

## THE EFFECT OF SUBCUTANEOUS INJECTIONS OF MAGNESIUM SULPHATE IN CHOREA \*

HENRY HEIMAN, M.D.

NEW YORK

The existence of the condition termed chorea has been well known ever since the Middle Ages. For centuries the medical profession has endeavored to treat it satisfactorily, as well as to explain its etiology. The results so far have been disappointing. Sedatives, such as bromids and chloral, the salicylates, rest, hydrotherapy, and hygienic measures, all have a beneficial influence on certain symptoms in chorea. Arsenic, however, in this condition is a greatly overestimated drug; I have yet to see it relieve, even in the slightest degree, the choreic manifestations or shorten the course of the disease. We are still sadly in want of a specific remedy to cope satisfactorily with this annoying, chronic, and occasionally serious malady.

In the absence of positive knowledge as to the causation of chorea, it is justifiable to attempt symptomatic treatment alone, with the view of lessening the severity and frequency of the choreic manifestations and rendering the patient more comfortable. Stimulated by the work of Meltzer in the treatment of tetanus by injections of magnesium sulphate, I applied a similar method in a series of chorea cases, in the hope that a favorable influence would be exerted on the psychomotor system.

Meltzer investigated the effect of various salts on animals and human beings and found that of magnesium sulphate unmistakably inhibitory in character. Various modes of administration were investigated—intravenous, intraspinal, intramuscular, and subcutaneous. In intravenous and intramuscular injections the effect was rapid, but of short duration; in intraspinal injections, rapid and of longer duration; in subcutaneous injections, slow and of still longer duration, with the possibility of a cumulative action. Meltzer claims that in tetanus there is no other remedy capable of relieving the very severe convulsive symptoms so satisfactorily as the injection of magnesium sulphate. To explain the inhibitory phenomena exerted by magnesium sulphate in tetanus, he offers the hypothesis that the magnesium solution contained in the lymphatic circulation enters into the spaces, or, as termed by Sherrington, "synaptic membrane," between the various neurons or between neurons and muscle, and thus interrupts the passage of afferent

---

\* Submitted for publication May 14, 1916.

\* Read at the twenty-eighth annual meeting of the American Pediatric Society, held at Washington, D. C., May 8-10, 1916.

impulses. He concludes that magnesium sulphate by subcutaneous injections should be given in every case of tetanus.

Chorea, though entirely dissimilar in etiology, in pathology, and in symptomatology to tetanus, is characterized by irregular, incoordinate muscular movements, which in turn depend on some pathologic condition of the psychomotor system, probably central in origin. Reasoning from analogy, therefore, I regarded it possible that magnesium sulphate might have a similar beneficial effect in chorea, and that a trial in a series of cases would be warranted. Feliziani and Natali have used intraspinal injections of magnesium sulphate in chorea with doubtful results. The latter had seven cases of chorea minor and one case of chronic chorea in which this method of therapy was employed. He claims that three patients were entirely, and four nearly, cured, but that the chronic case was not modified. Even if this method of therapy were but empirical and had not a possible theoretical foundation, no apology would be necessary for employing it in an endeavor to find a remedy for this obscure condition which has for so long baffled medical science. That the results were disappointing in chorea does not in any way speak against the use of magnesium sulphate in tetanus, in which disease excellent results have been obtained. If chorea is a direct sequel of rheumatism, influenza, scarlatina, or other infections, it is possible that no remedy will be of any avail until the respective toxins have been thoroughly eliminated from the system in each case, and the damage done to the nervous system healed by the natural and gradual processes of repair.

#### METHOD AND TECHNIC OF INJECTION

Five successive patients with chorea from the children's service of Dr. Koplik at Mt. Sinai Hospital were treated by repeated subcutaneous injections of magnesium sulphate. In every case a 25 per cent. sterile solution was used. The dose ranged from 0.01 gm. magnesium sulphate per kilogram of body weight (that is, 0.04 c.c. of the 25 per cent. solution) at the beginning of treatment, with a daily increase to 0.2 gm. magnesium sulphate per kilogram of body weight (that is 0.8 c.c. of the 25 per cent. solution) at the termination of treatment. The actual amounts of solution used daily were from 3 to 30 c.c. The injections were given three times daily for from ten to fifteen days, with the ordinary record syringe, into the back, loins and buttocks of the patients.

#### EFFECT OF TREATMENT

The table gives in brief the important data regarding the cases under observation. In only one of the five patients treated by this method was there a marked improvement after the series of injections, and in this case the choreic movements gradually diminished, the child

became less irritable and general improvement was noted. It is very questionable whether or not the improvement was directly due to the treatment; it is possible that it was purely coincidental and the result of natural processes. In the four other cases there was no improvement, the magnesium sulphate having had apparently no effect whatever on the psychomotor system. In all events the results of the treatment in the small series of cases was not sufficiently promising in my opinion to justify a continuation of the treatment.

DATA OF FIVE PATIENTS TREATED FOR CHOREA BY MAGNESIUM SULPHATE

Name	Age, Yrs.	Duration before Admission, Wk.	Severity	Dose MgSO <sub>4</sub> per Kg. Body Weight, Gm.	Period, Days	Number of Injections	Results
A. L. ....	8	3	Moderate	0.01 to 0.2	11	44	No improvement
I. D. ....	5	2	Severe	0.01 to 0.055	11	40	Slight improvement
B. K. ....	9	5	Moderate	0.02 to 0.2	13	45	No improvement
E. O. ....	10	6	Severe	0.01 to 0.05	11	37	Considerable improvement
E. W. ....	10	1	Mild	0.01 to 0.2	11	44	Slight improvement

\* All the patients were girls.

There are, however, certain decided objections to the use of this method. The quantity of solution used, especially at the termination of treatment, is so large that there is a possibility of an inflammatory reaction, even abscess formation. We did not have any accident of this nature, however, in our cases. Occasionally the patients, especially if very young, are likely to be unduly excited by the treatment itself. Another disadvantage is the possibility of having the needle broken off in the tissues during the administration of the solution, on account of the marked restlessness of the patient. Albuminuria has been reported by several observers after the injection of magnesium sulphate. In our cases albumin was noticed in several instances, but this condition disappeared after a short interval. This treatment, even if effective, would be best employed in hospitals, inasmuch as three or four injections daily by skilled hands would be required.

#### CONCLUSIONS

Subcutaneous injections of magnesium sulphate, though employed in only five cases, did not produce sufficient improvement to justify further trial.

I take this opportunity to thank Dr. L. G. Shapiro, formerly house physician of Mt. Sinai Hospital, for his painstaking assistance in this work.

64 West Eighty-fifth Street.