Raw Milk, Two E. coli O157:H7 Outbreaks, and hemolytic uremic syndrome (HUS): what are the real acute and long-term consequences? - Part 2

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Part 2 – Long-term consequences of hemolytic uremic syndrome (HUS)

Multiple studies have demonstrated that children with HUS who have apparently recovered will develop hypertension, urinary abnormalities and/or renal insufficiency during long-term follow-up. One of the best predictors is the duration of anuria and/or oliguria.

Milford, et al, (J Pediatrics, 1991) studied the importance of proteinuria at one year following the acute episode of HUS in 40 children. They found that a poor prognosis defined as hypertension, decreased renal function or end stage renal disease was strongly associated with proteinuria at the one year follow up.

Perlstein et al, (Arch Dis Child, 1991) reported results of oral protein loading in 17 children with a past history of HUS; they demonstrated that functional renal reserve was reduced in children with a past history of HUS who had normal renal function and normal blood pressure as compared to normal children. This study suggests that functional renal reserve in children with HUS is reduced although renal function and blood pressure are normal. The authors point out that the long-term significance of this finding is unknown and needs to be determined but the study suggests that functional renal reserve may be reduced in spite of normal recovery and that children with HUS need long term follow-up.

In the article by Gagnadouz, et al, (Clinical Nephrology, 1996) 29 children were evaluated 15-25 years after the acute phase of HUS. Only 10 of the 29 children were normal, 12 had hypertension, 3 had chronic renal failure and 4 had end stage renal disease (65.5%). Severe sequelae occurred in children with oligo/anuria for more than or equal to 7 days.

Other studies (Caletti, et al, Pediatric Nephrology, 1996) have demonstrated that histological finding of focal and segmental sclerosis and hyalinosis are observed several years following HUS. In that article, only 25% of the children had normal renal function during long-term follow-up.

Similarly, Moghal, et al. (Journal of Pediatrics, 1998) performed kidney biopsies in children with persistent proteinuria three to seven years following the acute episode of HUS. Global glomerulosclerosis was noted in six of the seven patients and two had segmental sclerosis as well. In addition, tubular atrophy and interstitial fibrosis was seen in all but one. Finally, the glomeruli in the children with HUS were significantly larger than those in normal children.

These are finding that are typically found in individual with reduced nephron number and are consistent with changes of hyperperfusion and hyperfiltration is surviving nephrons. Hyperfiltration is a process that frequently leads to progressive renal damage and the development of end stage renal failure.

In 1997 Spizzirri, et al, (Pediatr Nephrol, 1997), reported that 69.2% of children with 11 or more days of anuria and 38.4% of children with 1-10 days of anuria had chronic sequelae. In addition, of patients with proteinuria at the 1-year follow-up, 86% had renal abnormalities at the end of the follow-up. The authors suggested that children with residual proteinuria with or without hypertension would probably develop progressive chronic renal failure.

In 2002, Blahova, et al, reported that long term follow up of 18 children who had HUS 10 or more years previously, only 6 children were normal while the other 12 children had either residual renal symptoms, chronic renal insufficiency or renal failure (66.6%). Many of the children with residual renal symptoms or chronic renal insufficiency/renal failure had appeared to have recovered normally at earlier check ups.

Recently, Lou-Meda, et al, reported that 14 patients with microabluminuria and no overt proteinuria at 6 to 18 months after the acute phase of HUS, on long term follow up three had a decreased glomerular filtration (GFR), one had overt proteinuria, and four had hypertension. Eight of the 14 patients had at least one sequelae for an incidence of 57.1%. Six children had overt proteinuria and at the most recent follow up, two had hypertension, four and a low renal function and two had continued proteinuria; four (66.6%) had at least one renal sequale.

Recently, Oakes, et al, determined the risk of later complications in children who had HUS several years earlier; they found that the incidence of late complications increased markedly in those with more than 5 days of anuria or 10 days of oliguria. Among children with greater than 10 days of oliguria 63.3% had a low glomerular filtration rate, 33.3% had hypertension and 88.7% had at least one long term complication.

In summary, many children who have recovered normal renal function following the acute episode of HUS have a high risk for the development of late complications from their acute episode of HUS. The risk is substantially lower in children who did not require dialysis and in children who were not oliguria or anuric while the risk is the highest in children who had oligo/anuria for more than 7 days. In one study, all children with oligo/anuria for 14 days had residual renal disease (100%).

It is important to note that the risks of long-term (more than 20 years) complications are unknown and are likely to be higher than risks at 10 years as many of the above studies describe.

Tomorrow Part 3 – Long-term side effects of hemolytic uremic syndrome (HUS)