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Application of Bromelain and Proteases in Otolaryngology Practice

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Introduction

Bromelain is a proteolytic enzyme from pineapple and pineapple stems. The purpose of this report is to discuss my experience using these products in my Otolaryngology practice.

The application of Bromelain in ENT can be significant due to its properties:

- Reduces pain
- Anti-inflammatory effect
- Reduction of swelling
- Increases absorption of drugs
- Use in trauma
- Application to Eustachian tube blockage
- Application to Sinus Blockage
- Reduction of thickness of mucus

My personal experience with Bromelain began with the protease Papain which was available as a buccal tablet. Papain is an enzyme extracted from papaya. Culturally, natives wrap papaya leaves around wounds. I found Papain easy to use for reducing many forms of swelling and ear blockage.

When the buccal Papain was no longer available, I had to have a combination of Bromelain, Protease and Papain compounded for me for buccal use [1-3].

The peer reviewed double blind studies are noticeably missing here. Bromelain is an Herbal Remedy used by herbalist, naturopaths, etc. It is OTC, inexpensive and easily produced. Since it cannot be patented, there haven't been funds available for peer reviewed evaluations. In addition, sometimes outlandish claims have been made by some producers that prompted governments to close those companies. I hope, by this recount of my personal experience, these barriers can be overcome.

Eustachian Tube Obstruction (ETO)

As an advanced scuba diver, I have taken courses in scuba medicine. Eustachian blockage is the primary reason why many persons are unable to scuba dive. By coincidence, my office at that time was a short distance from Los Angeles International Airport. This location funneled pilots, fliers and divers to my office, primarily with ear complaints. The experience of 25 years of daily use of Bromelain, certainly indicates the value of Bromelain for Eustachian Tube Obstruction.

For persons with a history of difficulty in clearing their ear for diving or altitude changes, the nasopharynx is examined as well as the nose and sinus openings. In the absence of obstructive pathology, there patients were placed on the Bromelain/Papain combination. Because there were few failures, this method of treatment has been a cornerstone of my therapy. Because there are essentially no side effects, patients take a full day's medication the day before they dive or fly and continue them during the dive excursion. This product is safe to use in deep dives where the pressure may be 4x that of the ground atmosphere, as well as in altitude changes.

There are various procedures available used for dilatation of the eustachian tube. Since Bromelain is available and has been shown to be effective for ETO, it would be valuable to do a trial of Bromelain to test its ability to clear the blockage. Perhaps using Bromelain would make surgery unnecessary.

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Side Effects

Regarding side effects

Patients who are allergic to pineapple, do show allergy to Bromelain. Approximately 4% of patients find the buccal route irritating. They are switched to taking it via oral route with water before meals. It is important to emphasize buccal route and not sublingual. Sublingual tissue is too thin to administer such a strong enzyme [4].

Vacuum sinusitis

I have treated persons who land at the airport and have severe pain in the sinus areas. These patients are seen as an emergency, since the pain is severe. The sinus openings are vasoconstricted with packs, and then the patients are maintained on the Bromelain/Papain combination.

Sinusitis

Several references listed here are of studies showing increased permeability of tissue to antibiotics using Bromelain. In sinusitis, the period of duration of antibiotic therapy is longer than for bronchitis because the antibiotic must reach areas of bacteria with poor vascular access, such as a 3ml pool of infected material in the maxillary sinus. Therefore, I often add the Bromelain to the therapy in difficult cases.

The property of Bromelain to shrink swollen tissues, is of particular benefit in Sinusitis, and may even improve sinus cavity blockage, as it does the Eustachian tube [5-9].

Post trauma swelling

The ENT doctor sees traumatic injuries all the time. Speed at reduction of this swelling is needed. The following reports have studied the actions of Bromelain on trauma, and are fair indications for its use. With the added benefits of low cost and minimal side effects, I would recommend using Bromelain for trauma. In one study, boxers were placed on Bromelain with measured reduction of post trauma swelling and hematoma [7,10,11].

The Uvula

When the uvula is swollen, whether from trauma, allergy or infection, the patient's symptoms are severe, including difficulty of swallowing, sensation of air blockage, and pain. Because the action of bromelain is to reduce swelling, this has been my therapy for such cases, in addition to systemic medications and corticosteroids.

Adenoidectomy

One of the primary reasons for adenoid surgery is eustachian blockage and recurrent middle ear infections. However, there are certain patients where surgery might be avoided. Or, the parents are set against any surgery, and insist on some other approach. I have placed these children on Bromelain in order to attempt to shrink the inflammatory aspect of the adenoids. I cannot say what % of these cases were successful, but it remains an avenue to consider.

Debridement of Burns and Wounds

Literature here is well documented and certainly should be considered in such cases. The studies include laboratory experimental studies, as well as actual patient debridement in wounds, burns, and tissue traumas. It is also used topically in a cream – 35% in a suitable base [12-15].

Temporomandibular Joint Disorders -TMJD

The otolaryngologist sees patients whose complaint of ear pain is due to the TMJ. Often, they have seen other doctors, who stated that there was no ear infection and recommended pain pills. Several careful studies have been done on using Bromelain for acute rheumatoid arthritis and swollen joints. Since Bromelain has been studied extensively for its role in joint symptoms, I have encouraged its use for TMJD. It does work, along with instructions on using mirror biofeedback to learn jaw relaxation and opening the jaw midline by following a vertical line on the mirror. This method is particularly useful for patients who grind their teeth at night, damage their teeth, and keep their partner awake. However, there is no evidence that it is more effective than dental or other methods.

Patients who have been prescribed Bromelain/Papain for other purposes, such as ETO, have often remarked that they had a reduction in joint pains, and asked if they could use it for that purpose.

Cancer Inflammation

I have read articles addressing use of Bromelain in inflammation related to cancer. I have added some references that should be reviewed and considered for further research [16-19].

Bromelain *vs* Corticosteroids

The actions of corticosteroids have been studied thoroughly, including the application for swelling and inflammation. The applications of Bromelain have not had such extensive clinical investigations.

I have told this to my patients and explained that as far as is known, corticosteroids are superior. However, because of minimal side effects I have preferred to use the proteolytic enzyme route first, if possible. An advantage of using Bromelain is that it can be used for long periods of time without supervision.

Oral *vs* Buccal

The literature has studied the absorption of Bromelain from stomach and intestines, and has shown excellent absorption when taken without food. I find that patients do well via buccal pouch. It is my belief that there is better absorption. It would certainly be of value to perform a study to evaluate if buccal is superior to oral use [20,21].

Joint Swelling

The literature reports favorable results with Bromelain for various kinds of joint swelling. Similar applications in Otolaryngology should be considered. My experience with using Bromelain for TMJD has been positive. Cervical and arytenoid use may be of value. Certainly a careful study is indicated here [22-25].

Voice

Since I practice in the land of Hollywood, hoarseness and voice changes are of paramount importance to my patients. My experience with performers would strongly indicate that Bromelain is a primary aid for hoarseness due to excessive vocal use. My performers often carry a package of the Bromelain/Papain combination with then when they travel, in case they should develop signs of hoarseness.

Pure Bromelain *vs* Combinations

I have chosen to use a combination of Bromelain with Papain.

However, research has been primarily in pure Bromelain and I know of no studies comparing Bromelain itself vs combinations. I believe the important factor is that the enzymatic activity be stated for each tablet so that the doctor can decide on the medication. Papain has been studies as an aid to reduce pain [26].

Reported Medicinal Uses

There are reports in the literature of beneficial effects in angina pectoris, transient ischemic attacks, prevention and treatment of thrombophlebitis, dissolving cholesterol plaques, and for fibrinolytic action. Also it has been reported useful in skeletal muscular injuries.. There is extensive literature on its use in Rheumatic Osteoarthritis [27].

There are various mechanisms described for Bromelain's action. It inhibits T cell signal transduction, it decreases CD4 T cells, and reduces the expression of CD25.

The fact that Bromelain is effective in Rheumatoid Arthritis, indicates it has value in an autoimmune condition, and should be explored in other ones.

Discussion

The studies of the mechanisms of Bromelain indicate other applications that are outside of ENT practice. For example, the effect of Bromelain on inflammation in cases of Type 1 diabetes have been dramatic. I would invite readers to the listed articles for review [27-50].

My practice has relied on,

Bromelain 1,000,000 FCCPU units,

Papain 500,000 FCCPU units,

Protease 8,750 HUT units,

There are other units of enzyme measurement that are used including FIP units. These analyze based on enzymatic activity on various substrates. A common measure is GDU – measure of action on gelatin. Thus, the grams of Bromelain are not a good measure; it is the measure of enzymatic activity that is significant [51-59].

Whether a Papain/Bromelain formula has advantage over others is not established here. What is important is that Bromelain has been studied with evidence of benefits, is available world- wide, is inexpensive, with few side effects. On the other hand, eustachian tube blockage, swollen joints, infected sinuses are prevalent world- wide, and Bromelain offers an approach to be considered [60-69].

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