The Effectiveness of Alpha-Tocopherol (Vitamin E) in Reducing the Incidence of Spherical Contracture around Breast Implants

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Vitamin E is the name given to a series of related tocopherols that have analogous biological effects. Based on the findings of Lucy and Dingle,[9] vitamin E is a known lysosomal stabilizer, which would place it in the group of anti-inflammatory compounds, such as glucocorticoids and aspirin.[1,6,8,16] It is also a biological antioxidant that prevents peroxides from accumulating and protects cells from the damaging effects of free radicals, as well as ensuring the stability and integrity of biological membranes.[10,14,17] Lysosomal labilizing compounds such as vitamin A stimulate collagen synthesis and repair and will negate the anti-inflammatory effect of vitamin E when glucocorticoids are administered concurrently.[1,2,5,10,11]

It has long been known that glucocorticoids and aspirin inhibit healing.[6,9] Wounds treated with glucocorticoids contain fewer fibroblasts than do untreated controlled wounds.[14] The severity of this effect is related to dose and time sequence. Sandberg[15] demonstrated that cortisone administered after the second day following injury did not retard healing, as measured by collagen accumulation and wound strength. Thus the effects of glucocorticoids are diminished after inflammation has become established. These findings lend further support to the idea that lysosomal stabilizers inhibit inflammatory response with ensuing collagen synthesis and repair.

In 1971, Ehrlich et al. reported the findings of a study they designed to test the hypothesis that anti-inflammatory agents that stabilize lysosomes will inhibit collagen synthesis.[3] It is of interest to note that the study utilized silicone disks that were implanted in rats. The conclusions of the study confirmed that corticoids and vitamin E each significantly retarded collagen synthesis and tensile strength of the wounds. Vitamin E, when administered concurrently with the glucocorticoids, did not alter the corticoid effect. However, vitamin A administered concurrently reversed the retarding effect of both vitamin E and cortisone on collagen synthesis. The study concluded that the administration of vitamin E inhibited the inflammatory response to wounding, reduced the number of fibroblasts present, and retarded the accumulation of collagen. The responses were identical for vitamin E and glucocorticoid administration.[3] However, Peters et al. recently reported that the administration of vitamin E caused inhibition of inflammatory response during the first 2 weeks following surgical wounding in rats. Despite the early inhibition of inflammatory response, cellular infiltrate and fibroplasia appeared to increase at 3 months and did not prevent intraprosthetic pressure increases in the rats. It must be kept in mind, however, that this was a test animal as opposed to human model.[13] Clinically, vitamin E has been utilized by urologists for the treatment of Peyronie's disease.[12]

Based on this work, it was felt that the early administration of vitamin E may play a role in reducing the incidence of fibrous capsular contracture following breast augmentation, since the onset of contracture[4] occurs most frequently during the first 6 months following surgery (Table I).

Materials and Methods

To evaluate its effectiveness, two groups of 100 consecutive breast augmentation patients were

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TABLE I
Onset of Capsular Contracture in 1282 Breast Augmentations

Time of Onset	Number of Cases	Percentage of Contracture
0–6 months	215	62
6–12 months	104	30
More than 6 months	28	8
Total	347	100

selected for analysis. A minimum of 1-year follow-up was utilized for evaluating contracture in all patients.

Gel implants were utilized in all patients and 40 mg Kenalog was placed in each pocket at the time of surgery. Breast massage was begun on the third day after surgery and continued daily thereafter.

Group 1 received no vitamin E, and group 2 received 1000 IU alpha-tocopherol, b.i.d., which was begun 1 week before surgery. The Baker classification for severity of capsular contracture was utilized in evaluation of the patients (Table II).

Results

The 100 patients in group 1 who received no vitamin E developed a 30 percent contracture rate; 56 percent were grade II; 39 percent were Grade III, and 5 percent were grade IV (Table III).

The patients in group 2 receiving 1000 IU vitamin E, b.i.d., begun 1 week before surgery developed a contracture rate of 19 percent, with an increase in the less severe types, grade II and III (Table IV). The patients who developed the most severe contractures, grade IV, were the same for both groups.

TABLE II
Baker Classification of Capsular Contracture

Grade I	Absolutely natural—No one could tell that the breast was augmented.
Grade II	Minimal—One can tell that surgery was performed, but the patient has no complaint.
Grade III	Moderate—The patient feels some firmness.
Grade IV	Severe—The implant is obvious just from observation.

TABLE III
Group 1 (without Vitamin E)

Total number of contractures	30%
Grade II	56%
Grade III	39%
Grade IV	5%

TABLE IV
Group 2 (with Vitamin E)

Total number of contractures	19%
Grade II	63%
Grade III	32%
Grade IV	5%

The null hypothesis was utilized for statistical evaluation. A level of 0.05 (level of significance) was chosen for the testing. At this level there was a significant difference between the treated and untreated groups with regard to the reduction of the total number of contractures. (For comparison of the proportions that had contractures in the two groups in order to determine if there was a significant difference, the hypothesis testing procedure was felt to be the best method available. A chi-square, goodness-of-fit test yields comparable results.)

Discussion

In treating patients who develop capsular contracture, at the first sign of firmness, the "squeeze" closed capsulotomy is performed and the dosage of vitamin E is increased to 1000 IU, q.i.d. If softness is maintained for 6 months, the patients may return to the b.i.d. dosage. If softness is not maintained or the squeeze technique is ineffective, patients continue on 1000 IU, q.i.d., until improvement can be obtained. If no improvement is noted after 6 months, surgical capsulotomy is offered as an alternative to contracture.

In those patients taking vitamin E, the squeeze technique was usually easier to perform and a better result was obtained. However, 10 percent of the patients still remained resistant to any improvement.

Summary

Vitamin E appears to be a safe, simple, and inexpensive means of reducing the number of postoperative capsular contractures following breast augmentation. The synthetic form of vitamin E (alpha-tocopherol) is recommended to avoid nausea or skin eruptions in patients with oily skin, which are frequently encountered when the natural form is taken. No harmful side effects have been noted in any of the patients to date.

Vitamin E has no effect on coagulation systems and does not cause excessive bleeding either during or after surgery.[7]

The recommended dosage of synthetic vitamin E is 1000 IU, b.i.d., for 2 years beginning 1 week before surgery. If no contracture exists at that

time, the dosage may be reduced to 1000 IU daily thereafter.

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