

A lady who can't stand up

Inter-Hospital Geriatrics Meeting

26-8-2011

Dr Man Shiu Piu

NTWC

Madam Ho

- 89 years old
- Lives with family, walks with stick, ADL-I.
- Non-drinker
- Past health:
 - Labelled IHD since 1998. ECG: NSR, no ischaemic change. Aspirin, Isordil and simvastatin. No formal stress test, never admitted for ACS
 - Thrombocytopenia since 2003, plt ~100, prefer observation, treated as ITP

FU POH Medical

- Alternating constipation and diarrhoea since second half of 2010
 - Loose stool, no blood, no subjective weight loss, no fever, no travel, no OTC med use
- No urinary symptoms
- Impaired visual acuity despite wearing corrected glasses from optometrist
- Postural dizziness
 - Not vertigo

- Admitted to Hospital X in 4/2011 for syncope while sitting
- Regained full consciousness after 1-2 minutes after putting in supine position
- CT brain: periventricular hypodensity
- Holter: Sinus. Short run of SVT. Longest RR interval 1.46 sec.
- Discharged and given to Memo to POH

- Repeated admissions (three times) in 4/2011 for dizziness
- Supine BP 120/55mmHg, Erect BP (3min) 95/50mmHg
- Offered walking exercise, discharged
- Mainly confined to chair in this year, cared by maid

Investigation in private sector

- Stool: no growth, no ova and cyst, no blood
- TSH: normal
- OGD in 4/2011: mild gastritis
- Colonoscopy in 4/2011: normal, no polyp/mass, no biopsy taken

- Admitted to Hospital X in 5/2011 for diarrhoea with loose stool and vomiting
- AXR: dilated bowel
- CT abdomen and pelvis (contrast):
 - Dilated small bowel and colon down to splenic flexure
 - No mass
- Resolved on conservative treatment

- Repeated episodes of UTI by enterobacter species
- Treated with antibiotics

- Admitted to Pok Oi Hospital on 28/5/2011 for recurrent syncope for 1 day
- 7 episodes when she tried to stand up
- Regained consciousness shortly after putting in supine position
- Diarrhoea with loose stool for 1-2 days
- No other symptoms
- No recent use of OTC med or new symptoms

- Physical examination:
 - BP: 110/55 (S), P 52, BP 89/53 (E), P 53
 - Dehydrated clinically (dry mucosa, dry skin)
 - Normal cognitive function
 - No pupillary light reflexes, VA: can read bed number on the opposite wall, gaze normal
 - No parkinsonism features
 - Power full and symmetrical
 - Reflexes on upper and lower limbs normal
 - No cerebellar signs
 - No reduction in heart rate/BP and symptoms reproduced with carotid massage (no contraindication, under cardiac monitoring)

Investigation

- Hb 12 g/dL, NcNc
- LFT: normal
- RFT: Na 142 mmol/L and K normal. Urea 4.8mmol/L, Cr 85umol/L
- Random glucose 4.9 mmol/L
- HbA1c 5.2
- Cortisol level at 9am: normal
- Post-voiding residual volume: 220ml

- Echo:
 - Dilated LA and LV, EF 69%, moderate AR with thickened
- Holter:
 - Heart rate: 46-141 bpm
 - Occ runs of atrial fibrillation with fast ventricular response
 - No long pause detected

Diagnosis

- Orthostatic Hypotension
- Orthostatic syncope, Precipitated by Volume depletion

Management

- Intravenous fluid
- BP 100-120/40-55mmHg
- Fludrocortisone 50mcg daily from 4/6/2011
- BP 110-140/46-60
- Still have postural dizziness, can't walk
- Midodrine 2.5mg tds added since 8/6/2011

"Modified Early Warning Scores" (MEWS)

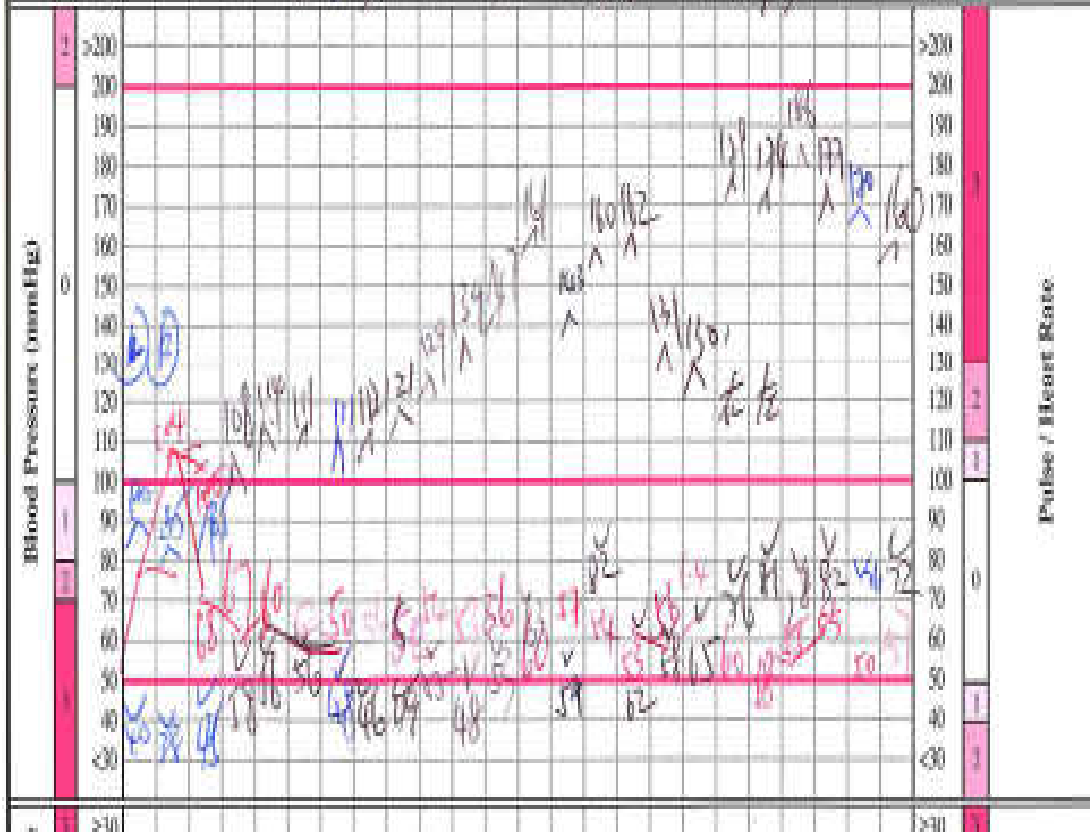
D
H
HXL101431200
28/05/2017 23:12
TNCV 3 MC
EP1

Frequency	
Date	28/5/17
Time	07:30, 08:00, 08:30, 09:00, 09:30, 10:00, 10:30, 11:00, 11:30, 12:00, 12:30, 13:00, 13:30, 14:00, 14:30, 15:00, 15:30, 16:00, 16:30, 17:00, 17:30, 18:00, 18:30, 19:00, 19:30, 20:00, 20:30, 21:00, 21:30, 22:00, 22:30, 23:00, 23:30

BW _____ kg
Albumin _____
Sugar _____
Ketone _____ (optional)

40	
0	0

Multistix (Urine)
pH Alert



Integrated

Midodrine reduced 2.5mg BD

L.O.	1	V	1	Verbal
	0	A	0	Alert
Blood Pressure (mmHg)	2	>200	>200	Pulse / Heart Rate
	1	200	200	
	1	190	190	
	1	180	180	
	1	170	170	
	1	160	160	
	1	150	150	
	1	140	140	
	1	130	130	
	1	120	120	
1	110	110		
1	100	100		
1	90	90		
1	80	80		
1	70	70		
1	60	60		
1	50	50		
1	40	40		
1	<30	<30		
Resp. Rate	2	≥30	≥30	beat per minute
	2	21-29	21-29	
	1	15-20	15-20	
	0	9-14	9-14	
	2	<9	<9	
MEWS Total				
SpO ₂ %	95 96 98 98 97 96 97 98 97 98 98			Pregnancy Test <input type="checkbox"/> ve Date on _____
O ₂	RA RA RA RA RA RA RA RA RA RA RA			
B.O.	RA RA RA RA RA RA RA RA RA RA RA			

Integrated Oh

MR 400074/NTWC

Readmitted for postural dizziness
again in 7/2011 after 1 day of
diarrhoea

Complications

AROU

Foley's catheter was inserted,
600ml of urine drained, no
evidence of UTI



Midodrine was stopped

Salient features

Postural dizziness with documented orthostatic hypotension

Alternating bowel symptoms

Retention of urine

Lack of pupillary light reflexes

No rise in heart rate with erect posture

Presentation suggestive of

Autonomic failure

What should we do?

Review of Orthostatic Hypotension

- Postural/Orthostatic hypotension (OH) is common
 - over 65 years: 20%
 - over 85 years: 30%
- Accounts for 30% of cases of syncope in elderly
- Defined as fall in SBP ≥ 20 mmHg or DBP ≥ 10 mmHg within 3 min of standing

NEJM 2005;352:1004-10

consensus statement on the definition of orthostatic hypotension, pure autonomic failure, and multiple system atrophy. Neurology 1996;46:1470

Pathophysiology

- Cerebral autoregulation within mean arterial pressure 60-140mmHg
- Standing results in pooling of 500 to 1000ml of blood

Pathophysiological basis of orthostatic hypotension. J Physiol 1999;519:1-10

Baroreflex failure

- “Blackout”: collapse of retinal perfusion (no autoregulation in eye)

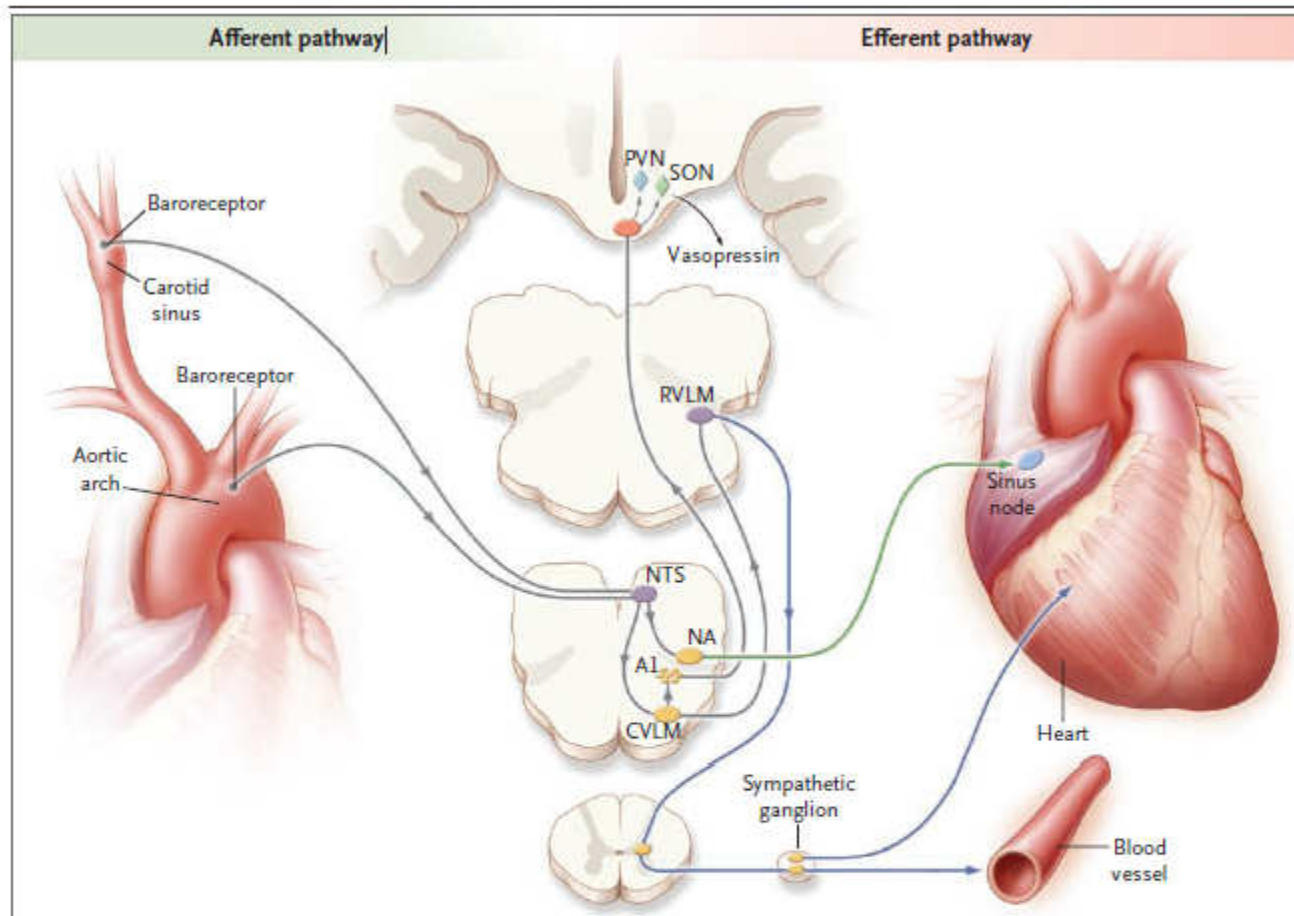


Figure 1. The Baroreflex.

A decrease in arterial pressure unloads the baroreceptors — the terminals of afferent fibers of the glossopharyngeal and vagus nerves — that are situated in the carotid sinus and aortic arch. This leads to a reduction in the afferent impulses that are relayed from these mechanoreceptors through the glossopharyngeal and vagus nerves to the nucleus of the tractus solitarius (NTS) in the dorsomedial medulla. The reduced baroreceptor afferent activity produces a decrease in vagal nerve input to the sinus node that is mediated by the neuroanatomical connections of the NTS to the nucleus ambiguus (NA). There is an increase in sympathetic efferent activity that is mediated by the NTS projections to the caudal ventrolateral medulla (CVLM) (an excitatory pathway) and from there to the rostral ventrolateral medulla (RVLM) (an inhibitory pathway). The activation of RVLM presympathetic neurons in response to hypotension is thus predominantly due to disinhibition. In response to a sustained fall in blood pressure, vasopressin release is mediated by projections from the A1 noradrenergic cell group in the ventrolateral medulla. This projection activates vasopressin-synthesizing neurons in the magnocellular portion of the paraventricular nucleus (PVN) and the supraoptic nucleus (SON) of the hypothalamus. Blue denotes sympathetic neurons and green parasympathetic neurons.

- Causes of OH

- Decreased intravascular volume

- Dehydration, salt deprivation, severe hypoalbuminaemia, adrenal insufficiency

- Autonomic dysfunction:

- CNS: Parkinson's disease, MSA, LBD, Pure Autonomic Failure, Autoimmune Autonomic Neuropathy
 - PNS: Drugs, DM, alcoholism, amyloidosis, Vitamin B12 deficiency

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 - Decreased intravascular volume
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Pure autonomic failure (PAF)

- Synucleinopathy
- Lewy bodies and loss of cells in the intermediolateral column of the spinal cord, and a loss of catecholamine uptake and catecholamine fluorescence in sympathetic postganglionic neurons
- Greatly reduced levels of catecholamines
- Diagnostic test:
 - Cardiac SPECT with sympathomimetic amine ^{123}I -MIBG: impaired MIBG uptake
- Prognosis: Good, mortality not increased

Evaluation

- Hydration status
- Drug history
- Exclude reduced cardiac output, endocrine disorders

Evaluation

- Autonomic tests
 - Performed in specialised centres
 - Functional assessment of
 - parasympathetic nervous system: HR change with respiration and Valsalva maneuver
 - Sympathetic nervous system: thermoregulatory sweat response, quantitative sudomotor axon reflex test
 - Diagnose asymptomatic abnormalities

Bedside autonomic tests

Test	Normal response	Part tested
1. HR response to standing: Check R-R interval on ECG at 30 and 15 s after standing up	30:15 \geq 1.04	Vagal afferent and efferent limbs
2. HR variation during deep breathing	Max – min HR \geq 15 beats/min <10 beats/min(abnormal)	Vagal afferent and afferent limbs
3. HR variation during deep breathing: Check longest R-R during expiration (E) and shortest R-R during inspiration (I)	E:I >1.2	Vagal afferent and efferent limbs
4. Isometric exercise: Check rise in DBP after sustained handgrip	Rise in DBP >15 mm Hg	Sympathetic efferent limb
5. Valsalva manoeuvre: Expiration against a closed glottis	Phase I: rise in BP Phase II: gradual fall in BP : tachycardia Phase III: fall in BP Phase IV: overshoot in BP : bradycardia	Sympathetic afferent and efferent limb Vagal efferent
6. Valsalva ratio: Tachycardia in phase II/ bradycardia in phase IV	\geq 1.4	Vagal afferent and efferent limbs

BP, blood pressure; DBP, diastolic blood pressure; HR, heart rate.

Management

- Goal:
 - Relieve symptoms without inducing severe supine hypertension (185/110mmHg)

The Lancet Neurology, Volume 7, Issue 5, Pages 451 - 458, May 2008

- Non-pharmacological
- Pharmacological

Non-pharmacological

- As important as pharmacological
- Vasopressors are ineffective in hypovolaemia
- Educate patients on orthostatic stress

Non-pharmacological

Adequate salt and fluid intake

- Fluid:
 - 1.5-2.5L/day
- Salt
 - 24 hour urinary sodium > 170mmol

Water Drinking as a Treatment for Orthostatic Syndromes

John R. Shannon, MD, Andre Diedrich, MD, Italo Biaggioni, MD, Jens Tank, MD, Rose Marie Robertson, MD, David Robertson, MD, Jens Jordan, MD

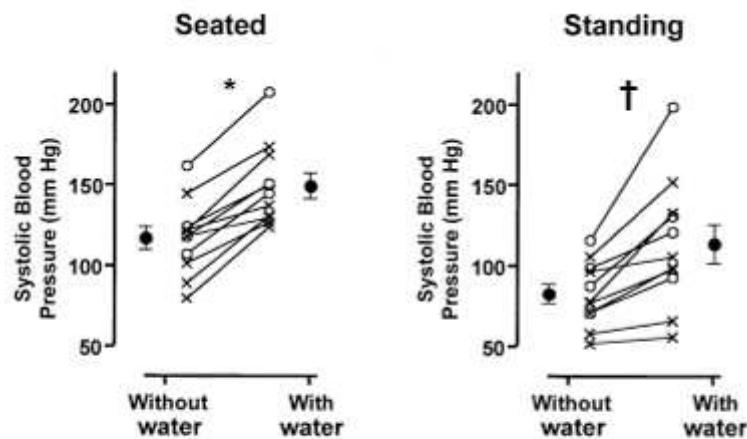


Figure 1. Seated and standing systolic blood pressure in 11 patients (patients 1 to 11 in Table 1) with primary autonomic failure before drinking and 35 minutes after drinking 480 mL of tap water. Seated and standing systolic blood pressure increased substantially with water drinking. Crosses (x) represent pure autonomic failure; empty circles (○) represent multiple system atrophy; filled circles (●) represent mean value \pm SEM; the asterisk (*) indicates $P < 0.001$; the dagger (†) indicates $P < 0.01$.

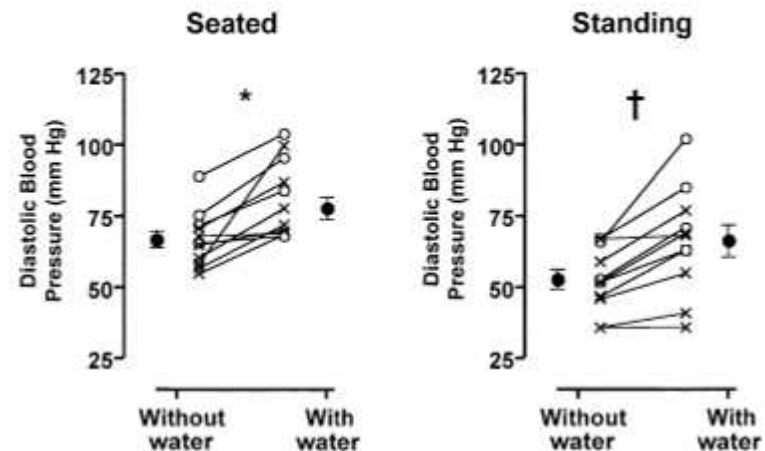


Figure 2. Seated and standing diastolic blood pressure in 11 patients (patients 1 to 11 in Table 1) with primary autonomic failure before drinking and 35 minutes after drinking 480 mL of tap water. Seated and standing diastolic blood pressure increased substantially with water drinking. Crosses (x) represent pure autonomic failure; empty circles (○) represent multiple system atrophy; filled circles (●) represent mean value \pm SEM; the asterisk (*) indicates $P < 0.001$; the dagger (†) indicates $P < 0.01$.

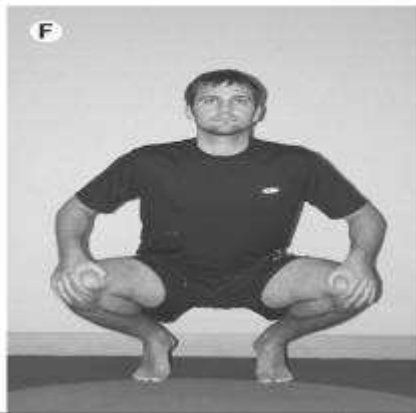
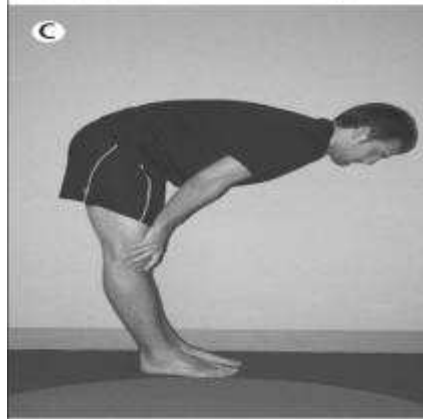
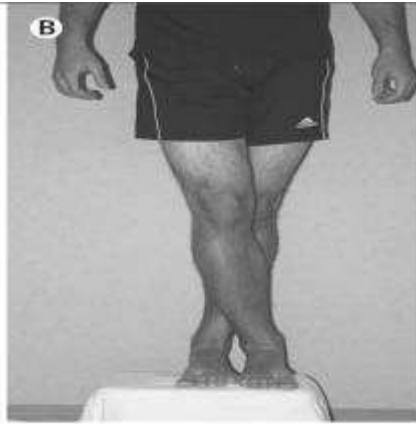
Non-pharmacological

Physical maneuvers



Physical counter maneuvers:

Presumed mechanism of action is reduced vascular capacitance leading to increased total peripheral resistance



Physical manœuvre

- Waist-high lower limb elastic stockings
- Abdominal binders
- Problem:
 - Troublesome, discomfort
 - Can increase the susceptibility to OH when not in use

Non-pharmacological

Sleeping Head Up (SHU)

- Elevate head of the bed by ~ 10cm
 - Reduce nocturia
 - Reduce supine hypertension
 - ?improve orthostatic hypotension

The effect of sleeping with the head of the bed elevated six inches on elderly patients with orthostatic hypotension: an open randomised controlled trial

Age and Ageing 2011; 40: 187–192

No improvement in orthostatic hypotension

Non-pharmacological

Physical maneuvers

Pharmacological

Midodrine

Midodrine

- First drug proven by double-blind placebo-controlled trial
- Alpha 1 agonist
- 5 to 30mg per day
- Onset: 0.5-1hr, last for 2-4 hour
- Not to give after 1800
- Precaution: supine hypertension, urinary retention, constipation, PVD
- Contraindicated: severe organic heart disease, acute renal disease, urinary retention, pheochromocytoma or thyrotoxicosis.

Pharmacological

Fludrocortisone

Fludrocortisone

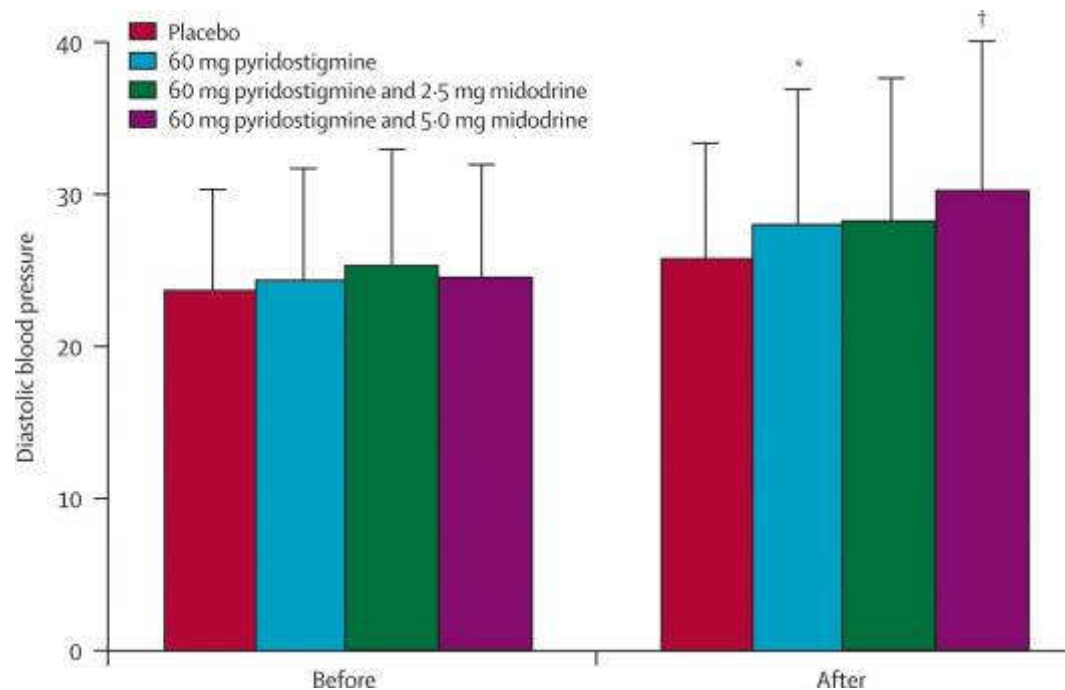
- Expands plasma volume
- Increase sensitivity of alpha adrenergic receptors
- Start at 0.1mg daily, increase by 0.1mg every week till development of trace pedal oedema/1mg per day is reached

Pharmacological

Pyridostigmine

Pyridostigmine

- Enhance acetylcholine mediated autonomic ganglionic transmission
- Supported by RCT (58 patients)
- Effect is limited



What we have done

- Advise adequate salt and fluid intake
- Avoid orthostatic stress:
 - rapid change in posture, prolonged recumbency, hot bath, heavy meal
- Advise to sleep head-up
- Step up Fludrocortisone 150mcg Daily
- BW 39.9 kg → 41.5kg

Bedside autonomic tests

Test	Normal response	Part tested
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30:15 =1

5mmHg increase

BP, blood pressure; DBP, diastolic blood pressure; HR, heart rate.

- Colonoscopy repeated: normal, biopsy: no evidence of microscopic colitis/amyloidosis
- Will arrange capsule endoscopy to rule out small bowel lesion
- PET-CT: no evidence of malignancy

Ref. : PCH/MC

Collect Date : 14/08/11
 Collect Time : 12:15
 Arrive Date : 14/08/11
 Arrive Time : 12:41
 Request No. : CP184371
 Urgency : --

Reference
Range Units

Urine Catecholamines Group

Urine Volume 1.88 L
 Ur. NorAd <5
 Ur. Ad 13 L
 Ur. Creatinine 4.2 L

Footnotes:

- § - Sex/Age related range given
- LEGEND - Ur. Ad = Urine Adre
- Ur. NorAd = Urine Nora

Collect Date : 04/08/11
 Collect Time : 17:02
 Arrive Date : 04/08/11
 Arrive Time : 17:25
 Request No. : CP184364
 Urgency : --

Reference
Range Un

URINE

Urine Volume p.73
 Ur. Sodium 207 30 - 300 mmol/L
 Ur. Creatinine 3.7 L 5.3 - 15.9mmol/L
 Cr. Clearance 51 L 75 - 115ml/min

Footnotes:

- § - Sex/Age related range given
- CrCl - Sex related range given.
- Ur. Cr. - Sex related range given for 24 hour urine creatinine.



1 piece: Na 220mg

ORAL MAINTENANCE SALTS

Per packet contains

Sodium Chloride	0.440 g
Trisodium Citrate dihydrate	0.735 g
Potassium Chloride	0.375 g
Magnesium Gluconate	0.250 g
Glucose, anhydrous	4.500 g

GLUCOLYTE

POWDER FOR ORAL SOLUTION



Manufactured by
PASCUAL LABORATORIES, INC.
Balagtas, Bulacan, Philippines

She can now walk again

Take Home Message

- Orthostatic hypotension is common and its symptoms can be severe and distressing
- Fluid and salt intake is as important as pharmacological treatment
- Beware of side effect of Midodrine in elderly