The Effect Of Vitamin C On Third Molar Surgery

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A study was performed in an effort to judge if therapeutic doses of Vitamin C would have any effect on clinical healing in third molar surgery. An approximate 4% reduction in poor healing in the Vitamin C group does not appear to justify its use as a routine in this type of oral surgery.

There is probably no other pharmacological material that has caused more controversy in the past few years than Vitamin C (ascorbic acid). Recommendations for its use include the control or treatment of the common cold[15], improving arthritic conditions[5,17], the slowing of aging[5], lowering cholesterol levels[14,18], reducing arterial plaque in atherosclerosis[9], and increasing athletic performance[1]. A subclinical deficiency is also implicated in the development of carcinoma[5,20].

This is a preliminary project prepared in an attempt to evaluate recommended theraputic doses of Vitamin C and its relationship in the healing of impacted third molar operative sites.

Materials and Methods

Patients were chosen at random in regard to sex, race, etc. This study was limited to those patients who had partial to full bony impacted third molars, between 17 and 25 years of age. The results of the study were limited to the healing of the lower third molar surgical site.

Armamentarium consisted of standard oral surgery and anesthesia equipment, but was limited to office oral surgery. Anesthesia type was of the intraveinous variety and was standardized to include intraveinous valium, nisentil, brevital, and regional block anesthesia with xylocaine 2% (1/100.000 epinephrine).

Patients were grouped according to those receiving Vitamin C and those given a placebo. All patients received steroids and antibiotic coverage.

Cevi-Bid 500 mg. tablets[6] was the Vitamin C of choice for reasons to be discussed later. The dose of Cevi-Bid was based on the following protocol:

a. Cevi-Bid was begun one to two days prior to surgery[4].
b. Two capsules (1 gm.) were given pre-operatively b.i.d. for at least two weeks[2].
c. Those patients who demonstrated unusual anxiety or stress related to the procedure to be undertaken received increased dosages of one to two times.
d. Those patients who smoke cigarettes had their dosages of Cevi-Bid increased by 1 gm./day for every pack of cigarettes smoked[11].

It must be understood that results of the study were based purely on clinical evaluation. By the nature of studies on patients in an oral surgery practice, post operative histological evaluation is not possible. Interpretation of all results must take this fact into consideration. Post-operative edema was evaluated by post-operative phone conversations with patients and clinical evaluation six days after surgery. Questions were asked to delineate the size and area of edema and the amount of time necessary for resolution. An evaluation of pain during the healing period was also illicited from the patient by direct communication one day post-operative and an interview at the six day period.

As much effort as possible was made to standardize these results. Therefore, detailed questioning was performed in an attempt to illicit:

a. whether the analgesic was effective
b. how often the analgesic had to be taken
c. was the patient able to sleep through the night
d. whether the patient had sharp or dull pain, etc.

The evaluation of pain was on the basis of:

a. that which would be expected
b. that which was greater than expected or
c. that which was less than expected, for the procedures performed.

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Review Of Literature

A brief historical review of the literature would serve to place this paper into proper context. It must be taken into account, however, that there have been no specific studies performed on oral surgery patients, and no significant research developments until the last five or six years.

Classically the only indication for the use of Vitamin C was in the prevention and treatment of Scurvy[7,11]. This disease is characterized by abnormalities in connective tissue, capillaries, and bone. Red, raw, bleeding gums might be the most obvious sign to the dentist. This was recognized as early as 1720 by Kramer, who observed that while medication gave no relief for this condition that

> "if you can get green vegetables, if you can prepare sufficient quantity of antiscorbutic juices, if you have oranges, lemons, citrons, or their pulp and juice preserved with whey in cask, so that you make lemonade, or rather give to the quantity of three or four ounces of their juice in whey, you will, without other assistance, cure this dreadful evil."

This was confirmed by Lind in 1757 who showed experimentally in human subjects that lemons could prevent the onset of this disease. In 1804, it became compulsory in Britain to issue a daily ration of lemon or lime juice to all British sailors. This led to the almost complete irradication of Scurvy in the British Navy, and to this date the nickname "Limeys" is applied to the British sailors[7]. Holst and Frolich in 1907 developed the ability to assay the biological levels of the vitamin, thus greatly improving the studies and the ability to research the subject. It was not until 1932, however, that King and Waugh[12] succeded in isolating a crystalline compound from lemon juice.

One of the greatest disputes regarding the properties of Vitamin C takes place regarding its pharmalogical action.

> "Administration of the compound in the amounts greatly in excess of physiological requirements cause no demonstrable effect.[7]."

In the scorbutic individual, however, the administration of Vitamin C leads to a rapid alleviation of symptoms.

> "If you were to ask a physician . . . the reply in many cases will be . . . that Scurvy is a very rare disease in this country and that he hasn't seen a case in years, despite the fact that a form of Scurvy is our most wide spread disease . . . Nearly every sick patient who seeks treatment from this or (any other) doctor is also suffering a very severe case of chronic subclinical Scurvy, in addition to the ailment that prompted the visit. The medical schools fail to teach the Doctors how to recognize the relevantly asymptomatic early stages of the chronic genetic malady"[20].

Physiologically, ascorbic acid and dehydro-ascorbic acid form a readily reversible oxidation reduction system. Both are equally effective as antiscorbutic agents. They play an important roll in cellular respiration. Not only do they act as enzyme systems with the body, they take direct part in metabolism of some amino acids. Ascorbic acid is also involved in carbohydrate metabolism as well as affecting the function of the adrenal cortex.

It has been documented that scorbutic animals exhibit hyperglycemia that is resistant to insulin therapy. Ascorbic acid may function to prevent the oxidation of epinephrine, since following stress the increased secretion of steriods is associated with the rapid decrease in adrenal Vitamin C level[7,10,13].

The symptoms of Vitamin C deficiency (Scurvy) are open to debate. The classic symptoms are as follows:

a. lesions in the growing bones at the epidiaphyseal junction
b. hemmorrhage
c. gingival inflammation
d. loss of intercellular ground substance
e. damage to the alveolar bone with loss of trabeculation, etc.[11]

There are those, however, who believe that subclinical scurvy develops during stress, infection, and acute or chronic disease states such as cancer, leukemia, and severe trauma. They feel that these subclinical states are greatly responsible for the susceptibility to viral, bacterial, and other systemic disease developments. It has been reported that decreased levels in leukocytes and platelets exist in those individuals taking oral contraceptives, and decreased levels in serum cholesterol in those individuals taking vitamin C[14,20]. Dr. C. R. Spittel[19] states that while Vitamin C is being given the cholesterol is directed away from the arteries. It also acts on other components of fats, such as the beta lipoproteins, enhancing the activity of lipoprotein lipase. The total triglyceride level is brought down, controling those factors which lead toward Atherosclerosis. It is also necessary for the maturation of collagen and its increase in tensile strength. It is this fact that is extremely important to this study[8,3].

Ascorbic acid is absorbed in the intestinal tract. If abnormalities are present, such as inflammation or diarrhea, the amount of absorption may be affected. After absorption, concentrations can be found within the plasma as well as certain cells (specifically leukocytes and platelets). The highest concentration in body tissues is found in muscle and stored fat. It is partially destroyed and partially excreted by the kidney in large amounts only when plasma levels exceed this threshold (which is approximately 1.4 mg)[7]. Although there is some variation in renal threshold[13], the use of very large broadside dosages of Vitamin C does not seem justified, since the blood level is rapidly increased, the renal threshold is reached, and a high percentage is lost. Furthermore, the body can only utilize this vitamin for a relatively short time. Repeated doses at very short intervals are necessary to maintain tissue saturation. This is extremely important to those individuals who feel that many cases of subclinical scurvy exists.

Results

(see Table 1)

There were 80 cases studied who had received Vitamin C as previously mentioned. There were approximately the same number of cases without Vitamin C.

1. Of the 80 cases, 51 cases had healing as would be expected at the six to seven day post-operative mark.
2. Twenty nine cases had healing that would be better than clinically expected at the six day post-operative mark.
3. Of all 80 cases there was **not one case** of abnormally slow healing.
4. Three cases of post-operative infection had developed in both groups. This occurred three to four weeks after surgery. This was easily controlled with proper drainage and antibiotics.
5. In three patients, two separate identical surgical cases were performed, one with and one without Vitamin C. There was no discernable clinical difference in pain, edema, or healing.
6. There was no clinical difference (in those patients who were taking Vitamin C) with regard to healing in those patients who did or did not smoke.
7. There was no difference in healing (with regard to anxiety level) in those patients who either were very relaxed or extremely anxious before surgery.
8. Of 80 cases with Vitamin C, 42 had less pain than expected, 12 had more pain than expected, and the balance had pain as expected (patient report). These numbers were almost identical in the control group.
9. Of 80 cases with Vitamin C, 64 had less edema than expected, 10 had no edema, and 6 had edema as expected or greater.
10. At the end of the three week period, there was **no clinical difference** in the healing in either group.

It is most important to note that in approximately 70 patients who did not receive Vitamin C, the number of cases that had healing that would be better or equal to that expected, was almost identical. Comparison of pain was also very similar. There appeared to be no difference in the percentage figures between average or above average healing in those cases who did or did not take Vitamin C. There were **three cases** of below normal healing in the 70 patients without Vitamin C. This is the **only** major difference in the two groups.

	Vitamin C Group (80)	Control (Placebo) Group (70)
Healing as expected	51 (63.8%)	43 (61.4%)
Healing better than expected	29 (36.3%)	24 (34.3%)
Healing worse than expected	1 (1%)	3 (4.2%)
Post-op infection	3 (3.75%)	3 (4.3%)
Pain as expected	16 (20%)	16 (22.9%)
Pain less than expected	42 (52.5%)	34 (48.6%)
Pain greater that expected	12 (15%)	10 (14.6%)
Edema as expected or greater	6 (7.5%)	6 (8.6%)
Edema less than expected	64 (80%)	56 (80%)
No Edema	10 (12.5%)	8 (11.4%)

Discussion

Since repeated doses are needed over a short period to maintain saturation (blood level is rapidly reduced by kidney), it would be more logical to spread out over a period of time the release of Vitamin C from the intestinal tract. In Cevi-Bid*, the dosage release problem is answered by the releasing of the medication by diffusion instead of disintegration. The company encloses the Vitamin C in microscopic shell of semipermeable material, and at the precisely controlled rate, they absorb the water from the GI tract. The cells then swell with an accompanying increase in permeability. These two effects (the decrease in concentration of the drug within the cell and the increase in permeability of the membrane) act together so the rate of release can be maintained at a steady, predictable rate. When taken one capsule b.i.d., blood levels varied between 1.9 and 1.20mg%. When a standard Vitamin C tablet of the same dosage was taken, blood levels varied between .26 and .4mg%[16].

It appears from the results of this study that ascorbic acid has no affect on the presence or absence of edema, pain, or the clinical healing process at the end of the seven day period in impacted third molar surgery. Realizing the difference in the individual nature, health of the patients, the difficulty of the surgery, and the interpretation of the results, the only valid difference noted was the apparent reduction in clinically poor healing, or below average healing, of slightly greater that 4% of the patients in the study. There were no notable clinical side effects in those patients that received Vitamin C or in the control group. Although one patient did develop urticaria, this appeared to be an anxiety related reaction. The ratio of one to two in above average versus average clinical healing did not differ in the Vitamin C or the control group. Smoking and anxiety were all taken into consideration in the dose given. We are making assumptions that the dosages were correct, that the patients gave us a true medical history, and the patient followed post-operative instructions in taking the medications. There was also no difference in the number of post-operative infections in either the Vitamin C or the control group.

Conclusions

Based on the results of this study, the following recommendations and suggestions can be made:

1. For the great majority of patients there did not appear to be any difference in the final result.
2. A small percentage (4%) appeared to be affected in a negative way without vitamin C.
3. It is difficult for this author to justify the use of large doses of Vitamin C to affect (4%) of the patients.

If one could project which patients would be in that one in twenty, administration of the vitamin would seem justified to this group of patients. In reviewing records, there did not seem to be any way that this could be determined pre-operatively. Ascorbic acid blood levels could be determined in serum and leukocytes in the patients before surgery, or a previous history of poor or slow healing after surgery may be a clue. Another study of this nature might gain us more information. It is obvious that further insight and research must be done in this area before recommendations to include this in our armamentarium could be undertaken.

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