29 yo woman with abdominal pain and vomiting

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HPI

- 29 yo F with DM1 and autoimmune primary AI admitted with N/V
- In usual state of health until day of admission
- Developed generalized weakness, epigastic abd pain, emesis x10, HA, joint pains
- Injected emergency Solu-Cortef and came to ER
- Did not feel any better after Solu-Cortef

HPI continued

- Had missed afternoon dose of hydrocortisone 2 days prior to admission due to sleeping before working night shift
- No other missed doses
- No fevers or other signs of illness prior to symptoms starting

PMH

- Type 1 DM
  - Diagnosed age 8
  - History of retinopathy requiring laser treatment, now stable
  - No neuropathy or nephropathy
  - Abnl gastric emptying study 2009 but no sxs
  - Had been on insulin pump x 10 yrs but switched herself back to injections x 2 mos
- Primary autoimmune adrenal insufficiency
  - Diagnosed 2009
  - Adrenal crises 2x/yr, last 1/2013
- Depression
  - Severe episode 5/2012, better with SSRI and therapy
- Bulimia
  - Binging and purging in college
  - Has withheld insulin at times, last in 2010

Home Medications

- Hydrocortisone 20/10
- Fludrocortisone 0.05 mg daily
- Lexapro 20 mg daily
- Lantus 22 units qam
- Humalog 1:10 carb ratio, 1:30>130 correction

Family and Social History

- Family History
  - Hypothyroidism: mother, maternal aunt, maternal uncle
  - DM1: brother
  - RA: paternal grandmother
- Social History
  - Lives with parents
  - Works at U of C in staffing
    - Works night shift several times per week
  - ½ PPD x 10 yrs, social EtOH

Physical Exam

- Vitals: T35.2, HR 113, RR 20, BP 93/49, SaO2 97% RA, Wt 61.2 kg, Ht 167.6 cm, BMI 21.79, BSA 1.69
- Constitutional: Well developed and well nourished, acutely ill
- HEENT: Normocephalic, atraumatic, OP clear, no increased pigmentation
- CV: Tachycardic, regular rhythm, no murmurs
- Pulm: Normal effort, CTAB
- Abdominal: BS normal, tender, no rebound, no distension
- MSK: No edema, normal ROM and tone
- Neuro: A+O x 3
- Skin: Slight increased pigmentation of scratch on arm and scabbed pump site

Labs

- CBC: WBC 18.6 (76% granulocytes, 17% lymphs, 6% monos, 1% eos), Hgb 15.5, Hct 43.1, Plts 366
- BMP: Na 129, K 5.6, Cl 93, HCO3 21, AG 15, BUN 12, Cr 0.8, Glu 335, Ca 9.4
- UA: SG 1.015, Neg LE, Neg nitrite, neg protein, neg blood, ketones 80, glucose 500
- Urine pregnancy negative
- A1c 10.2

Diagnosis?

- Gastroenteritis
- DKA
- Pyelonephritis
- Gastroparesis
- Adrenal crisis

Treatment?

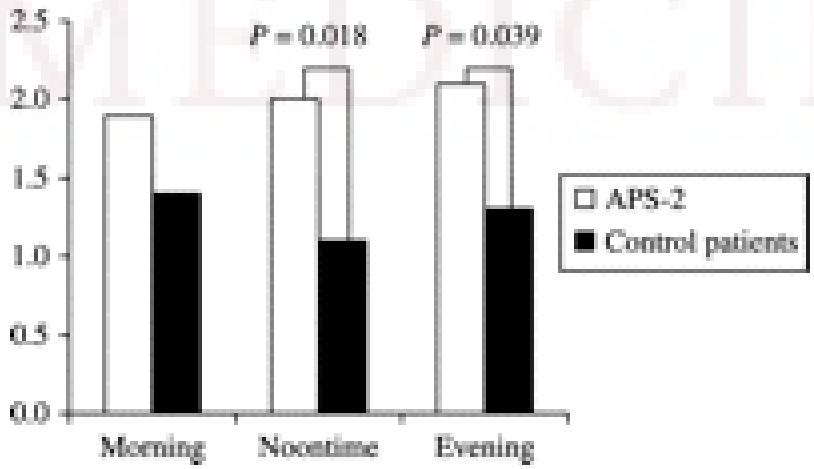
- Hydrocortisone 100 mg IV q8
- 1 L NS x 2
- NS 100 cc/hr
- Felt much better by the next morning

However…

- Labs the following morning:
  - Na 133, K 5.3, CL 99, HCO3 10, anion gap 24, BUN 11, Cr 0.8, glucose 368
  - Beta-hydroxybutyrate 5.59
  - Lactic acid 1.9
  - pH 7.28
- Extra subcutaneous insulin
- Gap closed by early afternoon

Etiology of ketosis?

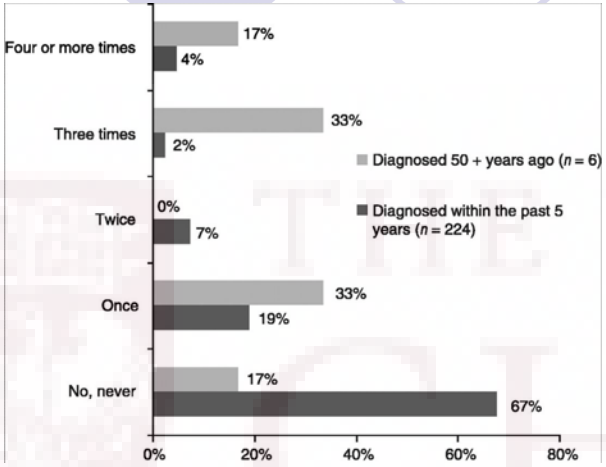
- Interaction of glucorticoids and ketone formation
  - Action of cortisol on lipase
  - Decreased risk of DKA with untreated AI
- Interaction of AI and diabetes



What triggered her adrenal crisis?

Trigger	% cases Primary AI	% cases Secondary AI
Gastrointestinal infection	32.6	21.8
Other infection/fever	24.3	17.3
Surgery	7.2	15.5
Unknown	6.6	12.7
Strenuous physical activity	7.7	7.3
Cessation of GCs by patient	5.0	6.4
Neglected GC intake	5.0	3.6
Psychic distress	3.3	3.6
Accident	2.8	2.7
Cessation of GCs by physician	1.1	3.6
Other	4.4	5.4

Risk factors for adrenal crisis?



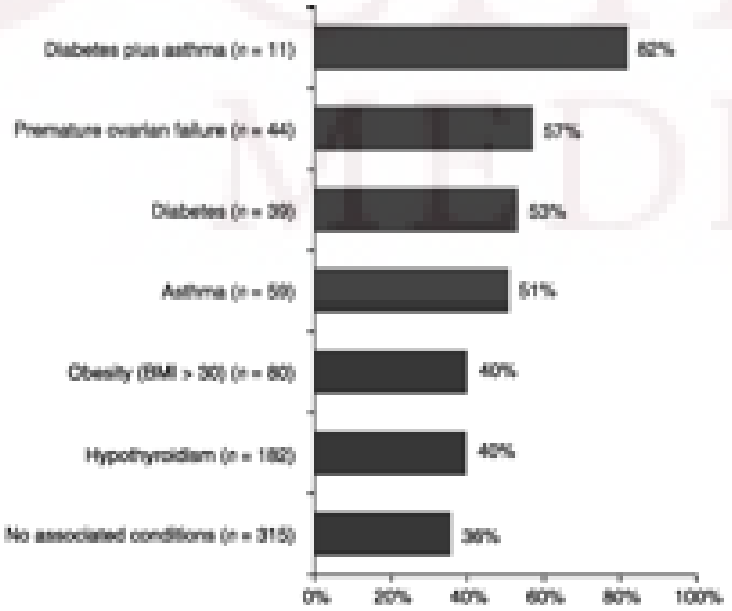


Table 5 Risk factors for adrenal crisis.

Adrenal crisis with hospital admission	Odds ratio	95% Confidence interval	*P*
All patients ($n=444$)			
DHEA replacement	0.88	0.52–1.49	0.63
Glucocorticoid dose/BSA	1.02	0.98–1.07	0.32
Age at diagnosis	0.98	0.96–1.01	0.12
Female sex	1.66	1.00–2.75	0.05
Educational status	1.22	0.70–2.14	0.49
Concomitant disease	**1.81**	**1.13–2.90**	**0.01**
BMI	0.98	0.93–1.03	0.40
SAI versus PAI	**0.51**	**0.27–0.97**	**0.04**
Patients with PAI ($n=254$)			
DHEA replacement	0.82	0.40–1.72	0.60
Glucocorticoid dose/BSA	1.02	0.96–1.08	0.50
Fludrocortisone dose	0.84	0.38–1.88	0.68
Age at diagnosis[a]	**0.96**	**0.93–0.99**	**0.02**
Female sex	1.60	0.74–3.44	0.23
Educational status	0.90	0.37–2.19	0.82
Concomitant disease	**2.02**	**1.05–3.89**	**0.04**
BMI	0.995	0.91–1.08	0.90
Patients with SAI ($n=189$)			
DHEA replacement	0.92	0.33–2.55	0.87
Glucocorticoid dose/BSA	1.04	0.96–1.12	0.32
Age at diagnosis	0.98	0.94–1.01	0.21
Female sex	**2.18**	**1.06–4.50**	**0.04**
Diabetes insipidus	**2.71**	**1.22–5.99**	**0.01**
Educational status	1.48	0.62–3.56	0.38
Concomitant disease	1.58	0.66–3.77	0.31
BMI	0.983	0.91–1.06	0.67

BSA, body surface area.
Bold indicates significant *P* values ($P<0.05$).
[a]Age at diagnosis was negatively correlated with frequency of adrenal crisis.

Course

- Frequent crises
  - 1/2013, 10/2012, 8/2012, 1/2012, 11/2011
- Uncontrolled DM?
- Shift work?

References

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