Polyurethane Sleeve Has Epistaxis Sponge Covered

Strong casing allows sponge expansion while preventing tissue ingrowth

Epistaxis packs are essential for controlling the nasal bleeding that occurs after a number of surgical procedures. **Ultracell Medical Technologies** (North Stonington, CT) produces a line of such sponges designed to absorb many times their weight and volume in liquid. Soft, absorbent, and biocompatible, the UltraPlus 5000 sponges are designed with fine pores to discourage tissue ingrowth.

Some patients, however, reported discomfort when the sponges were removed after several days in the nasal cavity. Ultracell turned to **Polyzen Inc.** (Cary, NC), a manufacturer of specialty and disposable components, to help develop a housing for the product that would eliminate all possibility of penetration by healing tissue.

The list of design challenges for this housing was extensive. It had to be constructed of a medically approved polymer that inhibits tissue ingrowth while remaining elastic enough to expand freely when hydrated. Additionally, the casing had to be hypoallergenic, remain firmly where positioned, and have enough tensile strength to prevent bursting or tearing during removal. After specifying a material with all of these properties, it would also be necessary to find a way to manufacture the housing without producing a large seam that could cause patient discomfort.

"We approached the problem by looking from the material angle first," says Polyzen president Tilak Shah. "After examining some stock materials, our engineering team realized that we needed to create a unique material in order to be successful." The solution to Ultracell's design challenges lay in a custom-blended urethane called TSP 1051. Soft, supple, and biocompatible, the Polyzen material successfully prevents tissue ingrowth and offers additional benefits. "The material is capable of expanding 200 to 300% and can be used in layers that are only 1 to 2 mil thick, something that is a major concern for products used in the finite space of the nasal passages," says Shah.

The Polyzen casing allows the nasal pack to stay inside the body for up to 5 days without causing ingrowth or infection.

After developing an appropriate material, Polyzen then needed to find a way to construct the sleeve without creating a sharp edge. "Initially we tried dip molding," says Shah, "but when the cost per part came in, the volume needed to make this method economically feasible was impractical." Polyzen then turned to a proprietary RF film-welding process that had been successful in the past. "This welding process is well suited for thin films, and it enabled us to produce the 1 × 4-in. cylindrical sleeve at a reasonable price," says Shah.

The Polyzen casing allows the UltraPlus 5000 nasal pack to stay inside the body for up to 5 days without causing ingrowth or infection. Ultracell was so impressed it made the product the company's standard casing and plans to work with Polyzen again. "The experience was so good that we're planning five more designs that use urethane sleeves in our product line, and we're looking at new shapes and other specific projects together," says Ultracell president Wayne Korteweg. —*Zachary Turke*