SODIUM DEPLETION IN CYSTIC FIBROSIS PATIENTS OLDER THAN 24 MONTHS

Ivan Bambir*, Bambir Ivan, Omerza Lana, Sapina Matej, Vukic Dugac Andrea, Tjesic – Drinkovic Dorian, Tjesic – Drinkovic Duska. University Hospital Centre Zagreb

Sodium depletion is a well-recognized complication of cystic fibrosis in infants and toddlers, due to which they are routinely prescribed sodium supplementation. It exists in normonatremic subjects as well. Data on sodium homeostasis in older age groups is scarce. Spot urine sodium/creatinine ratio (UNa/Cr) strongly correlates with the fractional excretion of sodium (FENa) and is considered to be a marker of normonatremic sodium depletion (NNaD). This is a pilot observational study investigating the (UNa/Cr) ratio in subjects older than 24 months, as a possible sign of sodium depletion.

Participants were children and adolescents seen between January 1st and October 31st 2019. at the UHC Zagreb – CF centre, Dept. of paediatrics.

Basic demographic, anthropometric clinical and laboratory data were collected. UNa/Cr ratio was considered pathological if <17mmol/mmol, corresponding to minimal target FENa of 0.5%. Descriptive statistics and Mann Whitney U test were used for data analysis; the significance set at p<0.05.

30 patients (13 male) aged from 2.25 to 21.5 years entered the study. Only one patient had UNa <10 mmol/l. The calculated UNa/Cr ratio ranged from 1.85 - 52.8 mmol/mmol. UNa/Cr below the lower limit of 17 mmol/mmol was found in 20/30 patients (median 6.41 mmol/mmol; IQR 4.24 – 7.39). One third of subjects (10/30) had UNa/Cr above the cut-off value with the median value 26.04 mmol/mmol (IQR 23.55 – 50.54). We observed an almost significant difference in the age of patients with and without decreased UNa/Cr: median age in decreased UNa/Cr ratio group was 14.65 years (IQR 8.24 – 19.76) vs. 8.675 years (IQR 6.1 – 12.5) in the normal reference group (p = 0.0556).

Plasma sodium concentration was measured in 20/30 patients and all samples were within the normal reference range (135 mmol/l to 144 mmol/l), regardless whether the UNa/Cr was normal (n=7), or below 17 mmol/mmol (n=13).

Measurement of UNa alone is a rough parameter of sodium balance; in our set of patients, this criterion identified only 1/30 subjects as sodium depleted. However, we found a significant proportion of tested subjects (20/30) with an abnormally low UNa/Cr, suggesting an abnormally low fractional excretion of sodium – a parameter that reflects sodium status more appropriately. The plasma sodium concentrations remained normal. We suggest that this is due to an increase in sodium reabsorption to control hyponatremia. NNaD may be an under-recognized condition among CF patients beyond toddlers’ age.

REFERENCE


PRIMARY CILIARY DYSKINESIA – A THERAPEUTIC CHALLENGE

Ivan Bambir*, Jadranka Keleotic, Sandra Huljev Frkovic, Dorian Tjesic-Drinkovic. University Hospital Centre Zagreb

Primary ciliary dyskinesia (PCD) is a hereditary heterogeneous pulmonary disease characterized by abnormalities of ciliary biogenesis, ultrastructure and function, leading to the development of bronchiectasis and chronic sinuses, with situs inversus in about half of the patients. Diagnosis is based on a combination of phenotypic characteristics and diagnostic tests.

Treatment is directed to preserve pulmonary function and delay chronic changes leading eventually to lung transplantation. Therapeutic recommendations are based on the experience regarding treating diseases with similar mucociliary clearance disorders.

Here we describe the treatment course of a girl with PCD with situs viscerum inversus, whose diagnosis was confirmed at the age of 6 months by biopsy of the airway mucosa and electron microscopy showing lack of inner dynein arms.

The patient had respiratory difficulties since birth and chronic cough. The chest X-ray repeatedly showed pulmonary paracardial shading of the left lung. Ad-hoc physical therapy, secretolitics, inhaled steroids, salbutamol and, if necessary, antibiotics were prescribed. At 7 years of age, MSCT of the thorax revealed advanced left-sided pathology: parenchymal consolidation of the middle lobe with air bronchogram and ectatic bronchi and in the lower lobe ectatic bronchi and small-nodular interstitial infiltrates.

According to these findings, therapeutic measures were intensified with daily physiotherapy including high-frequency thoracic drainage (Vent machine), Flutter, manual drainage and encouraging physical activity. The use of secretolitics with antibiotics (orally, i.v., inhalations) according to sputum microbiology was regular and macrolide as immunomodulatory therapy was introduced. Checkups with spirometry and sputum analysis were performed every 3 months and ENT controls 1-2 times yearly. She was vaccinated against pneumococcus and yearly against influenza.

After 3.5 years of this regular treatment and monitoring, a new CT-scan showed significant resolution of the consolidation in middle pulmonary lobe with now visible bronchiectasis and wall thickening, as well as complete resolution of parenchymal lesions in the posterobasal segment of the left inferior lobe. In
the meantime, genetic testing proved homozygosity for the pathogenic variant of the SPAG1 gene.

The treatment of PCD is challenging because of low evidence-based recommendations. However, this case report shows that with regular monitoring and therapy adjustments depending on the circumstances, it is possible to maintain the airways state and pulmonary function at a satisfactory level even when the profound chronic lung changes exist.

Primary ciliary dyskinesia (PCD) is a rare genetic heterogeneous disease with autosomal recessive inheritance. The estimated prevalence is 1:10 000 to 1:40 000 live-born. To date, more than 40 different genes where identified to be involved. The most common form of PCD is defects in the outer dynein arms and radial spokes. PCD is characterized by chronic upper and lower respiratory tract disease, infertility, neurological manifestations and abnormality in left-right asymmetry. The severity of disease varies between patients. When growing up, symptoms become more pronounced with the presence of destructive changes in the lungs, bronchiectasis, and the development of respiratory failure.

In this report we present a brother and sister, from young, healthy parents, who have recurrent respiratory symptoms and respiratory infections from infancy: chronic cough, recurrent bronchopneumonia and bronchiectasis in the segments of the lower pulmonary parenchyma for as long as possible.

Early diagnosis is important for introduction of early pulmonary rehabilitation and management of exacerbations in order to preserve the pulmonary parenchyma for as long as possible.

Noninvasive ventilation (NIV), refers to the administration of ventilatory support without the use of intubation and is a widely used and efficient method for treating patients with chronic respiratory insufficiency. Recent studies show that the spectrum of patients who could be candidates for NIV may require further evaluation, because, if started as early as possible, patients could benefit from less complications and a better quality of life.

This retrospective study included 7 patients with chronic respiratory insufficiency due to neurological and respiratory disorders as part of a complex genetic disorder which were followed and treated at Srebrnjak Children’s Hospital and ultimately received NIV as the main therapy of choice for respiratory failure. Laboratory findings and clinical status, as well as incidence of respiratory symptoms and frequency of hospital admissions were analyzed.

All of our patients fulfilled diagnostic criteria for chronic respiratory failure (requiring daily oxygen support, having baseline SaO2 < 88% on room air or pCO2 > 50 with a normal pH value).

Of our 7 patients 2 (28.6%) were female and 5 (71.4%) were male. Only one patient had no confirmed genetic diagnosis while 6 (85.7%) had proven chromosomal aberrations or genetic mutations. The most frequently diagnosed respiratory difficulties were recurrent respiratory infections of the upper airways (N=7, 100%), lower airways with bronchial obstruction (N=5, 71.4%) and recurrent pneumonias (N=2, 73.4%).

Results show that all of the included patients had a better respiratory status (measured by pulse oxymetry and acid-base status) and a significant decrease in the frequency of respiratory infections was also observed.

We conclude that noninvasive ventilation is the therapy of choice for children with chronic respiratory insufficiency. We suggest that NIV should be started as early as possible after the initial diagnostic procedures were performed and the clinical and diagnostic criteria have been met. The indications for NIV should be further extended as to prevent severe complications in patients with chronic diseases that affect respiratory muscle strength and would also be beneficial for their quality of life.