nça'scer לא סופייה זוכר

Raed Salim, MD
Dep. OB/GYN
Emek Medical Center

כינוס האיגוד הישראלי למיילדות וונקולוגיה
סינפ היפת וציפון
13 בפברואר 2018
Skin closure at CD

The ideal technique for skin closure

• Prevent scar complications
  – Infection
  – Separation
  – Hematoma

• Quick

• Simple

• Cosmetics perfection – better at least 6 months

• Maximizing patient satisfaction

• Cost-effective
• Post CD surgical site infection: 3-15%

• Essential STEPS for reducing post-CD SSI and mortality
  – Recognizing the consequences
  – Developing strategies to prevent
  – Developing strategies to diagnose
  – Developing strategies to treat
3 categories according to the time of intervention:

- Pre-operative
- Intra-operative
- Post-operative
Prevention strategies

Intra-operative

• Skin closure
Skin closure

Common skin closure techniques are:

1. Sutures, subcuticular or interrupted
2. Staples
3. Glue
   - Not as much studied
Skin closure

RCTs

Staples vs sutures
Skin closure

Techniques and materials for skin closure in caesarean section

Mackeen AD, Berghella V, Larsen M.

Staples vs absorbable sutures

• 8 RCTs
• Similar outcomes in terms of
  – Wound infection
  – Pain
  – Cosmesis
• **Staples increased risk of separation**, and need for re-closure.
• However, skin separation
  – Was variably defined across trials
  – Most staples were removed < 4 POD
Conclusions

- No conclusive evidence about how the skin should be closed after CD.
- If staples are removed on POD 3, there is an increased risk of separation and need for re-closure.
Skin closure

Suture compared with staple skin closure after cesarean delivery: a randomized controlled trial.

Multicenter RCT - suture compared with staples
• LTCS
• > 23 weeks
• Primary outcome = composite wound complications
  – Infection
  – Hematoma
  – Seroma
  – separation >1 cm or longer,
  – readmission for wound complications
Skin closure

- Total 746 women
  - 370 subcuticular continuous 4-0 suture (monocryl or vicryl)
  - 376 staple - removed on POD 4–10 at the discretion of the provider.

<table>
<thead>
<tr>
<th>Wound Complication</th>
<th>Suture (n=370)</th>
<th>Staples (n=376)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients with at least 1 wound complication</td>
<td>18 (4.9)</td>
<td>40 (10.6)</td>
<td>0.43 (0.23–0.78)</td>
</tr>
<tr>
<td>Infection</td>
<td>9 (2.4)</td>
<td>14 (3.7)</td>
<td>0.64 (0.24–1.63)</td>
</tr>
<tr>
<td>Hematoma</td>
<td>2 (0.5)</td>
<td>4 (1.1)</td>
<td>0.51 (0.05–3.54)</td>
</tr>
<tr>
<td>Seroma</td>
<td>5 (1.4)</td>
<td>6 (1.6)</td>
<td>0.84 (0.20–3.32)</td>
</tr>
<tr>
<td>Separation</td>
<td>6 (1.6)</td>
<td>28 (7.4)</td>
<td>0.20 (0.07–0.51)</td>
</tr>
<tr>
<td>Readmission for wound complication</td>
<td>2 (0.5)</td>
<td>3 (0.8)</td>
<td>0.69 (0.06–6.02)</td>
</tr>
</tbody>
</table>

- Study not powered to assess a difference in wound infection alone.

Mackeen AD, Obstet Gynecol. 2014
Suture versus staples for skin closure after cesarean: a metaanalysis.


12 RCTs on 3112 women

Sutures had lower incidence of wound separations

No significant differences in

- Infection
- Hematoma
- Seroma
- Readmission
- Pain perception
- Patient satisfaction
- Cosmetic assessments between the groups

Operating time: 7 minutes longer with sutures (95% CI, 3.10-11.31).
Subcuticular suture compared with staples for skin closure after cesarean delivery: a randomized controlled trial.

Aabakke AJ et al. Obstet Gynecol. 2013 (Denmark)

- To compare subcuticular sutures with staples for skin closure
- Study design
  - RCT
  - Scheduled cesarean delivery
  - Single-center
  - Follow-up time was 6 months.
  - Each woman was her own control
Subcuticular suture compared with staples for skin closure after cesarean delivery: a randomized controlled trial.


Randomization to side distribution of staples and subcuticular sutures

Staples: removed 3 days postoperatively

Subcuticular sutures (Vicryl Rapide)
Skin closure

Subcuticular suture compared with staples for skin closure after cesarean delivery: a randomized controlled trial.

*Aabakke AJ et al. Obstet Gynecol. 2013*

**Primary outcome - 6 months postoperatively**

Women’s overall preferred side of the scar (right, left, or no difference).

**Secondary - 1 and 3 days and 3 and 6 months postoperatively**

Side distribution of separation and infection

Pain scores between the two sides of the scar

**Secondary 6-month outcomes**

Women’s preferred closure technique (sutures, staples, or no difference)

Cosmetically preferred side (right, left, or no difference)

Objective cosmetic scores assessed by two plastic surgeons
Subcuticular suture compared with staples for skin closure after cesarean delivery: a randomized controlled trial.


RESULTS

59 WOMEN

Women preferred the stapled side (OR 2.55; 95% CI 1.18–5.52)
• Infection: 4 (6.8%) cases
  • 3 on the sutured side
  • 1 bilateral.
• Pain and scar separation – no difference.
Subcuticular suture compared with staples for skin closure after cesarean delivery: a randomized controlled trial.


- No significant difference in appearance after 3 months, whereas after 6 months women preferred the stapled side.
- Wound healing being an ongoing process.
- Cosmetic evaluation requires 6 months to 1 year of follow-up.

CONCLUSION:

Staples were preferred to subcuticular suture by women after CD
Skin closure

Abstracts – SMFM 2018
37. Oral

Comparison of staples versus subcuticular suture in class III obese women undergoing cesarean delivery: a randomized controlled trial

Mary N. Zaki et al. USA

- RCT
- Staples versus subcuticular suture
- Class III obese women- BMI > 40 kg/m2
- Primary outcome: composite wound complication - 6 weeks after delivery
  - superficial or deep separation and infection.
- Secondary outcomes
  - operative time
  - blood loss
  - pain scores
  - satisfaction scores
Skin closure

37. Oral

Comparison of staples versus subcuticular suture in class III obese women undergoing cesarean delivery: a randomized controlled trial

Mary N. Zaki et al. USA

RESULTS:
Total of 242 women
  119 - staple group analyzed
  119 - subcuticular suture group analyzed

Composite wound complication rate:
  staple group - 19.3%
  subcuticular suture group - 17.6% (p=0.74)

• No differences in the rates of
  – Infection
  – Separation
  – Satisfaction scores
Skin closure

551: poster

When is the right time to remove staples after cesarean delivery? A randomized control trial
Hadas Miremberg et al. Wolfson Medical Center, Holon, Israel

- RCT
- Scheduled and non-emergent CD
- Staples removal
  - early removal - POD 4
  - late removal - POD 8
- Scars were evaluated 8 weeks after CD
When is the right time to remove staples after cesarean delivery? A randomized control trial
Hadas Miremberg et al. Wolfson Medical Center, Holon, Israel

Primary outcome measures
— Patient and Observer Scar Assessment Scale (POSAS) scores.

Secondary outcome
— SSI
— wound disruption
— hematoma
— seroma

104 women was needed to achieve a 20% difference (5 point) in the POSAS scores between the groups
When is the right time to remove staples after cesarean delivery? A randomized control trial
Hadas Miremberg et al. Wolfson Medical Center, Holon, Israel

Removal on POD 4 versus POD 8 resulted in similar outcomes
Skin closure

Suture materials for subcuticular skin closure at cesarean delivery

- Vicryl 4-0 (a braided multifilament synthetic suture;) vs Monocryl 4-0 (a monofilament synthetic suture).

- In vitro and animal studies suggest multifilament suture materials may be associated with a higher risk of wound infection

- Clinical data on their relative effectiveness are limited.
Comparison of suture materials for subcuticular skin closure at cesarean delivery.


• Choice of suture material was at the discretion of the operating physician

• Primary outcome was SSI within 30 days after CD
Comparison of suture materials for subcuticular skin closure at cesarean delivery.


• Of 1082 patients who had follow-up after discharge in the primary trial
  – 871 had subcuticular suture:
    – 180 with 4-0 Vicryl
    – 691 with 4-0 Monocryl

• No significant difference in SSI or other wound complications

• Results suggest physician preference is acceptable for choice of subcuticular suture material at CD.
Comparison of Subcuticular Suture Type for Skin Closure After Cesarean Delivery: A Randomized Controlled Trial.

*Buresch AM et al. Obstet Gynecol. 2017 Sep*

- Scheduled or nonemergent cesarean delivery
- Pfannenstiel skin incision followed by subcuticular closure with either
  1. Monocryl 3-0: poliglecaprone 25 suture.
  2. Vicryl 4-0: polyglactin 910 suture.
- Primary outcome: 1 or more of the following - 30 days postpartum:
  - surgical site infection
  - wound separation of 1 cm or greater in length
  - hematoma,
  - seroma
- To detect a reduction from 12% to 4%, 237 women per group were required.
Comparison of Subcuticular Suture Type for Skin Closure After Cesarean Delivery: A Randomized Controlled Trial.

*Buresch AM et al. Obstet Gynecol. 2017 Sep*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Poliglecaprone 25 (n=263)</th>
<th>Polyglactin 910 (n=257)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary outcome: wound composite</td>
<td>23 (8.8)</td>
<td>37 (14.4)</td>
<td>0.61 (0.37–0.99)</td>
</tr>
<tr>
<td>SSI</td>
<td>16 (6.1)</td>
<td>25 (9.7)</td>
<td>0.63 (0.34–1.14)</td>
</tr>
<tr>
<td>Hematoma</td>
<td>1 (0.4)</td>
<td>3 (1.2)</td>
<td>0.33 (0.03–3.11)</td>
</tr>
<tr>
<td>Seroma</td>
<td>2 (0.8)</td>
<td>1 (0.4)</td>
<td>1.95 (0.18–21.42)</td>
</tr>
<tr>
<td>Separation</td>
<td>7 (2.7)</td>
<td>13 (5.1)</td>
<td>0.53 (0.21–1.30)</td>
</tr>
<tr>
<td>Classification of SSI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial</td>
<td>7 (2.7)</td>
<td>9 (3.5)</td>
<td>0.76 (0.29–2.01)</td>
</tr>
<tr>
<td>Deep</td>
<td>6 (2.3)</td>
<td>10 (3.9)</td>
<td>0.59 (0.22–1.59)</td>
</tr>
<tr>
<td>Organ</td>
<td>3 (1.1)</td>
<td>6 (2.3)</td>
<td>0.49 (0.12–1.93)</td>
</tr>
</tbody>
</table>

NNT to prevent one composite wound complication was 18
## Skin closure

Comparison of Subcuticular Suture Type for Skin Closure After Cesarean Delivery: A Randomized Controlled Trial.

*Buresch AM et al. Obstet Gynecol. 2017 Sep*

When groups were analyzed by actual suture received

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Poliglecaprone 25 (n=265)</th>
<th>Polyglactin 910 (n=217)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
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<tr>
<td><strong>Primary outcome: wound composite</strong></td>
<td>22 (8.3)</td>
<td>30 (13.8)</td>
<td>0.60 (0.36–1.01)</td>
</tr>
<tr>
<td>SSI</td>
<td>16 (6.0)</td>
<td>20 (9.2)</td>
<td>0.66 (0.35–1.23)</td>
</tr>
<tr>
<td>Hematoma</td>
<td>1 (0.4)</td>
<td>2 (0.9)</td>
<td>0.41 (0.04–4.49)</td>
</tr>
<tr>
<td>Seroma</td>
<td>1 (0.4)</td>
<td>2 (0.9)</td>
<td>0.41 (0.04–4.49)</td>
</tr>
<tr>
<td>Separation</td>
<td>8 (3.0)</td>
<td>8 (3.7)</td>
<td>0.82 (0.31–2.15)</td>
</tr>
<tr>
<td><strong>Classification of SSI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial</td>
<td>6 (2.3)</td>
<td>8 (3.7)</td>
<td>0.61 (0.22–1.74)</td>
</tr>
<tr>
<td>Deep</td>
<td>6 (2.3)</td>
<td>8 (3.7)</td>
<td>0.61 (0.22–1.74)</td>
</tr>
<tr>
<td>Organ</td>
<td>4 (1.5)</td>
<td>4 (1.8)</td>
<td>0.82 (0.21–3.24)</td>
</tr>
</tbody>
</table>

RR, relative risk; SSI, surgical site infection.
Data are n (%) unless otherwise specified.
Skin closure

TO GLUE OR NOT TO GLUE
Skin closure

Cesarean section, techniques and skin suture materials.


- **NOT - RCT**
- To compare, complications and costs of 3 skin suture techniques
  1. 98 - non-reabsorbable sutures
  2. 90 - metallic clips
  3. 112 - Glue (Dermabond)
- Outcomes at 4 days and 2 months:
  - cosmetic outcome
  - strength of incision closure
  - allergic reactions
  - suture infection
  - total costs
Skin closure

Cesarean section, techniques and skin suture materials.

• NOT - RCT
• To compare, complications and costs of 3 skin suture techniques
  1. 98 - non-reabsorbable sutures
  2. 90 - metallic clips
  3. 112 - Glue (Dermabond)

Results
  – Similar
  – Suture less costly
Skin closure of pfannenstiel incision with dermabond, staples, or suture during cesarean delivery: experience of a single attending.

*Siddiqui DS at al, Am J Perinatol. 2013. Danish*

- Retrospective
- Rates of wound separation and SSI by a single surgeon 211 CDs:
  1. Dermabond - 85
  2. Staples - 76
  3. Suture - 50
Skin closure of pfannenstiel incision with dermabond, staples, or suture during cesarean delivery: experience of a single attending.  
*Siddiqui DS at al, Am J Perinatol. 2013*

- **Overall wound separation rate was 7%**
  - Dermabond - 5%
  - Staple - 13%
  - Suture - 2%
  - $p = 0.09$ ............ Dermabond versus staple
  - $p = 0.65$ ............. Dermabond versus suture

- The overall SSI rate was 1.9%
- Randomization of 4325 women is needed to determine if Dermabond has one-third less wound complication than suture.
Skin closure

Glue (Dermabond) vs monofilament (Monocryl) epidermal sutures

Daykan Y, Am J Obstet Gynecol. Meir Medical Center, Kfar Saba, Israel; Apr, 2017

- RCT
- Scheduled cesarean delivery
- 5 surgeons participated in the study
- Primary outcome measures
  - Patient and Observer Scar Assessment Scale scores 8 weeks after the CD
- Secondary outcome measures
  - Duration of surgery
  - SSI or wound disruption (hematoma or seroma)
Skin closure

Glue (Dermabond) vs monofilament (Monocryl) epidermal sutures


- In the glue group, 2 layers of Dermabond were used:
  1. To attach the skin edges
  2. 60 seconds later, TO
     - improve the strength of the adhesion
     - create a barrier to decrease wound infections
- The wound was not dressed with an abdominal pad or adhesive tape
Skin closure

Glue (Dermabond) vs monofilament (Monocryl) epidermal sutures


• In the suture group:
  – the skin was closed with Monocryl 3-0
  – Steri-Strips were used vertically to cover the entire incision
Skin closure

Glue (Dermabond) vs monofilament (Monocryl) epidermal sutures


- 104 women in both groups
- Power analysis based on the assumption that a 20% (5-point) difference in POSAS score would influence the clinical decision

### TABLE 4

<table>
<thead>
<tr>
<th>Score</th>
<th>Glue</th>
<th>Suture</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSAS</td>
<td>16.4 ± 6.4 (4–36)</td>
<td>16.9 ± 6.2 (5–28)</td>
<td>.710</td>
</tr>
<tr>
<td>OSAS</td>
<td>12.4 ± 5.6 (6–27)</td>
<td>11.7 ± 5.2 (4–25)</td>
<td>.568</td>
</tr>
</tbody>
</table>

*Values are expressed as mean ± SD (range).*

*OSAS, Observer Scar Assessment Scale; PSAS, Patient Scar Assessment Scale.*

# Skin closure

Glue (Dermabond) vs monofilament (Monocryl) epidermal sutures


<table>
<thead>
<tr>
<th>Variable</th>
<th>Glue n = 52</th>
<th>Suture n = 52</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time, min, mean ± SD</td>
<td>37.4 ± 10.4</td>
<td>39 ± 13.4</td>
<td>.515</td>
</tr>
<tr>
<td>Subcutaneous thickness &gt;2 cm, n (%)</td>
<td>26 (50)</td>
<td>30 (58)</td>
<td>.431</td>
</tr>
<tr>
<td>Patient with hemoglobin decrease ≥2 g%, n (%)</td>
<td>3 (5.7)</td>
<td>2 (3.8)</td>
<td>.646</td>
</tr>
<tr>
<td>Blood transfusion, mean ± SD</td>
<td>1 (1.9%)</td>
<td>0</td>
<td>.314</td>
</tr>
<tr>
<td>Postpartum fever &gt;38°C, n (%)</td>
<td>1 (1.9)</td>
<td>1 (1.9)</td>
<td>1</td>
</tr>
<tr>
<td>Prolonged hospitalization ≥5 d, n (%)</td>
<td>1 (1.9)</td>
<td>1 (1.9)</td>
<td>1</td>
</tr>
<tr>
<td>Surgical site infection, n (%)</td>
<td>3 (5.7)</td>
<td>1 (1.9)</td>
<td>.212</td>
</tr>
<tr>
<td>Wound disruption n (%)</td>
<td>2 (3.8)</td>
<td>0</td>
<td>.153</td>
</tr>
</tbody>
</table>

Skin closure in CS

Summary

Staples

- Probably quicker

Sutures

- Probably less separation

Glue

- Not as much studied
תורדה על hakkישבה
Skin closure

Subcutaneous tissue closure

Reduced wound composite morbidity (RR 0.68; 95% CI 0.52-0.88; p = 0.0039).

- Hematoma
- Seroma
- Wound infection
- Wound separation

No difference in wound infection alone or other short-term outcomes

Anderson ER, Cochrane Database Syst Rev. 2004
In regard to subcutaneous thickness

• Depth is <2 cm, no difference in wound disruption between closure and non-closure.

• Thickness >2 cm, closure decreased wound complications (RR 0.66; 95% CI 0.48-0.91) and is recommended.  

• Subcutaneous drainage, regardless of tissue thickness, was not associated with decreased wound morbidity
Sutures versus staples for skin closure after cesarean delivery. Does the type of suture matter? A direct and indirect comparison meta-analysis.

Rubymel Jijon-Knupp, et al, Florida, USA.

**Staples versus absorbable and non-absorbable sutures**

21 trials (not all RCT) = 4,154 patients

Postoperative wound infections - when compared with staples:
- Non-absorbable sutures reduced the risk (OR 0.15, 95% CI 0.07, 0.29).
- Absorbable sutures reduced the risk (OR 0.41, 95% CI 0.30, 0.57).
- Non-absorbable sutures had a 66% probability of being the best treatment.