Turkish Journal of Endocrinology and Metabolism, (2004) 2 : 65-67 **ORIGINAL ARTICLE**

Magnetic Resonance Imaging Findings of Hypophysis in Patients with End Stage Renal Disease

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In order to evaluate the morphological findings of hypophysis with magnetic resonance imaging (MRI) in patients with end stage renal disease (ESRD), we examined the hypophyseal MRI (1.0 T magnetic field) results of 49 patients with ESRD of any underlying cause. Age, etiology and duration of chronic renal failure, time on hemodialysis therapy, hypothalamo-hypophyseal, adrenal, gonadal and thyroidal hormone profiles of the patients were recorded. Twenty-five females (51%) and 24 males (49%) with a mean age of 41.6 ± 12.3 years were held. Etiologies of renal failure were tubulointerstitial pathology in 28.6% (n=14), glomerulopathy in 36.7% (n=18), unidentified in 34.7% (n=17). Mean duration of ESRD was 78.6 ± 50.8 months. Hypophyseal MRI revealed pituitary adenoma in 20.4% (n=10), heterogenous pituitary parenchyme in 12.2% (n=6) and empty sella in 16.3% (n=8) of all cases. About 51.1% (n=25) of the patients had normal MRI reports. These findings exhibited no significant correlation with regard to age, gender, etiology of renal failure, mean duration of renal failure, time on dialysis therapy and pituitary hormone profiles (p>0.05). The detected parenchymal abnormalities may be the result of complex metabolic derangements encountered in uremic patients and needs to be clarified with more detailed studies.

Keywords: Hypophysis, magnetic resonance imaging (MRI), end stage renal disease (ESRD), dialysis

Introduction

Chronic uremia affects the central nervous system frequently in patients with end stage renal disease (ESRD). Neurologic problems in ESRD may manifest themselves as reversible metabolic or irreversible functional and morphological alterations. Although the introduction of renal replacement therapy with hemodialysis decreased the prevalence of these complications, there is still a broad spectrum of acute and chronic cerebral pathologies encountered in uremic patients. Vascular calcifications, dyslipidemia, hypertension, metabolic chaos of uremia, fluid and electrolyte imbalances and frequent infections, all contribute to neurologic complications of ESRD. Magnetic resonance imaging (MRI) is usually the method of choice for the prompt diagnosis of these diverse complex central nervous system problems of uremia (1- 5).

Although gonadal dysfunction, hyperprolactinemia, and growth hormone insufficiency have been recognized for a long time in uremic patients (6- 9), not much is known about the morphological changes that take place in the pituitary during chronic uremia.

As MRI has particular value in this group of patients, we analysed the hypophyseal MRI findings of patients with ESRD and discussed the relationship of these findings with clinical and laboratory parameters.

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Materials and Methods

Hypophyseal MRI findings of 49 patients with ESRD who had been referred to the Department of Endocrinology and Metabolism of Başkent University, School of Medicine were evaluated retrospectively from January 1999 through June 2002. Magnetic resonance imaging procedures were performed to rule out various hypophyseal diseases in cases with hypogonadism (n=12), hyperprolactinemia (n=28), secondary hypothyroidism (n=6) and headache (n=3). Age, etiology and duration of ESRD, time passed on hemodialysis therapy, hypothalamohypophyseal, adrenal, gonadal and thyroidal hormone profiles were assessed to define their roles as determinants of morphological changes in the pituitary gland.

Hypophyseal MRI procedures were performed in 1.0 T magnetic field (Siemens, Expert, Erlangen). Precontrast T1W coronal and sagittal images were obtained. Precontrast T2W coronal images were also added. Post-contrast dynamic images with a flash 2D sequence in coronal plane and routine SE T1W sagittal and coronal images were obtained after paramagnetic contrast injection.

Table 1. General features of the patients

Male/ Female (n)	24/25
Age (years)	41.6 ± 12.3
ESRD due to unidentified etiology (n)	17 (34.7%)
ESRD due to tubulointerstitial pathology (n)	14 (28.6%)
ESRD due to glomerular pathology (n)	18 (36.7%)
Mean duration of ESRD (mo)	78.6 ± 50.8
Mean time on hemodialysis therapy (mo)	57.5 ± 41.7
Pituitary adenoma (n)	10 (20.4 %)
Empty sella (n)	8 (16.3 %)
Heterogenous pituitary parenchyme (n)	6 (12.2 %)
Normal pituitary MRI (n)	25 (51.1%)

ESRD:End stage renal disease
n: number
mo: months

Statistical analysis

For statistical significance, differences between patient groups were assessed using the Student's t-test, paired samples t-test, Pearson Correlation and Chi-square test where appropriate. All results were expressed as means ± SD unless otherwise indicated. Statistical analysis was conducted using the SPSS for Windows software package, Release 10.0. Statistical significance was considered when a p value was equal or below 0.05.

Results

Twenty-five female (51%) and twenty-four male (49%) patients, with a mean age of 41.6 ± 12.3 years were included. The etiologies of renal failure of the patients were tubulointerstitial pathology in 28.6% (n=14), glomerulopathy in 36.7% (n=18) and unidentified in 34.7% (n=17). Mean duration of ESRD was 78.6 ± 50.8 months. Hypophyseal MRI revealed pituitary microadenoma in 20.4% (n=10), heterogenous pituitary parenchyme in 12.2% (n=6) and empty sella in 16.3% (n=8) of the patients. About 51.1% (n=25) of the cases had normal MRI findings. Of 28 patients with hyperprolactinemia, six had pituitary microadenoma, four of them had heterogenous pituitary parenchyme and five had empty sella. Although none of the patients with symptoms of hypogonadism (with normal PRL) had gonadotrophic hormone deficiency, two had empty sella, while other two patients had microadenoma and one had heterogenous pituitary parenchyme. All patients with supressed TSH values were diagnosed as sick euthyroid syndrome, but their pituitary imagings unmasked an adenoma, an empty sella and a case with heterogenous pituitary parenchyme.

The MRI findings exhibited no significant correlation with regard to age, gender, etiology of renal failure, mean duration of renal failure and time on dialysis therapy ($p>0.05$). Serum levels of cortisol, growth hormone (GH), thyroid stimulating hormone (TSH), follicle stimulating hormone (FSH), luteinizing hormone (LH,) prolactin, estradiol (E_2) in females, testosterone in males showed statistically insignificant relationship with MRI findings ($p>0.05$).

Discussion

It is well known that hypophyseal homeostasis is affected by metabolic stress, cardiovascular problems, infectious complications and toxic milleu of renal replacement therapy in patients with ESRD (1, 2, 6, 10, 11). In literature there are many reports about the hormonal impacts of uremia on hypophysis and dynamic tests for proper diagnosis. Although there has not been an accepted consensus of methodology yet, biochemical evaluation of

hypophyseal functions with dynamic tests is important for clinical assessment of these cases (6-8, 12, 13). Magnetic resonance imaging is of particular value in most patients when the biochemical evaluation is inconclusive. As far as we know, this is the first report investigating the hypophyseal MRI findings in cases with ESRD. We were unable to correlate clinical and biochemical findings with the pituitary morphologies illustrated, due to the low number of cases included. In this preliminary study, we unmasked a relatively high frequency of heterogenous parenchymal disease of the pituitary which surprisingly did not reveal any correlation with the underlying hormonal or clinical status including age, gender, type of renal pathology, duration of disease and the dialysis therapy. The search we made in literature gave no match with an ESRD patient with heterogenous pituitary parenchymal imaging.

In a study comparing the MRI appearance of the pituitary glands of healthy volunteers (n=52) with that of patients with microadenomas (n=14), focal hypointensities which were smaller and less darker in appearance than microadenomas, were common incidental MRI findings in healthy population. The clinical significance of this finding was not inquired in that study (14). The MRI findings encountered in our ESRD patients revealed diffuse heterogenousity presented as areas of both hypo and hyper-intensities in the hypophysis. Pituitary morphology is affected by age, ischemic changes, metabolic stress including diabetes mellitus and uremia, head injury, electrolyte imbalances, infections and many other identified and unidentified toxins. Most of these factors can be encountered in patients with ESRD with fluctuating degrees (1, 2, 15). We think that hypophyseal parenchymal abnormalities detected in uremic patients may be the result of these broad spectrum of factors that need to be clarified with more detailed studies. This preliminary study, being the first one showing hypophyseal parenchymal heterogenousity detected by MRI in patients with ESRD, provides basis for future clinical investigations.

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