



Iron deficiency syndrome (IDS)

an important differential diagnosis and a possible comorbid reason for an inefficient medicinal Methylphenidate-therapy in children diagnosed with an "Attention Deficit Hyperactivity Disorder (ADHD)"

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Introduction

The **Iron Deficiency Syndrome (IDS)** as a preliminary stage of the Iron Deficiency Anemia (IDA) often remains unrecognised.

This disease pattern is often found in women at the age of menstruation but also in children and old people. In this case, the iron absorbed through nourishment does not seem to suffice to uphold a normal iron metabolism.

The **cardinal symptoms** are for instance tiredness, depressive mood, concentration deficit, interferences in attention, retentiveness and distractibility, emotional instability and sleep disorder.

In children, but also in adolescents and adults, these symptoms can be misinterpreted as symptoms of ADHD. The beginning of an IDS pathology is postulated (1, 2) when ferritin reaches a value below 50 ng/ml (300-30ng/ml) and should therefore be treated thenceforward.

Method

In 2007 almost all of the newly allocated children with symptoms of ADHD and children who received a Methylphenidate-therapy which could not be adjusted optimally were tested for IDS in collaboration with the assigning doctors.

When **ferritin values were 50ng/ml or lower**, iron was substituted perorally over 3 months at least (for a maximum time period of 6 months). The course was analysed both clinically and by means of standardised ADHD-questionnaires.

In addition to this, the supply of iron from nutrition and factors that influence the absorption of iron were optimised in all patients. All other therapies remained unchanged during the observation period.

Literature

1. B. Schaub: Das Eisenmangelsyndrom IDS (Iron Deficiency Syndrom), *Ars Medici* 1/2006:18-22
2. Antidepressiva praktisch unwirksam (Federal Drug Administration FDA), Public Library of Science (Febr. 2008)
3. B. Schaub: Das Eisenmangelsyndrom IDS – Eine multizentrische descriptive Arzneimittel-Anwendungsbeobachtung, *Ars Medici* 9/2008: 387-92
4. F. Verdon et al: Iron supplementation for unexplained fatigue in non-anaemic women: double blind randomised placebo controlled trial, *BMJ* Volume 326, 2003; 326: 1124
5. R.M. Schaefer et al: Eisenbrief-Aktuelle Empfehlungen zur Therapie der Eisenmangelanämie, *Praxis* 2006; 95:357-364

Results

1) In **37 out of 65 (57%) children who had been assigned with an ADHD pathology** and who were differential-diagnostically tested for IDS, a ferritin value of 50ng/ml or lower was detected.

2) In **22 out of 52 (42%) children diagnosed with ADHD who could not be optimally adjusted to Methylphenidate** and suffered from disturbing symptoms such as sleep disorders, decline in appetite and depressive mood, respectively, ferritin values of 50ng/ml or lower were detected as well.

All children were treated with iron (iron (III) - hydroxide polymaltose complex- Maltofer®) perorally over 3 months at least (for a maximum time period of 6 months).

In the course, **9 out of 37 (24%) children within the first group no longer displayed any ADHD pathology**. In laboratory test after an average of 4 months, the ferritin values ranged between 60 and 100 ng/ml (30-300 ng/ml).

Within the second group, Methylphenidate was much more effective. Symptoms such as sleep disorder, loss of appetite, emotional fluctuations and depressive mood were significantly less pronounced. Ferritin values had risen similar to the first group.

There were no adverse effects. No child has been treated with iron injections until now.

Summary

The **Iron Deficiency Syndrome** constitutes an important **differential diagnosis** in children with ADHD pathology, which is often underestimated and unrecognised. If the ferritin value is determined and a thereupon diagnosed IDS is treated, ADHD symptoms can decrease or, in part, disappear completely through an iron therapy. Although one must bear in mind that typical symptoms can also appear in "**physiologically low**" **ferritin values around 50 ng/ml** and that, therefore, a treatment is indicated (norm values for ferritin should be reassessed and possibly be redefined (2)!).

Children and adolescents diagnosed with ADHD and comorbid IDS, who were under medicinal treatment with Methylphenidate, displayed a better medicinal adjustment with Methylphenidate and significantly less often showed symptoms such as sleep disorder, loss of appetite and depressive mood after an effective iron-therapy.

The Iron Deficiency Syndrome decreases the activity of the iron-dependent enzymes and thus influences the metabolism of neurotransmitters.

Through the supply of iron – in our study mainly perorally, in literature mainly intravenously – important, primarily cerebral metabolic functions are reactivated in children with ADHD pathology and concurrently existing IDS.

An early treatment, hence an accretion of the iron storage with iron (III) - hydroxide polymaltose complex - Maltofer®, is advisable.

For the time being, our results are of descriptive nature and should be verified through studies and a systematic evaluation.