EDTA Chelation In The Treatment of Vascular Disease and Other Chronic Conditions

Epidemiology

Coronary artery disease (CAD) is the most common cause of death in the United States. It is the most common cause of cardiac related disability and is the leading cause of death within the United States with over 500,000 deaths annually attributed to CAD. Of the estimated seven million Americans with symptomatic CAD, 1.5 million will experience a myocardial infarction (MI) every year. In the 1960s, 20% of all patients hospitalized with an MI died. Despite advances in diagnostic and therapeutic modalities, that number has been lowered to 10% mortality. New techniques include coronary angiography, percutaneous transluminal coronary angioplasty (PTCA), and coronary artery bypass grafting. However these procedures are highly invasive, carry a significant risk of morbidity and mortality, are very expensive, and have questionable clinical value in the eyes of some. The final outcome in patients with CAD in the United States and Canada are almost identical even though the patients in the US were 7.8 times more likely to receive either PTCA or CABG than their Canadian counterparts. 42% of all angioplasties stenosis within six months and 25,035 of all post-PTCA patients eventually require additional procedures. Physician re- evaluators in the US and United Kingdom deemed 13-35% of all CABGs inappropriate. CABG also has an average mortality of 4-10% and costs between $30,000 and 50,000 .

Recent publications implicate lead and cadmium in the development of peripheral vascular disease and hypertension (Circulation, 2004). EDTA removes these metals from the vascular tissue. The NEJM published a major article in January 2003 proving a 95% reduction in cost of care for patients with low levels of lead that were treated with 30+ treatments of EDTA chelation. JAMA(March 2003) published an article showing hypertension that develops in patients between 40 and 60 is due to lead from their bones.

Ethyl Diamine Tetraacetic Acid (EDTA) was developed in Europe in the first half of this century for use in industry and water purification. It was found to have particularly good chelation properties especially in regards to the heavy metals, and so it became an inexpensive way to purify drinking water. In the 1940s, US naval physicians began noticing a high incidence of lead poisoning among sailors assigned the duty of painting warships. The physicians used to intravenous (IV) EDTA chelation therapy to remove the lead with excellent results. In the 1950s, physician treating heavy metal toxicity also noticed that their patients with angina pectoris no longer complained of chest pain after a few EDTA treatments, and EDTA chelation therapy became popular in the 1960s as a treatment for coronary and other vascular disease. However, with the advent of evidence based medicine, EDTA therapy lost favor and has been regarded as "alternative medicine" until just recently. However, due to 40 years of positive data, the National Institutes of Health (NIH) is starting a double blind study of patients with coronary artery disease starting in March 2003. Estimates about the numbers of physicians practicing chelation therapy are difficult to obtain because many physicians have been reluctant to make themselves objects of scrutiny.

Etiology

The exact cause of CAD is unknown and the mechanism of action of EDTA in its treatment is unclear. Proponents of chelation therapy feel that the most important agent in the formation of artherolsclerotic plagues are free radicals or unbound circulating charged particles. CAD arises when faulty regulation accelerates oxidative molecular injury, outstripping the bodies ability to heal itself. EDTA may act as a major anti-inflammatory or anti-oxidant agent. Heavy metal replaces selenium and inactivates enzymes needed for day to day cellular processes. Removal of the heavy metal may explain why 8 months after the last treatment, renal blood flow continues to increase in patients treated with EDTA. Remodeling and repair of tissues takes months and years even after the offending agent is removed. Heavy metals bind up the nitric oxide system and cause spasm of the blood vessels in addition to the above free radical system. Improvement of 19% of the diameter of a vessel doubles the amount of flow in that vessel.

Physiology-Pathophysiology

EDTA has multiple mechanisms of action that may reduce plaque formation as well as alleviating existing plaques, and positively affecting cell membrane function. It was originally proposed that EDTA chelates calcium ions from within the arterial plaques thereby reducing their overall physical dimensions. This view has been replaced with more scientific theories concerning oxidative stress. Dietary fats, especially polyunsaturated fats, are the leading sources of pathological free radicals. The unsaturated double-bonds on the polyunsaturated fatty acids combine spontaneously with atmospheric oxygen to create lipid peroxides. The free radicals formed react aggressively with other molecules creating new bonds. Free radicals do this by virtue of their unpaired electron in the outer orbit, and the binding of free radicals to organic molecules within a cell's wall alters the cell wall functions. The cell wall's phospholipids are damaged. Substrate recognition by cell wall enzymes is damaged and the enzymes are unable to distinguish between substrates adequately. Cells walls containing fatty acids, which contain or generate free radicals, alter the cell membrane increasing its fluidity, increasing its permeability, and affecting active transport. Excessive amounts of free radicals alter the magnesium-calcium pump in the cell wall, resulting in increased intracellular calcium. The excessive amount of intracellular calcium can result in coronary artery spasm leading to ischemia, angina and even MI .

Cellular respiration has as a by-product of free radicals. Cellular respiration transfers electrons across mitochondrial membranes. A superoxide radical is produced for each electron transferred. These are normally quickly neutralized by mitochondrial superoxide dismutase (SOD), a manganese containing enzyme. Synthesis of prostaglandins and leukotrienes from unsaturated fatty acids also results in the production of free radicals. Leukocytes and macrophages are potent generators of free radicals. Disease causing organisms are destroyed by free radicals generated from leukocytes and macrophages. Normally, anti-oxidant enzyme production is adequate to control the balance of free radicals. However, a diet high in fats, a genetically impaired enzymatic pathway, or a diet insufficient in enzyme precursors can result in high levels if free radicals.

EDTA can reduce the production of free radicals by an estimated million-fold. EDTA chelation removes heavy metallic ions from the blood stream and body. These heavy metallic

ions when present initiate and support the uncontrolled proliferation of free radicals in living tissue. Concentrations of metallic ions with the ability to catalyze lipid peroxidation are so tiny that even traces remaining in distilled water can initiate reactions. Iron and copper are the most potent catalysts of lipid peroxidation and therefore free radical production. Extracellular iron and copper ions have been shown to cause free radical tissue damage .

Clinical Manifestation, Indications, Contra-indications, and Side Effects

As already mentioned, EDTA chelation is the treatment of choice in heavy metal toxicity. Other primary conditions in which EDTA therapy is indicated are cerebral, peripheral, or coronary vascular disease. Many patients with scleroderma, rheumatoid arthritis, and other autoimmune diseases may benefit. Sometimes healthy persons ask for chelation therapy for preventive medicine. Because chelation removes heavy metals to which most people are exposed, it may be reasonable to treat such patients with EDTA.

Allergy to EDTA, which is rare, is the only absolute contra-indication for EDTA. It can aggravate renal impairment if too much is given or it is given too fast. Patients with a creatinine clearance <30ml/min or a serum creatinine level >2.8 mg/dl should be treated only with low-dose EDTA and only by experienced specialists. Severe liver disease with significant liver enzyme elevation is another contra-indication. EDTA chelation is contra-indicated in pregnancy except in the presence of severe lead toxicity. Some patients have had their congestive heart failure aggravated by EDTA therapy because of the fluids received during IV infusion of the EDTA. These patients must have their fluid status monitored as well as their electrolytes. These patients typically receive an adjustment in the IV fluid infusion rate and a diuretic EDTA.

Potential side effects of sodium EDTA therapy are hypocalcemia with resultant tetany, rarely seizures usually due to too rapid of infusion, nephrotoxicity, local thrombophlebitis, hypotension, and hypoglycemia. Hypocalcemia is easily reversed with calcium infusions. Hypotension is usually mild, and slowing the infusion is usually adequate to prevent any significant problems. Patients typically eat before treatment begins, and since the infusions last 2.5 to 3 hours, they bring a snack. This prevents episodes of hypoglycemia . We use calcium EDTA and those side effects are prevented.

Besides chelating unwanted heavy metals, EDTA also removes several good minerals within the body. Patients usually receive a scheduled infusion of mineral and vitamins every fourth to fifth EDTA treatment, or are given routine oral supplements. Iron supplements should be avoided unless there is a documented iron deficiency.

Management

Before treatment begins the patient is evaluated by the physician providing the treatment. This includes a complete history and physical. Routine laboratory includes CBC, chemistries especially creatinine, and lipid levels. Some physicians also recommend a baseline thyroid function assessment For patients requesting or referred for treatment of CAD, all documentation of their disease is reviewed . Copies of reports for angiography, past surgical

reports, plain X-rays, echocardiograms, and any Doppler studies are reviewed if available. Repeat kidney testing is done every 5-10 treatments.

EDTA dose is calculated and adjusted based on the creatinine. Infusions are typically given 2-3 times per week for a total of 20-30 treatments but can be spread out over a longer time if needed. An infusion runs over the course of 3-4 hours. The IV solution is typically an iso-or hyperosmolar solution to prevent hemolysis or extravascular osmotic fluid shift. Each treatment has added to the EDTA infusion magnesium sulfate to replace that which is chelated and to reduce inflammation. Vitamin C which acts synergistically with EDTA in the chelation, sodium bicarb to buffer the solution. Vitamin B1, B6, B12 supplements, an injectable anesthetic such as Procaine to reduce discomfort, and a small amount of heparin to maintain the patency of the IV.

Conclusion

The debate over chelation continues. Some ascribe almost mythical healing powers to anti-oxidant treatments such as EDTA, IV hydrogen peroxide, and vitamin therapies. Others equate alternative medicine with the snake oil salesman of the nineteenth century. They claim that the quackery of alternative medicine does nothing more than expose a population of patients with serious medical conditions to potentially harmful substances while delaying needed conservative treatments and depleting them financially. Perhaps a middle of the road position is needed. Alternative therapies are not cure-all's and do not replace more conventional modalities. In the case of EDTA, it looks like this once "alternative" treatment is going to become part of the mainstream treatment of chronic diseases and a wonderful preventative for certain populations. The longer we live, the more toxins and heavy metals we have in our tissue and the more they affect our health. Genes point the gun, environment pulls the trigger . It is the removal of these environmental toxins that prevents the genes from having to act and cause disease.

Official Sites for chelation information:

www.ACAM.org -official organization of chelation doctors

www.drcranton.com - Harvard graduate that spearheaded chelation as a medical treatment

Bypassing Bypass by Dr. Cranton – Very educational book on chelation for docs and patients