Use of Desmopressin for Bilateral Inferior Petrosal Sinus Sampling in Pediatric Patients with Cushing Disease

Pituitary
P1-249

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Background

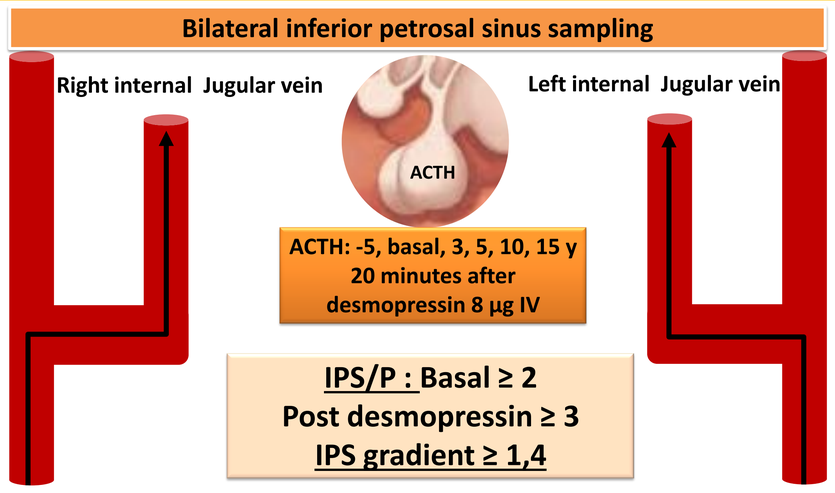
ACTH- dependent Cushing's syndrome could be caused by excess secretion of ACTH from a pituitary adenoma, Cushing Disease, (CD), or by ectopic secretion of ACTH from neuroendocrine tumors (ectopic ACTH syndrome), or rarely by ectopic secretion of corticotropin –releasing hormone (CRH). In adult patients, Bilateral Inferior Petrosal Sinus Sampling (BIPSS) with desmopressin stimulation has been proved to be useful in the diagnosis of ACTH-dependent CD with negative magnetic resonance imaging (MRI) or positive MRI but inconsistent biochemical data. However, little is known about its usefulness in pediatric population.

Aim

To evaluate the sensitivity and specificity of BIPSS with desmopressin stimulation in pediatric patients with MRI negative CD.

Subjects and Methods

We retrospectively reviewed the clinical records of twenty-three pediatric patients, (10 males), mean age 12.6 ± 2.5 years (y) (range 5.9-17.3) with CD followed in a single tertiary centre from 1992 to 2018. Inclusion criteria: Biochemical diagnosis of ACTH-dependent Cushing Syndrome (hypercortisolism proved by increased UFC, and ACTH >30pg/ml or partial response to 8mg dexamethasone suppression test) and hypothalamic pituitary MRI.
Every patient with negative MRI underwent BIPSS.
BIPSS was considered compatible with CD when inferior petrosal sinus (IPS) to peripherical (P) ACTH ratio (IPS/P) was ≥ 2 at baseline and ≥ 3 after desmopressin stimulation. Lateralization was considered when IPS gradient was ≥ 1.4.
Diagnosis of CD was confirmed by surgical and histopathological findings and/or clinical outcome



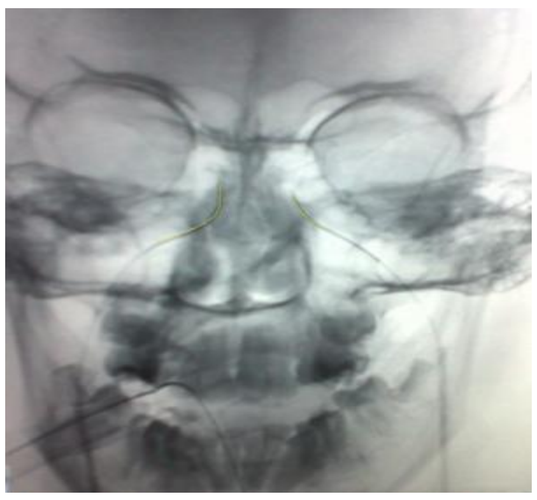
Results

- ✓ **Seven out of 23 patients had negative MRI (30.4%) and underwent BIPSS.**
- ✓ **BIPSS technical success rate was 100% and no complications were recorded.**
- ✓ **In all patients baseline IPS/P ratio was ≥ 2, sensitivity 100%.**
- ✓ **All but one patient (P3) had IPS/P ratio after desmopressin ≥ 3, sensitivity 85 %.**
- ✓ **IPS gradient predicted tumor lateralization in 4/7 patients (sensitivity 57%).**
- ✓ **Maximum IPS/P ratio was at 3 minutes, except in the patient who did not respond to desmopressin.**
- ✓ **Only two patients (P5 and P7) had persistent disease after surgery.**

Table 1: Baseline characteristics of 7 patients with negative MRI

Patients	Sex	Age (Years)	Height (cm)	Height SDS	Weight (Kg)	Weight SDS	ACTH (pg/ml)	Cortisol µg/dl	UFC (µg/m2/d)	8 mg on Dexa (%)	MRI
P1	F	8.88	122.7	-0.99	57	4.76	37.9	13.4	296.9	82	Normal
P2	F	5.88	109.3	-1.05	24.5	1.06	35.3	25.4	746	63	Normal
P3	F	12.3	145.3	-0.43	58	1.94	69.5	29.6	392	69	Microadenoma, not characteristic
P4	M	13.9	135.7	-2.65	45.9	-0.5	59	18.8	378	78	Normal
P5	M	14.1	147.8	-1.31	54.5	0.34	137	38	698	52	Rathke Cyst
P6	M	12.6	129.2	-2.5	58.5	1.84	70.4	23	215	93	Normal
P7	F	13.4	148.4	0.85	45.8	0.15	68.5	36.5	1063	NS	Not seen

Age: at diagnosis; NS: no suppression; 8mg on Dexamethasone: % cortisol suppression



Radioscopy showed the correct position of the two microcatheters in both inferior petrosal sinuses (marked in yellow dotted line) [5]

Table 2: BIPSS results, tumor location, histological findings and treatment outcome

Patients	IPS/P		IPS gradient		Location by surgery	Histology	Treatment outcome
	Basal	Post-Desmo	Basal	Post-Desmo			
P1	9.3	35.7	2.8 (L)	2.8 (L)	Left	Pituitary tissue	Remission
P2	12.8	50	14 (R)	14.2 (R)	Right	Adenoma ACTH +	Remission
P3	2.2	2.8	2.3 (L)	2.4 (L)	Middle	Adenoma ACTH +	Remission
P4	23.4	44.1	23.4 (L)	34 (L)	Right	Pituitary tissue	Remission
P5	16.8	17.4	2.1 (L)	2.1 (L)	Right	Pituitary tissue	Non Remission
P6	9.3	43	43 (L)	46.3 (L)	Left	Rathke Cyst	Remission
P7	41.6	7.9	2.8 (R)	7.7 (R)	Right	Pituitary tissue	Non Remission

IPS: inferior petrosal sinus; P: peripheral; L: Left; R: Right

Conclusions

The prevalence of negative MRI in pediatric patients with CD was similar to previous reports in adults. Our results demonstrate that BIPSS with desmopressin stimulation was safe and highly sensitive for the diagnosis of CD also in this population. The duration of BIPSS with desmopressin might be reduced without affecting the sensitivity as all patients respond at 3 minutes. BIPSS was not sensitive enough to predict tumor lateralization in our cohort. Even though this cohort has only 7 patients and more data are needed , we consider that our results contribute to validate the utility of BIPSS with desmopressin stimulation in the study of pediatric patients with Cushing syndrome.

References

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