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Vasopressin-sensitive Diabetes Insipidus

– A CASE REPORT

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SUMMARY

This is a case report of Vasopressin – Sensitive Diabetes Insipidus in a 5 year old Zambian Coloured male child together with a brief review of etiology, diagnosis and management of the condition.

CASE HISTORY

A five year old Zambian coloured male child was admitted to the University Teaching Hospital, Lusaka on 19th November 1975 with the problem of bed-wetting and excessive water drinking of 2 years duration. He woke up 3–4 times a night to drink 1–2 pints of water and wet his bed 3–4 times every night.

In 1973, the child fell on the face from a staircase (7 steps). He bled from the nose and had a bluish line along both infraorbital margins. He was never admitted and no X-Rays were taken.

There was no history of excessive water drinking in parents, grand parents and maternal uncles. The young brother is normal and healthy.

On examination the child weighed 16.32Kg with a head circumference of 52cm and height of 116cm. There was no pallor or lymphadenopathy. There were two congenital naevi. 10 x 7cm and 3 x 3 cm on left side of chest wall anteriorly and on back respectively. The pulse was 80 per minute. The blood pressure was 110/76 mmHg. The oral temperature was 37.6°C. The rest of the examination including neurological assessment was normal.

Investigations

The haemoglobin was 13.7gm% and the white blood count was 12.4 x 10^3 per cm^3 with differential of 76% neutrophils, 20% lymphocytes and 4% monocytes. The ESR was 40mm/hr. The sickling test was negative. The blood urea was 17mg% while Serum Sodium, Potassium Chloride and CO_2 – CP were 134, 3.6, 98, and 24mEq/Litre respectively. The blood sugar was 123mg% two hours after breakfast. The calcium was 11.4mg% (normal in our laboratory is 9.4 – 11.2mg%). The phosphorus was 5.8mg%. The total serum protein was 7.5mg% with albumin of 3.9gm%. The urine was clear as water in colour and had a specific gravity of 1.005. There was no sugar or protein and the microscopy of the urine was normal Skull and chest X-Ray were normal and so was the pneumoencephalogram.

The water intake, Urine output, Urine and Serum osmolarity during water deprivation test and after injection of vasopressin tannate in oil are shown in Fig. 1.

DISCUSSION

Diabetes insipidus has been defined as a rare condition with symptoms of polyuria and polydipsia which result from insufficient or lack of anti-diuretic hormone arginine vasopressin (ADH) (Coggins, 1967). The definition excludes such conditions as habitual compulsive water drinking, functional renal defects associated with hypokalaemia or hypercalcaemia and inherited defects with end-organ insensitivity to ADH of the renal tubules as occurs in nephrogenic diabetes insipidus. Vasopressin deficiency is divided into primary and secondary groups.

Classification of Diabetes Insipidus:–

A. – **PRIMARY**
- Familial
- Idiopathic

B. – **SECONDARY**

I. Space occupying lesions
- Pituitary tumours (Primary or Secondary)
- Craniopharyngiomas
- Other Tumours

II. Traumatic Causes
- Post surgery
- Basal skull fractures

III Infections
- Meningitis
- Encephalitis
- Syphilis
- Tuberculosis

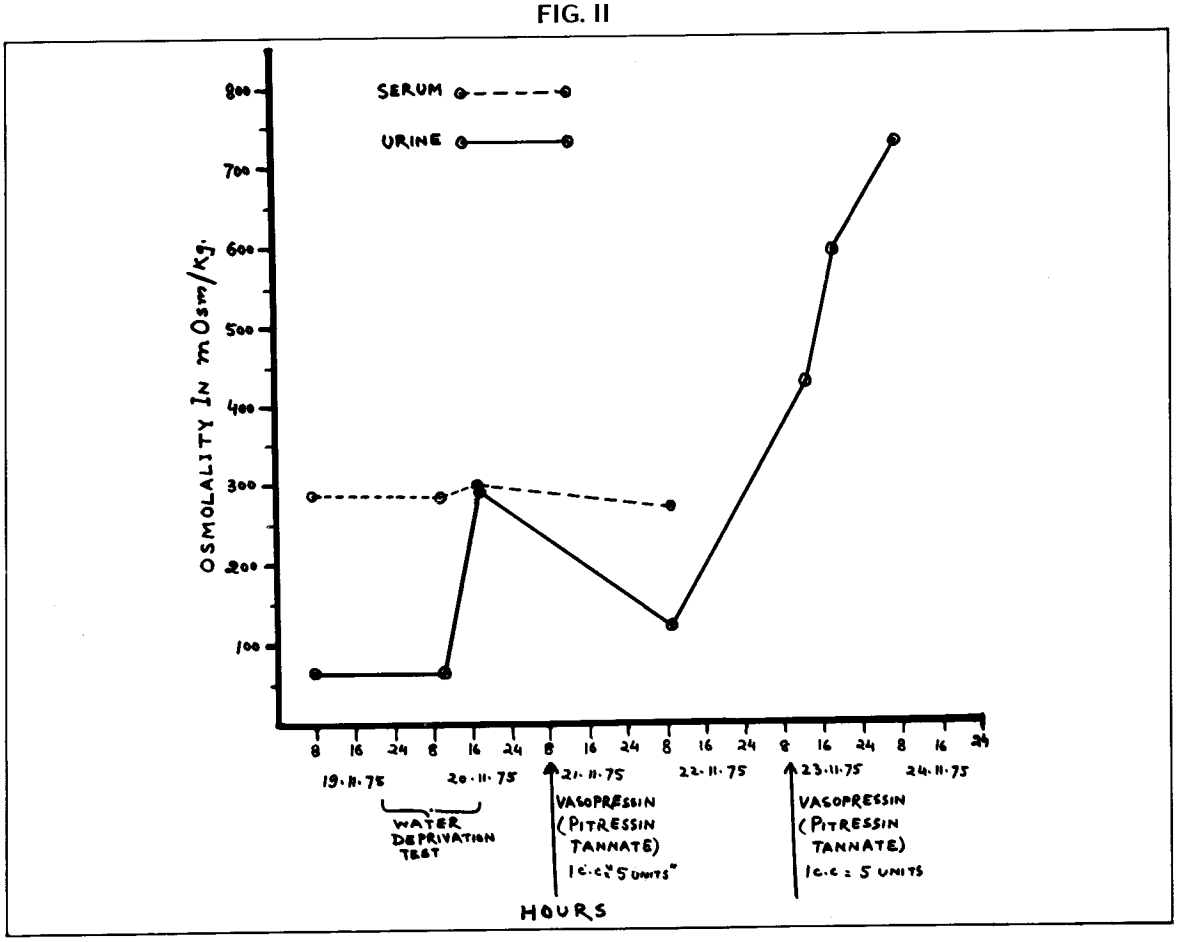
IV Infiltrative and Inflammatory conditions
- Histiocytosis

FIG. I

WATER DEPRIVATION AND PITRESSIN TANNATE RESPONSE

DATE	WATER INTAKE (c.c)	URINE OUTPUT (c.c)	WEIGHT (Kg)	TEMPERATURE (CENT.)	SERUM OSMOLALITY (mOSm/Kg)	URINE OSMOLALITY (mOSm/Kg)
I9.II.75	2749 (In I2 Hours)	I992 (In I2 Hours)	I6.32	37.6	284	64
			I6.60	38.2		
20.II.75 (WATER-deprivation test)	NO WATER (22 to 08 hrs.)		I6.IO	38.8		
	REHYDRATION (350c.c./hr.)		I5.80 I6.22	39.4 38.4		
	I050 c.c. (08toIO hrs.)					
	NO WATER (IIto I7 hrs.)	698 (In 7 hrs.)	-	38.6	275 (IIhrs.)	63 (II hrs.)
2I.II.75 PITRESSIN TANNATE Ic.c. ='5' units	900 (In 24 Hours)	569 (In 24 Hours)	-	-	287 (I7 hrs.) 273	285 (I7 hrs.) II9
23.II.75 PITRESSIN TANNATE Ic.c. = 5 units	-	-	-	-	-	428(I4hrs.) 605(I7hrs.) 720(24hrs.)

FIG. II



– Sarcoidosis

V Others

– Sickle Cell Disease
– Sheehans Syndrome
– Laurence – Moon – Beidl syndrome
– Optic Atrophy with Diabetes mellitus.

The diagnosis of diabetes insipidus is suspected on clinical grounds. Our case presented with polydipsia and polyuria. The urine osomolarity was low and did not rise to the expected value of over 800 mosm/kg after water deprivation test (Hockaday, 1972). The positive response to vasopressin injection as shown in Fig. 1 and graph (Fig. 2) leave no doubt that this patient has vasopressin sensitive diabetes insipidus as opposed to nephrogenic diabetes insipidus. The most probable cause was a basal skull fracture due to a fall two years back.

The intravenous hypertonic saline and nicotine tests were not performed as they do not give any more information than that given by the water deprivation test, further more they are traumatic to children (Gardner, 1969). We did not do vasopressin assay as facilities are not available in our hospital.

The boy is being treated with replacement therapy by deep intramuscular injection of vasopressin – tannate in oil 1cc = units every 48 hours. This dose is sufficient in older children to mediate formation of nearly maximally concentrated urine for a period of 48 hours (Gardner, 1969). The vial has to be warmed to blood heat and shaken thoroughly before injection to achieve reliable dosage. In this case urine osmolaity rose only to 119 mosm/Kg after first injection of vasopressin tannate in soil 1cc = "5 units" (Fig. 2). The probable reason being that it was not shaken and warmed properly as the second injection of vasopressin tannate 1cc = 5 units (Fig. 2) raised the urine osmolality to 720 mosm/Kg after 24 hours and the child did not wet his bed at night for the first time in two years.

Unfortunately vasopressin cannot be taken by mouth, though it can be absorbed through nasal mucosa. The snuff is unpredictable and cause irritation to nasal mucosa leading to chronic rhinitis and pulmonary complications (Pepys et al, 1966). Mahon et al (1967) reported a case having bronchospasm, eosinophilia and miliary shadows in lungs after taking pituitary snuff. Resistance often develops to nasal preparations and often this develops after five to ten years in contrast to vasopressin tannate (Hockaday, 1972).

The oral agents for treating diabetes insipidus like thiazides, chlorpropamide, clofibrate etc. have been used but out of these chlorpropamide has been found to be most effective in reducing symptoms to an acceptable level in one-third to half of patients and has been used by many workers (Edwards et al 1970) Reimold 1970, Ehrlich et al 1970, Rosenbloom,1971 and Choudhary, 1971) but its use is associated sometimes with sensitivity reactions and gastroentestinal symptoms. Also a low but definite incidence of serious blood dyscrasis, occurence of hypolycaemia, water retention and symptomatic hyponatremia occurs. Of 17 cases studied by Ehrlich et al 1970, six showed hypoglycaemia within 48-96 hours, three more had hypoglycaemia after going home. Two had hypoglycaemia during intercurrent illness and in one after six months of treatment with chlorpropamide. Luciano (1970) reported a child three years eight months old who had hypoglycaemia after six months of chlropropamide therapy. Similarly Linshaw et al (1971) reported that a danger of impaired excretion of waterload exists for anyone taking chlorpropamide who either requires intravenous therapy or ingests a large amount of fluid.

In recent years synthetic vasopressin analogue 1 desamino – 8 – D arginine vasopressin (DDAVP) has been tried by many workers (Anderson et al, 1972, Edwards, et al 1972 and Wards et al 1974). It has been found to be at least as potent and to have more prolonged action than vasopressin and is without serious side effects of oral agents and vasopressin tannate. In a study of 3 cases Wards et al, (1974) found twice daily intranasal DDAVP effected satisfactory control without any side effects in patients being treated previously with either Lysine Vasopressin nasal spray or Vasopressin tannate in oil with or without chlorpropamide. In those subjects who were unable to manage intranasal administration single daily intramuscular injection of DDAVP was found to offer excellent control.

Our case is being followed up and the disease is under control with 48 hourly injection of Pitressin tannate 1cc = 5 units. Chlorpropamide has not been tried as it has greater hazard in children than in adults. The DDAVP has been described as more effective, convenient and without side effects, but since it is not available in this country, we could not use it.

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