Can We Really Use Super Glue Instead of Suture?

The Real Scoop on the Use of Tissue Adhesive for Wound Closure
From: AFryeMidwf@aol.**com** (Anne Frye)

For several years there has been increasing interest in the midwifery community regarding the use of commonly available "Super Glue" types of adhesives for wound closure. Midwives who have done a little research have found that the cyanoacrylate glue (Super Glue) sold over-the-counter and medical cyanoacrylate glues are apparently identical in composition and rumored to the be same as the tissue adhesive used extensively during the Vietnam War. Some midwives have even used over-the-counter Super Glue (Krazy Glue) successfully in lieu of suture to close the perineum.

In readying in the 5th edition of Healing Passage: A Midwife's Guide to the Care and Repair of the Tissues Involved in Birth, I felt it was important to address this issue. This article offers an expanded version of the information you will also find in the new edition.

History and development:

In 1959, a variety of cyanoacrylate adhesives were developed, some types of which are now used for surgical purposes in Canada and Europe. These glues polymerize on contact with basic substances such as water or blood to form a strong bond. The first glue developed was methyl cyanoacrylate, which was studied extensively for its potential medical applications and was rejected due to its potential tissue toxicity such as inflammation or local foreign body reactions. Methyl alcohol has a short molecular chain which contributes to these complications.

Further research revealed that by changing the type of alcohol in the compound to one with a longer molecular chain, the tissue toxicity was much reduced. All the medical grade tissue adhesives currently available for human use contain butyl-esters, which are costlier to produce.

In 1964, the Tennessee Eastman lab submitted its first application for new drug approval to the FDA. The military learned of this new glue and became extremely interested in its potential for use in field hospitals. MASH units in Vietnam were overloaded. Many solders were dying from chest and abdominal wounds, despite the best efforts of medics. In 1966 a special surgical team was flown to Vietnam, trained and equipped to use cyanoacrylate adhesive. A quick spray over the wounds stopped bleeding and bought time until conventional surgery could be performed. The possibilities were immediately seized by the medical communities of Europe and the Far East. Meanwhile the FDA changed standards and kept requesting additional data until Eastman was reluctantly forced to withdraw his application. (Jueneman, 1981)

Histoacryl Blue (n-butyl cyanoacrylate) has been used extensively in Europe since the 1970s for a variety of surgical applications including middle ear surgery, bone and cartilage grafts, repair of cerebrospinal fluid leaks, and skin closure. It has been available in Canada through Davis & Geck Canada, with no adverse effects reported to date. Further, laboratory studies have been done which concluded that it has no carcinogenic potential. Tissue toxicity has only been noted when the adhesive is introduced deep in highly vascular areas (the perineum qualifies). While I always take claims of harmlessness with a grain of salt, if used as directed, these adhesives appear to be basically safe.

(Quinn & Kissick, 1994) Current use: Although not labeled as such, over-the-counter Super Glue products contain methyl alcohol, because it is inexpensive to produce. Cyanoacrylates cure by a chemical reaction called polymerization, which produces heat. Methyl alcohol has a pronounced heating action when it contacts tissue and may even produce burns if the glue contacts a large enough area of tissue. Rapid curing may also lead to tissue necrosis. Midwives have not noted such reactions because minimal amounts are being used for perineal repair. Nevertheless, with a greater toxic potential, over-the-counter products are inappropriate for use in wound closure. (Quinn & Kissick, 1994)

Medical grade products currently available contain either butyl, isobutyl or octyl esters. They are bacteriostatic and painless to apply when used as directed, produce minimal thermal reaction when applied to dry skin and break down harmlessly in tissue. They are essentially inert once dry. Butyl products are rigid when dry, but provide a strong bond. Available octyl products are more flexible when dry, but produce a weaker bond.

When used for repair, ideally the wound to be closed is fresh, clean, fairly shallow, with straight edges that lie together on their own. The glue is applied to bridge over the closed edges; it should not be used within the wound (on raw surfaces), where it will impair epithelization. The only currently FDA approved adhesives suitable for use as suture alternatives are veterinary

products; n-butyl- cyanoacrylate tissue adhesives Vetbond (3M) and Nexaband liquid and octyl-based Nexaband S/C (intended for topical skin closure when deep sutures have been placed). Histoacryl Blue (butyl based) (Davis & Geck) and Tissu-Glu (isobutyl based) (Medi-West Pharmaceuticals) are sold in Canada for human use. DMSO (dimethyl sulfoxide) or acetone serve as removers. (Helmstetter, 1995; Quinn & Kissick, 1994)

How to use tissue adhesive:

Although not specifically recommended for perineal repair, tissue adhesive has been successfully used by some midwives. However, Hisotcryl Blue was used in place of interrupted or subcuticular stitches in a small study of the closure of the superficial layer in mediolaterial clitorotomy (episiotomy). (Adoni & Anteby) In this study, the yoni (vaginal) mucosa and subcutaneous layers were closed with conventional suture techniques. It might be a good alternative to offer when women refuse conventional sutures. Tissue adhesive works best when the wound is moderately shallow. Midwives report that extremely shallow wounds tend to pull apart as healing occurs and usually require no closure of any kind. The wound should also have no pockets to collect lochia and should not require other sutures. However, as the study mentioned above demonstrates, it can also be used instead of subcuticular sutures after placing basting stitches.

Tissue glue is only applied to outside surfaces to bridge over edges; do not apply it directly to raw surfaces. The wound edges should be straight and lie together naturally. Insert a tampon, then clean and dry the skin thoroughly. Have your assistant stabilize the wound edges from top to bottom (be sure the edges are matched correctly). Insert your finger between the edges and pull it out to bring them forward slightly. This is to ensure that the wound edges are not rolled inward toward each other, but meet perfectly. It could also be accomplished with a tissue forceps. Hold gauze against the area immediately below the apex to catch and drips as you apply the glue. Apply tiny dots of glue sparingly at intervals where the wound edges meet. Or, apply a bead of tiny droplets to bridge the edges. (Thick applications do not enhance bonding and tend to crack and loosen prematurely.) Products dyed blue are easier to see. (If using Histoacryl Blue, attach a 27 g. syringe needle to the ampoule hub to help control application.

After use, the needle should be discarded and replaced with a new needle that does not have glue within its lumen.) Be careful to apply the glue on where it is needed; glue removers should not the used in the genital area. As long as no part of the tube tip or the attached needle contacts the tissue or bodily fluids, the tube can be reused.

Use a hair dryer or fan the area dry, which takes about 30 seconds. Adhesive will stiffen when dry. Women should observe the same precautions as those who have refused sutures entirely. Bathing is not contraindicated but prolonged soaking should be avoided. Expect the adhesive to flake off in 3 to 7 days. Allergic reactions are very rare, but may include inflammation and swelling.

References

(Various midwives 1993-95)

Adoni, A., & Anteby, E., "The Use of Histoacryl for Episiotomy Repair," Br. J. of Ob Gyn, Vol. 98, May 1991, pp. 476-8. Heimstetter, G., personal communciation, Permabond Internat. Bridgewater, NJ, 1995.

Jueneman, F, "Stick it to um," Industrial Research & Dev. Aug. 1981, p. 19.

Quinn, J., & Kissack, J., "Tissue Adhesives for Laceration Repair During Sporting Events," Clinical J. of Sports Med., Vol. 4 No. 4, 1994, p. 245.

Sources of tissue adhesives:

Animal Care Products, 3M Health Care, 3M Center Building 225 1N 07, St. Paul, MN 55144-1000, (612) 733-8477. 3M produces Vetbond Tissue Adhesive.

Veterinary Products Laboratory (800) 548- 2828 distributes Nexaband products which are manufactured by Tri-Point in Raleigh, NC (919) 790-1041. These products are restricted items sold and approved for veterinary use only.

Davis & Geck-CANADA (905) 470-3647 distributes Histoacryl Blue, which is manufactured in Germany by B. Braun.

Medi-West Pharmaceuticals markets Tissu-Glu.