GRUENING (E.)

ON THE REMOVAL OF

PARTICLES OF STEEL OR IRON

FROM THE

VITREOUS CHAMBER

BY MEANS OF MAGNETS.

BY

EMIL GRUENING, M.D.,

SURGEON NEW YORK EYE AND EAR IMFIRMARY, OPHTHALMIC SURGEON TO THE MT. SINAI AND THE GERMAN HOSPITALS.

Reprinted from THE MEDICAL RECORD, *May* 1, 1880.

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TROW'S PRINTING AND BOOKBINDING CO.,
201-213 EAST TWELFTH STREET.
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The passage of a foreign body into the vitreous chamber is justly regarded as one of the most serious accidents to the eye. Encapsulation or tolerance of the foreign substance is of very rare occurrence, and, in the vast majority of cases, not only is the injured organ lost, but its fellow threatened by sympathetic ophthalmia. Generally speaking, the indications in cases of recent injury, complicated with the lodgment of foreign particles, are, extraction of the body, and this failing, enucleation of the eyeball. Attempts at extraction by means of the instruments ordinarily employed (forceps, scoops, hooks, etc.) have so rarely been successful, that some surgeons disregard the first indication, and proceed at once to enucleate the injured eye. The most recent "Guide to diseases of the eye" (Nettleship) presents the status of the question as follows: "If it is certain that the foreign body has passed into the vitreous, whether through the lens or not, and whether by gunshot or not, it is scarcely ever worth while to attempt to save the eye."

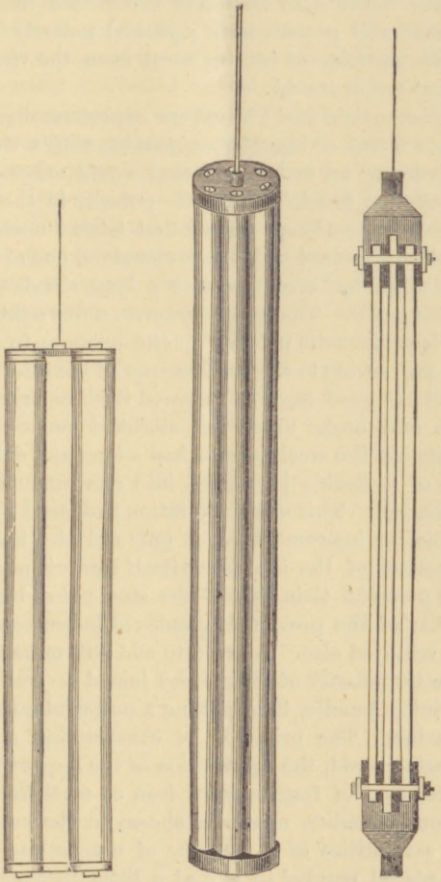
McKeown, of Belfast, was the first to introduce a magnet into the vitreous, for the purpose of extracting therefrom particles of steel or iron. (*British*

Medical Journal, 1874.) Though he succeeded perfectly in removing the foreign body, and in saving the eye, yet his recommendation of the magnet as an extractor did not procure for it a favorable reception. In a subsequent publication (*Dublin Journal of Medical Sciences*, 1876) he reports two additional cases, the one terminating in atrophy of the globe, the other in suppuration. Manz, who made an abstract of the first of these cases (Virchow und Hirsch, *Jahresbericht*, 1875), remarked that although the object of the operation had been accomplished, the body extracted, and the eye but slightly injured, still the magnet employed could not be considered a trustworthy instrument.

The reason, then, why McKeown's method did not receive the favor which it merited, will be found in the circumstance that the particular magnetic instrument used by him was not suitable to the purpose. The magnet is described as being about eight inches long, one inch broad, one line thick, and tapering to a point at both extremities.

In 1879, Hirschberg (*Berliner Klinische Wochenschrift*, No. 46, 1879) successfully removed a piece of iron, 3 mm. long and 2 mm. broad, from the vitreous chamber, by means of an electro-magnet constructed for the purpose. The magnet consisted of a hollow cylinder of malleable iron, the two extremities of which were drawn out into long, fine points, like the branches of an iris forceps. The cylinder was surrounded by a coil which connected with a galvanic battery. Either of the poles of this electro-magnet easily sustained the weight of a small key, and attracted iron chips, 1 to 5 mm. long, at a distance of 1 to 4 mm.

Hirschberg's case excited much interest because it



demonstrated clearly that a magnetic instrument, sufficiently delicate to be safely introduced into the eye, may still possess such powerful polarity as to extract particles of iron or steel from the vitreous without toil or trouble.

For some time past I have been experimenting with various forms of magnetic apparatus with a view of constructing an instrument that would concentrate the greatest possible magnetic polarity in the least possible dimensions. In my first trials I made use of well magnetized solid steel cylinders, one extremity of which had been filed into a long, slender, needle-like point. The latter, however, never exhibited sufficient magnetic polarity for the purpose in question, and, owing to the hard temper of the steel used in making good magnets, showed itself as brittle as glass, and broke upon the slightest provocation. Discarding the steel point, I had a long and delicate piece of malleable iron fitted into one extremity of the magnet. This slight alteration produced a more satisfactory instrument. Not only did the induced magnetism of the iron prove itself (cæteris paribus) more powerful than that of the steel point, but the fragility of the previously employed instrument had been removed also. In order to add still more to the magnetic polarity of the point, I joined several magnets into a bundle, thus making a powerful magnetic magazine. The principle of constructing such a magazine is old, the application of the apparatus for the removal of fragments of iron or steel from the vitreous chamber, new. As shown in the cuts the two extremities of a number of magnetized steel rods placed parallel to, and at a little distance from each other, are fitted into iron caps, one of which is provided with a delicate point of malleable iron, 32

mm. long, 1 mm. wide, and 0.3 mm. thick. This point is powerfully magnetic, sustaining, with ease, a weight of 15 grammes. Chips of iron weighing from 1 to 50 centigrammes, when placed into the vitreous of recently enucleated animal eyes, are attracted toward the point at a distance of 1 to 5 mm., and withdrawn with the greatest facility. The instrument thus perfected *equals* Hirschberg's electro-magnet in efficiency, but *surpasses* it in simplicity of construction, convenience of form, and lowness of price.

The figures represent three different forms of the instrument made for me by the Galvano-Faradic Manufacturing Company, No. 288 4th Avenue, New York.