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Case Report

Clinical Case of a Combination of Endocrine, Metabolic, and Mental Pathology; Hypopituitarism Associated with Organic Personality Disorder

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Abstract

Background: Psychiatric disorders are difficult to assess, diagnose, and treat in most cases. The present case describes an extremely rare psychological disorder in combination with metabolic and endocrine insufficiency.

Objectives: A 7-year-old child with inherited psychopathology from his father aggravated by his mother's alcoholism. The child was delivered from a primigravida/primipara mother emergency due to preeclampsia and premature membrane rupture.

Methods: The examinations involved clinical signs and symptoms and instrumental and laboratory findings. All laboratory results were compared with the normal ranges of the local laboratory.

Results: The examination results showed pronounced impairment in his ability to learn, control his own behavior, and communicate, as well as moderate impairment in the orientation.

Conclusion: The child was managed by diet correction, potassium iodide, hormone replacement, calcium supplement, nootropics 2 courses per year, examination by a urologist and pediatric endocrinologist 2/times a year, and hospitalization after 6 months of treatment.

Keywords: Psychology; Pathology; Behavior; Attitude & agitation; Cohen syndrome & rehabilitation

Introduction

An extremely rare case with a combination of organic brain damage, metabolic disorders, and endocrine deficit has been reported here. Typically, the sick person with organic changes also experiences emotional changes. Separation of organic diseases from spiritual and behavioral disorders seems impossible [1,2]. And during clinical practice usually psychiatrists treat not only with medications but by emotional and psychological support [3-5]. The deficiency of psychoemotional development in the child complicates the organic disease and worsen his clinical status. Typically, treatment of these patients requires correction of laboratory changes, but more attention must be paid to the psychoemotional state of the person [6,7]. It is necessary to study the patterns of disability formation in order to further develop theories and concepts of ways to protect human health, prevent disability, assess the rehabilitation potential and prognosis, and develop rehabilitation measures that improve social adaptation and integration of patients in the family and society.

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Case Presentation

On 20th December 2021, a 7-year-old invalid boy brought by his family to the Mordovian Republican Psychiatric Hospital seeking a rehabilitation program with complaints of his family from poor school performance and growth retardation. Firstly, the child was diagnosed with organic brain damage associated with a pronounced decrease in intelligence and emotional-volitional disorders. The results of general inspection showed: normal shape of chest, normal skin development and moisture, normal neck length, no dysmorphological changes in the face or head. The child lives with his father and grandmother.

The baby was delivered due to preeclampsia for a heavy alcohol consumer mother. Delivery is urgent due to prenatal rupture of the amniotic fluid. He was born with a weight of 2450 g and a length of 38 cm. The child screamed loudly after birth with an Apgar score in the first/fifth/tenth minutes of 7, 8, 9 respectively. Upon delivery of the child, the pediatrician, neurologist, and cardiologist evaluated him. On the second day of life, he was transferred to Children's Hospital No 1 with a diagnosis of cerebral ischemia (ischemic encephalopathy). Acute conjunctivitis was observed. From an early age, the child lagged behind his peers in development: he started sitting from 6 months, walks from 1.2 years, and first words at 4 years old. Courses of nootropics have been arranged for the child.

From 2 years old, the child attended kindergarten, special for children with mental retardation. Impaired comprehension and analyzing cause-and-effect relationship. Poor understanding of verbal and speech instructions. Sound pronunciation is severely impaired. The level of development of coherent speech is much lower than the age norm.

In December 2018, a retardation in growth (height SDS -3.03)

due to a reduction in the level of growth hormones, suspected to be secondary to hypocortisolism (Addison's disease). After that the child got replacement growth hormone therapy then started to increase height satisfactory. Bones are painless, no joint changes or pain, and sufficient muscle mass.

On the tongue of his school teacher, to count to 3, the child requires the help of the teacher, the efficiency is low, the pace of tasks is low, attention is unstable, high fatigue, and ends with motor anxiety. The child can follow the training instructions, but cannot work on them on his own; he has to repeat the instructions several times. Cannot find and correct errors in his work on his own. Fine motor skills of the hands are poorly developed; it is difficult to navigate in writing. Cannot remember the graphic writing of individual letters and numbers; periodically have to remind them. Significantly difficult works on assignments and selectively with hardly attracted attention. Memorizing is difficult, mechanical memory prevails, and when playing games, he constantly forgets details, needs leading questions. The emotional background does not correspond to the age of the child. The general emotional background is negative/positive instability, which changes abruptly and leads to hysteric attacks. Success situations evoke positive emotions in the child. Affective reactions, negativism and aggression are manifested.

During the age of 6.6 years (21.01.2021), height 110 cm (SDS -1.51), weight 26 kg (SDS +1.2), Body Mass Index (BMI) 21.49 kg/m^2 (SDS +2.86) and growth speed 9.73 cm/year (SDS +3.8).

Laboratory test results are shown in Table 1. An increase in cholesterol level (beta fraction) and phosphorus was found; other parameters were at normal values.

From the anamnesis, on January 22, 2021, instrumental investigations involved normal ultrasound findings of thyroid gland (Isthmus: 0.3 cm; Right lobe: 3.5 cm × 0.9 cm × 1.3 cm, volume 1.9 cm^3, normal size 0.86 cm^3-1.78 cm^3; Left lobe: 3.0 cm × 0.8 cm × l.1 cm, volume 1.2 cm^3, normal size 0.76 cm^3-1.64 cm^3; the total volume of the thyroid gland: 3.1 cm^3, normal size is 1.66 cm^3-3.38 cm^3) and supra renal gland. Ultrasound of the groin and testicular shows normal findings. Both testes descend into the scrotum. Right testicle size 1.6 cm × 0.8 cm × 1.0 cm, volume is 0.6 cm^3 (normal is 0.8/0.6 cm^3-1.1 cm^3), epididymis of the right testicle is not enlarged (head 0.45 cm × 0.48 cm). Left testicle size 1.7 cm × 0.8 cm × 1.0 cm, volume 0.7 cm^3, normal is 0.8/0.6 cm^3-1.1 cm^3, epididymis of the left testicle is not enlarged (head is 0.53 cm × 0.38 cm). Additional signs include single hyperechoic inclusion in the structure of right testis. Local bilateral testicular microlithiasis is recorded. The veins of the spermatic cord are not dilated. The external urethra opens in the typical place. Due, the child examined by the urologist, no objective signs of kidney enlargement, negative tingling symptoms, normal daily urine volume, independent urination. Also, negative Valsalva maneuver. On the Electrocardiogram (ECG), the heart rhythm is sinus, normal electrical axis, with a short PQ interval (0.1 msec). Heart rate between 80 to 100 beats per minute. On direct projection, hands X-ray visualized nuclei ossification asymmetry, right hand <left hand (D<S). In the left hand, trapezoid and navicular bones are visualized, whereas, the semilunar bone is underdeveloped in both hands. The bone age of the left hand corresponds to the 5 years; in contrast, bone age of the right hand corresponds to 3 years.

From anamnesis, on January 26, 2021, the child was examined by the ophthalmologist due to grandmother complaints that the child had

Table 1: Laboratory findings in an organically damaged brain with psychoemotional difficulties of the child.

Index	Measuring unit	Results	Normal range
Serum analysis, (22.01.2021), 10:59 AM			
Total protein	g/L	68.54	57.00-80.00
K+	mmol/L	4.78	3.40-5.30
Na+	mmol/L	139.1	130.00-156.00
Ca++	mmol/L	1.13	1.05-1.30
Total bilirubin	mmol/L	7.24	5.00-21.00
Conjugated bilirubin	mmol/L	5.54	0.00-19.00
Unconjugated bilirubin	mmol/L	1.7	0.00-3.40
ALT	Unit/L	22.55	0.00-50.00
AST	Unit/L	32.42	15.00-60.00
Total cholesterol	mmol/L	5.81	2.80-5.20
Triglycerides	mmol/L	0.57	0.14-1.71
Alpha- cholesterol	mmol/L	1.39	0.90-1.90
Beta- cholesterol	mmol/L	4.16	1.50-3.50
Atherogenic coefficient (non-HDL/HDL)	SI	3.18	0.00-3.02
Serum creatinine	mmol/l	0.045	0.044-0.071
Magnesium	mmol/l	0.82	0.73-1.06
Serum Phosphorus	mmol/l	1.9	1.20-1.80
Glucose	mmol/l	4.92	3.30-5.50
Oral glucose tolerance test (OGTT), capillary blood glucose (22.01.2021), 11:20 AM			
Fasting glucose level	mmol/l	4.2	3.00- 5.30
1 hour After glucose intake	mmol/l	4.5	<10.00
2 hours After glucose intake	mmol/l	5.9	<8.60
Urine analysis (22.01.2021), 2:20 PM			
Portions of urine	Hourly	one-time	
Quantity of urine	ml	50	
Urine density	g/l	1020	1003-1030
Ketones in urine	mmol/l	Negative	Negative
Glucose in urine	mmol/l	Negative	Negative
Enzyme linked immune sorbent assay (ELISA) (22.01.2021), 10:50 AM			
Thyrotropic hormone (TTH)	mkIU/mL	0.919	0.23-3.4
Free T4	mmol/l	12.95	10.0-23.2

strabismus. On inspection and slit light lamp examination, both eyes calm, transparent optical media, round pupil that preserved response to light, the fundus is pink (the remaining examination ended due to restlessness of the child). Visual acuity of the left eye (Vis OS=0.6) and visual acuity of the right eye (Vis OD=0.6). Eyeball movement is preserved, with outward deviation up to 25 degrees according to Hirschberg alternately. Final the child had strabismus and nystagmus.

On the patient's medical record, in March 2021, the child was recognized as a 2 to 3 level of general underdevelopment of speech (ICD.10. F70). Physical examination showed normal heart sounds/rate/rhythm (96 beats in a minute), normal vesicular respiratory sounds, and respiratory rate (25 per minute) for his age. The child has obesity II degree (SDS BMI +2.8) with dyslipidemia (high beta cholesterol fraction). No edema or lymph nodes enlargement. The abdomen is soft painless on palpation. Neurological examination of the eyes shows astigmatism with no nystagmus and no asymmetrical pupils' response to light. Moreover, the child has normal tendon reflexes, normal coordination test, normal skin sensitivity, and Romberg pose stable. Conducting experimental psychological research to evaluate intellectual development level seems not possible (short level arbitrary regulation mental health processes, negative attitude child to survey). The final diagnosis of the psychologist was speech underdevelopment to a confidently pronounced degree due to the main disease (organic brain damage). The child prescribed

Glycine, Thioridazine, and nootropics courses two times per year. The child is allergic to 30% Elcar solution.

With the rehabilitation program and the conducted treatment, remarkable improvement in the clinical and laboratory status of the child occurred (Table 2).

Table 2: Progress in laboratory findings after treatment with the recommended recommendations.

Index	Measuring unit	Results	Normal range
Full blood count (24.11. 2021)			
Hemoglobulin	g/L	127	132-166
Leukocytes	/L	$5.8*10^9$	$3.4\text{-}9.6 *10^9$
ESR	mm/h	5	44835
Biochemical tests (12.11.2021)			
Total bilirubin	mmol/l	11.3	5.00-21.00
Conjugated bilirubin	mmol/l	11.3	0.00-19.00
ALT	Unit/L	26	0.00-50.00
AST	Unit/L	42	15.00-60.00
Total serum protein	mmol/l	71	57.00-80.00
General urinalysis (24.11.2021)			
Urine density		1025	1003-1030
Leukocytes	Per high power field	1-2 per high power field	≤ 2-5
Protein	mmol/L	Negative	≤ 8.264
Epithelial cells	Per high power field	9-2 per high power field	≤ 15
Features		Transparent, yellow	Transparent, yellow

Also, from anamnesis, on 16 December 2021, Electroencephalography (EEG) showed diffuse alpha activity mainly in the central parietal regions, with an index of up to 30.00% in combination with polyphasic potentials and theta waves with a frequency of 7.0 Hz -8.0 Hz, amplitudes of up to 40 μV. Moreover, the alpha wave activity was irregular, non-modulated, slightly pointed, fronto-occipital gradient smoothed, no significant asymmetry was recorded. However, Beta wave activity was recorded in all brain part, more in the anterior lobe, frequency up to 20 Hz, amplitude up to 5 μV, and index up to 35.00% in combination with Electromyography (EMG) artifacts in the temporal area. Theta activity mostly recorded in the occipital-vertex-central parts of the brain, frequency up to 4.5 Hz -6.0 Hz, amplitude up to 50 μV, and index up to 40.00%. Delta activity recorded in the form of single flashes in the anterior brain parts with index up to 20%. Diffuse slow paroxysmal wave activity recorded during hyperventilation, mainly of Meta waves, with an emphasis on the occipital-parietal lobes, with amplitude of up to 60 μV.

To assess brain function, a phonotic stimulation test. However, when the child opens his eyes, the wave is somewhat weakened in the form of incomplete depression, leading to a desynchronization of the main cortical rhythm. And when the eyes were closed, the main cortical rhythm was not fully restored. In response to photo stimulation of 6-8-10-12-14-16-18-20-22-24-26-28-30-32-34-36 Hz, the response was satisfactory only in rhythmic photo stimulation of 6 Hz,8 Hz,12 Hz,14 Hz. Interestingly, with hyperventilation for 1 minute, a remarkable increase in the amplitude and the index of the main cortical rhythm is recorded, which is characterized by diffuse slow wave activity of predominantly theta waves. Mostly recorded in the occipital-parietal regions, with amplitude of up to 60 μV, with frequent motor artifacts, returns to the original recording at the end of 1 minute.

In the EEG, there are diffuse changes due to the increased influence and dysfunction of the diencephalic structures of the brain. The main cortical rhythm recorded diffusely, most pronounced in the parietal-central areas. Combination with polyphasic potentials and theta waves, low index, irregular, with episodes of deceleration in frequency up to 7 Hz. The reactivity of brain cells is somewhat weakened. Typical epileptiform activity was not detected at the time of the study. There is no significant asymmetry. Signs of a psycho-emotional labile background observed alongside with signs of neurophysiological immaturity.

In anamnesis, on December 212021, the nystagmus disappeared, but delayed psychoverbal development remained. A cognitive and intellectual deficit was observed. Performs the coordinating tests satisfactorily. Speech underdevelopment to moderate degree, due to the underlying disease (erased or mild dysarthria). Does not always respond to addressed speech, even if respond, with impaired sound pronunciation. The synthesis and secretion of the thyroid, pituitary, and adrenal glands did not improve.

Discussion

The development of the syndrome of obsession within the framework of mental disorders is accompanied by dysfunction of humoral and cellular immune responses and dysregulation of the pituitary-adrenal, pituitary-thyroid gland systems. The future consequence and complication are poorly understood. Management guidelines for such complicated cases are underdeveloped (Figure 1). Unfortunately, we could not perform an age-appropriate version of the Trail Making Test (TMT) such as like the Progressive Figures Test (PFT), which is appropriate for use from ages 5 to 8 because of the child discomfort.

Implications for practice

The clinical value of the presented report case resides in the diagnostics and treatment recommendations. The diagnostic methods involve clinical picture, instrumental, and laboratory findings. The treatment plan which was used in this patient involves:

1. Diet 5 with enrichment proteins products (meat, fish, cheese, cottage cheese), limited sweet after 6:00 PM, and hypolipidemic diet.
2. Observation by a pediatrician, pediatric endocrinologist, neurologist, ophthalmologist, psychotherapist, pediatric urologist.
3. Exercise therapy for traction (hanging on the horizontal bar), sleep no later than 9:00 to 10:00 PM.
4. To correct iodine deficiency: potassium iodide (Iodomarin 100 mcg, iodine balance 100 mcg) 1 time per day, for a long time, constantly. Standard diet of the basic variant and follow-up regimen on the ward.
5. Hormone replacement therapy involves genetically modified growth hormone-Rastan at a rate of 0.033 mg/kg/day (formula 15 IU/ml, 5 mg/ml-3.0 ml), a dose of 0.85 mg daily (indicator 17). S/Q at bedtime, constantly for a long time until socially acceptable growth is achieved. The need for the drug is 2 bottles a month.
6. Examination by a pediatric endocrinologist after 3 months indicating weight, height, blood tests for sugar, cholesterol, blood, and urine tests for hormones, clarification of the result

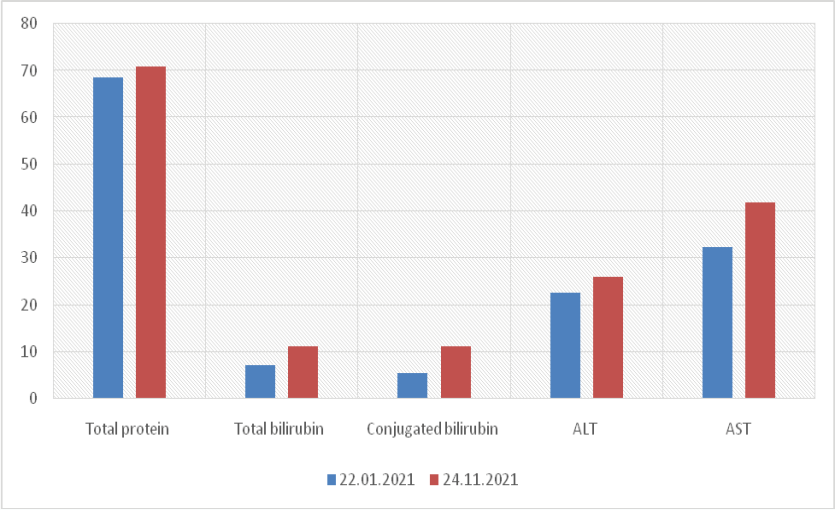

Figure 1: The progression of the biochemical laboratory results after the therapy plan. All measured in mmol/l, except ALT and AST measured by units/l.

in advance in the department each month.

7. Planned hospitalization in the department of endocrinology after 6 months, according to indications.
8. Continue treatment on an outpatient basis with calcium preparations (calcium supplement D3, calcium DZ Nycomed) 1 tablet/2 times a day.
9. Observation and treatment by a psychiatrist of the Mordovian Republican Psychiatric Hospital and at the place of residence; classes from defectogist.
10. On the recommendation of an ophthalmologist: Visual mode, exercises for the eyes, observation by an ophthalmologist.
11. Examination by urologist 2 times a year with the results of ultrasound of the testicles.
12. Continue with classes in the psychosocial rehabilitation group.
13. Nootropics 2-3 courses per year.

Conclusions

In conclusion, mainly EEG artifacts, frequent EMG (temporal, central section's), electro-oculography, and Galvanic Skin Response (GSR) were recorded. The child suffers from underdeveloped growth and development. The effects of organic brain damage impaired the pituitary gland function resulting in hypopituitarism (particularly low growth hormone). The child is disabled and protected by the low of the Russian Federation. His current medical status is satisfactory. Core temperature 36.8°C, skin normal color and humidity, mucous membranes of normal color and moist. Puerile breathing during auscultation of the lungs without wheezing. Respiratory rate 24 per minute and heart rate 102 beat per minute. Normal heart sounds in all zones without murmur noise with sinus rhythm. The percussion borders of the heart are not expanded. Blood pressure 96/62 mmHg. The tongue is moist and clean. The abdomen in usual, symmetrical shape, and participates in the act of breathing. On superficial palpation, the abdomen is soft. The immunomodulators modifies the pathogenetic mechanisms of the stress response through elimination of the damaging effects of hypoxia, inhibition of lipid peroxidation, optimization of the immune system. Hormonal markers of the effectiveness of treatment of stress-related diseases include the dynamics of serum hormone concentrations of the pituitary, thyroid, and adrenal glands.

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