Evaluation of the Use of a Barbed Suture for Skin Closure during Autologous Breast Reconstruction

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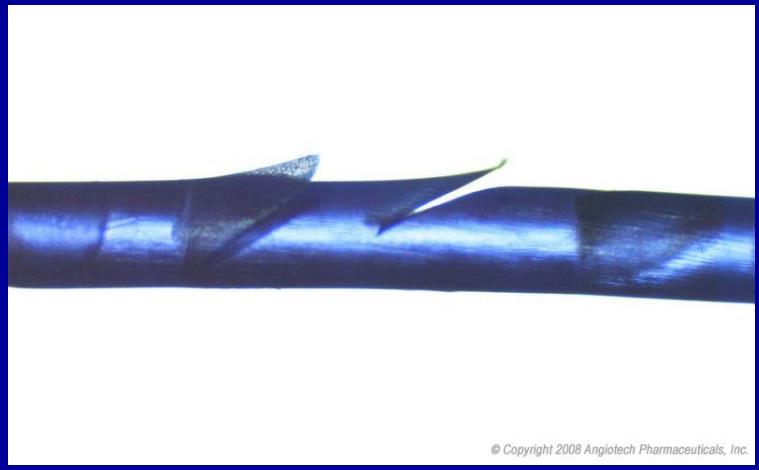
- Many options for skin closure
  - Sutures, Adhesives, Staples

- Ideal closure method:
  - Tensile strength - lasts long enough for healing
  - Good tissue opposition – healing, re-epithelialization
  - No excessive tension - tissue ischemia
  - Easy and fast to perform
  - Acceptable cosmetic appearance
  - Not cost-restrictive

Barbed Suture

- Bi-directional, self-retaining
- Quill™ SRS (Self-Retaining System) sutures (Angiotech Pharmaceuticals, Inc.)
- Tiny barbs on the surface
  - Penetrate and engage the tissue
  - No need to tie knots



Background

- Senior author
  - High-volume of autologous microvascular breast reconstruction
  - Started using barbed suture exclusively in January 2008
    - Both abdominal and breast incisions
  - Significant decrease in case length?

Methods

- Retrospective cohort study
- All free TRAM, DIEP, or SIEA flaps
- January 2007 through January 2009
- Barbed suture used exclusively after January 2008
- Compare two methods of closure after autologous breast reconstruction using abdominal tissue
  - Traditional closure (control group)
  - Barbed suture closure (experimental group)

Methods

- Patient demographics:
  - Age
  - Body mass index (BMI)
  - Smoking status
  - Diabetes
  - Immediate vs. delayed reconstruction
- Unilateral and bilateral cases

Outcomes Measured

- Total case length
- Delayed wound healing
- Suture-related complications:
  - Dehiscence
  - Suture extrusion (spitting)
  - Infection (cellulitis)

- Recorded from electronic hospital and outpatient records

Suture-Related Complications

- Dehiscence
  - Does barbed suture slip out without knots?
  - Is barbed suture strong enough for high-tension wounds like abdomen?
  - Is barbed suture strong enough for one-layer closure?
- Infection and suture extrusion
  - Is 2-0 PDO Quill acting like a foreign body?

Closure Methods

Traditional Closure (Control Group)		**Barbed Suture Closure (Experimental Group)**	
Breast	**Abdomen**	**Breast**	**Abdomen**
Buried, interrupted deep-dermal 3-0 Biosyn	Interrupted 2-0 Biosyn Scarpa's layer	Continuous, deep-dermal 2-0 PDO Quill	Interrupted 2-0 Biosyn Scarpa's layer
Continuous, subcuticular 4-0 Biosyn if necessary	Buried, interrupted deep-dermal 3-0 Biosyn		Continuous, deep-dermal 2-0 PDO Quill
	Continuous subcuticular 4-0 Biosyn if necessary,		

- Biosyn™ sutures (Covidien, Ltd.)
  - Synthetic polyester composed of glycolide, trimethylene carbonate, and dioxanone
- PDO Quill™ SRS (Self-Retaining System) sutures (Angiotech Pharmaceuticals, Inc.)
  - polydioxanone

Results

- 136 women
- 59 unilateral reconstruction
  - 29 control group
  - 30 Quill group
- 77 bilateral reconstruction
  - 31 control group
  - 46 Quill group
- No significant differences between groups
  - patient age, BMI, smoking status, diabetes, HTN

- Unilateral cases:
  - Barbed suture decreased mean OR time from 405.1 to 359.6 minutes
    - 50 minutes difference ($p = 0.02$) - significant
- Bilateral cases:
  - Barbed suture decreased mean OR time from 509.5 to 499.6 minutes
    - 10 minutes difference ($p = 0.44$) – not significant

- Intra-group analyses – case length
  - Flap type: free TRAM vs. DIEP vs. SIEA
    - No significant difference depending on the specific flap used within either group
  - Immediate vs. delayed reconstruction
    - No significant difference between groups

- Suture-related complications
  - Dehiscence
  - Suture extrusion (spitting)
  - Infection (cellulitis)

- Analyzed separately
  - No difference in unilateral or bilateral cases
- Examined as a group
  - Unilateral barbed suture group
    - Greater number of complications (47% vs 21%)
    - p = 0.054, nearing significance

Discussion

- Correlation between duration of surgery and intraoperative and postoperative complications
  - Nausea and vomiting
  - Deep venous thrombosis, pulmonary embolism
  - Pressure sores
  - Myocardial infarction

- Dehiscence, infection, suture extrusion
  - When analyzed as a group
    (i.e. any suture-related complication)
    - Elevated in the unilateral group – neared significance
    - Possible reasons:
      - Relatively large suture
      - Prolonged period of time for complete absorption
      - Relatively superficial placement in the deep dermis

Cost Analysis

- Suture Costs:
  - Control group - $30 ($3 x 10)
  - Barbed suture group - $84 ($21 x 4)
- OR and Anesthesia Charges:
  - Charged by half hour increments
  - Unilateral case:
    - Reduction of 50 minutes saves two additional half hours of charges for both the operating room and anesthesia fees
    - Saves $6000 in operating room charges
    - Saves $1600 in anesthesia fees
    - Total savings of $7600
- Extra cost of Quill sutures → Negligible

Conclusions

- Continuous, deep-dermal, barbed suture (Quill) in the closure of abdominal and breast incisions in cases of free flap breast reconstruction
  - Safe
  - Expedient
  - Cost-effective

Merci Beaucoup