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Treatment of Opioid Dependence and ADHD/ADD with Opioid Maintenance and Central Stimulants

Olof Blix, Arne Dalteg and Peter Nilsson

Addiction Medicine Unit, Department of Psychiatry, Ryhov County Hospital, Jönköping, Sweden, EU

Summary

Since January 2005 Medically Assisted Rehabilitation of opiate addicts (MAR) is a regular treatment supported by the National Board of Health and Welfare in Sweden. Treatment facilities are now open in most parts of Sweden. At the addiction medicine unit in Jönköping, high dose buprenorphine has been used since 1999, and methadone was added in 2005, when the previously separate regulations for the use of those two substances were merged in the present regulations. ADHD and ADD, together with OCD, are relatively common disorders among drug addicts. Since 2004 we have diagnosed over 150 patients with these disorders at the addiction medicine unit. By November 2007, treatment with long-acting methylphenidate or modafinil had been initiated in 85 subjects. Of those 85, 12 had also met the criteria for opioid substitution. This paper will discuss our experiences with the combined treatment with opioids and central stimulants, as administered to those drug addicts. In this naturalistic study, all 12 subjects (1 female), mean age 38 (range 20 to 51) were evaluated before starting Central Stimulant (CS) treatment with clinical interviews, self-assessments and formal computerized tests (EuroCog). The ambition is to follow each patient's development through the use of drug tests, interviews (subjects and relatives/significant others), and a retest to evaluate the outcome of the combined treatment.

Key Words: Opioid Dependence - ADHD - Stimulants - Opioid Maintenance

1. Introduction

Medically Assisted Rehabilitation (MAR) of opiate addiction was introduced in a research setting in Sweden in 1966 by Professor Gunne [11, 12], following pioneering studies by Drs. Dole and Nyswander [8]. MAR was long restricted and limited, both as to the number of patients in treatment, and to the clinics that were allowed to provide treatment, by the Department of Health and Welfare. In 1999 high dose buprenorphine (Subutex®) was registered as a pharmacological specialty in Sweden without such restrictions and with considerably fewer regulations. On 1 January 2005, the regulations for the use of methadone and Subutex were merged into a common regulation for MAR, which lifted limitations on the number of treatment providers as well as the number of patients in treatment for methadone. From that date on, only specialists in psychiatry working in addiction treatment facilities have been entitled to prescribe methadone and high dose buprenorphine (HDB). At that time, close to 840 patients were receiving methadone in the existing 6 MAR clinics, and over 1,300 were receiving HDB prescriptions. In January 2008, close to 60 clinics were providing treatment with either one or both compounds to 3,000 patients. The Buprenorphine + Naloxone combination (Suboxone®) was registered in Sweden in 2007, and was recently recommended as first choice when HDB treatment was under review by the Medical Products Agency in Sweden.

Attention-deficit hyperactivity disorder (ADHD) has been recognized for a long time in children, and it is a commonly co-occurring mental disorder among patients with substance use disorders. During the last few decades, it has been established that, in 30-60% of children that have the disorder, it persists into adulthood, though sometimes with less pronounced symptoms [21]. Often the hyperactivity diminishes, and the attention disorder becomes the major problem for the patient (ADD). In

Correspondence: Olof Blix, MD, Dr. Med. Sc., Addiction Medicine Unit, Department of Psychiatry, Ryhov County Hospital, SE-551 85 Jönköping, Sweden, EU. Phone ++46 36323404 ; Fax +46 36323061 ; E-Mail: olof.blix@lj.se

a 2008 study it was shown that 86.7% of adult ADHD patients had other psychiatric disorders, such as antisocial personality disorder, affective disorders, and abuse of alcohol or drugs. The latter accounted for half of the patients [22].

Treatment of ADHD includes both pharmacological and non-pharmacological strategies. Central stimulants, such as dexamphetamine and methylphenidate (MPH), are recommended as first choice. In a 10-year follow up study, Biederman et al. showed that there is no increased risk for later drug abuse in children and adolescents who received such treatment compared to those who did not [6]. In an earlier meta-analysis, Wilens et al. revealed a protective effect [24]. Current research provides data indicating that stimulant treatment is effective in adults, too [10], but more data are required to confirm long-term efficacy.

Treatment of ADHD patients with the problem of current drug abuse is often regarded as a contraindication for stimulant prescription, but there are some studies on methadone-maintained patients that have failed to show any change in side abuse when stimulant treatment was added to methadone maintenance [17].

In Sweden it became possible in 1997 to prescribe CS drugs to adults with ADHD through licensing. An increasing number of adult patients have been assessed for ADHD from the end of the 1990s. Levin et al. showed a prevalence of 15-24% of ADHD in various substance abuse samples [17]. ADHD is usually accompanied by other psychiatric disorders. In a sample of prisoners, Dalteg et al. (1999) found that ADHD was linked to specific personality characteristics and deviant alcohol reactions [7].

2. Methods

2.1 Treatment organization

The addiction treatment unit at the Ryhov County Hospital was established in 1969 (the in patient detox unit [DU]). In 1973 a rehabilitation unit was added, which later on developed into a day care centre, and around 1990 formed the present outpatient clinic (OPC). The latter has since then developed treatment for alcohol and/or drug-addicted patients with concomitant psychiatric disorders, and/or in need of MAR. The catchment area for the OPC comprises 165,000 inhabitants. The DU has the whole county as its catchment area (330,000 inhabitants). The OPC also serves the whole county in assessing applicants for MAR. The clinic administers methadone treatment throughout the county, whereas HDP is dealt with locally.

The authors represent a multidisciplinary team at the OPC - Olof Blix, MD, Arne Dalteg, psychologist and Peter Nilsson, psychiatric nurse.

2.2 Aims of the study

The main aim of the present study has been to determine whether adult patients with comorbid opioid dependence and ADHD/ADD can be treated with, and benefit from, combined MAR and CS treatment. For other psychiatric comorbidities in methadone treatment, it has been shown by, among others, Ball & Ross [4], that the results of treatment with methadone plus psychiatric treatment and social support improve patients' lives in several ways.

The present study is naturalistic, i.e. none of the originally included patients were excluded, even if some data are missing, and some existing data were collected retrospectively.

2.3 Sample

Patients fulfilling criteria for MAR and ADHD/ADD have been included. Most of them were in MAR treatment when assessed for ADHD, but two individuals were started simultaneously on both treatments; a third was first started on CS-treatment, after which MAR was added. The baseline characteristics of patients were compared with the situation 3 months after starting pharmacotherapy for ADHD/ADD. The abuse situation 3 months before and after central stimulant treatment was added to opioid maintenance was studied primarily through supervised urine tests whenever these were available.

In Sweden the general inclusion criteria applied for MAR treatment are:

1. A verified history of at least 2 years of dominant opioid addiction according to ICD-10.
2. Abuse of other substances that pose a risk of dangerous interactions with MAR must be manageable or be dealt with before a patient can be included in MAR.
3. The regular treatment service (through the social service system) should be judged to be insufficient as a standalone therapy.
4. A plan for social treatment (vocational, economic, housing, non-medical treatments) should be integrated into a treatment plan.
5. Patient participation must be voluntary.

2.4 Assessment

Current drug history and other important parameters were assessed through the Swedish version of Euro ASI, and through the collection of records from our own and other clinics, the social service system, the Criminal Justice System and the Police, all with written consent from the applicant. In addition, urine specimens taken in MAR during the 3 months preceding the initiation of CS treatment were analysed for benzodiazepines, opiates, cannabis, amphetamines and cocaine; the per-

centages recorded for positive and negative tests were compared with the situation that developed during the next 6 months.

Criteria for ADHD/ADD diagnoses were assessed using the Euro COG battery, a computerized neuropsychological test battery, formerly APT [15, 16]. WAIS-III Wechsler Adult Intelligence Scale - Third edition, was utilized to measure IQ [18].

The following Self-report inventories were used, too:

KSP - Karolinska Scales of Personality [13, 19].

SCID-II screening [3].

WURS - The Wender Utah Rating Scale translated into Swedish [7, 23].

AQ - The Autism-Spectrum Quotient dimensions of Asperger's syndrome/high-functioning autism [5].

GAF - Global Assessment of Functioning was assessed during: a) the latest year and; b) recent weeks before treatment started. DSM-IV defined Axis 5 refers to the assessment of the overall impression of a patient's symptoms and functional capacity. In that way the GAF score reflects the current need for treatment and care of a patient [2].

During the first weeks in treatment, a standardized questionnaire used by most clinics in Sweden when initiating MPH treatment to guide adequate dosing was administered to each patient. Evaluation of changes in attention, ability to concentrate, appetite, sleep and social relations were covered [1].

A follow-up questionnaire developed at the clinic to measure changes in ADHD/ADD symptoms was administered a minimum of 3 months after the initiation of CS treatment.

2.5 Clinical realization

Once a diagnosis of ADHD/ADD has been confirmed, the patient with his counsellor is scheduled for an appointment with the psychologist and the prescribing psychiatrist. Family member(s) or significant others and, if relevant, the patient's social worker are invited to participate. The focus is on explaining the meaning of the findings, and to form a treatment plan. This plan, besides the added pharmacological treatment (usually a CS such as MPH), includes social rehabilitation, ADL function and any needs for assistance. When previous vocational experience is missing, special attention must be dedicated to vocational rehabilitation or habilitation.

A prerequisite for initiating CS treatment is that the patient must be free of abuse. Ongoing MAR is not regarded as abuse. To confirm this, urine tests taken in connection with MAR are used. Patients starting with MAR and CS simultaneously are normally admitted to the DU before the pharmacological treatment is started.

Patients who have already been included in MAR usually have a plan for their social rehabilitation, and a social counsellor, in addition to his/her medical counsellor at the clinic. The treatment plan might have to be renewed to address the specific problems that are related to the added treatment, and it is important to include all supporting staff to achieve as comprehensive a treatment as possible. Informative contacts with employers or teachers, when these are involved, are often helpful.

Patients already in MAR are normally required to attend from one to three times a week. Supervised u-tests are normally taken once or twice weekly. The focus of the initial months in treatment is to establish a good treatment relationship with the patient. Positive u-tests do not automatically warrant drastic changes to the treatment plan; the difference they make is to provide an incentive to discuss further improvements in treatment.

When the questionnaire for dose titration is administered, we also ask a relative or significant other to give his/her view of the patient's functioning, if possible. Quite often, those near-the-patient persons take notice of changes before the patient himself/herself becomes aware of them, and they can reassure the patient about his/her improvements.

Blood pressure and heart rate, as well as weight, are measured before the onset of CS medication. Retesting is done weekly during the first month in treatment, and, if no significant changes occur, only once per month, and, later, at a minimum frequency of once per year.

Blood tests are taken before the start of treatment, including liver enzymes, blood status and urine status. Retesting is performed at a minimum frequency of once a year, but when pathological answers are shown, more often, and, when needed, further investigations will be carried out to make possible the treatment of somatic disorders.

One particular problem with this patient group is the difficulty they have in keeping appointments; this, in itself, is a symptom of ADHD. Patients often call the counsellor after the agreed time, to ask what the time of the appointment is. Last-minute attendance is a common pattern for some patients. This problem is best handled with some flexibility and a smile.

2.6 Statistical considerations

To generalize from a 12-subject sample in a naturalistic study like this is difficult. The results have therefore been interpreted mainly on a descriptive level, even if , on a statistical level, we have tentatively used the Paired-Samples T-test [20].

3. Results

3.1 Subjects

Only one of the 12 patients included was female (8%), compared to the general sex ratio of 20% females in the unit. One patient had impaired eyesight. Three (24%)

were born prematurely. Nine (72%) of them were brought up by their biological parents, one in a foster home and two in other types of institution. All had experienced great difficulty in ordinary schools. They did not keep up with the teaching, showed concentration and learning difficulties, had been bullied and, besides all these problems, they did not bother about school and played truant. Only 33% of the patients had completed senior high school. One of these is a skilled worker. None had started academic studies and none were considered suitable for the military training that is compulsory at around the age of 20; all of them made their living by benefiting from different social welfare systems and engaging in crime at the start of the treatment. They were evaluated for ADHD at a mean age of 38 (range 20 to 51).

Half of the patients have so far been IQ-tested (WAIS-III); their mean general intelligence was 87 (range 60 to 118). The results were slightly higher on the verbal than on the performance side.

The onset of criminality and drug-taking occurred early in the teenage period (12-16 years). There was a tendency for the onset of drug abuse to precede the onset of criminality. Four patients (32%) had displayed deviant alcohol/drug reactions, and at least 3 (25%) were obviously alcohol-dependent, while only 2 (13%) were teetotallers. Almost all had tested positively for benzodiazepines, cannabis, central stimulants, opiates, hallucinogens and ecstasy, while a minority had previously abused solvents. Three (25%) still had an ongoing benzodiazepine abuse, 4 were also cannabis abusers, whereas only two displayed amphetamine abuse. HCV-antibodies were recorded for 10 (83%) of the patients.

Half of the patients so far have also been re-evaluated on their neuropsychiatric symptoms.

3.2 Personality traits

The patients were extremely under-socialized; this indicates and confirms their serious social problems and also points to personality disorders (psychopathic and/or schizoid traits). They have high levels of somatic anxiety (physical/autonomous manifestations of anxiety and diffuse discomfort, without any identifiable cognitive correlates) and signs and symptoms of increased muscular tension, to such a degree that they have obviously been suffering from these difficulties for a long time and are in need of physiotherapy. They are easily wearied psychologically, find it difficult to make decisions (psychoasthenia), and show a high level of hostility (table 1).

Table 1. Personality traits (KSP) in T-values (Mean T= 50 +- 10).

Personality trait	Min	Max	Mean
Somatic anxiety	60	91	78
Psychic anxiety	38	82	63
Muscular tension	71	99	85
Social desirability	28	58	47
Impulsiveness	30	75	58
Monotony avoidance	32	62	47
Distance preference	38	90	61
Psychasthenia	34	86	70
Socialisation	1	35	20
Indirect Aggression	50	74	62
Verbal Aggression	48	78	60
Irritability	50	74	62
Hostility	30	89	66
Guilt	44	76	57
Inhibition of Aggression	32	71	47

3.3 Personality syndromes

The most pronounced personality syndrome among the subjects can be recognized in the extreme forms taken by their acting-out behaviours. All had a conduct disorder or were pre-psychopathic as children (before age 15) and all have been living antisocial lives as adults. They also have a history of anxiety-related syndromes (OCD and social phobia), together with proximity-inhibitional difficulties (e.g. schizotypical - peculiar/strange or magic thoughts, paranoid) (table 2).

All except one (the female) fulfilled the DSM-IV criteria for both childhood and adult ADHD (predominantly Hyperactivity/Impulsivity and "inattention"). They described a chronic course of ADHD symptoms from child- to adulthood. More than half (58%) of the patients were also "short tempered". Four (33%) patients fulfilled the criteria for Asperger's syndrome/autistic-like behaviour.

Considered as a whole, the sample is severely impaired in terms of academic achievement, employment, criminality and psychiatric comorbidity.

3.4 Global Assessment of Functioning

The mean GAF scores of the subjects during the previous year was 45 and during recent weeks 50. This indicates serious to very serious symptoms, such as suicidal and strange thoughts. They did not care about friends and relatives, and were unable to bring fulfilment to their everyday lives. Most of them needed initial in-patient treatment.

Table 2. Personality disorders/syndromes (SCID-II) and criteria for fulfilment

Disorder	Min	Max	Mean	Criterias
Fobia	2	7	5.25	>4
Dependent	0	6	2.75	>5
Compulsive	2	10	5.78	>5
Passive aggression	0	9	4.38	>5
Masochism	1	10	4.13	>5
Paranoid	2	7	5.11	>4
Schizotypical	1	10	5.25	>5
Schizoid	2	5	3.13	>4
Histrion	0	5	1.86	>4
Narcissism	0	10	5.14	>5
Borderline	1	10	5.88	>5
Conduct disorder	4	10	6.88	>3
Antisocial	4	7	5.75	>4

3.5 *Medication*

Half the patients were stabilized on Methadone, at an average daily dose of 107 mg, range 60-130. The other half had prescriptions for HDB (High Dose Buprenorphine), with an average daily dose of 20 mg, and a range of 16-32 mg.

One of the patients (with 16 mg HDB) was medicated with Modafinil (200 mg daily) and the only female patient took HDB 16 mg and MPH Capsules 30+30+20mg. The remaining 10 patients had MPH Oros, with an average dose of 72 mg per day. Half of them were taking MPH once daily, and the others twice daily (8.00 and 14.00).

3.6 *The clinic's follow-up questionnaire*

The clinical follow-up showed that the subjects' irritation/aggressiveness had decreased; their ability to organize their daily living had improved, as had their ability to relax, for example by reading books and/or watching TV, as well as in planning their daily activities in advance. Sleep and inner tensions were somewhat better. Appetite and craving for drugs were unchanged. Very few side-effects were reported. One subject experienced increased tics and involuntary movements.

3.7 *Neuropsychological tests and re-tests*

The results of the EURO COG re-test after 3 months did not display any major changes.

3.8 *Basic neuropsychological functions*

Subjects' reaction abilities were initially mostly within normal range with the exceptions of two-choice visual (Right/Left), where subjects seemed more hypo-reactive. There were no significant changes at re-test (table 3).

All subjects were right handed. Motor speed and co-ordination on the simple dexterity tests were initially within a normal range. There were indications ($p<.10$ - $p<.05$) of a decreased motor speed and co-ordination at the re-test (table 4).

Their perceptive and continuous performance, with attention on a certain feature (the letter K) of the environment, while ignoring distractors, were initially below

Table 3. Reaction time (RT) data (in msec). Min. max and mean values. Test and re-test.

Test/variable	N	Min	Max	Mean	Re-test N	Min	Max	Mean	P
Audi	10	163	373	240	6	171	373	257	n.s
Visu	10	165	326	232	6	175	339	243	n.s
2-choice									
Left	10	236	492	329	6	271	457	328	n.s
Right	10	235	439	328	6	225	491	350	n.s
L/R error	10	.0	.5	.27	6	.0	.75	.25	n.s
Inhib									
Left	10	275	681	442	6	328	2000	784	n.s
Right	10	284	660	443	6	390	2000	808	n.s
Failed inhib	10	.0	0.23	.14	6	.0	.46	.13	n.s

average range, especially within the more difficult version - 'letters as distractors' - indicating, for instance, a high level of dyslectic subjects. Signal detection ability (d-prim) increased significantly (p<.05) over time within the simpler version - 'squares as distractors' (table 5).

3.9 Specific aptitudes functions

The visual-spatial competence (Maze-tests) i.e. visual search, visual ability and general intelligence were initially within a normal range and did not change significantly over time. The R/L-quotes indicated these subjects´ general preferences to see solutions on the left side of the screen. This might indicate that the right half of the brain is more active among abusers (table 6).

3.10 Learning and memory functions

The learning ability (AL), Short-Term/working memory (STM) and Long-Term memory (LTM) were initially within in normal range. No significant changes were observed at re-test except an indication (p<.10) of worsened Long-Term memory (table 7).

3.11 Changes in abuse patterns

All patients took urine tests 2-3 times per week. The results of those tests showed a tendency to reduced or unchanged abuse of all kinds of drugs, except for amphetamines, where a marginal increase was noted, even if from a very low level. Overall, the percentage of negative urine tests increased by 19%, from 66.2 to 79% (Figure 1).

4. Discussion

The aim of this study was to find out if treatment that combines opioids and stimulants in a comprehensive setting was feasible for this multi-problem group, and if it could improve the functioning of those otherwise often overlooked individuals. Our results so far indicate that it does, and that it makes a difference not only in reducing the abuse of opioids, which the MAR treatment is well

Table 4. Finger Tapping. Test and re-test results. Min. max and mean values.

Test/Variable	N	Min	Max	Mean	Re-test N	Min	Max	Mean	P
Right index finger	10	4.9	8.1	6.3	6	4.0	7.6	5.8	n.s
Left index finger	10	4.6	7.0	6.0	6	4.4	7.2	5.3	n.s
Alt R	10	1.4	4.5	3.7	6	1.6	4.4	3.0	>.10
Alt L	10	1.5	4.5	3.2	6	1.6	4.3	2.8	>.05
Alt R/L index finger	10	3.1	4.6	3.9	6	1.7	4.5	3.3	n.s

Table 5 Selective perception (K-test 'letters' & 'squares' as distractors). Test and re-test.

Test/Variable Letters	N	Min	Max	Mean	Re-test N	Min	Max	Mean	P
Corr.rsps	10	43	86	72	5	69	95	80	n.s
Err.rsps	10	0	10	3.7	5	00	7	3.0	n.s
D-prim	10	2.5	4.6	3.6	5	3.4	4.6	4.0	n.s
Raptime corr	10	1480	5979	2213	5	1616	4972	2395	n.s
Squares									
Corr.rsps	10	87	141	116	5	119	143	130	n.s
Err.rsps	10	1	10	4.6	5	0	5	3.6	n.s
D-prim	10	2.8	4.7	3.7	5	3.7	4.8	4.0	>.05
Raptime corr	10	655	1321	874	5	634	868	759	n.s

Table 6 Maze-tests (with target info & no target info). Test and re-test.

Test/Variable Target info	N	Min	Max	Mean	Re-test N	Min	Max	Mean	P
Maxrows	10	8	15	12	5	9	18	15	n.s
% corr	10	.49	0.93	.70	5	.40	.79	.58	n.s
Process speed	10	1.15	10.1	3.9	5	2.06	11.4	7.0	n.s
Inspec speed	10	1.65	59.8	17.2	5	7.0	58.4	33.5	n.s
Check time	10	.56	1.4	.95	5	.44	1.4	.82	n.s
R/Lquotient	10	.21	.56	.38	5	.25	.55	.39	n.s
Rubouts	10	.01	.74	.22	5	.01	.36	.09	n.s
Variable No Target info	N	Min	Max	Mean	N	Min	Max	Mean	P
Maxrows	10	8	18	13.0	5	9	19	15	n.s
% corr	10	.43	.93	.63	5	.45	.60	.52	n.s
Process speed	10	1.1	10.0	5.6	5	3.1	15.5	9.7	n.s
Inspec speed	10	1.4	70.3	27.4	5	17.8	108.2	59.8	n.s
Check time	10	.47	1.54	.89	5	.44	1.16	.68	n.s
R/Lqoutient	10	.19	.56	.42	5	.26	.61	.41	n.s
Rubouts	10	.00	.61	.12	5	.02	.16	.08	n.s

Table 7. Associative Learning (AL). Short-Term Memory (STM-Digit span) and Long-Term Memory (LTM). Test an re-test results

Test Variable	N	Min	Max	Mean	Re-test N	Min	Max	Mean	P
AL									
Correst rsps	10	35	62	46.4	6	35	54	47.2	n.s
Error rsps	10	0	2	.8	6	0	2	0.5	n.s
Variable	N	Min	Max	Mean	N	Min	Max	Mean	P
STM									
Max forward	10	5	7	6.2	6	5	6	5.7	n.s
Max backward	10	3	6	4.6	6	4	7	5.8	n.s
Variable	N	Min	Max	Mean	N	Min	Max	Mean	P
LTM									
Correct rsps	10	0	47	13.0	6	1.0	23	10.5	n.s
Error rsps	10	17	71	41.1	6	11	71	42.3	n.s
Remembered	10	0	7	2.1	6	0.0	2	.05	>.10

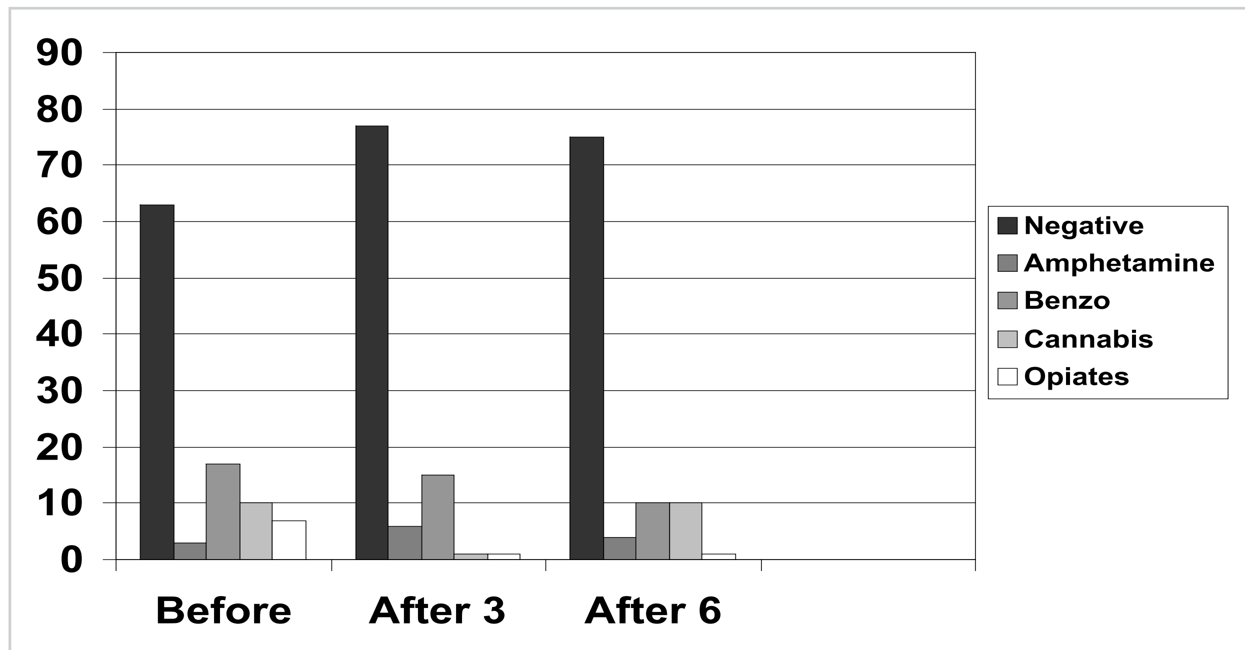

Figure 1: U-test results during the 3 months before the start of CS medication and the following 3 and next 3 months (%). N=10, as 2 patients started MAR and CS medication simultaneously.

known to do, but also some of the bothering symptoms of ADHD/ADD. The group studied was too small to generalize from, but the results are encouraging, and warrant further investigations.

From a neuropsychological point of view, there were few significant changes at re-test in this small sample. However, indications of a decreased motor speed and co-ordination were observed, together with an increased capability in perceptive signal detection. Contrary to expectations, there were no indications of more of "think before you leap" and fewer executive errors. It is noteworthy that the subjects' right hemisphere seems to be more active than the left one. When considering these subjects' learning and memory functions, there were no indications of any improvements. It is even possible that the MAR treatment alone can contribute to the reduction of ADHD/ADD symptoms, as mesolimbic dopamine levels are affected by μ-opioid receptor stimulation. However, the role of dopamine and its receptors in the rewarding of drug effects and the role in treating ADHD calls for further studies [14].

Previous studies have not shown any significant effects on craving or drug abuse behaviour [17], but the changes noted in our group as early as 3 months after treatment started indicates that it can reduce the abuse of benzodiazepines, cannabis and even opioids. The number of patients continuing with cannabis was reduced to one person on 6 months, whereas 3 patients were occasionally using cannabis before the added treatment. Figure 1 only gives the total percentage of positive u-tests in the group. It might be interpreted as a result of the decreased inner tension and anxiety that these patients attribute to the added CS treatment when they answer the clinic's questionnaire.

On the other hand, amphetamine use turned out to have increased marginally in our sample. This can be interpreted in terms of some patients´ continuing habit of self-medication, but could also indicate that even a 'mild' CS such as MPH can trigger a latent amphetamine craving.

Our general impression, though, is that those patients who occasionally took amphetamines were doing so to test if they could achieve a better level of functioning. Many of them, after an increase in MPH, discovered that the lower level was better overall; as a result, they not only cut out their amphetamine intake, but also asked for a cut in MPH dosage. So far we have noticed this tendency among our approximately 50 non-MAR ADHD/ADD-patients who were treated with CS medication and were addicted to drugs other than opioids.

5. Conclusions

All in all, the addition of this new tool in treating our addicted patients has been an inspiring experience in our everyday work. Our feeling is that we are at the beginning of a new era of addiction treatment, where the basics from MAR are being translated into a similar, but at the same time different method of helping a patient group that has been overlooked for too long, while suffering

considerably from our previous lack of understanding of their problems.

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Contributors

The authors contributed equally to this work.

Conflict of Interest

The authors have no relevant conflict of interest to report in relation to the present study.

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