Signature: Med Sci Monit, 2003; 9(4): HY11-14
PMID: 12709677

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Hypothesis

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Received: 2002.10.27
Accepted: 2003.02.10
Published: 2003.04.23

On reducing the need for arthroplasty: benefits for patients and budgets

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Source of support: Applied Research Institute, a 501(c)(3) non-profit organization

Summary

The need for arthroplasty, especially in the hip, arises primarily because of failure to replace damaged structural proteins as a result of improper balance in essential nutrients. The principal failure is an inadequate production of elastin resulting in cartilage consisting primarily of a collagen that may be flexible but is not elastic. In spite of the fact that an excess of protein, with adequate lysine, is commonly consumed by the affluent societies, this lysine is not utilized because of the inadequate intake of ascorbic acid necessary for virtually every step of the structural protein synthetic reactions. Experiments in animals support these conclusions. It is anticipated that dietary correction in candidates for total hip replacement will be able to restore normal hip cartilage (with corresponding improvements of other structural protein deficits throughout the body) in less than a year. Adoption of this regimen should result in: (1) a greatly decreased need for arthroplasties; and (2) better results in those that are performed, with less failures and less need for revisions. The benefits include much less suffering for patients and far lower medical costs.

key words: **arthroplasty • ascorbic acid • collagen • elastin • lysine • structural proteins • total hip replacement**

Full-text PDF: http://www.MedSciMonit.com/pub/vol_9/no_4/3238.pdf

Word count: 2282
Tables: –
Figures: –
References: 33

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Background

It is obvious that surgery can save life and improve its quality in many circumstances. For years, surgeons have expressed much interest in factors that could facilitate wound strength, healing rapidity, and freedom from infection. All three of these conditions are strongly influenced by ascorbic acid (AA). Yet, there has been little interest shown by medicine as a whole in the fact that patient AA is commonly low at surgery and falls precipitously in surgery or other stress [1–3]. Hume reported the dangerous fall of white blood cell (WBC) AA to scorbutic levels within 12 hours after heart attack in 31 consecutive patients [3]. Similarly, AA decreases by half 12 hr post-operatively [4]. The WHO June 2000 report tabulation of health levels showed very poor scores in advanced nations using the US health care system; among the 191 UN member states, the US ranked 72nd and New Zealand 80th [5]. Unequivocal analyses [1, 6,7] argue that the high morbidity and mortality represented by these rankings are due to: 1) the misconception that AA is a vitamin; and 2) the high blood sugar levels accepted as normal in affluent societies today. In many circumstances, the need for surgery simply results from a failure of medicine. Although total hip replacement (THR) is considered a highly successful and cost effective form of surgery, we estimate that the dietary correction proposed here would be considerably less than 10% of the cost of surgery it prevents. The savings could, for example, be better used in other areas of surgery or clinical medicine. It should be noted that a recent study of outcome in 332 elderly hip fracture patients (mean age 80) reported THR was not found to be a satisfactory solution at 1 year post-discharge ($p=0.02$) [8].

Proposed therapeutic regimen

Although much of the following discussion refers to THR, the general nature of the remarks applies to many other arthroplasties as well. In a person with 'optimum' (or 'the best of') health as defined by the Nobel laureates Linus Pauling and Albert Szent-Gyorgyi, the intake of AA, lysine and other nutrients is adequate to maintain youthful flexibility and elasticity of the structural proteins by continuous replacement of collagen and elastin [1,9]. In disease states, defective biosynthesis of these proteins occurs. For example, in human abdominal aortic aneurysms, significantly fewer elastin cross-links (i.e, the lysine-containing desmosines and isodesmosines) are present compared to controls [10]. Moreover, hyper-crosslinked collagen accumulates rather than being replaced. For persons who experience joint pain leading to prosthetic surgery of the hip, the commonly held belief has been that the cartilage is 'wearing away' and surgery (at a cost of circa $150,000) is the only recourse. We propose here that replacement of hips and other joints may be readily avoidable in most cases by possibly no more than one year of dietary correction (at a cost of a few dollars per day) designed to stimulate renewal and growth of structural proteins throughout the body. We have designed this regimen for correction of orthopedic lesions (by reversing structural protein damage [11]) as an extension of a method first developed by Pauling for relief of angina [2]. Although our formula is not commercially available at this time, the Pauling formula can be used for orthopedic problems (www.Paulingtherapy.com).

THR candidates are elderly joint-pain patients who have not been able on the traditional diet to maintain youthful flexibility and elasticity of their structural proteins, by replacement of damaged tissues with newly synthesized. Using the proposed therapeutic regimen, the newly made proteins will have youthful qualities of strength, flexibility and elasticity due to the high production of collagen and elastin with more desmosine than would have been present at lower levels of AA and lysine. In addition, higher AA levels increase cellular immunity resulting in more resistance to infection [1,7]. As a result, there will be less failures due to septic as well as aseptic osteolytic dissolution.

Details of dietary correction

Protein intake and amino acid balances need to be considered. Total amount of protein consumed by all humans should be adequate for all maintenance and repair needs, but not in such excess that stress would be placed on the kidney, liver, etc [12]. Sufficient amounts of amino acids, as well as, the correct proportions of all are required, especially the essential amino acids. If 'complete proteins' (usually from animal sources and containing all the essential amino acids) are not consumed, appropriate complementary proteins that provide the correct proportions must be obtained (i.e, corn with beans, etc). Certain amino acids such as lysine are particularly important. Lysine is an essential amino acid for all mammals and is required for healthy growth, tissue repair, and strengthening immunity. It is an important component of collagen, the most plentiful protein in the body. The structural protein elastin is particularly rich in lysine and provides elasticity in the normal hip that is lacking in the THR candidate patient. Also, this lack of elasticity has been shown clearly in patients with: 1) aneurysms [10]; and, 2) heart attack [3,13]. Four molecules of lysine combine to form desmosine, the specialized linkage that enables the elastic net-like properties of elastin [9]. High AA levels are needed to support the hydroxylation requirements in conversion of proline and lysine to their hydroxy derivatives for the synthesis of the structural proteins. Loss of the youthful properties of structural proteins is exaggerated in the THR candidate and is a primary mechanism of aging [11].

The minimum daily dietary lysine requirement for adult humans is about ~1 g/day. Animal-derived protein foods contain on average about 50 mg lysine per gram of protein. Thus, the typical US, non-vegetarian diet, that provides more than 1 g protein/kg of body weight, yields ~3.5 g lysine daily for a 70 kg person. Although this quantity is well above the minimum requirement, it may be less than the optimum amount, especially for persons with any condition that requires replacement or repair of large amounts of structural proteins; supplementing to total intake of 6 g lysine per day has been suggested and used [2].

A number of animal and human studies suggest that very few humans have sufficient intakes of AA and lysine to maintain youthful elasticity and flexibility of structural proteins. Depending upon a number of factors, lysine intake can be too low or can be increased to optimize health but at higher levels exerts serious toxicity [12,14,15]. Some people have excess lysine intakes which are not properly utilized primarily due to inadequate levels of other essential nutrients including AA, vitamin E, etc. In addition, many elderly patients have impaired liver and or kidney function that prevents them from taking lysine at the levels they need and which must be addressed before lysine intake is increased.

A vitamin is an essential constituent of the diet required in only minute amounts for optimum health. Pauling [1] and others have reported that several grams (over ten in many people) a day of AA are absolutely necessary for numerous aspects of optimum health in humans. The confusion over AA's non-vitamin nature has been prolonged by continued use of the misnomer 'Vitamin C' for communication convenience by those who know better (even Pauling). There are about 4000 mammals that synthesize AA, on average circa 50 mg/kg body weight daily or about 4 g/day (normalized to 70 kg human). This amount has been found to be essential for optimum health [1,2,7,16]. When in stress (e.g, pain, fear, disease, etc.), the needs and synthesis are far higher (~100 fold!) [17]. Such mammals, often called 'normal', were here on earth long before humans. It is important to note that, in the wild state, the normal mammals do not get scurvy and do not consume a refined diet (i.e, their free sugar intake is very low). In evolution, they developed and used AA as an important endogenous molecule that is necessary in such large quantities for essentially all systems and functions. In addition to enhancing replacement and maintenance of structural proteins, AA enables all normal mammals to resist most diseases, intoxications, and other disorders of humans including tuberculosis, polio, etc. In the human body, there are thought to be about 50,000 different kinds of enzymes, a large number of which are influenced by AA [1]. As AA levels fall, many enzyme systems fail, disorganizing numerous physiologic functions [18]. Unfortunately, the ability of humans to synthesize AA like normal mammals (copiously in the liver) was lost in evolution about 25 million years ago [1]. However, the human need for AA is still the same as that of the normal mammals. When this need is met and their blood sugar is maintained at a low level as described later, humans are also protected. Many reports demonstrate that high AA is required for optimum or 'full health' as defined to be 'the greatest resistance to disease' by Albert Szent-Gyorgyi, the Nobel Prize winner who first isolated AA [19]. He also said AA was not a vitamin, and 'The medical profession itself took a very narrow and wrong view. Lack of ascorbic acid caused scurvy, so if there was no scurvy there was no lack of ascorbic acid.' [19]. Linus Pauling, the only holder of two unshared Nobel Prizes explained at great length why AA is not a vitamin [1]. He also estimated that most people get only 2% of the AA necessary for full health [19].

Klenner [4] cites references from 1937 onward [20,21], that it was known that post operative AA was necessary for healing wound tensile strength, resistance to infection and elimination of most post-operative deaths. In the human many AA functions (ie, the renal thresholds for AA, etc) are the same as in normal mammals; thus, one realizes the system 'expects' the adrenal response to infective or trauma stress to be supported by AA synthesis from the liver which does not occur in humans. This leaves every sick or surgical patient in cell mediated immune anergy (WBC suppression). After myocardial infarction, AA falls in serum and WBC and can remain low for months, reflecting tissue depletion unless corrected by AA supplements [13]. Klenner [4] found that without post-operative AA: (1) by 6 hours, the plasma AA fell 1/4; (2) by 12 hours was down to 1/2; and (3) at 24 hours was 3/4 lower than at surgery. Klenner [4] encouraged patients to take oral AA 10 g/d for weeks prior to elective surgery and suggested surgeons use AA freely in fluids. His clinical wisdom is also apparent in an example demonstrating the safety and efficacy of high AA doses in an 'incurable' case: he had assisted on an abdominal exploratory surgery for an apparently scorbutic patient with numerous intestinal adhesions of her friable tissue. After repairing ~20 tears, the surgeon closed the cavity as hopeless. In post-operative care Klenner gave the patient 2 g AA every 2 hours for 2 days, and then 4 times/day; the patient was ambulatory in 36 hours, was discharged well in 7 days and outlived the surgeon by many years. Other essential nutrients are also important in surgical patients. For example, among his many findings, Ochsner [22] showed that E is a safe prophylactic in all surgery patients, preventing venous thrombosis without producing a hemorrhagic tendency (as anticoagulant drugs tend to do). He used 100 IU alpha-tocopherol tid until patients were ambulatory.

Successes of AA in clinical trials against colds and cancer in the 1960's and 70's were falsely compromised by the high blood glucose levels accepted as normal in developed nations [6,23–27]. Until the 1900's, the *low-sugar*, whole-grain, unrefined diet produced 2-hour postprandial blood glucose values of 50–90 mg/deciliter. These are still seen where the primitive diet prevails [28] and are approximately half the glycemic levels typical of affluence today [27]. Although it was not understood at that time, it is now known how and why the cold and cancer trials failed: briefly, hyperglycemia opposes AA because glucose competitively inhibits the insulin mediated active transport of AA against the high gradient (AA in cells is ~50 times the plasma level in health [17]). The inability to raise intracellular AA to optimum levels compromises all biochemical processes [29]. We have seen no definitive research on dietary modification by persons in the age range of most THR candidates. And, the studies that have been done utilized animals that were AA synthesizers.

Benefits of the regimen

The WHO Report cited above [5] reflects great economic strain and poor quality of life even in US and New Zealand as well as in developing countries. Need for

THR is expected to increase greatly by 2020 in many countries, for example by almost 50% in Holland [30]. The number of THR's performed annually in the US had risen to 120,000 in 1994, a 64% increase over 1982 [31]. Only 5 years later in 1999, the US annual THR total had reached nearly 270,000 [32]. If there is a reduction of only two-thirds in the 2002 US THR surgeries estimated at 300,000, we forecast a saving of over $20 billion per year (that can be spent more effectively in other areas of surgery or clinical medicine, raising quality of life for the elderly and improving the present very low WHO ranking cited above for health quality in the US and other countries using its medical system) and annual prevention of the painful experience and disability in over 200,000 US former candidate patients.

CONCLUSIONS

In his review, Bland [33] suggested that osteoarthrosis could be reversed. We hypothesize that by use of our dietary therapy: 1) most THR (and other arthroplasty) may be eliminated; 2) need for revision of existing THR may be lessened or spared; and 3) future unavoidable arthroplasties may have much lower failure rates.

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NOTE:

For reader convenience, full text of limited-availability references [2], [4], [6], [7], [19], [26] and [27] can be found at:
http://faculty.washington.edu/ely/msmrefs.html

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