Early Growth Hormone Administration in the Treatment of Prader-Willi Syndrome: A Case Report

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Background

Prader-Willi Syndrome (PWS) is a rare genetic condition that is characterized by hypotonia, hyperphagia, delayed growth development, undeveloped genitalia, and mild-moderate intellectual impairment (Picture 1). In addition, some features are commonly seen such as narrow forehead, almond shaped eyes, short stature, and small hands and feet (Picture 2). PWS is a genetic disorder that occurs in 1 every 15,000 children that are born. It is caused by a loss of function in genes on paternal chromosome 15. The loss of function of the gene can be caused by deletion (70%), uniparental disomy (10-15%), or imprinting mutation (<5%) (Figure 1). The genes that have lost function normally produce proteins known as small nucleolar RNA (snRNA). In the past, PWS was diagnosed clinically, however it is now diagnosed by genetic testing using DNA methylation testing. Screening early on with infants that present with hypotonia can help with early intervention by supplementing growth hormone and consulting with a nutritionist.

Case Description

We present a case of a newborn infant who was born preterm at 33 weeks by C-Section with an APGAR score of 5 at 5 min, and 10 at 8 min. Infant was 1880 grams at birth, and presented with Left brachial plexus injury, ASD, prenatal anemia, Tethered Cord Syndrome, and bacterial sepsis. Mother of infant was positive for GBS and E.coli of an UTI. Immediately after birth, decrease in muscle strength was noted more so in the left than right extremities. A series of lab tests were done to rule out any metabolic or hematologic disorder. The next option to evaluate was genetic testing, which was positive for Prader-Willi Syndrome. Infant was in NICU for 35 days secondary to pulmonary infection complicated by respiratory distress. After being discharged from hospital and following up with pediatrician, they were referred to endocrinologist to discuss possible evaluation of growth hormone treatment. Infant was recommended somatotropin at 4 months. Since treatment, infants height has increased 1.125 inches/month compared to prior to treatment height was increasing .75 inches/month. Weight continues to grow exponentially from 1.4 lbs/month prior to treatment, to 2.07lbs/month after beginning treatment. Time frame of values is within 8 months.

Picture 1. Common Findings in PWS

Picture 2. Common Facial Findings in PWS

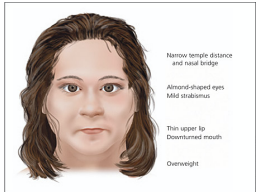
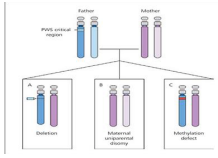
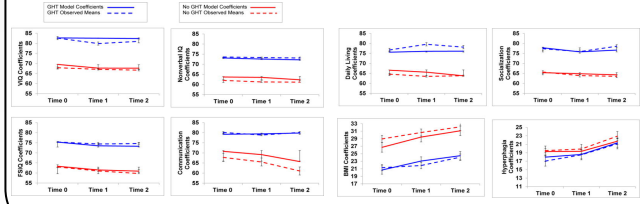


Figure 1. Genetics in PWS



Graph 1:Cognitive and Adaptive Behavior Outcomes with rhGH in Dykens study (2017)



Growth Hormone Treatment

In 2000, the medical community got the approval to use recombinant growth hormone for specific disorders such as PWS. rhGH has been proven to increase height, decrease in body fat, increase bone mineral density as well as improving cognitive performance. However, rhGH does not convey significant change in the body weight when expressed as standard deviation scores. The recommended age to begin administration is 2 years, however recent studies have conveyed more benefits beginning at an earlier age. The Dykens study in 2017 conveyed that children start rhGH before 12 months of age had higher verbal and composite IQs as well as communication and daily living skills than children who started after 12 months (Graph 1).

The infant was referred to an endocrinologist that began somatotropin 0.4mg SubQ at 4 months. As described in the case presentation, the rate of height growth has increased for the infant. Although rhGH can decrease body fat, that is not accurately represented in the weight of the infant. The BMI rate increase decreased from 1.5 kto 0.4 kg/m^2/month. This proves that growth hormones helps increase the height and decrease the BMI of the child overtime.

Two contraindications for somatotropin that must be monitored in an infant taking somatotropin are sleep apnea and severe respiratory impairment. In the case of a respiratory infection, the infant must be treated aggressively.

Conclusion

Prader-Willi Syndrome is a rare genetic condition that continues to have ground breaking research to help continue to improve the quality of life for those affected and their families. This case conveys the initial and long term benefits of administering rhGH at an earlier age. It is imperative to be proactive in the treatment of PWS and to continue to monitor the long-term effects. The treatment of PWS consists of multidisciplinary intervention such as occupation and physical therapy, speech therapy, ophthalmologic, neurologic, psychiatric, gastroenterology, and endocrine care. This case is an example of treating PWS in an earlier age than the recommended age can have benefits for the child's development and growth.

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