Reprinted from ORAL SURGERY, ORAL MEDICINE, AND ORAL PATHOLOGY, St. Louis
Vol. 72, No. 6, PP. 642-645, December, 1991 (Printed in the U.S.A.)

Textured collagen, a hemostatic agent

A pilot study

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The hemostatic properties of a new form of bovine collagen were observed on 25 dental patients. Early in the investigation it became apparent that pain, swelling, and trismus were reduced and healing was accelerated.

(ORAL SURG ORAL MED ORAL PATHOL 1991;72:642-5)

The control of bleeding has been a challenge from the earliest days of surgery. Today, ligation and suture remain the most convenient methods of hemostasis for most situations. However, on certain occasions problems remain, particularly in large oozing surfaces or when access is poor.

Under the influence of Hippocrates, cauterization was the popular method of hemostasis for many centuries. Early in this century, where ligation was impracticable, various materials such as muscle,[1] fat, and fascia were used. The substantial collagen content of these tissues, especially muscle and fascia, provide an autologous hemostatic wound dressing. In 1915 Grey,[2] used sterilized washed patches of sheep's blood fibrin. Harvey[3] improved on this by mincing the fibrin and compressing it into thin sheets. In 1940 Bering[4] developed a fibrin foam from dried human plasma. The first true fabric designed for hemostasis, presented by Yackel and Kenyou[5] in 1942, was oxycellulose, produced by treating cotton gauze with nitric acid. In 1945 Correll et al.[6] introduced a gelatin foam. This was improved by Jenkins and Clarke,[7] who soaked this foam in a thrombin solution.

The 1967 report of Battista et al.[8] on Avitine microcrystalline powder (Avicon Inc., Fort Worth, Tex.) demonstrated that commercially available collagen has excellent hemostatic properties. However, it is expensive and difficult to handle with surgical gloves and instruments. The fine powder fibers readily become airborne and migrate beyond the operative site. One year later Chvapil and Rolusa[9] introduced a new form of lyophilized collagen sponge. In 1985 Stein et al.[10] demonstrated the use of a porous collagen sponge to control bleeding from oozing palatal periodontal donor sites.

Eckmeyer et al.[11] provided a further refinement by processing purified collagen into long fibers that were then fabricated into nonwoven pads of various sizes. This type of collagen is now available as Hematex (BIOPLEX Corp., Montvale, N.J.). The pads are readily cut and tailored to any shape, according to the particular environment. Hematex was chosen as the focus of this study because of its features. It is composed of native collagen fibers, as is the potent Avitine powder, but is more coherent, to prevent migration or aspiration. It has the convenience and purity of sponges but without the prominent porosity.

Various other configurations are now in preparation such as a loose fiber form for office and hospital use.

Hematex collagen is derived from bovine Achilles tendon by a complex chemical process. The product is available in double-sheathed sterile packs, free from noncollagenous proteins, toxic heavy metals, and glycosaminoglycans. It is also pyrogen free, nontoxic, and nonirritating. Chvapil et al.[12] pointed out that collagen can be mildly allergenic. However, Bell et al.[13] found that when the animal collagen was highly purified, the problems of allergenicity and unwanted tissue reaction did not arise.

Except for size, Hematex collagen is identical to Novacol (BIOPLEX Corp.), which is marketed to hospitals worldwide for use in surgery, thoracic surgery, trauma surgery, and most recently neurosurgery.[14] The same product is used in hospitals in the United States under a different trade name.

Another collagen product derived from porcine skin has been used by Mitchell and Lamb,[15] who successfully closed off 30 oroantral communications. In

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