

POSTPRANDIAL HYPOTENSION



“Dante & Virgil Among the Gluttons”, woodcut print, 1867, Gustave Doré.

I am in the third circle, of eternal, hateful rain, cold and leaden, changeless in its monotony.....

Dante Alighieri, The Inferno, VI, 7-9 (1306-1317)

*While the one spirit said this
the other wept, so that for pity
I swooned as if in death.
And down I fell as a dead body falls.*

*With my returning senses that had failed
before the piteous state of those two in-
laws,
which had confounded me with grief,*

*new torments and new souls in torment
I see about me, wherever I may move ,
or turn, or set my gaze.*

*I am in the third circle, of eternal,
hateful rain, cold and leaden,
changeless in its monotony.*

*Heavy hailstones, filthy water, and snow
pour down through bloomy air
The ground it falls on reeks.*

*Cerberus, fierce and monstrous beast,
barks from three gullets like a dog
over the people underneath that muck*

*His eyes are red, his beard a greasy black,
his belly swollen. With his taloned hands
he claws the spirits, flays and quarters
them.*

*The rain makes them howl like dogs.
The unholy wretches often turn their
bodies,
making of one side a shield for the other.*

*When Cerberus - that great worm - noticed
us,
he opened up his jaws and showed his
fangs.
There was no part of him he held in check.*

*But then my leader opened up his hands,
picked up some earth, and with full fists
tossed soil into the ravenous gullets.*

As the dog that yelps with craving

*grows quiet while it chews its food,
absorbed in trying to devour it,*

*the foul heads of the demon Cerberus were
stilled,
who otherwise assaults the ears of souls
so heavily they would as soon be deaf.*

*We were passing other shades sprawled
under heavy rain, setting our soles
upon their emptiness, which seems real
bodies.*

*All of them were lying on the ground,
except for one who sat bolt upright
when he saw us pass before him.*

*“O, you who come escorted through this
Hell!”
he said, “if you can, bring me back to mind
You were made before I was undone”.*

*And I to him, “The punishment you suffer
may be blotting you from my memory:
it does not seem to me I’ve ever seen you.*

*“But tell me who you are to have been put
into this misery with such a penalty
that none, though harsher, is more
loathsome”.*

*And he to me, “Your city, so full of envy
that now the sack spills over,
held me in its confines in the sunlit life.*

*“You and my townsmen called me Ciacco.
For the pernicious fault of gluttony,
as you can see. I’m prostate in this rain.*

*“And in my misery I am not alone.
All those here share a single penalty
for the same fault”. He said no more.*

***Dante Alighieri, The Inferno, V 139-42 &
VI, 1-57 (1306-1317)***

After encountering the damned souls of the lovers Paolo Malatesta and Francesca da Rimini in the Second Circle of Hell Dante collapses in state of emotional exhaustion, “*I swooned as if in death*”. Dante describes sudden collapses at a number of points throughout the “Divine Comedy” - so visceral are his descriptions that some commentators have put forth the hypothesis that he may have suffered from epilepsy, although there is no direct evidence for this, more likely is simply the brilliance of his writing.

The manner of his transition from Circle to Circle in Hell, from Terrace to Terrace in Purgatory or from Sphere to Sphere in Paradise is sometimes clear but often it is not. Some are accompanied by periods of exhausted sleep, others following a collapse, though it is clear that one way or another his guides Virgil or Beatrice have magically transported him. Following one such “swoon”, in the Second Circle of Lust he awakens to find himself in an even worse place; the Third Circle of the damned souls of the Gluttonous. It is a fearful place of relentless rain, hail and dirty snow - this part of the Dantean Hell was ice - cold. In life the gluttonous thought only of their bodily comfort, and so in Hell they are deprived of any physical comfort- they freeze as naked “shades” in filthy ice cold muck.

Within the Third Circle dwells Cerberus, the terrifying three headed Hound of Hell, who tortures the damned souls by his incessant thunderous howling, he “*assaults the ears of souls so heavily they would as soon be deaf*”. But more horrifically he bites into them lacerating and quartering them, following which they are remade whole again, only to suffer the same fate over and over and over for all eternity. In life they consumed without restraint, in Hell they are themselves consumed.

In the modern (western) age of ungoverned consumerism and urge for instant gratification the “sin” of gluttony seems incongruous. But this is to misunderstand the history of most the human condition up until the second half of the Twentieth century. Putting food onto the table was the daily preoccupation with the vast majority of the world’s population - eat or starve to death was a basic tenet on the Human condition. In most religions thanks to a deity for food was gratitude for survival for another day - a perspective lost on modern sensibilities. One of the seven medieval deadly sins therefore was the shameful sin of gluttony. When loved excessively food becomes an end in itself, leading the soul away from spiritual matters and away from God. In the medieval hierarchy of the seriousness of sins it was not excessively serious ranking second bottom. Gluttony is one of the three sins of material desire - or sins of the flesh - lust, gluttony and avarice in that order. The other four sins were those of the spirit - and so much more serious - in order sloth, anger, envy and pride, the most deadly sin of all.

Since the apple (i.e food) was offered by Eve to Adam, gluttony also has sexual (or aphrodisiac) implications that link it causatively to lust - hence the mediaeval obsession with fasting as a means to salvation. In the Divine Comedy, the gluttonous damned are punished in the Third Circle of Hell, whilst those in Purgatory are expiated of their gluttony on the Sixth Terrace. There is also Biblical resonance in Dante’s guide through Hell, Virgil’s quieting Cerberus with a handful of dirt. Dante is terrified when Cerberus suddenly notices the travellers; “*When Cerberus - that great worm - noticed us, he opened up his jaws and showed his fangs. There was no part of him he held in check*”

Just as God condemned the serpent who tempted Eve, in Genesis, “And dust you shall eat all the days of your life”, the serpents punishment for having urged Eve to eat the fruit of the Tree of Knowledge, is to eat the dead earth, is now a punishment shared by the Hound of Hell - “But then my leader opened up his hands, picked up some earth, and with full fists tossed soil into the ravenous gullets. As the dog that yelps with craving grows quiet while it chews its food, absorbed in trying to devour it, the foul heads of the demon Cerberus were stilled...”

For the first time in Hell, Dante is recognized by the one of the souls of the damned, “O, you who come escorted through this Hell!”, His name is Ciaccio, one of many Florentines that he encounters in the afterlife, the vast majority of whom are in Hell. So horrifically changed are the souls by their ordeals in Hell or in Purgatory Dante rarely recognizes them at first, “The punishment you suffer may be blotting you from my memory: it does not seem to me I’ve ever seen you”. Even on the Sixth Terrace of Purgatory, those still with an ultimate chance of salvation, appearances are so vilely deformed he fails to recognize his old friend Forese Donati.

For those who indulge in the deadly sin of ungoverned gluttony, an Earthly punishment awaits them in their elderly years, that of post-prandial hypotension. This is a much unrecognized condition, but in fact is relatively common. And it is not a benign condition - being an independent risk factor for mortality. If the elderly gluttonous are not perturbed by this, then perhaps they may change their ways by a consideration of what may await them in the afterlife!



“But then my leader opened up his hands, picked up some earth, and with full fists tossed soil into the ravenous gullets...”

“Dante & Virgil Among the Gluttons”, woodcut print, 1867, Gustave Dore.

POSTPRANDIAL HYPOTENSION

Introduction

Postprandial hypotension is a condition in which there is a systolic blood pressure drop of > 20 mm Hg in a supine or sitting position **within 2 hours** after **eating a meal**.

Postprandial hypotension is a very **under-recognized** condition, even though it is **relatively common** in **geriatric** populations

Complications can be significant, including:

1. Injuries from syncope

Or occasionally in severe cases:

2. ACS
3. TIA
4. Stroke

Postprandial hypotension is an *independent* predictor of mortality.

There is no specific treatment for postprandial hypotension and so treatment consists of risk reduction in at risk patients.

History

Postprandial hypotension was first described by Seyer-Hansen in 1977 in a patient with severe Parkinson's disease.

Epidemiology

Postprandial hypotension is common in the **elderly**.

Among elderly residents of nursing homes, in one study, up to 36 % of patients had a 20 mmHg or greater fall in systolic blood pressure within 75 minutes after eating a meal.¹

In another series of 401 consecutive elderly patients with hypertension 73 % were found to have a 20 mmHg or greater fall in systolic blood pressure within 2 hours after a meal.¹

Pathophysiology

The aetiology of postprandial hypotension is uncertain.

Splanchnic vasodilatation after a meal is the most important factor for post prandial hypotension. Sympathetic activity after a meal should increase 2 to 3 times to prevent post prandial hypotension.

Current theory holds that there is an **inadequate sympathetic compensation** to meal-induced pooling of blood in the splanchnic circulation, leading to impaired venous return and a consequent fall in cardiac output.

Other possible contributors include vasodilatation induced by:

- Insulin

Or

- Vasoactive gastrointestinal peptides.

Risk factors include:

1. Elderly
2. Hypertension
3. Intravascular volume depletion
4. Medication related:
 - Anti-hypertensive medications
 - Psychotropic medications
 - Diuretics
5. Other causes of autonomic failure in particular:
 - Diabetic autonomic neuropathy
 - ♥ In particular type 2 diabetes mellitus.
 - Parkinson's disease
6. Type of meal
 - Carbohydrate-rich meals

Carbohydrate-rich meals cause more postprandial hypotension than meals comprised mostly of fat or protein. This is possibly secondary to increased amounts of insulin with its corresponding vasodepressor effect.

- Warm meals

Warm meals (50°C) appear to cause a greater decrease in postprandial blood pressure than meals served cold (5°C).

- Breakfast and lunch

Postprandial hypotension can occur after any meal, but **breakfast** and **lunch** (as opposed to **dinner**) appear to be associated with the most pronounced decrease in blood pressure, resulting in more severe symptoms. It is not clear why these meals are associated with the greatest degree of postprandial hypotension, but it is not likely due to meal composition or drugs

Higher early morning blood pressure is associated with larger decreases in postprandial blood pressure, but these changes have not been correlated with symptoms.

Orthostatic hypotension, at one time thought to be a risk factor for postprandial hypotension, appears instead to be additive rather than synergistic with postprandial hypotension.

Complications:

These can include:

1. Injuries from syncope

Or occasionally in severe cases:

2. ACS
3. TIA
4. Stroke

Postprandial hypotension is an *independent* predictor of mortality.

Clinical features

Classically, postprandial hypotension has been defined as:

- A decrease in systolic blood pressure of ≥ 20 mm Hg

Or

- A decrease below 90 mm Hg from a pressure of 100 mm Hg

within 2 hours after a meal.

Symptoms result from cerebral hypoperfusion and so syncope / near syncope is the usual presenting symptom.

Patients also frequently suffer from postural hypotension

Important points of History:

1. Temporal relationship of the syncope with a large meal
 - Usually with 2 hours.
2. Any history to suggest volume loss
3. Medications
 - Diuretics
4. Past history, in particular:
 - Type 2 diabetes
 - Parkinson's disease

Important points of Examination:

1. Vital signs
 - Look for postural blood pressure drop

Formal clinical testing involves blood pressure measurements checked before a meal in the lying position after 5 minutes of rest.

Blood pressure should then be checked post meal at 15, 30, 60, 75, 90, and 120 minutes in the lying position.

A blood pressure drop is seen:

 - ♥ In 15% of individuals within 15 minutes after eating.
 - ♥ In 70%, of individuals within 30 - 60 minutes after eating.
 - ♥ In 15%, of individuals within 75 - 120 minutes after eating.
2. Any evidence of volume loss

- Dehydration
3. Any neurological deficits

Investigations

The diagnosis is ultimately a clinical one and so investigations are predominantly done to exclude other possible causes of syncope/ hypotension

The following should be considered

Blood tests

Consider:

1. FBE
 - Check for a low hemoglobin, (occult blood loss).
2. U&Es/ glucose
 - In particular look for hypokalemia or hyperkalemia, (as a possible cause of arrhythmias)
 - Look for electrolyte disturbances suggestive of Addison's disease
3. Cardiac enzymes
 - If an ACS is suspected

ECG

For arrhythmia or ACS (either as a precipitant of the syncope or as a consequence of it).

Ambulatory blood pressure monitoring:

Ambulatory blood pressure monitoring is also helpful in establishing a diagnosis of post prandial hypotension.

Management

There is **no specific** treatment for postprandial hypotension and so treatment consists of risk reduction in at risk patients.

The following strategies have been suggested:

1. Dietary modifications may assist in limiting symptoms:

- Increased water intake before eating
 - Substituting 6 **smaller** meals daily for 3 larger meals a day.
2. Recumbent position or walking:
- Patients suffering from postprandial hypotension are usually advised to lie in a recumbent position until symptoms settle.
 - Despite this, one clinical trial found that when patients walk 20 minutes after a meal, the pressor effect of exercise can completely compensate for the expected post-meal decrease in blood pressure. This protective effect on blood pressure lasts *only while the patient is walking*, and blood pressure again decreases once the patient stops ambulating.³

Presumably sitting or simply standing then are the least advisable positions.

3. Avoidance of precipitating medications (where possible).
4. Diabetic control:
- Strict diabetic control has been shown to improve diabetic autonomic neuropathy, which, in turn, may improve both postural hypotension and post prandial hypotension.
5. Pharmacotherapy:

Several pharmacotherapy options have been suggested, however efficacy studies have given conflicting results, and side effects frequently limit their use.

Caffeine:

- Caffeine, an adenosine receptor antagonist, may ameliorate post-meal blood pressure decreases when coffee or tea is given before a meal.

Until more definitive evidence is available, caffeine may be worth trying for symptomatic patients, titrating from 60 to 200 mg before meals.

Acarbose:

- Alpha-glucosidase inhibitors such as acarbose have been shown to diminish the decrease in postprandial blood pressure.

These medications are typically used in the treatment of type 2 diabetes mellitus and act by inhibiting carbohydrate digestion at the level of the brush border in the small intestine.

Their effects on postprandial hypotension might reflect alterations in circulating vasodilatory GIT peptides secreted.

Although these drugs appear promising, their use is limited by gastrointestinal side effects; around 30% of patients experience diarrhea / flatulence.³

Octreotide:

- Octreotide, a somatostatin analog has been shown to alleviate symptomatic blood pressure decreases in elderly patients, hypertensives, and in those with autonomic failure, perhaps by increasing splanchnic and peripheral vascular resistance.

A single pre-meal 50 micrograms subcutaneous injection completely prevented a 15 mm Hg post-meal decrease in systolic blood pressure in hypertensive elderly patients.³

Octreotide also has been shown to have a pressor effect on elderly patients with autonomic failure.

While promising, octreotide's use is hindered by its high cost, QT prolongation, and required for parenteral administration (abdominal injection).

Midodrine:

- This is a pressor agent used in some forms of autonomic neuropathy.

While it may have theoretical benefit it has not been tested in the setting of post prandial hypotension.

6. Education:

- Education and increased awareness of post prandial hypotension is important.

This may lead to improved quality of life, with decreased risk of falls and injuries.



"The Seven Deadly Sins & the Four Last Things: the Deadly Sin of Gluttony", (Detail), oil on board, c. 1480 Hieronymus Bosch, Prado Museum, Madrid.

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