Magnetic Sentinel Lymph Node Localisation in Breast Cancer – Background and First Experience

Facing cancer management together – adding value to lesion localisation and lymph node staging

Paepke, Stefan: Technische Universität München, Comprehensive Cancer Center 15.02.2019
Sentinel - Localization

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DCIS- Recurrence (BCS 7/2017; DCIS periareolar, 5 cm)
Sienna+®: magnetic localization of SLN + staining

- **Non-radioactive** detection system to magnetically mark and locate sentinel lymph nodes prior to their surgical removal and subsequent analysis.

- **Sienna+®** ➔ magnetic tracer
- **Sentimag®** ➔ handheld detector

- Designed for SN localization
- **Superparamagnetic Iron Oxide Particles (SPIOs)**
- **Nanoparticle size** (59 nm) optimized for lymph node uptake
- **Quantifiable magnetic and visual signal** due to blackish-brown coloration of SPIOs
The Procedure – 3 days to 30 min before surgery

Injection

Compression

Massage
Preoperative Control-Measurement

Sonographically Re-Investigation (Tumour and Sentinel)
Intraoperative Measurement

Signal-guided Excision

Visualization

Ex-vivo Measurement
Sentimag® / Magtrace®
Clinical Data BC

Summary and Results in 1300+ BC-patients

Detection rate per patient

97% (Sienna+® / Magtrace®)
97% (Standard)

Concordance

98%

Malignancy detection rate per patient

95% (Sienna+® / Magtrace®)
94% (Standard)

Malignancy concordance

98%

Average nodes

2.0 (Sienna+® / Magtrace®)
1.9 (Standard)

Details in Sysmex BC Publication Spotlight
Masterclass-Programm Senologie
Agenda 07.02.2019

9:30 Uhr
Eintreffen der Teilnehmer, kurze Stärkung

10:00 Uhr
Einführung und kurze Vorstellungsrunde

10:15 Uhr – 11:00 Uhr
**Schwerpunkt 1:**
Prä- und intraoperative Bildgebung

11:00 Uhr
**Live-OP:** brusterhaltende OP mit intraoperativer Bildgebung, Sentimax-gestützte Sentinel Lymph Node Biopsy
Prof. Dr. med. Markus Hahn/Dr. med. Stefan Paepke

Versetzt/parallel

**Live-OP:** subkutane Mastektomie mit implantbasierter und materialunterstützter Rekonstruktion
Prof. Dr. med. Ralf Ohlinger/Dr. med. Stefan Paepke

c. 13:00 Uhr
Lunch mit kurzer Kaffeepause und bio-break

13:30 Uhr – 17:00 Uhr
**Schwerpunkt 2**
Rekonstruktive Mammachirurgie

17:00 Uhr
Besprechen und Anzeichen der Patientinnen für die Live-OP's der AWOgyn-Tagung
Sentinel - Targeted Axillary Dissection
(Context: Primary Systemic Treatment in iN+)

Facing cancer management together –
adding value to lesion localisation and lymph node staging

Paepke, Stefan: Technische Universität München, Comprehensive Cancer Center

15.02.2019
Context: Sentinel Lymph Node Biopsy beyond PST

Sentinel node after neoadjuvant chemotherapy in patient with axillary node involvement: the French GANEA 2 prospective multi-institutional trial


Background

Neoadjuvant chemotherapy is a standard treatment for operable breast cancer that has no axillary lymph node involvement at the time of lymphadenectomy. Sentinel lymph node detection (SLND), performed in patients with breast cancer, can be spared of an axillary lymph node dissection in the case of a negative sentinel node biopsy (SNB) on frozen section analysis. However, the feasibility of SLND after patients clinically assessed as NO1 has been shown.

Objective

The aim of our prospective multi-institutional study was to assess the identification rate and the false negative rate of SLND after NAC in the particular case of patients with a proved axillary lymph node involvement before NAC.

Patients - Methods

Inclusion criteria: FIGO T2-T3, indication of NAC, surgery (radical or conservative) after NAC, axillary lymph node involvement before NAC.

Exclusion criteria: inflammatory cancer, local relapse, NAC interrupted due to progressive disease.

Design: Diagnosis and indication to plan a NAC, control of axillary lymph node involvement, control of axillary lymph node involvement, axillary sonography with fine needle cytology before NAC. After NAC patients with a positive cytology underwent both SLND, with Blue dye and radioactive colloid, and complementary ALND.

Pathological procedure: carried out according to standard methods, according to the last American Joint Committee staging system and Sataloff classification.

Studied parameters were detection rate, false negative rate and Sataloff grading on tumor and lymph nodes. We evaluated particularly the likelihood that the FNR in patients with one or more SLN examined was greater than 10%.

Results

From July 2010 to February 2014, 270 patients from 18 institutions were enrolled, with a proven axillary lymph node involvement before NAC.

Detection rate was 83.7% (226/270). From the 226 patients detected, 47.3% had macro metastasis (107/226), 10.2% a micro metastasis (23/226) and 42.5% sentinel node free (96/226). In cases of detection failure 56% had involved lymphadenectomy.

The false negative rate was 14.6% in the whole series.

In the case of only 1 SLN resected, the false negative rate was 23% and 12% in case of more than 2 SLN resected.

Results of Sataloff grading will be part of a further communication.

Conclusion

Before NAC an axillary sonography +/- cytology is warranted. For patients with a proved axillary node involvement, SLND detection with a combined technique may be performed after NAC with a complementary lymphadenectomy in case of SLND involvement, in case of detection failure or in case of only one SLN detected.
# pCR-rate beyond PST 2003-2014

<table>
<thead>
<tr>
<th></th>
<th>pCR ypT0ypN0 In %</th>
<th>pCR Her2 ypT0ypN0 In %</th>
<th>pCR TNBC ypT0ypN0 In%</th>
<th>pCR HR + ypT0ypN0 In%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>12,33</td>
<td>23,81</td>
<td>45,45</td>
<td>4,49</td>
</tr>
<tr>
<td>2010</td>
<td>26,32</td>
<td>45,45</td>
<td>22,73</td>
<td>20,45</td>
</tr>
<tr>
<td>2014</td>
<td>35,29</td>
<td>67,74</td>
<td>45,71</td>
<td>22,82</td>
</tr>
</tbody>
</table>
AGO
SLNB/Axilla nach PST
Szenario 3

cN+ → pN+ (FNA/CNB) → ycN0 → SLNB (allein)
2b B +/-
→ ycN+ → ALND
2b B +
→ ypN+ (FNA/CNB) → ALND
2b B ++
Targeted Axillary Dissection

European Journal of Surgical Oncology

Wire localization of clip-marked axillary lymph nodes in breast cancer patients treated with neoadjuvant chemotherapy

Steffi Hartmann, Angrit Stachs

A New Tool to Intraoperative Ultrasound-Guided Excision of Axillary Clumps in Patients with Neoadjuvant Treatment

Christian Sitz, Martin Espinosa-Bravo, MD, Neus Rus, MD, Octavi Cordoba, MD, Roberto Rodriguez, MD, Vicente Pég, MD, and Isabel T. Rubio, MD, PhD

N = 30
Detektionsrate: 70,8 %

N = 46
Detektionsrate: 96,7 %
TAD

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>1 SLN</th>
<th>2 SLN</th>
<th>3 SLN</th>
<th>&gt; 3 SLN</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSABP B 32</td>
<td>9,8%</td>
<td>17,7%</td>
<td>10,0%</td>
<td>6,9%</td>
<td>6,5%</td>
</tr>
<tr>
<td>SENTINA</td>
<td>14,2%</td>
<td>24,3%</td>
<td>18,5%</td>
<td>4,9%</td>
<td></td>
</tr>
<tr>
<td>ACOSOG 1071</td>
<td>14,7%</td>
<td>31,5%</td>
<td>21,1%</td>
<td>9,0%</td>
<td>9,09%</td>
</tr>
</tbody>
</table>

Primary Surgery

24 % der Fälle

After PST

22 % der Fälle

34 % der Fälle
Sentinel + TAD


Abigail S. Caudle, Wei T. Yang, Savithi Krishnamurthy, Elizabeth A. Mittendorf, Dallah M. Black, Michael Z. Gilcrease, Isabelle Bedrosian, Brian P. Hobbs, Sarah M. DeSnyder, Rosa F. Hwang, Beatriz E. Adrada, Simona F. Shaitelman, Mariana Chavez-MacGregor, Benjamin D. Smith, Rosalind P. Candelaria, Gidy V. Babiera, Basak E. Dogan, Lusmarie Santiago, Kelly K. Hunt, and Henry M. Kuerer

SLNB alone: 10.1 %

TLB: 4.2 %

SLNB + TLB (TAD): 2.0 %

False-negative rate
SLN alone = 10.1% (95% CI 4.2 to 19.8)
SLN + evaluation of the clipped node = 1.4% (95% CI, 0.03 to 7.3)
P = .03

Discussion

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Data

Sentinel Node and Recurrent Breast Cancer (SNARB) study

Sicherheit von Re-Sentinel nach Lokalrezidiv

- Multizenter Registerstudie (Holland)
- Dual mapping Technik
- 63% detection rate
- 201/515 mit neg. SLND
- 22.4% mit RT
- 63.2% mit Systemtherapie
- Follow-up 4.7 (range 0.9–12.7) Jahre

- 2 mit axillärem Rezidiv (1%)
- 7 mit regionärem Rezidiv (3.5%)
- Total 4.5% regionäres Rezidiv

<table>
<thead>
<tr>
<th>Author</th>
<th>Patients (N)</th>
<th>Follow-up after IBTR (months)</th>
<th>Regional recurrence</th>
<th>Ipsilateral axillary recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agarwal et al.</td>
<td>1</td>
<td>25</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Boughey et al.</td>
<td>8</td>
<td>Median 13 (of 13 patients)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Roumen et al.</td>
<td>2</td>
<td>Mean 14</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Barone et al.</td>
<td>14</td>
<td>Mean 15 (of 19 patients)</td>
<td>–</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Port et al.</td>
<td>31</td>
<td>Mean 26.4 (of 115 patients)</td>
<td>–</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Cox et al.</td>
<td>36</td>
<td>Mean 26 (of 56 patients)</td>
<td>–</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Karam et al.</td>
<td>7</td>
<td>Mean 33.3 (of 11 patients)</td>
<td>–</td>
<td>1/7 (14.3%)</td>
</tr>
<tr>
<td>Kaur et al.</td>
<td>3</td>
<td>Mean 21.6 (of 45 patients)</td>
<td>–</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Doris et al.</td>
<td>2</td>
<td>Mean 12</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Tokmak et al.</td>
<td>5</td>
<td>Mean 27 (of 6 patients)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Matsumoto et al.</td>
<td>27</td>
<td>Median 40.3 (of 28 patients)</td>
<td>–</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Innis et al.</td>
<td>171</td>
<td>All 60 (of 196 patients)</td>
<td>–</td>
<td>8/212 (3.9%)*</td>
</tr>
<tr>
<td>Uth et al.</td>
<td>47</td>
<td>Median 38 (of 144 patients)</td>
<td>–</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Karrakli et al.</td>
<td>15</td>
<td>Mean 36 (of 39 patients)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Johnson et al.</td>
<td>8</td>
<td>Mean 55.5 (of 12 patients)</td>
<td>1/8 (12.5%)*</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>15 Articles</td>
<td>376 patients</td>
<td>Range 12–60 (1–3 years)</td>
<td>1/33 (3.0%)</td>
<td>9/376 (2.4%)</td>
</tr>
</tbody>
</table>

Poodt IGM et al Ann Surg Oncol 2018

18.01.2019
Targeted Axillary Dissection (TAD)
Clip and/ or Seed localisation (MARI) of a positive lymph node at the time of biopsy and targeted resection of this lymph node after PST.

Fußzeile