

Case Report

Prader-Willi Syndrome Case Report from Rehabilitation Point of View

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ABSTRACT

Introduction: Prader-Willi Syndrome (PWS) is a genetic disorder due to loss of function of paternal copy of chromosome 15 while most manifestations are attributable to hypothalamic dysfunction.

There are wide range of diversity in the symptoms such as hypotonia, abnormal neurologic function, hypogonadism, developmental and cognitive delays, hyperphagia and obesity, short stature, and behavioral and psychiatric disturbances.

Objective: This study aimed to describe the musculoskeletal and developmental improvement in a child with Prader-Willi Syndrome after physiotherapy program.

Case report: A girl aged 18 months old, attended to our clinic, with all the inherent PWS characteristics such as hyperphagia, obesity, hypotonia and delay motor milestones.

Conclusion: Parents motivation to keep physical activity in parallel with special physical therapy program can both lead to case improvement.

Keywords: Prader-Willi syndrome; Multisystemic genetic disorder; Hyperphagia; Obesity; Neonatal hypotonia.

Introduction

Prader-Willi Syndrome (PWS) is a complex multisystem genetic illness caused by a disruption or deletion of genes in the proximal arm of chromosome 15 or by maternal disomy in the proximal arm of chromosome 15. The syndrome, originally described in 9 Swiss children by Prader, Labhart, and Willi in 1956 [1-3]. In 1981 Ledbetter et al., identified deletions located between bands 15q11 and 15q13 and attributed the PWS pathology to that [4-6].

The syndrome has characteristic phenotypes including severe neonatal hypotonia, early onset hyperphagia that leads to morbid obesity, short stature, hypogonadism, learning difficulties, behavioral problems, and psychiatric phenotypes with severe consequences and difficult management issues for patients, families, and care givers [7-11].

Prader-Willi syndrome has been reported worldwide. Reported prevalence rates for Prader-Willi syndrome range from 1 per 8000 population in rural Sweden to 1 per 16,000 population in western Japan [12,13].

Differences in prevalence rates between sexes have not been reported. Since it is a genetic disorder, PWS has lifelong implications [14]. There is a clear need for an integrated multidisciplinary approach to facilitate early diagnosis and optimize management to improve quality of life, prevent complications, and prolong life expectancy [15].

Direct medical resource utilization was considerably greater among patients with PWS than members without the condition [16].

Case report

The patient was the second sibling of 2 children born to unrelated Caucasian parents. She has an older normal brother. At the time of her birth the mother was 35 y old and the father 39 y old. Neither earlier nor subsequently did her mother miscarry. The pregnancy was uneventful, but the mother recalls very little intrauterine activity. Antenatal ultrasound (U/S) revealed intrauterine growth retardation (IUGR) with weight less than the 10th percentile. Doppler study showed high resistant blood flow. There were no complications during her pregnancy period until the 36th week gestation when emergency Low Section Caesarian Section (LSCS) was committed due to high resistant blood flow.

Data in delivery room

Low birth weight (about 1790 gm), length 44 cm (BMI 9.2 Kg/m^2) and head circumference was 32 cm. her APGAR score 8 & 9 at 1 and 5 minutes. The child failed to cry. Shortly after birth she became cyanosed and developed respiratory distress, she was admitted in an incubator for three weeks. She was floppy with sever generalized hypotonia, being unable to suck she was fed with a dropper. Her physical examination and investigations revealed no dysmorphic features, heamodynamically stable circulation, normal respiratory system, lax abdomen with neither organomegally nor distension, neurologically free (including MRI brain, EMG, NCV), Normal genitalia, and infection panel was also negative. After three weeks she was discharged stable, full feed with 2.170 gm weight (BMI 11.2 Kg/m^2) but still hypotonic.

One month later, clinical suspicion of PWS came to mind and genetic confirmation was needed. It yielded maternal uni-parental disomy of chromosome 15 (UPD15). She was 18 month old when her mother came to our clinic seeking assessment and help.

Initial physical assessment

She was awake, her weight was 13kg, length was 60 cm, BMI 36.1 Kg/m^2, react to voice and light with minimal head tilt, low activity in her mothers lab, small hands and feet, no yet milk teeth appeared, normal range of movement of both upper limbs and lower limbs, thoracolumbar scoliosis to the right, generalized hypotonia with four limbs flaccid.

Head support (achieved at age of 9 months), reach out for objects (at age of 15 months), can't sit alone without support, can't transfer objects from hand to hand, can't crawl nor creeps, can't stand or walk holding furniture. Neck Righting Reflex (NRR), Landau's reflex and Symmetrical Tonic Neck Reflex (STNR) were all present. Tonic Labyrinthine Reflex (TLR), Moro reflex, Startle reflex and Asymmetrical Tonic Neck Reflex (ATNR) were all absent.

Our plan and targets of therapy

Our targets of therapy were to improve muscle strength, aerobic endurance, postural control, movement efficiency, function of movement, balance and co-ordination in order to achieve delayed milestones. Obesity management with help of dietitian to minimize the cardiovascular risks and osteoporosis.

We described resistive strength training exercises taking in consideration the state of hypoactivity of the patient; We tried to provide an attractive treatment environment rich in colorful toys and music encouraging her to move and also to encourage her mother to do the same at home.

Strengthening exercises to abdominal muscles and spinal extensor muscles, balance training and strengthening exercises using Swiss ball, Prone push-ups, Log rolling, Weight bearing exercises–prone kneeling, Reflex inhibition exercises, Pelvic bridging, Static balance in long sitting and high sitting, Joint compression and Chest physiotherapy.

Follow-up

Three months of treatment decreased her BMI to 33.3 Kg/m^2 improved neck control, she is able to lift, hold and transfer objects, can roll over, balance in long sitting with support and partial high sitting balance achieved. Reflexes status was the same except for ATNR which started to be evident. On the other hand, she couldn't crawl, creep, stand or walk holding furniture.

So, we continued extensive strengthening exercises program for all muscles, trunk rotations, standing from lying position, standing and walking training with the aid of splints and supports, resistive range of motion exercise, ball kicking, swing a weighted bat in addition to static and dynamic balance in high sitting.

After 6 months from initial treatment, her BMI dropped to 30.6 Kg/m^2, high sitting balance, supported standing and walking initiated with splints were all achieved. By this rate of weight loss, diet control and activity lead to 1 kg loss every 3 months, this might seems slow rate but really promising and full of hope.

Discussion

Management of PWS requires multidisciplinary care team that includes combination of behavioral therapy, early diet managements, speech therapy, routine preventive health care with exercises and medications [17].

Neonatologist, Geneticist, Pediatrician, Endocrinologist, Orthopedic surgeon, Psychologist, Psychiatrist, Physiotherapist, Dietitian, Dentist and Urologist has to deal with the numerous medical and psychological problems in PWS patient. Only in this way we can improve quality of life, prevent complications, and prolong life expectancy [18]. In the neonatal period of life, motor activity is a strong stimulator for cortical and muscular development [19].

Early diagnosis and intervention allow implementation of reasonable nutrition and physiotherapy programs to prevent obesity and improve motor milestones [20]. Silverthorn and Hornak reported the beneficial effects of aerobic conditioning in patients with PWS. Exercise decreased resting heart rate, improved aerobic capacity and decreased both body fat and body weight [21].

Motor problems are most striking in infancy, in which motor development is dramatically constraint by severe hypotonia and muscle weakness [22]. The most important complications of PWS are related to the cardiovascular and respiratory involvement caused by obesity. These complications are directly responsible for the high incidence of death in children and adults with PWS [23].

Conclusion

Patient and family should be constantly motivated to maintain highly specialized physiotherapy program under meticulous supervision. Strict follow-up with multidisciplinary team will

insure better quality of life and will lead to early detection of any possible complications.

Declarations

The authors declare that they have no Conflict of Interest.

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