

Criminal Poisoning: Munchausen by Proxy

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The diagnosis and subsequent prosecution of Munchausen by proxy (MBP) cases requires the collaborative teamwork of health care teams, laboratory personnel, law enforcement, and social services. Poisoning occurs in a significant number of the MBP cases with a diverse variety of agents used. To aid laboratory professionals in determining the appropriate toxicology tests to perform in such criminal cases, health care professionals must focus their testing requests on substances that correspond to the victim's signs, symptoms, and ancillary test values. This article reviews MBP, with particular focus on poisoning agents that have been used in past reported cases.

History and definitions

Munchausen syndrome was first described by British physician Richard Asher in 1951 [1]. It is a psychiatric disorder that causes an individual to self-inflict injury or illness or to fabricate symptoms of physical or mental illness to receive medical care or hospitalization. Categorized as a factitious disorder in which the physical or psychological symptoms are under voluntary control, Munchausen syndrome seems to be motivated by a need to assume the role of a patient. Unlike malingering, there is not a clear external secondary gain (eg, money) in Munchausen syndrome. The term

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Munchausen was derived from Baron Karl Friederich von Munchausen, an eighteenth century German military man known for his dramatic and untruthful tall tales [2].

MBP was first described in 1977 by Sir Roy Meadow [3]. MBP is also known as Polle's syndrome, after Baron von Munchausen's only child Polle, who died mysteriously at 1 year of age [4,5]. MBP is defined as the intentional production or feigning of physical or psychological signs or symptoms in another person who is under the individual's care for the purpose of indirectly assuming the sick role. MBP has also been called factitious disorder by proxy, fabricated disorder by proxy, and Meadow's syndrome [6,7]. MBP most often is noted in the context of children, but cases have also been reported in adults [8]. MBP in children is considered child abuse and must be reported to the authorities in accordance with mandatory child abuse reporting laws [9].

MBP is distinctly different from somatoform disorder and malingering by proxy. In somatoform disorder, the signs and symptoms are real to the person afflicted and not produced under voluntary control; they are not simulated intentionally or created. In malingering by proxy, guardians coach their children to misbehave or fake disabilities to obtain an external incentive, such as supplemental security income payments. If the fabrication of an illness includes repeated hospitalization or treatment, MBP association also may occur [10].

Epidemiology

Accurate epidemiologic data pertaining to MBP are unavailable. Deception is an integral part of factitious disorders; therefore this behavior certainly is underreported [11]. An additional problem in determining prevalence is that the diagnosis criteria for MBP are not consistent. In available reports, the incidence of MBP has been noted to be 2 cases per 100,000 in children younger than 1 year of age and 0.5 cases per 100,000 in children younger than 16 years of age [12,13]. MBP is not unique to Western society, but has been reported in multiple countries and cultures [14].

Siblings of MBP victims often are affected [15–19]. In one study, 30% of the siblings of MBP victims were either poisoned or otherwise abused, with numerous siblings of MBP victims having died of uncertain causes [20]. In another review of 117 cases of MBP, 10 deaths of siblings of MBP victims were reported to occur under unusual circumstances [21]. Sudden infant death syndrome has been diagnosed in several siblings of MBP victims [22,23]. In previously reported cases of multiple sibling involvement of MBP, the siblings were affected sequentially and not simultaneously [24].

In MBP, the offender can either simulate or produce an illness. With simulation, an offender fakes an illness by verbally presenting an untrue history

for a nonexistent illness or condition. For example, a caregiver can give a false history that the child had a seizure and describe in detail a grand mal convulsion that in fact did not occur. By production, the offender actually induces a pathologic condition in the MBP victim. For example, a caregiver could administer camphor to a child, causing that child to develop seizures. In one study MBP offenders actually produced illness in 70% of cases [21].

The mean time taken to make the correct diagnosis from initial presentation is 7 months in cases referred to child protection agencies and 23 months in cases not referred [25]. Mortality rates in MBP victims have been estimated at 10%, but the true rates of mortality are unknown [21,26]. Of the methods used, poisoning accounted for 34% of the MBP cases in one series. The most common presenting signs for MBP are bleeding (44%), seizures (42%), central nervous system depression (19%), apnea (15%), diarrhea (11%), vomiting (10%), and fever (10%) [12].

MBP victim

Most reported victims of MBP have been less than 5 years of age, with a mean age of 20 months [13]. MBP victims are divided nearly evenly between boys (47%) and girls (53%) [13]. The MBP victims tend to be dependent, display separation anxiety, be immature, have a symbiotic relationship with the offender, use alternative communication options, passively tolerate medical procedures, present with multiple symptoms, and fail to thrive (Box 1) [25]. The documentation of the resolution of signs and symptoms when the perpetrating caregiver is separated from the victim should raise the possibility of MBP as the cause.

MBP offender

The responsible caregivers have been described as “Great Pretenders” [9]. They are more commonly white, upper class, and educated, though all segments of the population are represented. Most of the offenders are the victim’s mother, with men responsible for less than 5% of cases [13,25]. Studies have documented that 27% to 50% of the MBP offenders have some form of health care training [15,26,27]. The perpetrators tend to be calm, welcome painful medical tests, give extensive praise to medical staff, be knowledgeable about the victim’s illness, shelter the victims, and have a high degree of attentiveness (see Box 1) [12,28]. The offender’s personality can vary, however, and individuals also have been described as “poorly educated, single, antagonistic to nursing staff and physicians, and hardly an ideal mother” [29]. Fathers tend to be separated physically from the family or detached and unaware of the poisoning [30].

Box 1. Characteristics commonly found in MBP offenders and victims*Profile of MBP offender*

Biologic mother
Extensive praise to medical staff
High degree of attentiveness
Calm despite severity of child's illness
Shelters the victim
Knowledgeable about the victim's illness
Some degree of medical education
History of similar illness as the child
Communication with the victim through methods other than speech
Welcomes painful medical tests and procedures without question

Traits of MBP victim

Dependent
Displays separation anxiety
Immature
Symbiotic relationship with caregiver
Views offender as ideal parent
Passively tolerates medical procedures
Excessive school absence
Not involved in normal social activities
Failure to thrive
Illness corresponds with presence of caregiver
Illness resolves with close surveillance

Poisons used in past MBP

Numerous agents have been used to poison children in cases of MBP. In a case series of 128 children with MBP, 40 (35%) were poisoned with 38 different toxins used, and 7 children received more than one poison [13]. Of poisons used, 71% were prescribed drugs. The most common drugs used in this study were anticonvulsants and opiates. A partial listing of specific agents reported in MBP investigations in the medical literature can be found in **Box 2**.

Criminal poisoning is a diagnostic challenge, and MBP cases are no exception. Initial visits of MBP victims to health care providers are unlikely to raise the diagnosis of MBP as a possibility. By the time the diagnosis of MBP is being entertained, testing of urine or blood may be of limited value because the agent used to poison may no longer be detected. To narrow the class of agents that may be responsible in a criminal poisoning case such as MBP, it is imperative that the health care workers fully review the

Box 2. Specific agents used to poison children in MBP cases as reported in the medical literature

Paregoric [51]
Antidepressants [13,52–55]
Barbiturates [17,56,57]
Caustics [58,59]
Rat poison [60]
Salt [13,17,58]
Insulin [8,28,31,34,51,61,62]
Methaqualone [17]
Benzodiazepines [13,63,64]
Ipecac [29,30,35–37]
Antihistamines [13,24]
Bethanecol [51]
Salicylates [64]
Bleach [13]
Antipsychotics [5,51,65–67]
Clonidine [67,68]
Arsenic [49]
Furosemide [17,69]
Glucose [70]
Acetaminophen [13]
Opioids [13,64]
Sulfonylureas [33,34,71]
Laxatives [51,72,73]
Carbon monoxide [13]
Anticonvulsants [13,42]

presenting symptoms, signs, laboratory values, and other ancillary tests. This review aids the toxicology laboratory personnel in choosing the correct panel of tests. For example, a child presenting with frequent visits of altered mental status or seizures and found to be solely hypoglycemic with no other findings should be tested for either exogenous insulin or oral hypoglycemic administration. The triad findings of hypoglycemia, elevated insulin, and suppressed c-peptide should raise the concern for potential exogenous insulin administration [31,32]. The administration of oral hypoglycemic agents of the sulfonylurea class, on the other hand, can mimic an insulinoma, with the MBP victim having hypoglycemia, elevated insulin, and elevated c-peptide [32,33]. Pancreatectomy has been reported in cases of MBP in which the diagnosis of sulfonylurea poisoning was not entertained [34]. Specific laboratory analysis for oral hypoglycemic agents should be performed in suspected cases [32].

As another example, syrup of ipecac is one of the most common reported toxins used in published MBP cases [29,30,35–37]. Syrup of ipecac currently is available as a nonprescription product in many countries, including the United States. It is prepared from the dried rhizome and roots of the *Cephaelis ipecacuanha* or *C acuminata* plant, which contain the alkaloids emetine and cephaeline. These alkaloids are potent emetics inducing vomiting by direct local gastrointestinal effects and central nervous system actions at the chemoreceptor trigger zone. Emesis following syrup of ipecac ingestion typically occurs within 20 minutes of ingestion and persists for 30 to 120 minutes. Children who are administered ipecac in MBP cases are often misdiagnosed as having gastrointestinal reflux. Chronic administration of ipecac in MBP cases may result in gastrointestinal bleeding, electrolyte abnormalities, and skeletal and cardiac myopathy [38]. Cardiomyopathy has been reported as the cause of death in such cases [39]. Emetine causes impaired myocardial cellular respiration, carbohydrate metabolism, and protein synthesis causing a progression to myofibrillar degeneration and myocytolysis [39]. Emetine and cephaeline serum levels peak within 1 hour after ingestion and are undetectable within 6 hours [40]. Emetine and cephaeline are detected in the urine within 40 minutes and may be detectable in the urine for several weeks after ingestion [30,39,40]. Children who present with repetitive emesis that resolves in a supervised setting and who have an elevated creatine phosphokinase, proximal muscle weakness, or evidence of cardiomyopathy, should have ipecac toxicity included on their differential diagnosis [30].

Laboratory testing

Routine urine or serum toxicology screens are of limited value for detecting a poison that may be contributing to an MBP victim's signs and symptoms. Most screening tests check for a small number of common agents, with numerous false negative and positive results possible. Most hospitals use commercially available urine immunoassays for drugs of abuse that can detect a combination of common drugs, such as amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine derivatives, and opioids [41]. As noted in **Box 2**, many of the agents that have been reported in MBP cases are not tested for on routine toxicology screens. To narrow the differential, it is imperative that the patient's case be closely reviewed to determine the class of agent that is consistent with the victim's signs, symptoms, routine laboratory values, and ancillary tests such as an electrocardiogram.

Pharmacokinetic modeling

The application of pharmacokinetic models may assist in diagnosing a case of MBP. For example, Mahesh and colleagues [42] described a

4-year-old child who presented to health care facilities on multiple occasions with altered mental status and seizures. Abuse had been suspected, but urine drug screens had revealed only the presence of the medications he was prescribed: phenytoin and carbamazepine. During his hospital admissions the serum levels of these anticonvulsants demonstrated extreme fluctuations, from subtherapeutic to toxic, without recorded dose changes. The mother of the child in this case contended that her child had abnormal drug metabolism. Evaluation of the child's pharmacokinetics by a clinical pharmacologist documented a normal serum half-life thereby suggesting surreptitious dosing and leading to a confession by the mother that she had been administering additional doses of the drugs.

Findings that may be associated with criminal cases of MBP in which the victim's prescribed drugs are used include: (1) discrepancies between history and drug levels, (2) abnormal pharmacokinetics despite appropriate dosing, (3) resolution of abnormal pharmacokinetics when the victim is under close supervision of health care providers and the MBP perpetrator is removed from the victim [42]. The application of common therapeutic drug monitoring techniques may assist the health care team in diagnosing MBP. To accurately use clinical pharmacokinetic methods, the health care team must keep a precise record of the dose size, timing of drug administration, and exact time at which serum drug levels are obtained. With these data, fundamental pharmacologic equations can be used to determine expectant drug concentrations. Because all this information is readily available in the hospital setting, the use of pharmacokinetics can represent a simple, inexpensive, and accurate way to identify objectively the child poisoned in MBP cases.

MBP investigation

There are numerous warning signs that may provide health care workers clues that a patient is an MBP victim, especially in cases in which there is recurrent illness that cannot be explained, discrepancies between clinical findings and history are noted, symptoms occur only when the suspected perpetrator is present, and a family history of sudden or unexplained infant death has occurred (see Box 1) [27,28]. The diagnosis and management of an MBP case is complex. Kathryn Artingstall's book [9] summarizes these difficulties by stating: "The complexities involved in MBP case compilation necessitates a union of forces within the legal, medical, social/protective service, and law enforcement professions. There is no other type of investigation that requires an understanding and protocol between agencies to the degree required in MBP investigations" [9]. Documentation must be objective, accurate, detailed, and legible. Actual pertinent quotations of the suspected perpetrator should be documented. The child's signs and symptoms should be documented fully and clearly both in the presence and in the absence of the suspected caregiver. Hospital covert video surveillance of

caregivers suspected of MBP should be considered, using appropriate protocols [43–46]. Appropriate hospital administration and child protective services should be contacted at the time a case of MBP is suspected. Laboratory testing should be focused and laboratory personnel should be in open communication with the health care team to decide the most appropriate battery of toxicologic testing.

Future for MBP victims

There are few studies examining the long-term impact on children who have been victims of MBP. It is likely that many of the victims are never identified or are lost to follow-up. Children have been reported to demonstrate significant psychological difficulties later in life, including conversion symptoms, fabrications, poor school attendance, diminished ability to concentrate, and emotional and behavioral problems [47,48]. The childhood problems of MBP victims have been reported to persist into adulthood, especially posttraumatic stress symptoms [49]. Victims described struggling to avoid playing the victim role, difficulty maintaining relationships, and insecurity. These victims had difficulty separating fantasy from reality, especially in relation to illness and need for medical treatment [49,50].

Summary

Health care personnel should consider the diagnostic possibility of MBP in their practices, especially in cases fitting the patterns described in this article. In suspected cases of poisoning, clinicians should attempt to narrow the testing to agents that correspond to the presenting clinical data. If assistance is needed in detecting a suspected toxin, clinical toxicology consultation should be sought.

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