Hemostasis in Breast Surgery

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Surgery inevitably leads to bleeding

Haemostasis in surgery must be:

• Effective
• Secure
• Fast
• Economic
Hemostasis occurs with complex and well-articulated mechanisms.
Hemostasis in Surgery

- The surgeon and the anesthesiologist must be aware of any preoperative coagulation disorders through:
  - Case history
  - Platelet count
  - PT, APTT, fibrinogen

..... if necessary dosage of: factors of coagulations
  AT III, protein S, C, etc
HEMOSTASIS IN SURGERY

Hemostasis aims at reducing...

Hematoma formation

Rebleeding

The amount of blood loss

Repeat Surgery And Transfusions
- Various locally applicable agents are in use for improving the hemostasis:
  - Gelatin (Gelaspon, Spongostan etc)
  - Gelatin-trombin-matrix (Floseal)
  - Collagen (Hemocel, Mediforme, etc)
  - Oxidized regenerated cellulose (Tabotamp)
  - Fibrin sealant glues (Tissucol, Quixil, etc)
  - Synthetic glues (Coseal)
  - Etc

- Systemic hemostasis may be achieved with inhibitors of fibrinolysis (epsilon-aminocaproic acid or tranexamic acid and aprotinin), but the use of these substances in surgery is discussed.

- The role of recombinant activated factor VII in achieving systemic hemostasis is being investigated

In Breast Surgery these substances are used exceptionally.
Hemostasis in Breast Surgery

A variety of surgical cutting and coagulation devices have been evaluated in attempts to reduce the complications of breast surgery

- Ligations
- Electrocautery mono or bipolar
- Laser scalpel
- Harmonic scalpel
Hemostasis in Breast Surgery

• Most studies comparing surgical techniques in breast surgery are retrospective and nonrandomized

• Electrocautery is universally used and has been thoroughly investigated

• It achieves effective hemostasis but increases the incidence of seroma for thermal effect on the tissues
Ultrasound Harmonic Scalpel

The instrument consists of a generator delivering electrical energy to a handpiece, where the energy is transformed via a piezoelectric crystal system into mechanical energy in the form of vibrations. The blade or tip of the instrument vibrates axially with a constant frequency of 55000 HZ. The energy liberated as an ultrasound wave is applied directly to the tissue. The application of ultrasound allows three effects, which act synergically at all times: cavitation, coaptation/coagulation and cutting. The longitudinal extension of the vibration can be varied between 25 and 100 microm in five steps.
Serial section of 5 microns stained with hematoxylin-eosin of the external mammary vein, dissected with the ultrasonic scalpel. Thickening of the parietal cell components and collagen. Perfect fusion of intimal endothelial cells with indistinct margins and fusiform nuclei. Subintimal space is clearly visible, the middle layer is loose with evidence of interstitial edema. Not observed hemorrhagic or necrotic areas.
Mastectomy using ultrasonic dissection: effect on seroma formation
*The Breast* 2003; 12: 338-41

Ultrasound scalpel vs scissors/electrocautery

There is no statistically significant difference between the two methods in terms of:

- Peroperative bleeding
- Postoperative hematoma
- Drainage volume of the axilla
- No. of seroma
- No. of seroma punctures
- No. of wound infections
- No. of wound necrosis
- Operating time
Ultracision reduces acute blood loss but not seroma formation after mastectomy and axillary dissection: a pilot study
*Int J Clin Pract* 2006; 60:562-564

Harmonic scalpel vs scissors/electrocautery

- Acute blood loss was reduced
- There was little difference in terms of day hospital stay, volume or duration of postoperative drainage or subsequent aspiration of seroma
<table>
<thead>
<tr>
<th></th>
<th>Study Patients</th>
<th>Historical data</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>30</td>
<td>30</td>
<td>NS</td>
</tr>
<tr>
<td>Age*</td>
<td>61 (39 – 81)</td>
<td>65 (42 – 78)</td>
<td>NS</td>
</tr>
<tr>
<td>Tumor size (mm)*</td>
<td>18 (0.7 – 35)</td>
<td>16 (0.9 – 29)</td>
<td>NS</td>
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<tr>
<td>No. of nodes removed*</td>
<td>24 (18 – 32)</td>
<td>22 (17 – 30)</td>
<td>NS</td>
</tr>
<tr>
<td>Nodes with metastasis*</td>
<td>3 (0 – 5)</td>
<td>1 (0 – 8)</td>
<td>NS</td>
</tr>
<tr>
<td>BMI*</td>
<td>23 (19 – 26)</td>
<td>24 (20 – 25)</td>
<td>NS</td>
</tr>
<tr>
<td>Conservative surgery</td>
<td>25</td>
<td>25</td>
<td>NS</td>
</tr>
<tr>
<td>Mastectomy</td>
<td>5</td>
<td>5</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Median (range)
The entire surgical procedure was made using only US scalpel in accordance with a standardized surgical technique.

Blood and lymphatic vessels directed from breast and chest wall towards axilla are dissected by harmonic scalpel.
A plane of dissection along the inferior border of the axillary vein is found and all the blood and lymphatic vessels are interrupted by harmonic scalpel.
Axillary Dissection I - II level
## RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Harmonic scalpel</th>
<th>Historical data</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (min) *</td>
<td>115 (90-180)</td>
<td>120 (80 – 170)</td>
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<tr>
<td>No. Intraoperative bleeding</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>No. Postoperative bleeding</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Drainage volume chest wall (ml/day)*</td>
<td>30 (25 – 40)</td>
<td>50 (30 – 60)</td>
<td>NS</td>
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<tr>
<td>No. days of suction drain chest wall *</td>
<td>2 (1 – 3)</td>
<td>3 (2 – 4)</td>
<td>NS</td>
</tr>
<tr>
<td>Drainage volume axilla (ml/day)*</td>
<td>60 (50 – 70)</td>
<td>200 (100 – 350)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>No. of aspirations for axilla seroma *</td>
<td>0</td>
<td>4 (2 – 6)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>No. Wound infection</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Upper limb lymphedema (%)</td>
<td>0</td>
<td>2 (4.4)</td>
<td>NS</td>
</tr>
<tr>
<td>Hospitalization stay *</td>
<td>3 (3 – 4)</td>
<td>5 (4 – 6)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*Median (range)

The operative time of the entire operation is not different but we observed that with US scalpel the axillary dissection is shorter and breast resection is longer with respect to electrocautery.

No significant difference was seen in intraoperative blood loss, postoperative hematoma; but significant differences were observed in volume seroma, No. of seroma and No. punctures seroma of the axilla.
CONCLUSIONS

• In our experience the use of the Harmonic scalpel is justified only for reduction of axillary seromas

• The benefits of using ultrasonic energy should be lesser thermal injury to the tissue and better sealing off of small vessel and lymphatic channels

• Conservative breast surgery is more difficult with the ultrasonic scalpel and there are no significant differences compared to electrosurgical device

• A complete axillary dissection can be performed only with US scalpel without ligations because the closure of the blood vessels is effective, secure and fast

• Actually the technique has a severe economic disadvantage

• Further prospective randomized Trials comparing Harmonic Scalpel and conventional techniques are needed to study the impact on morbidity
THANK YOU FOR YOUR ATTENTION