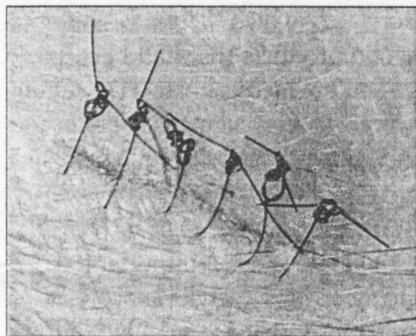


Tissue Adhesives and Sutures: How Do They Compare?

The first study to examine cosmetic outcomes over the long term finds that in many instances, the two methods achieve comparable results, even one year after the original wound repair

Among the alternatives to conventional sutures that have undergone clinical scrutiny, none have been studied in as much detail as tissue adhesives, but most of the randomized trials performed so far have either focused on the older and relatively weak butylcyanoacrylates or, if they have employed the latest octylcyanoacrylate formulation, have limited patient follow-up to only three months after the original wound repair. Although octylcyanoacrylate appears to produce cosmetic outcomes comparable with those of sutures at the three-month mark, the question remains how well this preparation, the first to be approved for medical use by the Food and Drug Administration, compares with conventional wound closure over the long term. Because surgeons typically wait a year for difficult wounds to fully mature before attempting surgical revision, some physicians have suggested that what is really needed is a study evaluating the cosmetic outcome of wounds closed with octylcyanoacrylate one year after the original wound repair.

Such a long-term study is now in hand, thanks to a team led by Dr. James Quinn, assistant professor of clinical medicine at the School of



Medicine at the University of California, San Francisco, and the results suggest that octylcyanoacrylate appears to have made good on its early promise. To determine how well octylcyanoacrylate stacks up against sutures over the long term, the investigators first randomly assigned 136 patients who had traumatic lacerations to undergo wound closure with either octylcyanoacrylate tissue adhesive or 5-0 or 6-0 monofilament sutures. Only patients with wounds requiring sutures on the face, torso, or extremities were eligible for the study. Excluded from the investigation were patients with animal or human bite or scratch wounds; puncture wounds; stellate crush wounds; wounds across mucocutaneous junctions; scalp or ear lacerations; hand or foot wounds; wounds crossing joints; and contaminated wounds requiring débridement.

Each laceration was assigned a wound score at 5 to 10 days, 3 months, and 1 year after the original injury. Photographs taken of the wounds after three months and one year were rated by a cosmetic surgeon, blinded to the method of wound closure, using a validated visual analog cosmesis scale.

Among the 77 patients available for one-year follow-up, no significant cosmetic differences were found between the wounds repaired with the tissue adhesive and those repaired with sutures, Dr. Quinn and his associates report in *Annals of Emergency Medicine* (vol. 32, p. 645, 1998). Both the optimal wound scores and the visual analog scale cosmesis scores were comparable between the two groups, indicating that for many wounds, octylcyanoacrylate can produce long-term cosmetic outcomes that are just as good as those produced by conventional sutures.

A secondary aim of the study was to determine how well early cosmetic outcomes—those obtained 5 to 10 days after injury—and 3-month cosmetic outcomes correlated with the cosmetic outcomes after 1 year. Although many surgeons wait a full

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year before attempting surgical scar revision, "that practice is based more on convention than on science, so our aim was to determine its clinical justification, if any," Dr. Quinn told EM. The investigators found poor agreement between early and three-month wound scores but a very strong correlation between three-month and one-year wound scores, suggesting that at just three months after injury, physicians can make a good estimate of how a wound is going to look.

"It probably does take a year for most wounds to fully mature," says Dr. Quinn, who was an assistant professor of medicine in the division of emergency medicine at the University of Ottawa School of Medicine in Ottawa, Canada, at the time of the study. "But at the three-month mark, most wounds will have regained 80% of the undamaged skin's original tensile strength, so it's unlikely that significant changes that could affect the cosmetic outcome, such as alterations in wound remodeling or scar widening, would occur between three months and one year." Indeed, the most dramatic changes in wound healing appear to occur between the 10-day mark, when a wound has only 10% of its original tensile strength, and the 3-month mark.

"Surgeons may still decide to wait a year for a particularly messy wound to fully mature before revising the repair, but after three months they're going to have a clear idea of the wound's ultimate cosmetic outcome," says the California specialist.

Octylcyanoacrylate is the first tissue adhesive to meet the standard for nontoxic medical devices, which is why it is the only tissue adhesive approved by the FDA. Its tensile strength is also greater than that of its predecessors, the butylcyanoacrylates, which were all industrial-grade products that had been packaged for medical use. Dr. Quinn cautions, however, that octylcyanoacrylate must be used with great care to ensure the duplication of his study's results.

It is especially important to remember that octylcyanoacrylate is not appropriate for every wound but has specific indications and contraindications. "Physicians need to appreciate that this tissue adhesive can't close all wounds, but if used properly, it can be a great adjunct to conventional wound closure," says Dr. Quinn. "The real limiting factor for tissue adhesives in general is that they don't break up over time; they stick to the stratum corneum, and as that top layer of skin shears off, the

adhesive falls off along with it. Octylcyanoacrylate, consequently, is used optimally on wounds in areas, such as the face, that are not subjected to shearing forces, movement, or aggressive washing; the stratum corneum over those areas can stay in place for 10 to 14 days. Octylcyanoacrylate is not well suited for wounds in areas where the stratum corneum sloughs off more rapidly, such as the hands or areas over joints. I also wouldn't advise using it on wounds to the lips and oral mucosa."

Wounds that are closed with octylcyanoacrylate should be given the same care given to wounds closed with sutures. As with any other wound, wounds closed with octylcyanoacrylate should be explored and thoroughly cleaned, with topical anesthetics, if necessary. It is important to apply the adhesive topically, never between the wound edges. "And, it's especially important to ensure that the wound edges are well opposed before applying the adhesive," Dr. Quinn stresses. "The key point is that octylcyanoacrylate is placed on top of the wound, it doesn't stick the wound edges together. The last thing you want is for the adhesive to infiltrate the wound, where it will act like a piece of plastic caught between the wound edges, preventing the wound from healing."

As effective as octylcyanoacrylate tissue adhesives can be, practice in applying them is still necessary to achieve good results. "Physicians who expect to be expert in applying octylcyanoacrylate their first time out are in for a surprise," warns Dr. Quinn. "You can learn to become proficient in its use, but like suturing, the procedure takes time and effort." □

OCTYLCYANOACRYLATE: WHEN AND WHEN NOT TO USE

Anatomic location

Face

Lips and mucosa

Extremities and torso

Hands and feet

Indication

Most cutaneous closures

Not recommended

Cutaneous closures, deep sutures recommended; never over joints

Minor lacerations only; generally not recommended

Adapted with permission from J. Quinn et al: Tissue adhesive versus suture wound repair at 1 year. Randomized clinical trial correlating early, 3-month, and 1-year cosmetic outcome. *Ann Emerg Med* 32:645, 1998.