17yo female with pituitary mass

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Chief Complaint

- 17 5/12yo F with h/o pituitary mass s/p transsphenoidal partial hypophysectomy

HPI

- Presented to PCP with various sx including dizziness, fatigue, temperature intolerance, loss of taste, palpitations, twitching
- Work-up (labs, EKG) were nL
- Saw a traditional Chinese doctor who recommended various herbs
- MRI done showed pituitary hyperplasia (8mm) at upper limits of nL for pubertal F but no clear mass
- Referred to NSGY and endo

ROS

- Constitutional: Negative for fever, **+fatigue**
- Endo: Negative for galactorrhea, polyuria
- HEENT: Negative for neck pain, **+tinnitus, visual disturbances**
- CV: **+palpitations**
- GU: Negative for menstrual abnormalities
- Skin: **+flushing**
- Neurol: Negative for HAs and syncope, **+dizziness**
- Psych: Negative for behavioral changes

Physical Exam

- Vitals: T 37°C, HR 87, RR 15, bp 109/53, wt 51.2 kg (50th%), ht 157.4 cm (25th%), BMI 21.4 kg/m² (54th%)
- General: well-developed, NAD
- HEENT: normocephalic, PERRL, **intact visual fields**
- Neck: thyroid palpable, not enlarged, smooth
- CV/Pulm/Chest: RRR, CTAB, **Tanner 4 breasts, no discharge**
- Neuro: alert, no focal deficits, 2+DTRs
- Skin: normal pigmentation, **mild acanthosis on neck, comedonal facial acne**

Labs

- TSH 1.85
- Total T4 6.6
- Free T4 1.15
- ACTH 14.5
- Cortisol 12.2
- Prolactin 10.5
- FSH 7.4
- LH 7.1
- 17OHP 47
- DHEAS 103
- Total testosterone 19
- Free testosterone 0.6
- SHBG 22
- Insulin 9.9
- HbA1C 5.2
- Urine cortisol 9.6
- Urine metanephrines 71
- CMP normal

Assessment / Plan

- Pituitary hyperplasia with intact pituitary function- monitor clinically
- Follow-up with NSGY and endo
- Repeat MRI in 3 months

3-month NSGY f/u

- HPI and PE stable
- MRI: interval growth of pituitary gland now abutting optic chiasm without compression (10 mm)
- Assessment: Pituitary hyperplasia vs. adenoma
- Plan: Repeat MRI in 6 months

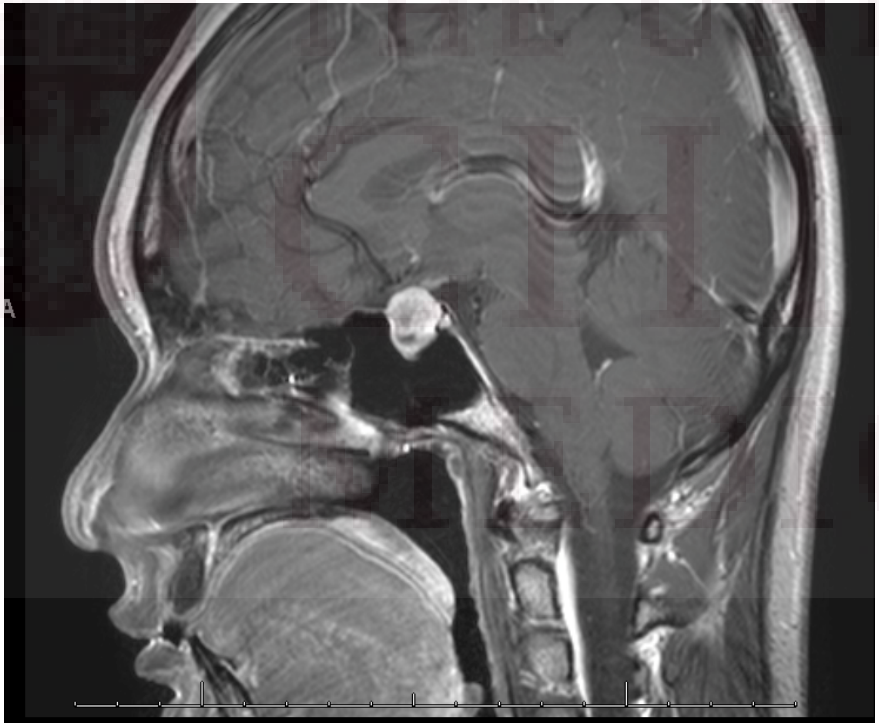
Interval History

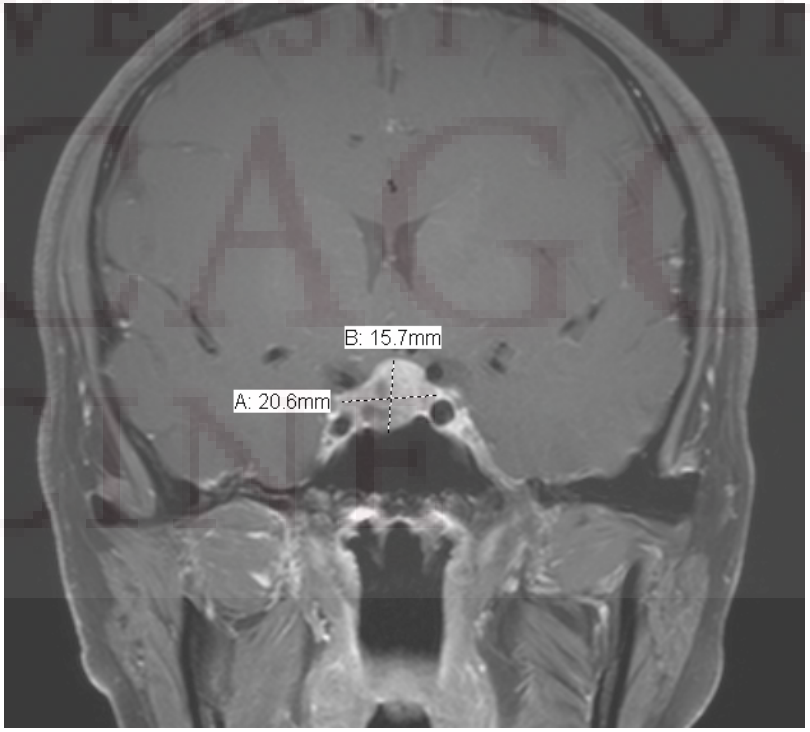
- Next 2.5 years: Pt followed up at Northwestern
- Developed peripheral visual field deficit, irregular menses, mildly elevated prolactin
- Repeat MRI showed R sided pituitary adenoma
- Surgery was recommended and she returned to U of C for second opinion

Interval History- cont'd

- ROS: Negative for fever, galactorrhea, polyuria, HAs **+peripheral vision loss, heavy menses Q2weeks for last year**
- FH: No change
- SH: Now in 11th grade. Still doing well in school.
- Meds: None
- PE: **+bitemporal hemianopsia, Tanner 5 breasts, no discharge, no focal neuro deficits**

Imaging





Labs

- TSH 1.07
- Free T4 1.05
- ACTH 9.9
- Cortisol 9.3
- Prolactin 71.34
- IGF_1 333
- $IGFBP_3$ 5.0
- FSH 5.1
- LH 13.3
- Estradiol 136
- 17OHP 67
- DHEAS 176
- Total testosterone 23
- Free testosterone 8
- SHBG 17
- Androstenedione 187

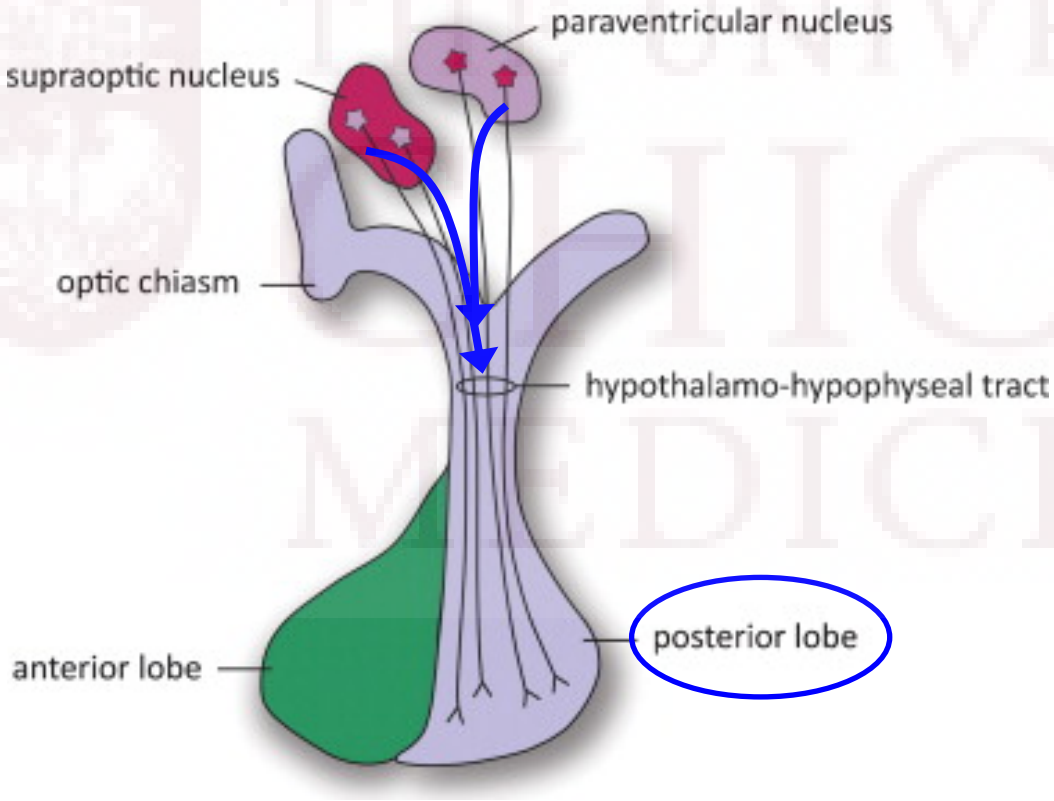
Plan?

Management

- Dopamine agonist was considered
- Given prolactin level below <100s, progressive visual field deficits, surgical intervention was recommended by NSGY

Post-op concerns?

AVP



DI:

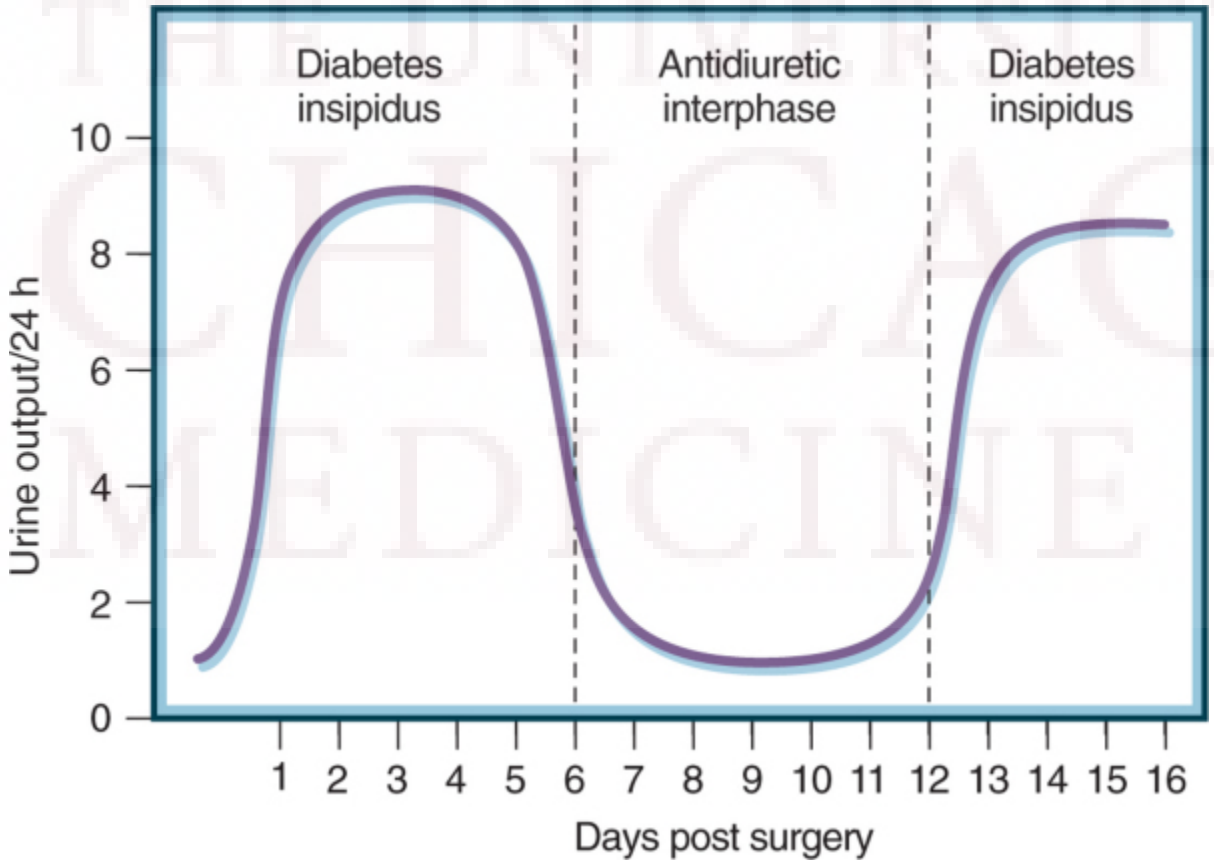
- Polyuria (>300 mL/kg/d)
- ↑ Serum osmolality (>300 mOsm/kg)
- ↓ Urine osmolality (<600 mOsm/kg)

↓

- Hypernatremia
- polydipsia

Schreckinger M, et al. Clinical Neurology and Neurosurgery 2013; 115(2).

Triphasic DI

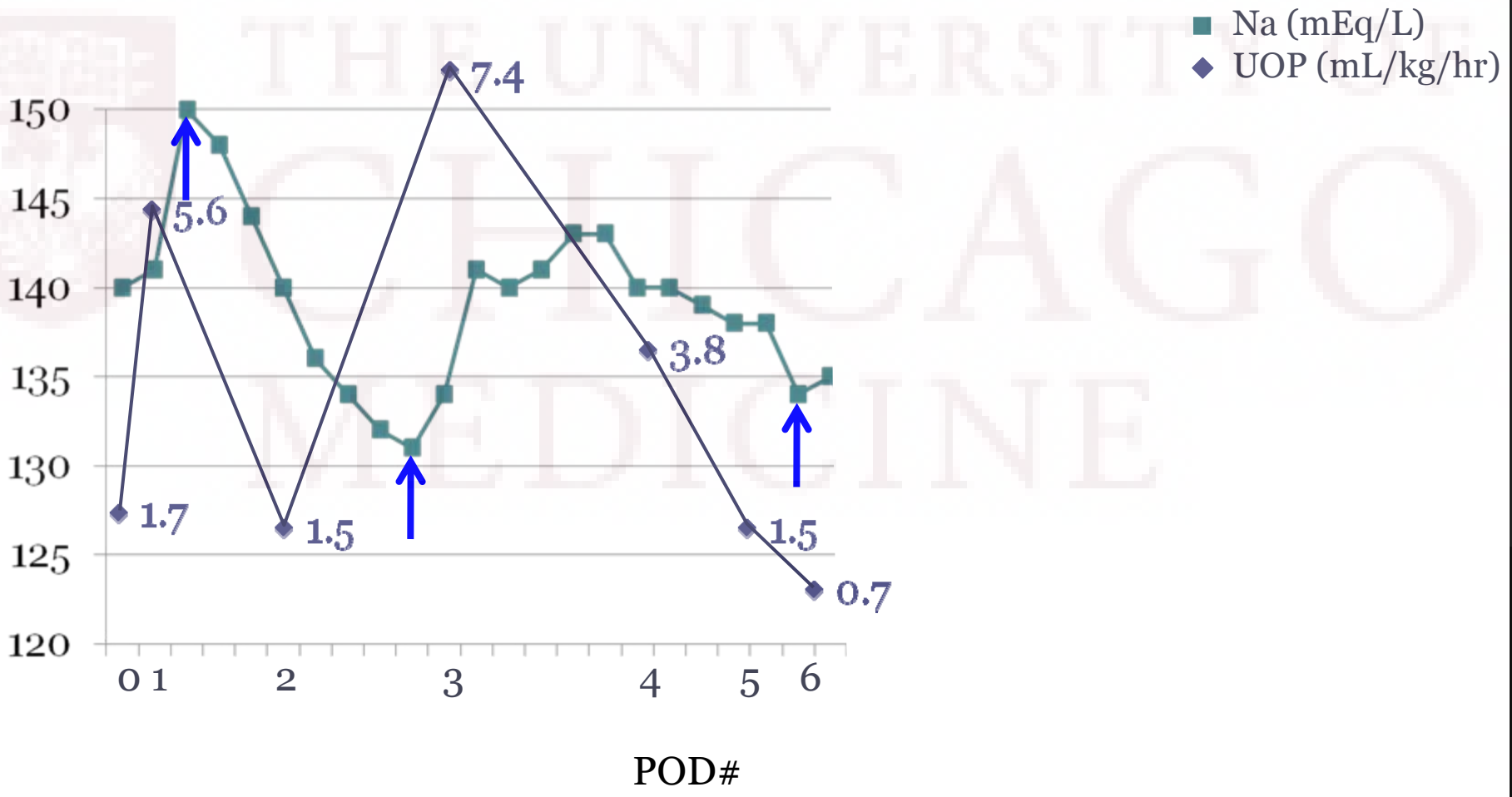


Kronenberg HM. Willams Textbook of Endocrinology 11th edition. 2011.

POD#1

- Increasing UOP since early AM: ~350 mL/hr (6.7 mL/kg/hr)
- Increasing Na: 140 → 141 → 150
- Increasing thirst but PO limited by nausea

Serum Na and UOP



Hospital Course- POD #6

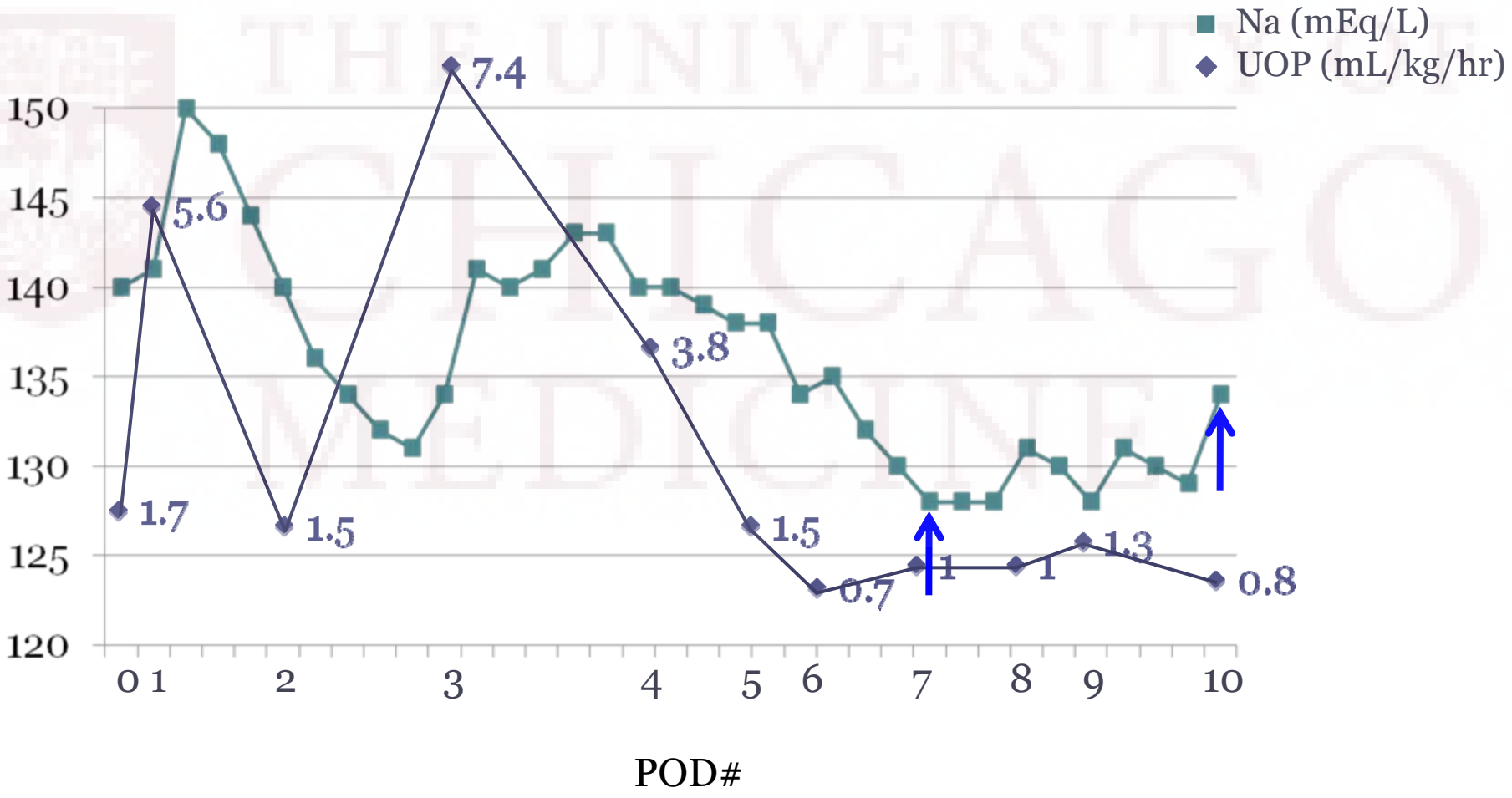
Labs:

- TSH 0.02, fT4 0.71
- ADH < 0.5
- ACTH 14.1, Cortisol 0.4
- Prolactin 7.64
- FSH 0.7
- LH < 0.1
- Estradiol 5
- DHEAS < 15

Hospital Course- cont'd

- Drinking to thirst
- Possible D/C home
- Down-trending Na

Serum Na and UOP



Discharge

- Fluid restriction of 500 mL/d
- Pituitary labs to be rechecked as outpatient
- Stress-dose hydrocortisone instructions

Pathology

- All cell types present with nL architecture
- One small nest of monomorphic cells positive for prolactin
- nL MIB-1 activity

Clinical Questions

- What is the natural history of pituitary hypertrophy?
- How common is post-op DI?
- What are risk factors for developing DI?

Physiologic Pituitary Hypertrophy

TABLE 1. Baseline gonadotropic hormonal and neuroradiological characteristics in seven patients with physiological enlargement of the pituitary gland

Patient no.	Age at diagnosis (yr)	Gonadotropic function						PRL		Pituitary dimensions		Follow-up duration (yr)
		Basal LH (IU/L)	LH peak[a] after GnRH (IU/L)	Basal FHS (IU/L)	FSH peak after GnRH[a] (IU/L)	Basal α-subunit (IU/L)	α-Subunit peak after GnRH[a]	Basal PRL (μg/L)	PRL peak after TRH[b] (μg/L)	Height (mm)	Width (mm)	
1	15	3.5	20	7	17	0.46	0.62	9	38	10.6	14	4
2	17	0.6	33	2.2	7	0.33		15	154	11	14	3
3	19	9.4	22	6.2	8.3			8	107	10	12	2
4	23	4.8	14	3.9	6.6	0.28	0.6	13	66	10	10	7
5	24	16	59	8.4	11			20	43	12	12	2
6	27	2.8		3.2		0.3		10	78	9	11	8
7	19	14	174	5	11.5	0.52	4.4	22	107	12	16	4

- Pituitary enlargement (>9mm) in a young woman or adolescent girl should be considered **normal hypertrophy** *if*:
  Pituitary MRI and labs are **normal**

Chanson P, et al. J Clin Endocrin & Metab 2001; 86: 3009-3015.

How common is post-op DI?

Study	# of Procedures	Transient DI	Chronic DI
Berker et al.	624	29 (4.6%)	3 (0.5%)
Frank et al.	381	N/A	6 (1.6%)
Zhou et al.	375	14 (3.7%)	N/A
Gondim et al.	341	15 (4.4%)	4 (1.2%)
Yano et al.	213	10 (4.7%)	2 (0.9%)
Dehdashti et al.	200	5 (2.5%)	2 (1%)

Schreckinger M, et al. Clinical Neurology and Neurosurgery 2013; 115(2).

Risk factors for DI

TABLE 1. Incidence of postoperative diabetes insipidus in patients as determined by sex, tumor size, prior pituitary surgeries, intraoperative cerebrospinal fluid leaks, postoperative cerebrospinal fluid leaks, and preoperative apoplexy[a]

	Total no.	No DI	Transient DI (<6 mo)	Permanent DI (>6 mo)	Overall DI[b]	Overall DI Incidence within subtype (%)	*P* value	95% CI
Sex								
M	53	46	5	2	7	13.2%	0.545	0.23–1.79
F	57	46	10	1	11	19.3%	0.545	0.56–4.41
Adenoma size[c]								
Macroadenoma	78	66	11	1	12	15.4%	0.997	0.28–6.74
Microadenoma	17	15	2	0	2	11.8%	0.997	0.15–3.63
Intraoperative CSF leak								
Yes	19	12	5	2	7	36.8%	0.021	1.38–13.07
No	91	80	10	1	11	12.1%	0.021	0.08–0.73
Postoperative CSF leak[d]								
Yes	11	10	1	0	1	9.1%	0.797	0.06–4.02
No	99	82	14	3	17	17.2%	0.797	0.25–17.3
Previous pituitary resection								
Previous nonendoscopic transsphenoidal	14	8	4	2	6	42.9%	0.01	1.55–17.77
Previous endoscopic transsphenoidal	5	5	0	0	0	0%	0.984	0.02–8.12
Previous craniotomy	1	1	0	0	0	0%	0.519	0.07–42.07
All previous	20	14	4	2	6	30%	0.137	0.90–8.65
No previous	90	78	11	1	12	13.3%	0.137	0.12–1.12
Apoplexy								
Yes	5	5	0	0	0	0%	0.984	0.02–8.12
No	105	87	15	3	18	17.1%	0.984	0.12–43.92

Tumor types	No. of tumors	No DI	Overall DI[b]	Transient DI	Permanent DI	Incidence of overall DI within tumor type (%)	P value	95% CI
Nonfunctioning adenoma	61 (55.5%)	52	9	8	1	14.8%	0.52	0.27–1.67
GH-secreting	15 (13.6%)	13	2	2	0	13.3%	0.70	0.12–2.68
RCC	12 (10.9%)	6	6	4	2	50%	0.003	2.0–25.8
ACTH-secreting	9 (8.2%)	8	1	1	0	11.1	0.75	0.19–4.6
Prolactinoma	9 (8.2%)	9	0	0	0	0%	0.36	0.01–3.1
Craniopharyngioma	1 (0.9%)	1	0	0	0	0%	0.55	0.04–17.5
Chordoma	2 (1.8%)	2	0	0	0	0%	0.55	0.04–17.5
FAS-secreting	1 (0.9%)	1	0	0	0	0%	0.48	0.05–34.7
Total	110	92	18	15	3	19.2%		
		110		18				

Sigounas DG, et al. Neurosurgery 2008; 62(1), 71-78.

Risk factors for DI

- Na >145 mmol/L in the first 5 days post-op → increased risk of permanent DI
  - A single serum Na of > 145 → 23.3% risk of permanent DI
  - Sensitivity 87.5%, specificity 83.5%
- 4 out of 96 (0.04%) of pts with Na < 145 mmol/L developed transient DI
  - NPV 99.5%

Sigounas DG, et al. Neurosurgery 2008; 62(1), 71-78.

Summary

- Pituitary hyperplasia is a physiologic phenomenon that occurs in adolescent/young adult females
  - Suggests normal variations in size, which persist over time
  - Characteristics that are not supportive of benign etiology include: AbL MRI, AnL labs, clinical sx
- Risk factors for DI: Na > 145 mmol/L, previous non-endoscopic pituitary surgery, RCC pathology

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