

Family Practice Grand Rounds

Hyperactivity: A Symptom, Not a Disease Entity

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DR. JERRY AUTHIER (*Assistant Professor, Departments of Family Practice and Psychiatry*): We are fortunate to have with us today Dr. John Donaldson, with whom most of you have had previous contact. As you know, Dr. Donaldson has had considerable experience with hyperactivity and discussion today will evolve from Dr. Prica's presentation of two cases which presented in the clinic with hyperactivity as the major symptom.

I would like to set the stage for what I hope this program will accomplish; that is, hyperactivity is merely a symptom rather than a disease entity.

Many physicians see hyperactivity as automatically being Minimal Brain Dysfunction (MBD). As Dr. Donaldson¹ has indicated in his article, hyperactivity as a symptom may present in a child with MBD, an anxious child, or an unsocialized child. He will clarify this later as he discusses the cases to be presented today. (Further, the addendum to the article

[Table 1] presents a summary of these as well as other medical problems which may have hyperactivity as a presenting symptom.) Thus, we see that hyperactivity may be present as a symptom of mental retardation, childhood schizophrenia, minimal brain dysfunction, neurotic problems, or because of lack of discipline and internalized controls.

MBD is further broken down by Peters, Davis, Goolsby, and Clements² into three types (Figure 1). The first type is the "Pure Hyperkinetic Type," the second the "Mixed Hyperkinetic and Learning Disability Type," and the third is the "Pure Learning Disability Type." Note the key symptoms of the former as compared to the latter. Pure Hyperkinetic Type MBD has short attention span, distractibility, impulsivity and hyperactivity as four major symptoms while Pure Learning Disability Type MBD has writing disability, reading disability, spelling disability, and hypoactivity as its four major symptoms. It is noteworthy that hyperactivity does not usually present as a symptom in the Pure Learning Disability Type MBD. Moreover, right-left confusion is highly likely in these children whereas it is rarely present in Pure Hyperkinetic Type MBD. But the differential diagnosis between these two types of MBD is the topic of another round so now we will turn our attention to hyperactivity as a symptom with multiple causes.

The cases which will be presented today should help to make some distinction between at least the first two types of MBD and the other medical problems which have hyperactivity as a presenting symptom. Dr. Prica's two rather interesting cases should fit within these schemata and hopefully, a discussion of these cases will help clarify this, especially in terms of making a differential diagnosis and regarding the treatment which a family physician could offer.

DR. GEORGE PRICA (*first-year family practice resident*): The lack of knowledge about their clinical courses is going to make it difficult to place these people within the schemata.

I found both of these patients presenting in my clinic in one day, so I suddenly felt inundated with hyperactivity. The first case involves Pedro F, whom I inherited from a graduate family practice resident. Pedro is a seven-year-old Mexican male, with a history of normal pregnancy, labor, and delivery, who did well until the age of seven months, when he contracted meningitis and was in a coma for several days. One month later, the onset of seizures was noted and he was started on barbiturates with good control. He has been on barbiturates to this date. He had essentially a normal motor and language development, according to the history given by his mother. At about age four, he became increasingly aggressive toward his sib-

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lings and was described by his mother as an agitator. I noticed in two clinic visits with Pedro and some of his siblings, that Pedro was always the underdog; his mother was always "onto" Pedro for "bugging" one of the other children or running around the room. She was constantly at odds with Pedro. It had gotten so bad, especially this last summer, that she had tried to institutionalize him and remove him from the other siblings, whom she felt he threatened. When he started school at age five, he was aggressive toward other children causing fights in class, falling behind in schoolwork, and eating garbage from trash cans on the way home from school. Methylphenidate HCl (Ritalin) treatment was initiated at this time in our clinic, and his mother and teachers reported improvement in his behavior.

I called the South Omaha Family Health Center, where Pedro has been followed for approximately the past year and they reported working with Pedro and his mother to try to work out some of the conflicts in their relationship, but they did not feel that they had been very successful. Additionally, they indicated that while the father is in the home, he is not really participating in the rearing of the children.

Pedro's medications currently include oral mephobarbital (Mebaral) 64 mg b.i.d. for his seizure disorder and Ritalin 20 mg b.i.d. It seems to me that he is very active while in the clinic, more active than the normal seven-year-old, but he is able to sit still, he is able to comprehend my questions and to answer them in more than just a yes-or-no fashion. Also he does seem to be able to concentrate the answer. His mother stated that he seems to have calmed down more and is more able to participate in activities which do not require a lot of physical motion (eg, he can sit and watch television for a while; he can sit with a book for a short period of time).

DR. JOHN DONALDSON (*Associate Professor, Department of Psychiatry; Director of Children's Services, Nebraska Psychiatric Institute*): With the Ritalin?

DR. PRICA: Yes.

DR. DONALDSON: I would see this case as a good, but somewhat atypical, example of what I would call the classical type of minimal

cerebral dysfunction with hyperactivity. These children usually have soft neurologic signs. Did you check him for problems with rapid alternating and rapid repetitive movements and for tandem walking?

DR. PRICA: Yes, I did. Do the soft signs persist during treatment?

DR. DONALDSON: Yes, usually they do. They may diminish a bit but they are still there. These children will also often have some kind of learning disability. This can be checked with psychological testing. Often there is a good history of a possible brain injury at birth or early in life. In this case, it is seen as a result of the meningitis he had in infancy. Typically, these children with the classical syndrome are free of physiologic signs of anxiety. He may have some now that he is on Ritalin, but prior to that he should have had dry warm hands and no history of psychophysiologic gastrointestinal problems, no tendency for hyperreflexia or dilated pupils. The hyperactivity in children of this type tends to be constant and stimulus-bound; in other words, they are just constantly moving around from one thing to another in their environment.

Reaction to stress is one exception to the above behavior. Sometimes this can confuse the issue. You may be presented with a history of severe hyperactivity, but when the child comes to the doctor and is stressed by the visit, he may look nearly normal. The mother is often embarrassed and may say, "If he was always this good, I would not have brought him in; I feel kind of silly bringing him in." We are hypothesizing that increased stress may temporarily increase catecholamine levels enough to relieve the syndrome. This correlates with the observation that a stimulant or an anti-depressant medication is often very helpful for these children. Similarly, if a child does have minimal brain dysfunction, one almost certain way to make it worse is to give him a barbiturate. Incidentally, it is important to keep this in mind when a child combines hyperactivity with a seizure disorder. I understand that this patient is being treated with barbiturates.

DR. PRICA: His seizure disorder is being handled by the seizure clinic and I spoke to one of the residents

handling this case who feels he probably has a petit mal type of seizure disorder.

DR. DONALDSON: Pure? Or is it mixed with grand mal?

DR. PRICA: It is not mixed with grand mal. He still has occasional recurrences about every four months. Attempts have been made to decrease his phenobarbital levels but the seizures again become a problem.

DR. DONALDSON: You might check to see if they would consider using a non-barbiturate alternative like ethosuximide (Zarontin).

DR. AUTHIER: In terms of psychological testing, I concur with what Dr. Donaldson has said in terms of the patient's presenting as a hyperactive, hyperkinetic child, but recall the three kinds of MBD denoted by the schemata. Note that he really presented as Mixed Hyperkinetic and Learning Disability Type MBD, rather than a Pure Hyperkinetic Type MBD, because there were some learning problems as well. Yes, he presented with hyperactivity, poor attention span, easy distractibility, those kinds of cardinal symptoms of MBD with pure hyperkinesis but he also demonstrated poor motor coordination, reading, writing, and spelling problems. In fact there are reports in the literature now that MBD with pure hyperkinesis will not have a learning, reading, or writing disability — that, in fact, children with the syndrome are equal to a normal control group in reading, writing, and arithmetic skills when the variable of intelligence is controlled. Thus, the important finding appears to be that the children with pure hyperkinesis do more poorly in school not because of a learning disorder but because of a combination of lower IQs, as reported by Palkes and Stewart,³ and Wikler, Dixon, and Parker,⁴ and of reading, spelling, writing, and math problems, which are usually mild and secondary to haste.

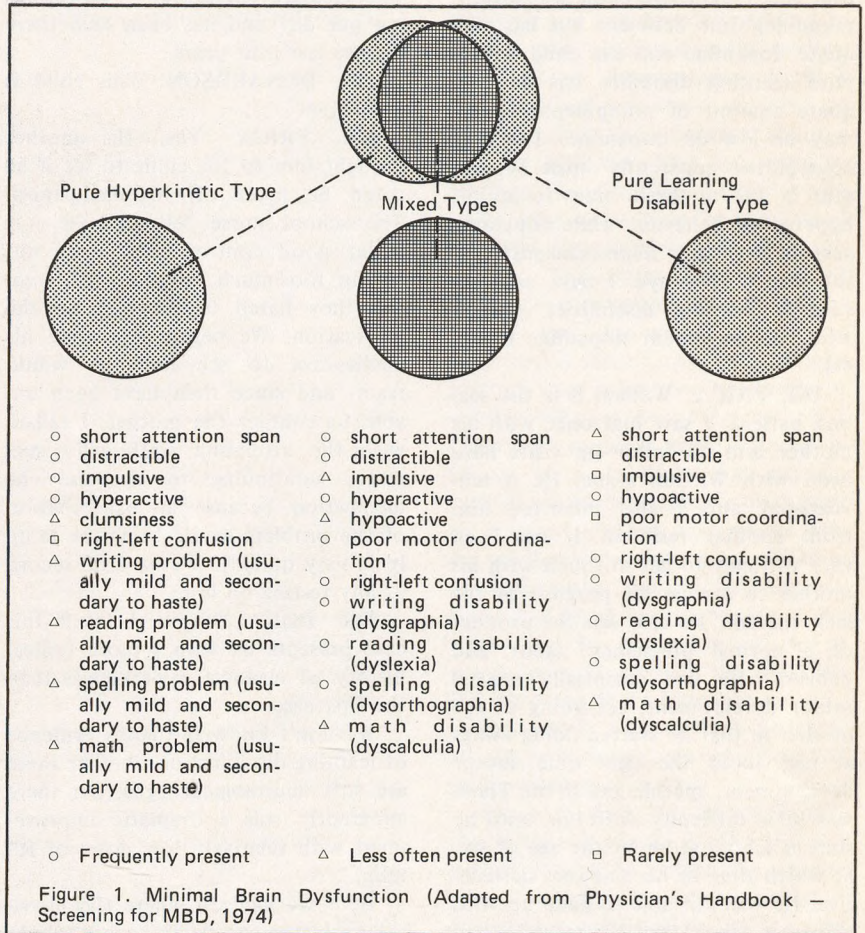
DR. DONALDSON: The children with "pure hyperactivity" may be behind because they cannot stay at work long enough to get their assignments done.

DR. AUTHIER: Pedro was behind in school-related things so he did have the mixed syndrome with some school ability deficits.

DR. DONALDSON: Actually, I have not been too concerned about

Table 1. Hyperactivity — One Symptom, Multiple Causes

1. Mental retardation
2. Childhood schizophrenia
3. Minimal Brain Dysfunction
 - a. Soft neurologic signs
 - b. Learning disabilities
 - c. History of brain injury or insult
 - d. Infrequently anxious
 - e. Hyperactivity is constant and stimulus-bound
 - f. Stimulant medication often helps
4. Neurotic problems — anxiety and depression
 - a. Intense physiologic evidence of anxiety — sweaty palms, gastrointestinal complaints, etc
 - b. Hyperactivity is intermittent
 - c. No soft neurologic signs
 - d. History consistent with neurosis or depression
 - e. Stimulant medication is contraindicated — may require tranquilizers
5. Lack of discipline and internalized controls
 - a. Socially disadvantaged
 - b. Emotionally detached
 - c. Little, if any, anxiety
 - d. No soft neurologic signs
 - e. Hyperactivity is intermittent and responds to structure
 - f. Child is often pre-delinquent
 - g. Medication usually of no value — may be required for severe aggressiveness



the issue of separating learning disability and hyperactivity. My experience is that the distinction is not that important. This is because 80 to 90 percent of the children we see have the mixed syndrome and it is relatively rare to see them all one way or the other. Interestingly enough, the difference in these children, particularly when it is an issue of pure hyperactivity or pure learning disability, may not be in the "wiring" (neurologic intactness) but in the neurotransmitters. It can be hypothesized that the hyperactive child is relatively norepinephrine deficient but has adequate dopamine and the child with a pure learning disability has an adequate amount of norepinephrine but may be low on dopamine. The norepinephrine apparently must be present in the midbrain areas to inhibit hyperactive behavior, while dopamine acts as the major neurotransmitter in the visual pathways. I have seen reversible learning disabilities created with certain potent dopamine blockers.

DR. PRICA: William S is the second patient. I saw him once with his mother and all follow-up visits have been with William alone. He is ten-years-old and I also inherited him from another resident. It has been very difficult to get in touch with his mother to discuss his progress or the lack thereof. He also was the product of a normal pregnancy, labor, and delivery. He had essentially normal infant development, according to the mother in that he started doing things at just about the right time, motor development, speech, and so on. There was little difficulty with him until he started school at about the age of six, at which time he became very destructive. He was not able to keep up with things at school and his teachers had labeled him as a troublemaker. I went through the old chart, but there is not much about his family or social history. There are a few short notes which discuss his reaction to the Ritalin therapy and that is about it.

I have a reprint with me of the resident's evaluation on his initial visit at age six. The following is taken almost verbatim from the resident's notes: "constant disruption to classes, poor attention span even when watching television, cannot sit still for more than ten minutes, constant energy, becomes destructive when an-

gry, past history of recurring trauma including lacerations, burns, etc. While in office, this child was in constant motion, on table, off table, plays with curtains, talking, unable to keep still. Physical examination within normal limits. Impression: Hyperactive child, MBD. Begin Ritalin 5 mg daily after breakfast."

Subsequent reports indicated improvement on Ritalin. The mother claimed that the child was more controllable, the teachers were saying that he was doing better, his dose was steadily increased to about 20 mg per day and has been held there for the last four years.

DR. DONALDSON: This child is about ten?

DR. PRICA: Yes. His mother brought him to the clinic to see if he could be taken off his medication. The school nurse felt that he was under good control, they were not having too much trouble with him, and they hated to see him on the medication. We began decreasing his medication to see how he would react, and since then have been unable to contact the mother. I talked with the attending staff, who suggested continuing to decrease the medication because an exacerbation of the problem would bring the family in very quickly. We have no record of any testing on him.

DR. DONALDSON: I think this case presents us with a more typical history of classical hyperkinesia than the first case.

We don't know if there's evidence of learning disability or whether there are soft neurological signs, but there apparently was a dramatic improvement with relatively low doses of Ritalin.

Here we can see where the physical problems can begin to contribute to psychogenic problems. This child was probably on the hyperactive side as a preschooler, around home, but his mother was able to structure his time around the house and do whatever else was necessary to get along with him. She apparently had a pretty good relationship with him and felt his behavior was all right. Then he got into school where he was expected to sit still and be a good little boy, and he couldn't do it. He began to cause trouble in class and to develop an identity as a "bad kid." In many cases, this tends to

compound the disruptiveness and the child moves toward an anti-authority position. Fortunately, in this case, the problem behavior was improved very rapidly and the child was then able to function well in class and has maintained a positive attitude toward parents and teachers. This is a good example of how you can, by intervening early and bringing the behavior under control, positively affect the self-concepts of these children.

DR. PRICA: Do these children outgrow their need for medication?

DR. DONALDSON: Yes, typically as they approach puberty, chances are they will not need it anymore. The apparent reason for the tendency to outgrow hyperactivity has just been worked out within the last few years. When the child reaches puberty, (s)he goes through a complex chain of events as the body begins to produce sex hormones. These appear to inhibit monoamine oxidase, which in turn causes an increase in the catecholamine levels. Finally, these patients have enough norepinephrine or dopamine to allow them to function normally. Incidentally, this same mechanism may be related to the pubertal onset of schizophrenia in children at the opposite end of the physiologic continuum.

MRS. EVELYN ALPERIN (*Instructor, Medical Social Worker, Department of Family Practice*): Are there more boys than girls who are hyperactive?

DR. DONALDSON: Yes. I think it is partly because more boys seem to have this minimal problem with neurologic defect and partly because more boys seem to have problems due to poor attachment to a primary caretaker.

DR. AUTHIER: This child also has a manipulative tendency and perhaps has an anxiety component; I recall his wanting the doctor to come in and listen to his chest because he thought something was wrong with it, but he turned out to be physically well. The mother's concern may have been either the cause of the anxiety or the reason for the manipulation. The reason I was called in the first place was that there was a big family dispute over a pool table; the boy was not being allowed to play on it, so he came into the family doctor with his acting-out behavior. This seemed to me to be a way to manipulate his

mother into allowing him to play on the pool table. We worked this out with a contract which may have fallen into his manipulation, but since it improved family relations, we decided to go ahead with it. Nevertheless, there was an obvious manipulative tendency on the boy's part.

DR. DONALDSON: The earlier discussion about the dramatic improvement apparently was not true as far as his more delinquent behavior was concerned. I think there is an indication for using the medication diagnostically in that it will make little difference to the behavior of an unsocialized child who has a high level of activity because of a failure to internalize limits. If it is not being used to correct a physiologic abnormality, it is unlikely that medication will cause an improvement.

DR. AUTHIER: That point may partially explain the results of a study by Rie, Rie, and Stewart.⁵ These investigators studied 28 underachievers and found that Ritalin actually had a detrimental effect on comprehension and peer sociogram ratings. Perhaps then, this population consisted of children who were underachievers for other than physiologic reasons, and this is the reason for their negative findings.

DR. DONALDSON: With a study like that, unless you know how they decided which child got Ritalin, there is the possibility that a number of anxious or unsocialized children might have been included. In that case, one subgroup would significantly improve in their activity level, their ability to orient things in space, and be relieved of their learning disability. But the subgroup of anxious children on Ritalin would have a number of problems. The drug may inhibit them so that they can sit better but often they are quite uncomfortably anxious or irritable. Some people will interpret that as a positive response but I think what does happen, particularly with anxious children, is that they become hypersensitive, they cry easily, and they cannot concentrate very well because their associations may begin to loosen. These "super anxious" children tend to rate lower with their peers, because they are uncomfortable in spontaneous group settings.

DR. AUTHIER: That might indeed explain these results, they did mention that of those 28 children there were

only 13 who had the Pure Hyperkinetic Type MBD, showing soft neurologic signs such as the equivocal Babinski reflex and the unilateral eye-wink. Ritalin may have made the remaining 15 less capable of learning school-related tasks. That is, some of them may have been underachievers due to a Pure Learning Disability Type MBD and were hyperactive due to one of the other medical problems listed earlier and thus for them, the benefit of decreasing their activity levels would have to be weighed against the possible decrease in their comprehensive ability. The important point here is that Ritalin does not work for all children who present with hyperactivity as a symptom; thus, the family physician should not routinely prescribe Ritalin for patients who present with hyperactivity as their major symptom. A good history and physical, as well as a consultation with the child's teacher, is probably the best way for the family physician to make the differential diagnosis.

DR. DONALDSON: I would agree.

DR. AUTHIER: In the final minutes, I wonder if you could summarize how you differentiate hyperactivity as a symptom in MBD, an anxious child, a mentally retarded child, and so forth, and perhaps provide some practical ideas as to how family physicians could deal with these cases.

DR. DONALDSON: In my experience, you start with the history of hyperactivity. You watch the child for a few minutes to see if there is a stimulus-bound quality to it, remembering that if the child happens to be quiet on the first visit, it doesn't necessarily rule out the syndrome, because he may be situationally anxious. You then need to check for physiologic signs of anxiety. This is most easily done by shaking hands with the child. Anxious and normal children will tend toward having cold, wet hands. If you add to this about two to three minutes of tests for soft neurologic signs, you can be sure of the diagnosis in 80 to 90 percent of the children. The most important tests include those for rapid repetitive and rapid alternating movements. It is also helpful to have them tandem walk and to hop on each foot.

Another test which has been described recently involves having the child sit with hands still on knees for 20 to 25 seconds. The child with

severe hyperactivity may not be able to even hold them there that long. Even the milder cases will begin to have minor movements of the fingers. If you have two or three of these different signs combined with no physiologic signs of anxiety and a history of hyperactivity, it is very likely that the child has the syndrome of classical hyperactivity.

DR. ENSZ: Do you usually obtain psychometric results on a child who has the classical signs or do you use a trial of medication?

DR. DONALDSON: I would not routinely use psychometric testing to make a decision regarding the medical treatment of hyperactivity. I think that decision depends mainly on whether there is a concern about a learning disability. You may want to know if the child has normal intelligence with a learning disability or if the child has borderline mental retardation. That might make a lot of difference in expectations and how the child is placed in school. Or, if you have already started prescribing Ritalin and you have had a good improvement of the behavior but there is still a significant problem with learning in school, then I think that psychometrics would be helpful to document the kind of problem and maybe help the teacher with remediation. Often in our experience, the children have already had psychometric testing at the school by the time they get to us which helps us confirm the diagnosis of minimal brain dysfunction.

DR. ENSZ: Hyperactivity does not discriminate in any way against a child on an intelligence test?

DR. AUTHIER: Yes and no, in that one of the criteria for MBD is that the patient has to be within the normal range intellectually. Consequently, if the child is intellectually normal and having problems with attention span, concentration, distractibility, etc., (s)he probably has MBD with pure hyperkinesis. If (s)he demonstrates these signs to some degree and is very low in school-related abilities, then (s)he probably has MBD with a mixed hyperkinesis and learning disability. Finally, if (s)he demonstrates many of the above symptoms, but is below the normal range intellectually, then (s)he is mentally retarded.

DR. DONALDSON: As a group, hyperkinetic children tend to be on the low side of average in IQ. You see

a disproportionate number of below average children with the syndrome, but with the classical syndrome, the mechanism is the same whether the child has an IQ of 50 or 140.

DR. AUTHIER: As we discussed earlier, some would argue that if a child is Pure Hyperkinetic Type MBD they would be within the normal range intellectually and would only have a mild reading, writing, or spelling disability, usually secondary to haste. Thus, if the school-related areas are really the more affected, then the fact that the child may be a little hyperactive might be secondary. Perhaps the family physician should consider not

using Ritalin but another medication to reduce hyperactivity but not depress learning capability.

DR. DONALDSON: Yes, I agree, and in the case of a child with pure hyperactivity and little or no learning disability, you are better off using dextroamphetamine sulfate (Dexedrine) because it mimics norepinephrine. I think the most important question is, does a given drug significantly help a particular patient? We must be certain that the adverse effects do not outweigh the positive effects in each case.

DR. AUTHIER: Dr. Donaldson, I surely appreciate your coming by, and

Dr. Prica, thank you for the case presentations.

References

1. Donaldson J: Some considerations in the treatment of hyperactive children. *Nebr Med J* 60(6): 194-196, 1975
2. Peters J, Davis J, Goolsby C, et al: *Physicians Handbook: Screening for MBD*. CIBA Medical Horizons, 1974
3. Palkes H, Stewart M: Intellectual ability and performance of hyperactive children. *Am J Orthopsychiatry* 42(1): 35-39, 1972
4. Wikler A, Dixon J, Parker J, Jr.: Brain function in problem children and controls: Psychometric, neurological and electroencephalographic comparison. *Am J Psychiatry* 127: 634-645, 1970
5. Rie H, Rie E, Stewart S, et al: Effects of methylphenidate on underachieving children. *J Consult Clin Psychol* 44(2): 250-260, 1976

