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Spina Bifida Occulta in Persistent Primary Nocturnal Enuresis

Background/Objectives: Of congenital malformations of the central nervous system 46% are abnormalities of the spinal cord, which includes spina bifida occulta (SBO). The occurrence and significance of spina bifida occulta in patients with persistent primary nocturnal enuresis (PPNE) were evaluated.

Materials and Methods: Between January 2000 and February 2001, 109 consecutive children who had nocturnal enuresis more than once a week after the age of 7 years for an uninterrupted period of at least 3 months, with less than 50% reduction in wet nights despite different treatments for at least 6 months, were prospectively evaluated for the presence of associated spina bifida occulta. The results were compared with data from a group of 40 normal children.

Results: The mean age was 9.9 years in PPNE patients and 7.5 years in normal group. SBO was present in 86 (78.9%) of PPNE patients and 10 (25%) of normal children. This difference was statistically significant using chi-square test. (P-value < 0.001)

Conclusion: Spina bifida occulta was thought to have no clinical significance but our results showed its significant higher rate among PPNE patients. There is no direct causal relation between spina bifida occulta and enuresis, apparently, but the findings suggest a common developmental etiology.

Keywords: child, primary nocturnal enuresis, spina bifida occulta

Introduction

There has been interest in the importance of finding unfused posterior arches on lumbosacral spine radiographs from earliest days of radiology.¹⁻⁴ Since then, many investigators have studied its prevalence in different populations. The reported incidence varies enormously from 1.2%⁴ to as high as 50%⁵ and in a recent study, Kamanli and Genc (2002) by reviewing the radiographs of 503 healthy volunteers determined the 21.4% prevalence for spina bifida occulta.⁶ The fusion of the vertebral arches does not take place until the first year of life and is not complete until adolescence. This fact accounts for the higher incidence of spina bifida occulta in children than in adults. One fourth of all infants and young children show some minor defects of the vertebral arches in radiographic examination which is more common in males.

The majority of spina bifida occulta cases are of no clinical significance and show no evidence of neurologic deficit or musculoskeletal abnormality. However, in 1985 Galloway et al⁷ and in 1989 Fidas et al^{8,9} found an increased prevalence of spina bifida occulta in adults with lower urinary tract dysfunction and genuine stress incontinence, respectively. It is still controversial whether lumbosacral spina bifida occulta is associated with functional lower urinary tract disorders. Recently, Samuel and Boddy examined 158 children presenting with lower urinary tract and bowel dysfunction and reported lack of direct association between spina bifida occulta and lower urinary tract dysfunction.¹⁰

The aim of this study was to determine the prevalence and association of spina bifida occulta in children presenting with persistent primary nocturnal enuresis.

Materials and Methods

The presence of spina bifida occulta was determined in 109 patients (68 girls and 41 boys) presenting with nocturnal enuresis more than once a week after the age of 7 years for an uninterrupted period of at least 3 months, and despite different treatments for at least 6 months, they had a less than 50% reduction in wet nights. The investigations confirmed the absence of any structural and organic abnormalities of the urinary tract, as well as any neurological disorders. Urological investigations included frequency-volume chart, urine analysis and culture, uroflowmetry and ultrasonography of kidneys, ureters and bladder. And examination by a pediatric neurologist consultant confirmed the absence of any neurological deficit.

The rate of spina bifida occulta was also assessed from the pelvic radiographs of 40 age and sex matched normal children. Normal cases included 26 girls and 14 boys aged 7-14 years, without any urinary or faecal complaints, not affected by spinal anomalies, and undergoing pelvic radiography for various reasons (e.g. trauma, acute abdomen, urinary lithiasis).

All radiographs were taken under identical conditions (1000 mA, Siemens), the patient were in supine position while the radiographs were taken with the beam centered on suprapubic region. Spina bifida occulta was defined by definite failure of fusion of the posterior arches of one or more vertebrae above the level of the third sacral segment.

Statistical analysis was performed by the χ^2 test with $P < 0.05$ considered statistically significant.

Results

The prevalence of spina bifida occulta was obtained in 40 children without any urinary or fecal complaints, considered as normal population. Mean age was 7.7 years in this group of children ranging from 7 to 14 years, 10 (25%) were shown to have spina bifida occulta. In persistent primary nocturnal enuretic children with mean age of 9.9 ranging from 7 to 18 years, 86 (78.8 %) were shown to have spina bifida occulta (Figure 1). Statistical analysis showed that the prevalence of spina bifida occulta was significantly higher in persistent primary nocturnal enuretic patients. ($\chi^2 = 37.09$, $df = 1$, $P < 0.001$) The calculated odds ratio was 11.2. (CI 95% = 4.79 – 26.27)

Discussion

Virchow coined the term spina bifida occulta in 1875. Early reports indicated that the incidence of spina bifida occulta in the general population was low, although these studies were based on anatomical

dissections.⁴ After X-ray examination of the spine became possible nonfusion of the spinous processes of the lumbar and sacral vertebrae was among the most common congenital anomalies of the spine. Spina bifida occulta was initially thought to be a normal anatomical variant but in the early part of the 20th century it was implicated in a number of disorders. Reports described increased incidences of spina bifida occulta in patients with back pain,^{11,12} lower urinary tract and bowel dysfunction,⁹ stress incontinence,⁸ and enuresis.¹³⁻¹⁵

The reported incidences of spina bifida occulta in enuretic patients are from 35% to 60% comparing with the 29% incidence in normal children.¹⁶⁻¹⁸ Enuresis is a developmental disorder and there is a consensus that every child attains urine control in a special age, the same as the ability of speaking, and delay in urine control is considered a developmental delay in micturition reflex.

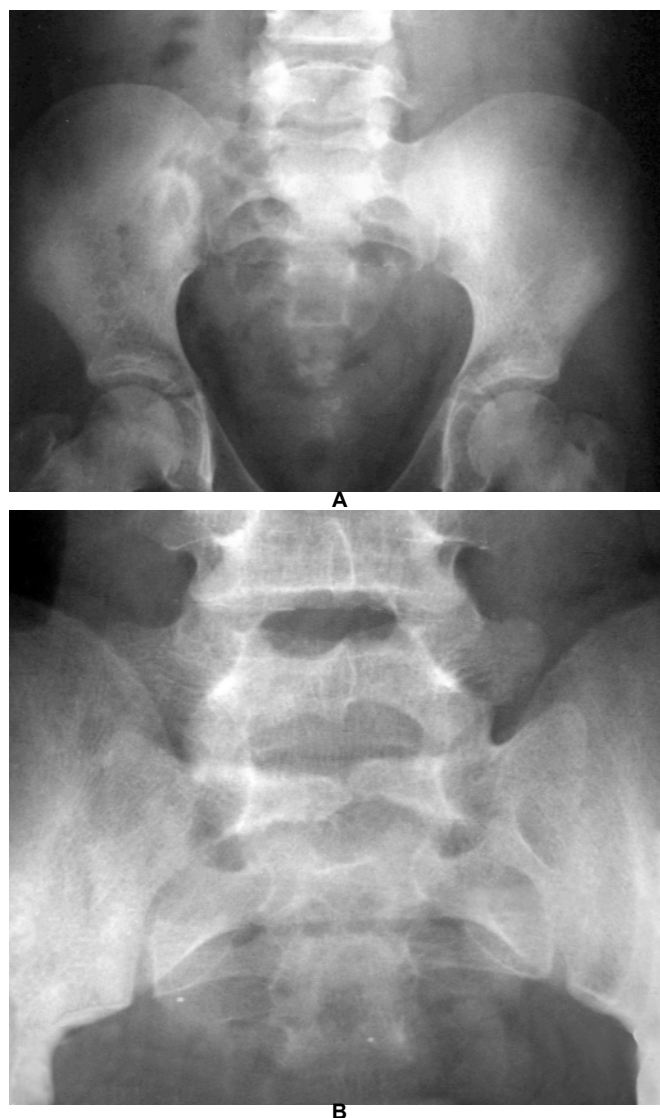


Figure 1: Spina bifida occulta of L₅ and S₁
A) in a 5 years old girl with PPNE
B) in a 17 years old boy with PPNE

It appears that there is no causal relationship between spina bifida occulta and urine control, but they both may have a common etiology and show a developmental delay. This hypothesis is confirmed by the fact that both of these phenomena are age dependent and in majority of the patients spontaneous resolutions of both problems occur, simultaneously.

Prospective studies on enuretic patients with spina bifida occulta are needed to determine whether resolution of spina bifida occulta can predict a good prognosis for enuresis.

In light of our findings we recommend that special attention should be paid to find spina bifida occulta in plain radiographs or MRI's of patients presenting with urinary symptoms. In the other hand, all patients in whom spina bifida occulta has been found incidentally should be questioned about history of urinary or faecal complaints, and if positive, appropriate investigations requested, accordingly.

Acknowledgements

The authors wish to thank Dr. Parisa Saeedi for her kind help with cooperation in preparing the manuscript.

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