An Observation of the Effect of EDTA Chelation and Supportive Multivitamin/Trace Mineral Supplementation on Blood Platelet Volume: A Brief Communication

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ABSTRACT: Eighty-five subjects with chronic degenerative disorders were treated with intravenous infusions of disodium ethylene diamine tetraacetic acid (EDTA). These patients were evaluated objectively for individual blood platelet volume before and after EDTA chelation. Each subject had 30 or more treatments over a period of approximately 13 months. Mean platelet volume increased 0.51 femtoliters ($p < 0.001$). Overall, 72 patients (85.0%) had an increased mean platelet volume after EDTA infusions.

Introduction

This study continues a series of papers analyzing the effects of intravenous EDTA therapy (1-12). As far as can be determined this is the first attempt to examine the effect of EDTA upon platelet volume.

Historically, EDTA has been used to treat heavy metal poisoning (13), certain collagen disorders, and digitalis intoxication (14). Many physicians have successfully used EDTA chelation therapy to treat atherosclerotic vascular disease. Primary mechanisms of action focus on stimulation of the parathyroid gland and inhibition of free radical tissue auto-oxidation (13). A complementary mode of action of EDTA in vascular disease is its potential effect on platelets.

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Materials and Methods

Eighty-five patients suffering chronic degenerative disorders, including atherosclerosis, participated in this experiment in a private practice environment. Included were 60 males ranging in age from 32-87 years old (mean 62.5 ± 10.45 years) and 25 females ranging in age from 49-84 years old (mean 64.3 ± 9.36 years). As part of clinical routinue, initially each patient underwent a detailed history, a physical examination, and a comprehensive battery of biochemical tests, including platelet volumes. Venous blood was drawn from the fasting patient with a 21 gauge stainless steel needle with vacutainer, collected in a 6452 purple top tube containing 7.5 mg of freeze dried disodium edetate (15). The tube was then rotated 4 times. Platelets were counted and their volume measured on a Technicon H-1 analyzer. Ten microliters of the EDTA anti-coagulated blood was then mixed with 5 ml. of a sphering agent (16) containing phosphated buffered saline (10 mmol/L phosphate) and 1mg/dL sodium dodecylsulfate. For preservation of the shape, 0.1% glutaraldehyde was added, overall dilution 1:625. Platelet volume was not altered by glutaraldehyde (17). The platelet effluent was then aspirated through a sheath-stream flow cell at a velocity of approximately 1 meter/second. A helium/neon laser with a wave length of 632.8 nm. measured scattered light intensities. The amount of light scattered is related to platelet volume. The theory of scattering electromagnetic radiation has been developed completely for this particular case of homogeneous spheres (Mie scattering) (18). Platelet measurements were determined (17) using a histogram that represents a tranciated mean of the platelet volume (i.e. the mean of the signals of the central 60% of the platelet volume pulse height distribution).

Each subject then received 30 intravenous disodium edetate infusions over a period of approximately 13 months. The dosage was 3 grams of disodium edetate per treatment. After completion of treatment, mean platelet volume was measured again.

Results

The mean platelet volume increased $0.51 \pm .071$ femtoliters ($p < .001$) overall after the series of EDTA infusions (Table 1). In males it increased $0.58 \pm .093$ femtoliters ($p < 0.001$) and in females, $0.31 \pm .091$ femtoliters ($p < 0.050$). In both males and females this increase was statistically significant.

Discussion

It is important to point out why EDTA was used as anticoagulant in this study. It will cause an increase platelet volume by approximately 0.50 femtoliters in vitro (19). This is not peculiar to EDTA since most

TABLE 1

Increases in Platelet Volume After 30 Intravenous Infusions of EDTA Plus Multivitamin Trace Mineral Supportive Therapy

Study Group	Mean Age	Number Patients	Platelet Volume (in Femtoliters) Before EDTA	After EDTA	Femtoliter Increase	t Score
Male	62.5 ± 10.5	60	8.23	8.81	$0.58 \pm .093$	4.570*
Female	64.3 ± 9.4	25	8.56	8.87	$0.31 \pm .091$	3.311**
Total Group	63.0 ± 10.2	85	8.32	8.83	$0.51 \pm .071$	5.501*

*statistically significant to $p < .001$ level
**statistically significant to $p < .050$ level

other anticoagulants also alter the platelet volume by the same order of magnitude (20). Other agents were not considered for two reasons. First, they influenced this determination in the same amount; secondly, the standard protocol of the reference laboratory called for EDTA in the determination (15,18).

Since this technique was used both before and after in vivo chelation, it can be assumed that the increase in platelet volume in vitro would be constant. Hence, any significant change observed after the administration of EDTA in vivo cancels the in vitro effect (Table 1).

The important point is that, irrespective of the in vitro effect, platelet volume increased significantly after EDTA infusion in vivo. Of eighty-five subjects, only 15% (4 females, 9 males) failed to demonstrate an increase in platelet volume after the course of chelation.

It is not clear why platelet volume increased less in females than in males. This may be due to inherent sex differences. Neither is it clear why the platelets of some patients failed to increase in volume at all. Since some patients fail to obtain clinical benefit from the chelation infusion, for unknown reasons, further study of the phenomenon might yield a method by which non responders could be detected.

Platelet coagulant aggregability contributes to the formation of

thrombus and atherosclerotic plaque (21-30). Haerem found that patients dying suddenly from coronary disease had platelet aggregates in several intramyocardial arteries (29,30). Since these patients had no fresh thrombus in their coronary arteries, he suggested that platelet aggregation may explain sudden death (26,29,30).

Van de Schaar (25) found 85-95% of patients dying from acute myocardial infarction had post mortem thrombosis. He also found that platelet modifying drugs had a beneficial effect on the course of atherosclerotic disease. This may suggest that platelet aggregation may play a significant part in the disease process and that sudden death may be more closely related to this than generally supposed.

A principle function of platelets is to repair small defects in the endothelial lining of blood vessels and to suppress hemorrhage by promoting coagulation of blood (31). In cases such as chronic hyperlipidemia, cigarette smoking or excessive circulatory epinepherine, the damaged wall becomes progressively thicker. Calcification may follow and subsequent narrowing might eventually lead to thrombosis or infarction (22,26,27).

Previous studies indicate that platelets change shape after administration of EDTA in vitro (21). They become more rounded with less surface area and exhibit fewer pseudopodia which aid aggregation (21,23). This change is associated with an increase in platelet volume (20,24,32,33).

When other anti-coagulants are added to whole blood, platelets change similarly as with EDTA. Mannucci and Sharp (20) reported that the addition of Cocaine, promethazine hydrochloride, and Reserpine all produced rounder platelets, increase in volume, and inhibition of aggregation on glass. During coagulation, platelet volume appears to decrease. They become large and flat with less endomembrane volume (20,23,34).

Thus, in addition to free radical and parathyroid hormone effects, increasing platelet volume may be a third mechanism by which EDTA helps fight the atherosclerotic process. Further investigation is required.

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Effect of EDTA Chelation on Serum Iron

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ABSTRACT: One hundred and twenty-two patients suffering from various chronic degenerative disorders were evaluated objectively for fasting serum iron values before and after EDTA (ethylenediamine tetracetic acid) chelation plus multivitamin mineral (excluding iron) supplementation. After 30 intravenous 3 gram treatments of EDTA, average serum iron levels dropped 17.5% (t = 4.230, p < 0.001). Abnormally high initial iron decreased 43.1% (t = 7.602, p < 0.001), while low initial iron increased 41% (t = 3.30, p < 0.010).

Introduction

This continues a series of papers analyzing effects of EDTA chelation therapy (1-13). For years EDTA has been used to remove toxic heavy metals in the human body (14-16). This research in particular is studying fasting serum iron values before and after EDTA infusions.

Patients and Methods

Over a period of 17 months, one hundred and twenty-two patients suffering from degenerative disorders participated in this experiment in a private practice environment. Included were 73 males ranging in age from 32-84 years old (with a mean and a standard deviation of 61.5 ± 10.10) and 49 females ranging in age from 39-84 years old (with a mean and a standard deviation of 64.0 ± 10.30).

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