CLINICAL VIGNETTE

New-Onset Diabetes in a 90-Year-Old Male: A Diagnostic Dilemma

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Case Presentation

A 90-year-old causasian male with no previous h/o diabetes, presented with polyuria, polydipsia, weight loss of 11 lbs., fatigue and unsteadiness for 1 year; symptoms had worsened for approximately 4 months prior to presentation. He had recently been hospitalized for these symptoms and found to have blood glucose levels >600 mg/dl. Blood sugars were normalized with IV fluids, insulin and electrolytes and he was discharged on multiple daily injections of insulin.

Of note, he had a pertinent positive past medical history of Ulcerative colitis, Hypothyroidism, Osteoporosis, stroke and Rosacea.

Labs for several months including hospitalization are summarized as follows.

	3/21/17	5/29/18	**7/19/18 (inpatient)**	10/16/18	12/28/18
A1c	4.9	5.7	**9.5**		6.0
Glucose	97	122	**339**	184	145
Glutamic acid decarboxylase (GAD) antibodies			**88.1 (High)**		
C-peptide				1.09	0.47 (L)
TSH	7.2	8.1	**3.38**		11.1

Interestingly, even though GAD antibodies were positive, patient was not in DKA during the hospitalization (Na 135, K 6, Cl 95, CO2 31, BUN 30, Creatinine 1.57 (baseline 1.1)) and c-peptide was detectable at least until October 2018; however repeat testing revealed that it was low in December c/w Type 1 diabetes mellitus or it's subset, Latent Autoimmune diabetes in adults (LADA).

Discussion

Type 1 diabetes mellitus (T1DM) or Immune mediated diabetes

Previously known as 'insulin-dependent diabetes' or 'juvenile-onset diabetes', T1DM occurs due to cellular-mediated auto-immune destruction of pancreatic beta-cells. It accounts for 5-10% of diabetes and incidence is increasing by 2-5% annually worldwide. In the U.S. alone, there are approximately 40,000 new diagnoses of T1DM each year. Although T2D is by far the more common disease process, T1D may also present as an initial diagnosis in adulthood, even in an older adult.[1] It is critical that providers make the correct diagnosis and hence it is vitally important to review the history for important clues related to care. These may include:

* Thin body habitus or weight loss
* Family history of type 1 diabetes mellitus
* History of DKA (in one third of cases)
* Rapid worsening of A1c on oral medications
* History of other autoimmune conditions

As providers are aware, T2D is associated with the metabolic syndrome. Co-existing medical histories often include obesity, hypertension, PCOS, hyperlipidemia. In T1D, the metabolic syndrome may be present, but not required for diagnosis. Therefore, patients may have a thin body habitus. Weight loss can occur in patients with uncontrolled diabetes. DKA can be a defining process in the diagnosis, but as presented, may not always be present.[2] Patients who have a rapid worsening of control may have an abrupt loss of beta cells where oral medications are not effective. Important clues to an initial incorrect diagnosis may be the use of multiple oral medications that are not effectively treating the patient to goal.[3]

As is standard of care, obtaining a detailed summary of other medical problems may be an important clue to diagnosis. T1D is an autoimmune disease process and associated with other autoimmune processes. In a review from the T1D Exchange in 2016, 27% of patients living with T1D have another auto-immune diseases.[4] In patients 65 years of age and older, it is even higher with 47% having an additional diagnosis of autoimmunity.[4] These diagnoses include thyroid (Hashimoto's, Graves'), gastrointestinal (celiac, colitis, Crohn's, UC), collagen vascular disease (rheumatoid arthritis, psoriasis, lupus, scleroderma), Addison's, and skin disease (vitiligo, alopecia, dermatomyositis).

Latent autoimmune diabetes in adults (LADA)

LADA is a subset of autoimmune diabetes in adults with slow progression of beta cell failure. Hence these patients are not insulin requiring, at least during the first 6 months after diagnosis of diabetes. Patients with multiple islet antibodies appear to develop beta cell failure within 5 years, whereas those

with single antibody (GAD or islet-cell antibody only) mostly develop insulin dependence after 5 years. One prospective case series demonstrated this latter group remaining insulin free for up to 12 years.[5]

Case related discussion

Our patient presented with rapid deterioration of beta cell function as evidenced by worsening of HBA1c over a 4-month period. He had absence of DKA but positive GAD antibodies during hospitalization for hyperglycemia (c-peptide detectable for at least 3 months post hospitalization) followed by undetectable c peptide within 5 months of hospitalization and within 7 months of initial elevation in HBA1c. He was thin built and presented with weight loss, polyuria and polydipsia. He also had other autoimmune conditions like hypothyroidism and ulcerative colitis. Our diagnosis for this patient is type 1 diabetes but discussion of the LADA subset of T1DM is relevant here given the initial detection of beta cell function.

It is important to recognize that while immune-mediated diabetes commonly occurs in childhood and adolescence, it can be diagnosed at any age, even in the 8th and 9th decades of life.[6] The clinical suspicion for autoimmune diabetes for this patient should have been high and could have potentially led to intervention (insulin therapy) prior to hospitalization.

REFERENCES

1. **Beck RW, Tamborlane WV, Bergenstal RM, Miller KM, DuBose SN, Hall CA; T1D Exchange Clinic Network**. The T1D Exchange clinic registry. *J Clin Endocrinol Metab*. 2012 Dec;97(12):4383-9. doi: 10.1210/jc.2012-1561. Epub 2012 Sep 20. PubMed PMID: 22996145.
2. **Dabelea D, Rewers A, Stafford JM, Standiford DA, Lawrence JM, Saydah S, Imperatore G, D'Agostino RB Jr, Mayer-Davis EJ, Pihoker C; SEARCH for Diabetes in Youth Study Group**. Trends in the prevalence of ketoacidosis at diabetes diagnosis: the SEARCH for diabetes in youth study. *Pediatrics*. 2014 Apr;133(4):e938-45. doi: 10.1542/peds.2013-2795. Epub 2014 Mar 31. PubMed PMID:24685959; PubMed Central PMCID: PMC4074618.
3. **American Diabetes Association**. 2. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes-2019. *Diabetes Care*. 2019 Jan;42(Suppl 1):S13-S28. doi: 10.2337/dc19-S002. Review. PubMed PMID: 30559228.
4. **Hughes JW, Riddlesworth TD, DiMeglio LA, Miller KM, Rickels MR, McGill JB; T1D Exchange Clinic Network**. Autoimmune Diseases in Children and Adults With Type 1 Diabetes From the T1D Exchange Clinic Registry. *J Clin Endocrinol Metab*. 2016 Dec;101(12): 4931-4937. Epub 2016 Sep 27. PubMed PMID: 27676394.
5. **Stenström G, Gottsäter A, Bakhtadze E, Berger B, Sundkvist G**. Latent autoimmune diabetes in adults: definition, prevalence, beta-cell function, and treatment. *Diabetes*. 2005 Dec;54 Suppl 2:S68-72. PubMed PMID: 16306343.
6. **American Diabetes Association**. 12. Older Adults: Standards of Medical Care in Diabetes-2019. *Diabetes Care*. 2019 Jan;42(Suppl 1):S139-S147. doi: 10.2337/dc19-S012. Review. PubMed PMID: 30559238.

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