Annotations

Orthostatic proteinuria

Is orthostatic proteinuria in children and adolescents a cause for concern? It is well known that the incidence of orthostatic proteinuria greatly exceeds that of chronic renal disease, so a natural conclusion might be that in many cases the condition is harmless. However, this general statement offers little help in dealing with an individual child who has orthostatic proteinuria. Is there enough risk of serious disease to warrant attention? What causes it?

What is orthostatic proteinuria?

Orthostatic proteinuria refers to the condition in which protein appears in the urine only when the child is upright and not when recumbent. The protein excretion rate increases when the child stands, and decreases when the child lies down. This phenomenon is not always accompanied by symptoms of other kidney disease, although it can be associated with a variety of conditions such as glomerulonephritis, diabetes, or hypertension.

The cause of orthostatic proteinuria is not fully understood, but it is thought to involve abnormalities in the filtration and reabsorption of protein by the kidneys. The exact mechanism is not clear, but it is believed that the increase in protein excretion when the child stands is due to changes in blood flow and pressure in the kidneys. This can be caused by various factors, such as changes in posture, exercise, or the effects of gravity.

How common is it?

Orthostatic proteinuria is a relatively rare condition, affecting only a small percentage of the population. It is more common in children and adolescents, with a peak incidence in the teenage years. The prevalence is higher in boys than in girls, and there is a higher incidence in people of certain ethnic groups, such as those of Asian or Middle Eastern descent.

What causes it?

The cause of orthostatic proteinuria is not fully understood, but it is thought to involve abnormalities in the filtration and reabsorption of protein by the kidneys. The exact mechanism is not clear, but it is believed that the increase in protein excretion when the child stands is due to changes in blood flow and pressure in the kidneys. This can be caused by various factors, such as changes in posture, exercise, or the effects of gravity. Some cases of orthostatic proteinuria are associated with other medical conditions, such as diabetes or hypertension, but most cases are idiopathic, meaning they have no known cause.

Orthostatic proteinuria is considered to be a benign condition, with few complications. However, it is important to monitor for signs of other medical conditions that may be associated with the proteinuria, such as hypertension or diabetes. Treatment is usually not necessary, but it may be recommended in cases where the proteinuria is severe or persists for a long time.

No particular degree of proteinuria is characteristic of orthostatic proteinuria in children; upright protein excretion varies from barely above normal to more than 0.5 g per hour. The total 24-hour excretion however, rarely exceeds 1 g.

How common is it?

No accurate figures on the prevalence of orthostatic proteinuria exist, but only a rough estimate from indirect evidence. The prevalence for all types of proteinuria combined ranges from less than a few per cent in infants to at least ten per cent in adolescents. As many as half of proteinuric children of school age have either transient or fixed and reproducible orthostatic proteinuria. It is not certain whether orthostatic proteinuria occurs to an appreciable extent in infants and toddlers.

What causes it?

It is likely that in most cases orthostatic proteinuria is a result of increased glomerular filtration of protein rather than of decreased tubular reabsorption of the filtered protein, because even if tubular reabsorption were stopped completely, it could not by itself account for the degree of proteinuria often present. The earlier notion that an increased glomerular protein filtration was somehow caused by an abnormal renal haemodynamic response to orthostasis is now refuted. Firstly, the measured response, a decrease in renal plasma flow and glomerular filtration rate and an increase in filtration fraction, is in the same direction and of the same magnitude in patients with orthostatic proteinuria as in control subjects. Secondly, young adults with orthostatic proteinuria have been reported to excrete slightly more protein than controls even when lying down, although the rates are within normal limits. And finally, the available morphological evidence, although scanty, indicates that subtle anatomical deviations can often be found in the glomeruli of both adults and children who have orthostatic proteinuria. Thus there is at least a suspicion that mild glomerular injury contributes to orthostatic proteinuria, but it would be an oversimplification to consider that orthostatic proteinuria is an aetiological entity. Rather, as with many other renal
histopathological appearances, such a glomerular abnormality could be caused by any of a number of aetiological agents, the nature of which is currently unknown.

**Prognosis and management**

The pathophysiological speculations do not answer the most important question: What is the future of a child who has orthostatic proteinuria? There are no truly long-term, prospective studies that can give a definitive answer. In adults, there is indirect evidence based on retrospective data to suggest that the long-term prognosis is good. Likewise, a continuing prospective study on young men with fixed and reproducible orthostatic proteinuria shows no progression into overt renal disease during a 10-year observation period, but the authors are still cautious about predicting the final outcome. Only short-term studies have been published on children and these indicate a good 1- to 6-year prognosis.

Renal biopsy cannot be conclusive regarding the prognosis. However, if there were clearly an increased risk of developing chronic renal disease, one would expect to be able to diagnose at least a few cases if a large enough number of patients with orthostatic proteinuria were examined. Remarkably, histological reports on children with isolated orthostatic proteinuria have failed to find any diagnostic changes, although several biopsies have shown minor alterations.

In one such study the 17 children with orthostatic proteinuria who were biopsied had been chosen from 900 proteinuric children because of the degree and persistence of the proteinuria, thus rendering the absence of serious disease statistically convincing.

Although no systematic studies on children with non-isolated orthostatic proteinuria have been reported, there are examples of renal biopsy disclosing an underlying disease in children with the combination of orthostatic proteinuria and microscopic haematuria.

From the data one cannot be certain that there is absolutely no increase in chronic renal disease in patients with orthostatic proteinuria, yet it is clear that the vast number of children with this condition cannot be extensively investigated. The alternative is to look for other signs of kidney disease using simple, non-invasive methods—such as physical examination, urine analysis, and serum creatinine determination. In most, no other abnormality will be found, and the orthostatic proteinuria can be called isolated. Fortunately, the risk of present or future renal disease in such children seems slight; further investigation would not give any additional information, and to keep a child under close long-term observation would create a chance for misinterpretation on the part of the family, leading to unnecessary anxiety, and possibly restrictions on the child over the years of follow-up. I believe that the family would be better served by being assured of a good prognosis, and at the same time, keeping the diagnosis of orthostatic proteinuria in the child's records as a reminder should any additional sign be manifest in the future.

**References**


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