


Fronto-Temporal Dementia, Diabetes Mellitus and Excessive Eating

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Abstract

Diabetes mellitus is common among older people. Hypoglycemia is a sign of poorly controlled diabetes mellitus and may lead to irritability, agitation, anxiety, hunger, and an excessive food intake, which in turn may make the control of diabetes more difficult. Excessive, inappropriate food intake is also a sign of Fronto-Temporal Dementia (behavioral variant: bvFTD). In this case study, we describe the events leading to an altercation that developed between an older diabetic patient with bvFTD and the staff in an Assisted Living Facility. His first dose of insulin was given early that morning while he was still asleep. He, subsequently, woke up feeling hungry, agitated, and irritable. This, in turn, exacerbated the hyperorality associated with bvFTD. We examine what went wrong in the patient/caregiver interaction and how this potentially catastrophic situation could have been avoided or defused.

Keywords

Alzheimer's/dementia, assisted living, caregiving and management, cognition, confusional states

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Objectives

At the end of this case presentation, readers will appreciate that

1. The first signs of hypoglycemia include irritability, agitation, and anxiety.
2. Hunger may not be the presenting symptom of hypoglycemia in older patients.
3. Control of diabetes mellitus is often a difficult complex task.
4. Hyperorality is a symptom of behavioral variant Fronto-Temporal Dementia (bvFTD).

Case Presentation

Characters

- Louis, 68-year-old, has been accepted to an Assisted Living Facility about 2 weeks ago because he could not cope on his own after his wife's death 3 weeks ago. He has bvFTD, diagnosed about a year ago. He also has poorly controlled type II diabetes mellitus, for which he is on an oral hypoglycemic and a sliding scale of insulin. He is meant to be on a strict diabetic diet but does not comply with the prescribed regimen. He is always rummaging for food in the dining

room, other residents' rooms, and also kitchen. Louis also has osteoarthritis.

- Jennifer, a volunteer attendant in the Assisted Living Facility with minimal training. She has known Louis for 2 weeks since he was accepted into the facility.
- Interdisciplinary team, including a psychologist or behavioral therapist, diabetologist, or dietitian to assess Louis's condition and develop a management plan that included food restriction early in the morning before breakfast.

Scenario

Today is a particularly bad day for Louis: When Jennifer came early in the morning, she found him in the staff kitchen eating jam and bread. She reprimanded him and explained that he has diabetes mellitus, should watch the food he is eating, and anyway should not be in the kitchen: "This is for staff use only and is out of bounds

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for residents.” But Louis did not pay attention to what she was saying and continued to eat. Jennifer tried to stop him, but he replied “I’m hungry!” Jennifer then tried to take him to his room but he objected: “I’ll go to my room when I finish eating.” After much cajoling, Louis agreed to be escorted to his room.

As soon as he was on his own, he went to the other residents’ rooms, picked their food trays, and brought them to his room. After accumulating about four trays, he sat in his room and started eating. Jennifer notices that food trays are missing from the residents’ rooms. Upset, she goes straight to Louis’s room and sees the food trays and Louis still eating. She again reprimands Louis and tries to get him to stop eating, but Louis does not listen. He keeps saying “I’m hungry.” She tries to explain to Louis that he has diabetes and needs to be careful about the food he is eating, otherwise, he may develop complications. But Louis is not concerned, he at first ignores Jennifer and then says, “I’ll stop eating when I’m no longer hungry.”

Jennifer gets frustrated and tells Louis he should stop eating now. The argument gradually escalates. Jennifer piles whatever food is left on the trays and puts it all on one tray. Louis is watching her and tries to eat as quickly as he can. As Jennifer is about to leave with the tray, Louis gets hold of the tray and pulls it toward him, she resists. Louis pulls harder and is able to wrench the tray from her hands, but all the food ends up on the floor. Louis is now very upset and hits Jennifer on the head with the empty tray he is still holding.

Case Analysis

Turning Points

Jennifer reprimands Louis. The first interaction that morning between Louis and Jennifer was confrontational. Jennifer reprimanded Louis and told him that he should not be eating and that the kitchen is out of bounds for him. This sets a hostile, confrontational tone for the rest of the encounter.

Could it have been avoided? Jennifer should have first warmly greeted Louis. “Hello Louis! I’m glad to see you’re up bright and early. Did you have a good night’s sleep?” This sets a friendlier, nonthreatening tone for the rest of the encounter: Jennifer is putting Louis at ease and is in effect first disarming him and avoiding a potentially confrontational issue.

Then, she could have mentioned that they could both get into trouble because the staff kitchen is strictly for staff use and out of bounds for residents: “Come quickly, let me take you back to your room before anyone notices. Otherwise, we’ll both get into trouble.” She is now on Louis’s side, thus avoiding any paranoid delusions.

Identify the cause(s) of “excessive” food intake. Two factors may be responsible for Louis’s excessive food intake.

First is the poorly controlled diabetes mellitus and possible hypoglycemia that developed after the administration of insulin, while he was still sleeping. Second is the underlying bvFTD. Insulin-induced hypoglycemia can usually be avoided by ensuring Louis’s diabetes mellitus is well controlled and that he does not become hypoglycemic. Hyperorality associated with bvFTD may respond to trazodone and selective serotonin reuptake inhibitors such as fluoxetine, sertraline, paroxetine, fluvoxamine, and citalopram. This is further discussed below.

Could it have been avoided? Attempts should have been made to find out whether Louis has hypoglycemia. He was given a dose of insulin earlier that morning while he was still sleeping and may have gone for a couple of hours before eating. Given the potentially nefarious effects associated with hypoglycemia, it is important to first exclude it before taking any other action. Blood glucose level can be easily measured at home using a glucometer.

If Louis had hypoglycemia, then he should have been encouraged to eat more bread and jam to raise his blood glucose level as soon as possible. If, on the contrary, his blood glucose level was within the normal range, then it would be appropriate to ask him to stop eating and go to his room.

Older patients better tolerate marginally elevated blood glucose and HbA1C levels than tightly controlled blood levels. As a general rule, the tighter the goal of diabetes control, the more likely the patient, especially the older patient, is to develop hypoglycemia.

Jennifer starts a confrontation: She tells Louis he cannot eat and tells him to go to his room. Jennifer confronts Louis and issues orders: “You cannot eat.” Louis only hears someone telling him, that is, ordering him, about what he cannot do. This triggers paranoid delusions and incites Louis to ignore, then resist the “order.” This is further aggravated by Jennifer telling him to go to his room: Another direct order.

Could it have been avoided? Having ascertained that Louis did not have hypoglycemia, Jennifer could have offered or promised Louis something better to eat than bread and jam: “I’ll fix you something better: how about some eggs and sausages? Let me first take you to your room, and then I’ll bring you a full breakfast in a few minutes.” Jennifer is now ensuring that Louis gets to his room and that he stops eating the bread and jam he found in the kitchen.

On the way to his room, she could try to distract him: “Isn’t it beautiful outside? Did you see the daffodils that bloomed yesterday?” She could then try to redirect his focus by asking him to help with a chore: “Oh Louis, I’ve got a special favor to ask you: could you please help me with . . . ?”

Jennifer argues with Louis and tries to convince him that he should not eat. Jennifer should have known that Louis

has bvFTD that may lead to excessive eating: hyperorality. The dementia also prevents him from participating in any sensible argument. Given these circumstances, it is just not possible to convince him that he should not eat. Jennifer's attempts at getting him to stop eating are therefore futile, and may indeed worsen the interaction.

Could it have been avoided? Arguments should be avoided. Instead, the patient's focus should be redirected. Immediately after disarming the patient and putting him at ease, as mentioned above, his focus should be redirected: "I'm so glad you're here. I need your help to . . ."

In the particular case presented, it would have been advisable to let him eat as much as he wishes, and then check his blood glucose level 1 and 2 hr later and adjust the dose of insulin accordingly. Louis, anyhow, is on an insulin sliding scale.

Jennifer again issues orders, then argues with Louis, this time in his room, and tells him he should not eat. It is just not possible to convince a patient with dementia, especially one who is agitated, irritable, and upset. At this stage starting/maintaining an argument only increases the agitation and aggravates any paranoid feeling the patient may have.

Could it have been avoided? Distracting and redirecting, as described above, are good strategies.

Jennifer tries to remove the food trays from Louis's room, thus escalating the confrontation. Trying to remove the food trays from Louis's room escalates the confrontation to a physical level and invites retaliation, including physical retaliation. Louis tries to eat as fast as he can, and then in desperation, as he sees the food and trays being removed, he physically tries to stop Jennifer from removing them and gets upset when the food ends on the floor. He retaliates by hitting Jennifer with the empty tray he is left holding in his hand.

Could it have been avoided? Physical altercations should be avoided. Distracting and redirecting, as described above, are good strategies.

Louis had ready access to the kitchen and food. Louis had ready access to the kitchen and food. Had the kitchen been locked, that episode could have been avoided. On the contrary, given that food vending machines are usually readily available and easily accessible in common gathering and other areas, it would be difficult to entirely restrict access to food, especially as other residents often keep some type of food in their rooms. In addition, Louis had no qualms procuring food from other residents, with or without their consent.

Could it have been avoided? An interdisciplinary plan of action should be developed tailored to the needs of

the individual patient and in compliance with the rules and regulations of the health care facility. It may be needed to enlist the help of a diabetologist, nutritionist, and psychologist, with the active participation of nurses, social workers, and administrative staff.

The signs and symptoms of hypoglycemia. Caregivers of patients who have diabetes mellitus should be able to check the blood glucose level by using a glucometer or dipsticks. Most patients with diabetes know how to measure their blood glucose level, and those patients on a sliding insulin scale are able to adjust the dose of insulin to their blood glucose level.

The diagnosis is hypoglycemia if the patient's blood glucose level is below 70mg/dL. The diagnosis and management of hypoglycemia is discussed below. In Louis's case, however, because of the bvFTD, one cannot expect him to measure his blood glucose level.

Could it have been avoided? Caregivers and health care professionals providing care to patients with diabetes mellitus should be knowledgeable about that condition and the various factors that may affect the blood glucose level. As stated above, had the health care provider suspected that Louis was hypoglycemic, she would have checked his blood glucose level and managed it according to standard recommendations.

Case Discussion

Diabetes Mellitus and Dementia

- Louis has no other pathologies and is not on any other medications. Until now his wife had been taking care of him at home. Therefore, this episode could have been exacerbated by a new environment.
- By increasing the risk of atherosclerosis, diabetes mellitus increases the risk of cerebrovascular accidents and vascular dementia.
- Patients with diabetes mellitus also may develop other types of dementia, as in this particular case, when the patient had bvFTD that also induced a craving for food: hyperorality.
- Control of diabetes mellitus is often a difficult complex task, best achieved by an interdisciplinary team, including a psychologist or behavioral therapist, diabetologist, and an experienced dietitian with an interest in diabetes mellitus. The management plan, developed in conjunction with relatives and loved ones, should be tailored to the individual circumstances of the patient and caregivers.
- If the patient is in an institution, the staff should be cognizant of the potential impact of the disease, the swift changes in blood glucose levels that may occur, particularly in older people, as well as the early clinical symptoms and signs of

hypoglycemia, hyperosmolar hyperglycemia, and diabetic ketoacidosis (DKA). Staff should know when to seek medical help.

Hypoglycemia: Early Presentation

- Glucose is essential for all cellular functions, especially the brain, which has no energy reserve stores. Whenever the blood glucose levels tend to drop, the suprarenal glands, pancreas, and liver are stimulated to release a number of hormones to rapidly raise the blood glucose levels. These hormones include adrenaline and noradrenaline, cortisol, glucagon, and growth hormone. Gluconeogenesis also is stimulated in the liver.
- The first manifestations of hypoglycemia include irritability, anxiety, agitation, and possibly aggression. These are due to the release of catecholamines, such as adrenaline and noradrenaline from the suprarenal glands. Poor coordination, dizziness, and headaches are also reported. In addition, patients may experience nightmares and vivid dreams. Personality changes may also occur.
- Hunger and craving for food may not be initially obvious in patients with hypoglycemia, especially older ones.

Hypoglycemia: Clinical Manifestations

- Symptoms of hypoglycemia start to develop when the plasma glucose level falls below 70mg/dL and are due to the release of a number of hormones, listed above, in an attempt to increase the plasma glucose level.
- Initial clinical signs of hypoglycemia include tachycardia, excessive sweating, and tremors.
- As the glucose level falls, further evidence of cognitive impairment develops: The patient is confused, feels drowsy, somnolent, and may have a slurred speech. Unless rapidly corrected, the patient may develop focal neurological deficits, such as hemiplegia and seizures. Initially, these are due to transient ischemic attacks, but if untreated, may progress to a full stroke.
- “Relative hypoglycemia” occurs in patients who have been hyperglycemic for long periods of time (months or years, with blood glucose levels often exceeding 200 mg/dL) and whose blood glucose levels are suddenly reduced to “normal levels” through a combination of medication and lifestyle changes. In these patients, hyperadrenergic hypoglycemic symptoms may develop, even if the plasma glucose level is 120mg/dL or even higher (American College of Physicians, 2012).

Hypoglycemia: Management

- Hypoglycemia is a potentially serious condition. If the patient is drowsy, sleepy, confused, unsteady, has slurred speech, or experienced one or more falls, he should be taken as soon as possible to the nearest emergency room. Hypoglycemia is a medical emergency.
- If the patient is conscious and coherent, attempts should be made to increase the blood glucose level by one of the following means: administering glucose tablets, hard candy (not sugar free), one or two table-spoonful of honey or rapidly drinking a hot sugary drink, fruit juice, or soda drink (not sugar free). The blood glucose level should be checked at about 10-min intervals, and if the level does not increase or remains below 70mg/mL, or if the patient’s clinical condition deteriorates, he should be sent promptly to the emergency room.

Hypoglycemia: Incidence and Etiology

- Hypoglycemia is more common in patients with type I (insulin dependent) diabetes mellitus. It is, nevertheless, also seen in patients with type II diabetes, who are either on insulin therapy or receive medication that stimulates the release of insulin, such as sulfonylureas. The half-life of many medications, including some sulfonylureas, tends to be prolonged in older patients, especially those with impaired renal or hepatic functions and may lead to hypoglycemia.
- Several medications, including medications obtained over the counter, may interfere with pharmacokinetics and pharmacodynamics of medications used to manage diabetes mellitus. It is, therefore, important for the treating clinician to know about any medication taken, including medications obtained over the counter.
- The administration of insulin may induce hypoglycemia, especially if short, rapidly acting insulin is used, and particularly if no food is consumed shortly after the insulin injection. In this respect, regular insulin (short acting) and NPH insulin (intermediate acting) are safer, but their duration of action is longer than rapidly acting insulin.
- Postexercise hypoglycemia may occur several hours after engaging in prolonged physical exercise if the exercise is not followed by the consumption of complex carbohydrates. This is due to the liver and muscles continuing to mobilize glucose from the blood to replenish their glycogen stores, which have been depleted during the prolonged physical exercise. Caution should be undertaken by patients who participate in prolonged strenuous physical exercise close to bedtime (American College of Physicians, 2012).

- Hypoglycemia also can result from excessive alcohol consumption, which suppresses glucose production in the liver. Some symptoms of hypoglycemia such as drowsiness, slurred speech, and altered personality may be erroneously attributed to the excessive alcohol intake and the diagnosis of hypoglycemia not made in a timely manner. This could be particularly problematic if the excessive alcohol intake occurs around bedtime.
- In older patients with diabetes mellitus, hypoglycemia is more deleterious than hyperglycemia because of the neurological damage that may occur.

Hyperglycemic Hyperosmolar Syndrome (HHS)

- HHS is a serious, life-threatening condition.
- Early symptoms of severe hyperglycemia include polyuria, polydipsia, and weight loss. Thirst, however, may not always be apparent in older patients, because of their often impaired sense of thirst. Dehydration may then ensue if the patient's polyuria exceeds his fluid intake.
- Symptoms of severe hyperglycemia include drowsiness, difficulties concentrating, lethargy, focal neurological signs, and coma.
- Patients suspected of having the HHS should be taken to the emergency room for further management.

DKA

- DKA is a serious, life-threatening condition.
- In addition to the symptoms of hyperglycemia, listed above, patients with DKA experience hyperventilation, abdominal pain, nausea, and vomiting.
- Patients suspected of having DKA should be taken to the emergency room for further management.

Fronto-Temporal Dementia (FTD)

- FTD is the third commonest type of dementia after Alzheimer's disease (AD) and Dementia with Lewy Bodies.
- Four different subtypes of FTD are now recognized:
 - bvFTD
 - Progressive nonfluent aphasia (PNFA)
 - Semantic dementia (SD)
 - FTD associated with motor neuron disease (FTD-MND)
- Hyperorality: inappropriate excessive food intake, sometimes leading to overweight and obesity, is a clinical feature of bvFTD. Other signs of hyperorality include a change in food preferences, patients indulging in new habits not consistent

with their lifelong habits, such as starting excessive alcohol intake or cigarette smoking. Occasionally, hyperorality manifests by the patient trying to eat inedible substances or rotten food.

The Clinical Diagnosis of bvFTD

Two sets of criteria are available to diagnose FTD (Budson & Solomon, 2016; Finger, 2016; LaMarre et al., 2013; Perry & Miller, 2013; Rascovsky et al., 2011). Both stipulate first a progressive deterioration in behavior and cognitive functions from a higher level of functioning, and second that this deterioration interferes with the patient's daily activities. In addition:

1. The 2011 International Consensus Criteria for bvFTD

(Budson & Solomon, 2016; LaMarre et al., 2013; Rascovsky et al., 2011) require that first there be evidence of deficits performing executive tasks, but relative sparing of episodic memory and visuospatial skills. Second that at least one of the following listed symptoms, from at least three of the five categories outlined below, occur within the three years of the presentation:

- a. Behavioral disinhibition, contrary to lifelong behavior:

Socially inappropriate behavior
Loss of manner and decorum
Impulsive, rash, or careless actions

- b. Apathy or inertia:

Apathy: loss of interest or motivation
Inertia: reduced initiative to initiate behavior

- c. Loss of sympathy or empathy:

Diminished appreciation of and responsiveness to other people's feelings.
Diminished social interest and withdrawal from social interactions.

- d. Perseverative, stereotyped, or compulsive/ritualistic behavior:

Simple repetitive movements
Complex compulsive or ritualistic behaviors
Stereotypy of speech

- e. Hyperorality:

Altered food preferences
Binge eating, increased (often new) cigarette smoking, or alcohol consumption
Oral exploration or consumption of inedible objects

Brain imaging studies. Depending on the results of brain imaging studies (Computed Tomography [CT], Magnetic Resonance Imaging [MRI], Positron Emission Tomography [PET], or Single Photon Emission Computed Tomography [SPECT]), patients with bvFTD can be further classified as having either

- a. Probable bvFTD, if in addition to the clinical symptoms listed above (i.e., at least one symptom from three of the five listed categories), they have evidence of focal atrophy, hypometabolism or hypoperfusion in the frontal and/or temporal lobes.
 - b. Possible bvFTD, if brain imaging studies are negative.
2. The 2013 *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013) Criteria:

A diagnosis of possible FTD is made if (in addition to the progressive deterioration in cognitive functions from a previously noted higher level and a degree of cognitive dysfunction interfering with the patient's ability to function independently) the following criteria are evident:

- a. An insidious onset.
- b. Three or more of the following behavioral symptoms:
 - a. Disinhibition
 - b. Apathy or inertia
 - c. Lack of empathy
 - d. Perseverative, stereotyped, or compulsive/ritualistic behavior
 - e. Hyperorality and changes in eating habits.
- c. A lack of etiological pathology that may explain the above mentioned changes including cerebrovascular diseases, substance abuse, other neurodegenerative diseases, and neurological or systemic disorders.

A diagnosis of probable FTD is made if, in addition, the patient has evidence of genetic mutation or brain imaging studies demonstrating disproportionate frontal and/or temporal lobe involvement.

Brain Imaging and Clinical Symptoms of bvFTD (Budson & Solomon, 2016; Dickerson, 2014; Finger, 2016; Miller, 2014)

- Atrophy or hypometabolism of the right (i.e., nondominant) frontal and/or temporal lobe is the hallmark of bvFTD.
- Atrophy or hypometabolism of the left (i.e., dominant) frontal and/or temporal lobe or both dominant and nondominant sides usually

manifests itself in the form of language deficit: PNFA or SD.

- Brain imaging, particularly PET amyloid imaging can be used to differentiate FTD from AD: Whereas patients with AD show an increased amyloid binding, those with FTD do not.

Pharmacological Management of FTD (Boxer et al., 2013; Budson & Solomon, 2016; Finger, 2016; Miller, 2014)

- a. Trazodone and selective serotonin reuptake inhibitors such as fluoxetine, sertraline, paroxetine, fluvoxamine, and citalopram are sometimes useful to control irritability, agitation behavioral disinhibition, perseverative behavior, and hyperorality in patients with bvFTD (Manoochchri & Huey, 2012; Seltman & Matthews, 2012; Tsai & Boxer, 2014).
- b. Atypical antipsychotics including risperidone, aripiprazole, olanzapine, and quetiapine are also sometimes used to control behavioral disinhibition (Manoochchri & Huey, 2012; Seltman & Matthews, 2012; Tsai & Boxer, 2014).
- c. A trial of carbidopa/levodopa, titrating up to 25mg/250mg 3 times a day may be recommended as it may help apathy and executive dysfunction (Tsai & Boxer, 2014).
- d. Acetyl choline esterase inhibitors are not recommended in patients with FTD because they may increase the degree of agitation. However, as many patients with FTD also may have AD and, therefore, may benefit from these medications, a 2 to 3 months' trial may be indicated (Manoochchri & Huey, 2012; Seltman & Matthews, 2012).
- e. Memantine. At the time of preparing this article, there is no data to support the use of memantine in patients with FTD (Manoochchri & Huey, 2012; Seltman & Matthews, 2012; Tsai & Boxer, 2014).

Summary

1. Diabetes mellitus is common among elderly patients. It is often difficult to manage. Tight control of the blood glucose level is associated with an increased risk of hypoglycemia, which is usually not well tolerated by older patients.
2. Hypoglycemia is a medical emergency and should be promptly and efficiently addressed. If it is not responsive to first aid measures, the patient should be sent to the emergency room.
3. Hypoglycemia can be precipitated by an excessive, inappropriate dose of insulin or the patient not eating after receiving the insulin injection. It can also be precipitated by the intake of medications,

including over-the-counter medications. It can also occur several hours after excessive physical exercise the patient does not usually undertake.

4. The first signs of hypoglycemia include increase irritability, agitation, and anxiety.
5. Hunger is not always present in patients with hypoglycemia, especially older patients.
6. FTD is the third commonest type of dementia, after AD and Dementia with Lewy Bodies.
7. The main subtypes of FTD are behavioral variant, PNFA, SD, and FTD-MND.
8. bvFTD is the most common subtype of FTD. The diagnostic criteria of FTD and its variants are now well established.
9. Excessive eating could be the presenting features of bvFTD.
10. Arguments with patients who may be hypoglycemic or have dementia should be avoided. Instead, attempts should be made to distract and redirect the patient's energy.

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