James Greenberg on the best suture for episiotomy

What's the best suture material? Technological advances mean there are more suture materials available for perineum repair. In the first edition of Williams' *Obstetrics*, the authors opined that silkworm gut accompanied by plain catgut was the ideal suture choice.[1] A few years later, carbolized catgut was recommended for perineal repairs.[2] Today, chromic catgut remains the standard of choice, with polyglycolic acid sutures offered as a possible alternative.[3,4]

When considering sutures for episiotomies, I focus on 2 characteristics: strength and inflammation-inducing properties. (For the purposes of this article, perineal lacerations are defined as natural tears or episiotomies confined to the perineum and not involving the anal sphincter or rectum.)

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Strength. Because of increased blood flow to the perineum during pregnancy, most perineal lacerations heal in 7 to 14 days.[5] Therefore, the suture material must maintain adequate tensile strength for that amount of time. Permanent sutures or those with prolonged resorption rates cause pain and should be avoided.

Inflammation-inducing properties. As with any foreign body, the suture material interacts with the immune system and results in an inflammatory response, which involves infiltration of the affected tissues by polymorphonucleocytes, lymphocytes, monocytes, and macrophagocytes. The degree of local inflammation is directly related to the pain response: the greater the inflammation, the greater the pain.

That said, I believe the "perfect" suture material should maintain tensile strength from 7 to 14 days and dissolve quickly thereafter. In addition, it should cause as little inflammation as possible.

Choosing from what's available. Generally, suture materials are classified as nonabsorbable and absorbable and then subclassified into natural and synthetic fibers. Within these classifications, sutures have different tensile strengths and reabsorption rates. Since nonabsorbable sutures have no place in postpartum perineal laceration repairs, I will focus only on options in absorbable materials.

Natural fibers include plain catgut and chromic catgut, while polyglycolic acid, coated polyglycolic-910, and pretreated coated polyglactin-910 round out synthetic choices.

Natural Fibers

Plain catgut. Produced from the collagen of the submucosal layer of a sheep's small intestines or the serosal layer of cattle intestines, this material is chemically treated with formaldehyde to resist enzymatic degradation.

- **Mechanism by which it is absorbed:** proteolytic enzymes and phagocytosis
- **Tensile strength (00 size):** 7 lb, losing half of its strength in 4 to 6 days
- **Degree of inflammatory response:** highest of all suture material[6]
- **Absorption rate:** 70 days

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Chromic catgut. Like plain catgut, this material is produced from sheep or cow intestines but is coated with chromium to delay degradation.

- **Mechanism by which it is absorbed:** proteolytic enzymes and phagocytosis
- **Tensile strength (00 size):** 8 lb, losing half of its strength in 10 to 14 days
- **Degree of inflammatory response:** high
- **Absorption rate:** 90 days

Synthetic Fibers

Polyglycolic acid and coated polyglactin-910. Produced by polymerization of glycolic acid, these suture materials are extruded, stretched, and braided into various sizes. The sutures are further coated with silicone to improve their handling characteristics.

- **Mechanism by which they are absorbed:** hydrolysis
- **Tensile strength (00 size):** 9.6 lb, losing half of their strength in approximately 21 days
- **Degree of inflammatory response:** low[6]
- **Absorption rate:** 60 to 90 days[7,8]

Pretreated coated polyglactin-910. This suture is pretreated with ionizing beams to accelerate hydrolysis.

- **Mechanism by which it is absorbed:** hydrolysis
- **Tensile strength (00 size):** 9.9 lb, losing half of its strength in 5 days
- **Degree of inflammatory response:** low
- **Absorption rate:** 42 days[8]

Quick study of the evidence. The physiologic characteristics of wound healing after vaginal delivery would seem to dictate the use of glycolic acid-derived sutures for perineal repairs. Recently, this conclusion was echoed by Kettle and Johanson in the *Cochrane Database of Systematic Reviews*. The authors revisited 8 randomized trials that compared absorbable synthetic sutures with plain or chromic catgut. After an in-depth analysis of the methodology and results of each study, they concluded there was significant evidence that synthetic materials are associated with less short-term pain, a reduction in the use of analgesia, and less wound dehiscence than natural fibers. One caveat: Synthetic sutures were associated with increased rates of suture removal in some patients because the materials were too long-lasting.[9]

Key points

- Plain catgut produces the highest inflammatory response of all suture materials.
- Synthetic sutures have a higher incidence of suture removal than plain or chromic catgut.
- Synthetic materials are associated with less short-term pain, a reduction in the use of analgesia, and less wound dehiscence than natural fibers.

The bottom line. To my mind, the ideal suture material is pretreated coated polyglactin-910. Since it is chemically identical to polyglactin-910, it is reasonable to assume that it has a similar favorable pain profile. Furthermore, because it is completely absorbed within 42 days, a patient will not encounter the persistent suture problem present with polyglycolic acid and polyglactin-910. I have been using this suture for 6 years and have found that it is easier to work with than chromic catgut and well tolerated by my patients. While well-designed, randomized clinical trials are needed to prove the suture's effectiveness, available data suggest it is currently an obstetrician's best choice. ■

REFERENCES

1. Williams J. *Obstetrics*. 1st ed. New York, NY: D. Appleton and Company; 1903:295.
2. Williams J. *Obstetrics*. 2nd ed. New York, NY: D. Appleton and Company; 1908.
3. Conduct of Normal Labor and Delivery. In: Cunningham FG, MacDonald PC, Gant N, et al, eds. *Williams Obstetrics*. 21st ed. New York, NY: McGraw-Hill; 2001:328.
4. Conduct of Normal Labor and Delivery. In: Cunningham FG, MacDonald PC, Gant N, et al, eds. *Williams Obstetrics*. 19th ed. Norwalk, Conn: Appleton & Lange; 1993:391.
5. Van Winkle W, Hastings JC. Considerations in the choice of suture material for various tissues. *Surgery, Gynecology & Obstetrics*. 1972;135:115.
6. Hardy J. *Hardy's Textbook of Surgery*. 2nd ed. Philadelphia, Pa: J.B. Lippincott Company; 1988:119.
7. U.S. Surgical Web site. Available at: http://www.ussdgsutures.com. Accessed March 7, 2002.
8. Ethicon Products. Johnson & Johnson Web site. Available at: http://www.jnjgateway.com/home/jtml?loc+USENG. Accessed March 7, 2002.
9. Kettle C, Johanson RB. Absorbable synthetic versus catgut suture material for perineal repair. In: *The Cochrane Database of Systematic Reviews*. 2001;3.

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