Capsular Contracture: Prevention & Treatment

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Disclosures

Merz
Syneron/Candela

May use brand names due to lack of distinguishing generic names
Disclaimers

• Limited to augmentation
  – More variables in reconstruction
  – Same principles may apply
• Focus on more recent studies
  – Newer generation implants
  – More likely to use current techniques
• Individual surgeon’s case series
  – Tend to under report CC
• Variability in reporting technique details
  – Pocket irrigation
  – No touch technique
  – Pocket dissection
Etiology

- Bacterial contamination in 2/3rds of Baker III/IV capsules
- Emerging evidence of biofilms
- Nonbacterial causes
  - Hematoma
- Common inflammatory pathway
# Baker Grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>Feel</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Soft</td>
<td>Natural</td>
</tr>
<tr>
<td>II</td>
<td>Little firm</td>
<td>Normal</td>
</tr>
<tr>
<td>III</td>
<td>Firm</td>
<td>Abnormal</td>
</tr>
<tr>
<td>IV</td>
<td>Hard, cold, painful</td>
<td>Distorted</td>
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</tbody>
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Unless otherwise mentioned, will only refer to Grade III & IV
Capsular Contracture

- **Common cause of reoperation**
  - **Saline** (Mentor & Allergan)  
    - Augmentation  up to 20%
    - Reconstruction  up to 30%
  - **Gel** (Mentor & Allergan)  
    - Augmentation  up to 40%
    - Reconstruction  up to 14%

- **Common cause of implant removal**
  - **Saline** (Mentor & Allergan)  
    - Augmentation  up to 15%
    - Reconstruction  up to 30%
  - **Gel** (Mentor & Allergan)  
    - Augmentation  up to 33%
    - Reconstruction  up to 21%
Capsular Contracture Over Time

A Long-Term Study of Outcomes, Complications, and Patient Satisfaction with Breast Implants

Background: Breast implants have been used worldwide for more than 40 years. Despite extensive clinical experience, there is continued concern about the safety of these devices. The purpose of this study was to compare the efficacy, complication rates, frequency of reoperation, and degree of patient satisfaction with different types of implants.

3495 saline or silicone gel implants in 1529 women for any indication
Capsular Contracture Over Time

Is capsular contracture inevitable?

A Long-Term Study of Outcomes, Complications, and Patient Satisfaction with Breast Implants

2006

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Indication

Surface
Core studies NOT same design

Capsular Contracture Rates following Primary Breast Augmentation

2015

Textured Silicone Breast Implant Use in Primary Augmentation: Core Data Update and Review

Summary: Evolution of silicone breast implant design has focused primarily on advances in implant fill, surface texture, and shape. Fifth-generation, shaped, formable, silicone breast implants from all three major implant manufacturers...
Core Studies Summary: CC

Core studies NOT same design

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Capsular Contracture: Prevention & Treatment

**Prevention**
- Implant choice
  - Smooth vs textured
  - Shaped vs round
- Incision choice
- Implant pocket
- Pocket irrigation
  - Betadine
  - Antibiotics
- Surgical technique
  - No touch methods

**Treatment**
- Nonsurgical
  - Medication
  - Ultrasound
- Capsule modification
  - Closed capsulotomy
  - Anterior vs complete capsulectomy
- Pocket site change
- ADM placement
- Different implant
- Prevention
Textured Surfaces NOT the Same

Mentor

Silimed® TRUE Texture®

Sientra

BIOCELL®

Allergan
Differences in Same Manufacturer

Mentor Round MemoryGel
100 pores/inch

Mentor Shaped MemoryShape
65 pores/inch

Mentor CPX Tissue Expander
45 pores/inch

The Design and Engineering of the MemoryShape Breast Implant

Summary: The recent approval of MemoryShape implant by the Food and Drug Administration introduces a novel implant available to the surgeon for cosmetic enhancement.
Recommendation: Use **textured** implants for **subglandular** placement

**Smooth** implants may be appropriate for **submuscular** placement
No Recommendations

- Lack of current prospective data comparing saline & silicone implants
- Therefore can’t make data-driven recommendations regarding:
  - Pocket, fill type, surface
- Textured implants (saline and silicone) have tendency for less contracture
- Submuscular plane (saline and silicone) has tendency for less contracture
Should we Use Textured Implants?

Current Risk Estimate of Breast Implant–Associated Anaplastic Large Cell Lymphoma in Textured Breast Implants

David J. Collett, MBBS
Hinne Rakhorst, MD, PhD
Peter Lennox, FRCSC
Mark Magnusson, MBBS,

**Background:** With breast implant–associated anaplastic large cell lymphoma (BIA-ALCL) now accepted as a unique (iatrogenic) subtype of ALC, directly associated with textured breast implants, we are now at a point where a sound epidemiologic profile and risk estimate are required. The aim of this article is

- **Silimed Polyurethane** 23 Relative Risk*
- **Allergan Biocell** 17
- **Mentor Siltex** 1
- **Mentor Smooth** 0
Adams et al. 14 Point Plan + 1

1. IV antibiotic prophylaxis before skin incision
2. Inframammary incision
3. Nipple shields
4. Atraumatic dissection
5. Prospective hemostasis
6. Avoid dissection into the breast parenchyma
7. Dual-plane pocket
8. Pocket irrigation with triple antibiotic +/- Betadine
9. Minimize skin contamination (insertion sleeve)
10. Minimize implant open time and sizers
11. Change surgical gloves
12. No drains
13. Layered skin closure
14. Antibiotic prophylaxis for future invasive procedures
15. Leukotriene Inhibitor x 3 months post op
183 primary augmentations, mean follow-up 1.2 years
Betadine + triple antibiotic irrigation + IV antibiotics
CC rates:
- 6.4% transaxillary
- 2.4% periareolar
- 0.5% inframammary
Incision Site

- 856 primary augmentations, mean follow-up 1.4 years
- Variable pocket irrigation
- Overall CC 2.8%
  - Antibiotic irrigation decreased CC (3.9% vs 0.4%)
  - Tobacco users had more CC (5.5% vs 1.9%)
  - Saline implants had more CC than silicone gel (4.3% vs 1.3)
- Recommend IMF & submuscular placement, antibiotic irrigation
Incision Site

- Inframammary incision CC: 0.59%
- Periareolar incision CC: 9.5%
- Periareolar mastopexy CC: 8%
- “due to an increase in contamination of the breast pocket with intraductal material colonized by bacteria.”

Wiener 2008
Pocket Irrigation: Betadine

- Betadine rinse followed by saline (FDA OK)
- Leaving Betadine in the pocket (FDA NOT OK)
- Intraluminal Betadine (FDA NOT OK)
- FDA concerns of implant shell compromise
  - Studies suggest it is safe
Pocket Irrigation: Betadine + Abx

• 330 inframammary dual-plane augmentations
  – **Group A**: Cephalothin 1.5 g IV + cephalexin 750 mg PO BID x 7 days
  – **Group B**: Cefuroxime 750 mg IV + levofloxacin 500 mg PO QD x 5 days + pocket irrigation
    • 25 mL 10% povidone-iodine + cefuroxime 750 mg + gentamicin 80 mg in 15 mL saline

• CC at 2 year follow up
  – Group A: 6%
  – Group B 0.6%
Betadine Irrigation

- Meta-analysis of four studies
  - 1191 patients Betadine irrigation
  - 595 patients saline irrigation
- Less CC with Betadine
  - 2.3% vs 8.9%
- Implant rupture <1%
- Low study methodologic quality limits recommendation for standard of practice

Efficacy and Safety of Povidone-Iodine Irrigation in Reducing the Risk of Capsular Contracture in Aesthetic Breast Augmentation: A Systematic Review and Meta-Analysis

Background: Capsular contracture is common and distressing after aesthetic breast augmentation. The precise cause of capsular contracture is not well established. This systematic review investigates current available evidence regarding perioperative povidone-iodine irrigation safety and efficacy in reduc-
Triple Antibiotic Irrigation

- 335 patients, mean follow-up 14 months (6 - 75 months)
- **No control group** – compared to historical controls
- 50,000 U bacitracin + 1 g cefazolin + 80 mg gentamicin in 500 cc NS
- No touch techniques + postop antibiotics
- CC rates:
  - 1.8% primary breast augmentation (n=248)
  - 0% augmentation-mastopexy (n=24)
  - 9.5% breast reconstruction (n=63)
Postoperative Antibiotics

- 605 implants: 1° or 2° breast augmentation
- 1% CC at mean 3.8 year follow up
- Protocol:
  - 1 g cefazolin IV (or clindamycin)
  - Bacitracin irrigation
  - Smooth Mentor saline or silicone gel implants
  - 3 days of antibiotics (52%) vs none (48%)
- No reduction in CC, infection, or complication rate
Electocautery vs Blunt Dissection

Brief Communication

• 615 cases
• 51% visualized dissection with electrocautery
  – CC 0.64%
• 49% blind Dingman blunt dissection
  – CC 6.4%
Combined Augmentation Mastopexy

One-Stage Augmentation Mastopexy:
A Review of 1192 Simultaneous Breast Augmentation and Mastopexy Procedures in 615 Consecutive Patients

W. Grant Stevens, MD, FACS; Luis H. Macias, MD; Michelle Spring, MD; David A. Stoker, MD, FACS; Carlos O. Chacón, MD, MBA; and Seth A. Eberlin, MD

2014

2.4% CC

Simultaneous Augmentation/Mastopexy:
A Retrospective 5-Year Review of 332 Consecutive Cases

M. Bradley Calabrace, M.D., Donald R. Herdt, B.S., Kyle J. Cuthron, M.D.

Background: Of all mastopexies performed in the authors’ facility, approximately 77% of patients have an implant placed simultaneously. The unique challenges and safety concerns associated with the simultaneous aug-

3.9% CC

2013

• Does not appear to dramatically increase risk of CC?
• Place implant, close pocket, then do mastopexy
Nipple Shield

- NAC covered with adhesive shield
- 35% had + bacterial cultures

Risk of Breast Implant Bacterial Contamination From Endogenous Breast Flora, Prevention With Nipple Shields, and Implications for Biofilm Formation

Roger N. Wixtrom, PhD, DABT; Ross L. Stutman, MD; Renee M. Burke, MD; Amy K. Mahoney, BS; and Mark A. Codner, MD

No Shield: 5% CC, n=60
Shield: 0% CC, n=105
Skin Barrier

A Simple Barrier Drape for Breast Implant Placement

Kenneth C. Shestak, M.D.
Morad Askari, M.D.
Pittsburgh, Pa.
Insertion Funnel

$100 to $130

One case use

Keller Funnel & Inplant Funnel
Keller Funnel

27-fold reduction in skin contact

Contamination in Smooth Gel Breast Implant Placement: Testing a Funnel Versus Digital Insertion Technique in a Cadaver Model

2012

Hunter R. Moyer, MD; Bahaier Ghazi, MD; Neil Saunders, MD; and Albert Losken, MD
Keller Funnel

1177 patients no funnel  1.49% CC reoperation
1620 patients with funnel  0.68% CC reoperation
54% reduction (P = 0.004)

All sites that used same techniques had same or lower CC rate when using funnel
4.6% CC in control group vs 0% in Singulair group at 2 years
Postoperative Leukotriene Inhibitor

- No LTI: 5.0% CC
- Accolate: 2.2% CC ($p < 0.05$)
- Singulair: 3.3% CC
- Mentor smooth gel implants, DP, Abx irrigation
- LTI x 3 months
Capsular Contracture: Prevention & Treatment

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- ADM placement
- Different implant
- Prevention
Montelukast (Singulair)

- 19 patients with existing CC
- Singulair (10 mg QD) + massage BID
  - 11% worse
  - 16% no change
  - 26% improved
  - 37% completely improved
  - 11% prevented from having CC formation (given after surgery for CC)
- Baker II had better improvement than III & IV

Breast Surgery

Effects of Singulair (Montelukast) Treatment for Capsular Contracture

Catherine K. Huang, MD; and Neal Handel, MD

2010
Ultrasound

- Specific protocol
- Disrupts biofilm
- Allows antibiotic to work
- Not as useful for Baker 4
- No good published studies

- Prophylaxis trials
Capsular Contracture Surgery

Do something different

• Remove capsule
• New implant
• New pocket
• Use all other techniques
• Add ADM?
• Recurrent CC
  – When to stop & remove implant
  – Offer fat grafting?
Closed Capsulotomy

Not recommended

• Implant rupture
• Hematoma
• Implant pseudoherniation
• Low success long-term
Open Capsulotomy: An Effective but Overlooked Treatment for Capsular Contracture after Breast Augmentation

Eric Swanson, MD

**Background:** The prevailing theory for capsular contracture after breast augmentation is a subclinical capsular infection. A capsulectomy, site change, and implant replacement are common treatments but are associated with increased infection risk.

- **Replacements were smooth & round, 93% saline.**
- **23% developed recurrent capsular contracture.**
  - 3% experienced second recurrence.
- **Patients with ruptured gel implants had greater risk of recurrence.**
- **Capsular contracture corrected with**
  - 1 procedure in 77% of patients
  - 2 procedures in 97% of patients
- **Short follow up period**
Swanson Capsulotomy Algorithm

[Diagram of the Swanson Capsulotomy Algorithm]

1. Capsular contracture
   - Subpectoral?
     - Yes: Extensive calcification?
       - Yes: Change to subpectoral implant replacement
       - No: Subpectoral?
         - Yes: Indication for implant replacement?
           - Yes: Open capsulotomy
           - No: Open capsulotomy implant replacement
         - No: Open capsulotomy implant replacement
     - No: Change to subpectoral implant replacement
   - Yes: Change to subpectoral implant replacement

2. Implant ruptured?
   - No: Subpectoral?
     - Yes: Indication for implant replacement?
       - Yes: Open capsulotomy
       - No: Open capsulotomy implant replacement
     - No: Open capsulotomy implant replacement
   - Yes: Open capsulotomy implant replacement

3. Open capsulotomy implant replacement
   - Yes: Subpectoral?
     - Yes: Indication for implant replacement?
       - Yes: Open capsulotomy
       - No: Open capsulotomy implant replacement
     - No: Open capsulotomy implant replacement
   - No: Change to subpectoral implant replacement
Capsulectomy

Recurrence of Subglandular Breast Implant Capsular Contracture: Anterior versus Total Capsulectomy

Nicholas Collis, B.Sc., F.R.C.S.(Ed.), and David T. Sharpe, O.B.E., M.A., F.R.C.S.

West Yorkshire, England

2000

Total (vs anterior) capsulectomy when possible
Pocket & Capsule

• If subglandular
  – Capsulectomy
  – Submuscular pocket
  – Muscle sutures
  – ADM?

2003

The Correction of Capsular Contracture by Conversion to “Dual-Plane” Positioning: Technique and Outcomes

Scott L. Speer, M.D.
Mary Ella Carter, M.D.
Jason C. Gant, M.D.
Washington, D.C.

Little has been published regarding the treatment of patients with long-established capsular contracture after previous submuscular or subglandular breast augmentation. This study reviews 7 years of experience in treating established capsular contracture after augmentation mammoplasty by relocating implants.
New Pocket & Leave the Capsule

• If submuscular
  – Anterior capsulectomy \textit{versus}
  – Complete capsulectomy \textit{versus}
  – Neosubmuscular pocket
    • Between muscle & anterior capsule
    • Avoids intrathoracic penetration
  – ADM?
Patient Discussion on Intraoperative Decision Making

- Prepare patient for change in operative plan
- May not be a full capsulectomy
- May be a pocket change
- May be a neosubpectoral pocket
- May need tissue support – cost!
Site Change & New Implant

- Site change + new implant seems to give lowest recurrence
- Additional cost may be worth recurrence
ADM Evidence

- Most studies in reconstructive surgery
- Mostly short term case reports for aesthetic breast surgery
- Significant cost – not my first line option
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