
- All were on hypotensive drugs
- 6 underwent head up tilt testing
- TIAs reproduced in 3
- All improved following a decrease in medication
- 3 other small case series (50 patients)

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Questions

1) What is the incidence of posturally induced TIAs in elderly patients?

2) Can we safely reproduce them on the tilt table?

3) What is the incidence of postural hypotension in this group of patients?
Postural hypotension (PH)

- Is **COMMON** in the elderly and is frequently secondary to **medication**
- Particularly during initiation of treatment
- **Worst offenders:**
  - Doxazosin (alpha blocker)
  - Labetolol (alpha, beta blocker)
  - ACE inhibitors, beta blockers

Method

- Patients 65 years and over were recruited from the emergency department, medical wards and neurology clinics.

- **Inclusion criteria:**
  - Anterior circulation TIA
  - Sinus Rhythm
  - Well enough to sign consent and undergo tilt
Method

- After consenting a questionnaire which included recent neurological symptoms, postural symptoms and medication was completed

- Assessed whether lying and standing BP was recorded by medical staff
Method

- Patients underwent 70 deg head up tilt testing with continuous systolic BP (SBP) monitoring using photoplethysmography

- A precursory neurological examination was performed
If patients were not hypotensive after 15 min of tilt sublingual nitroglycerine (GTN) spray was administered to induce hypotension.

Patients carefully observed for focal neurological symptoms and signs.
Method

- Patients were returned rapidly to the horizontal position in the event of **focal neurological changes or impending syncope**

- Neurological examination was repeated while hypotensive
Method

- Changes were made to hypotensive medication if symptomatic hypotension was demonstrated

- Patients were followed up at an outpatient clinic approximately 3 months after tilt
Results (whole group)

- 69 patients (39M/30F)
- Average age: 76 years (65-92)
- 57 patients (83%) were on hypotensive drugs
- Prior lying and standing BP was documented in only 26 (38%)
Tilt results (whole group)

- Mean supine systolic BP (SBP) 141mmHg (94-208)
- Mean BP at 5min of tilt 140mmHg (59-230)
- Mean SBP nadir 74mmHg (30-159)
Tilt results

- TIA symptoms reproduced in 8/69 patients (12%)
- 5/8 history of documented postural hypotension pre tilt
- All were on hypotensive drugs
- Previous cerebrovascular disease in 6
- Focal neurology: mostly limb symptoms (4 leg weakness, 1 arm weakness, 1 arm altered sensation, 1 expressive dysphasia and 1 diplopia)
- Duration of symptoms: 90 seconds to 15 minutes
- At F/U 1/8 patients had another event
Comparing Tilt negative (61 patients) vs. Tilt positive group (8 patients)

- Tilt + group were older – 80 yrs vs. 76 yrs

- No statistical significance in difference in supine SBP, SBP at 5 mins or nadir SBP during tilt

- 49 of Tilt – group were on hypotensive drugs

- Tilt + group were on 2.4 hypotensive drugs vs. 1.7
Conclusion

1) We were **safely** able to reproduce TIA's in 12% of patients by tilt induced hypotension

2) This is consistent with our hypothesis that TIA's may occur secondary to low flow rather than by embolic mechanism
Conclusion

3) PH not routinely assessed and not commonly seen during early tilt

4) Tilt testing is useful to confirm the diagnosis but we are not sure how sensitive it is
Conclusion

5) Postural hypotension may be an under-recognised treatable cause of TIAs in the elderly
Recommendations

1) Postural hypotension should be routinely assessed

2) If shown to have postural hypotension their medication should be reviewed
Acknowledgements

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Is OH a risk factor for stroke?

- A study done on 11707 middle aged people followed up for 7.9 years (Atherosclerotic risk in Communities Study, 1987 - 1996) provides evidence that orthostatic hypotension (OH) is a risk factor for stroke
Sensitivity and specificity of HUT

- Sensitivity depends on your selected population:
  - 50 – 60% in neurocardiogenic syncope
  - >75% in autonomic impairment
  - Almost 100% in POTS
  - Specificity 92% in first group
Reproducibility of HUT

- Positive test 50 – 80%
- Negative test 95%
Postural hypotension

- Tilt positive group: 5/8 (62.5%)
- Tilt negative group: 7/61 (11.5%)
- But not routinely assessed
Significant carotid stenosis

- Tilt positive group: none
- Tilt negative group:
  - >70% stenosis --- 2 patients ---- 1 proceeded to stenting
  - 60 – 69% stenosis --- 4 patients --- 1 proceeded to endarterectomy and 1 to stenting
Questions:

1. What Ethnic group do you see yourself part of? ________________________________
2. How many of the attacks that brought you into hospital have you had? ________________
3. Is there any particular time of the day/activity during which these attacks occur? ___________________________________________________________________
4. And over what period of time have you experienced them? _____________________________
5. Have you ever fainted? YES / NO. If you have fainted, how frequently does it happen? ___________________________________________________________________
6. Do you get light headed when you stand up from a sitting position? YES / NO
7. Do you fall over for no reason? YES / NO.
8. Have you had a stroke? YES / NO.
9. Are you on treatment for high blood pressure? YES / NO.
10. Do you have prostatism (an enlarged prostate)? YES / NO.
11. What medication are you taking and what doses? ________________________________________________________________________
• Have there been any changes to your medication over the last month? YES / NO.

• What tests have you had done?
  - Blood sugar YES / NO.
  - Cholesterol YES / NO.
  - ECG YES / NO.
  - CT head scan YES / NO.
  - MRI head scan YES / NO.
  - Carotid ultrasound YES / NO.

• If so, what changes have been made?
  ____________________________________________________
  ____________________________________________________
  ____________________________________________________
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Other references

- Heart 2000; 83: 564-569
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- Circulation. 1998; 98: 2290-2295