Rates of Presurgical Underestimation of Breast Cancer after Standardized Assessment of Breast Calcifications

Raten präoperativer Unterschätzung von Brustkrebs bei standardisierter Abklärung von Mikroverkalkungen der Brust

Authors

L. Timpe¹, S. Berkemeyer¹, M. Puesken¹, J. Tio², W. Heindel¹, S. Weigel¹

Affiliations

¹ Department of Clinical Radiology and Reference Center for Mammography, University Hospital Muenster, Germany
² Department of Gynecology and Obstetrics, University Hospital Muenster, Germany

Key words

- breast
- breast cancer
- biopsy breast
- ultrasound
- vacuum-assisted biopsy
- quality assurance

Abstract

Purpose: To determine the frequency of histopathological underestimation of breast cancer after vacuum-assisted biopsy (VAB) in standardized assessment of breast calcifications compared to postsurgical diagnosis.

Materials and Methods: The retrospective study included acquired data of 506 consecutively examined women, who underwent VAB for the assessment of pure calcifications after standardized digital mammographic and sonographic imaging. 119/506 (24.5%) women underwent further surgical procedures: 37 women had a surgical diagnostic excision biopsy, 82 women a surgical procedure based on a therapeutic concept. Presurgical results of VAB were compared with the postsurgical histopathological reports.

Results: In 91/119 women (76.5%) the final histology was malignant. The rate of ductal carcinoma in situ (DCIS) was 79.1 % (72/91) and the rate of invasive carcinoma was 20.9 % (19/91). In 9/37 women with diagnostic excision biopsy, the presurgical status of benign or uncertain changed to a postsurgical diagnosis of malignant (24.3 %). In eight cases underestimation included DCIS (21.6 %) and in one case invasive cancer (2.7 %). Seven of the nine underestimated cases (77.8 %) resulted from excision biopsy of atypical epithelial proliferation of ductal type (AEPDT, positive predictiv value 30.4 % (7/23)). After surgery due to DCIS in 7/71 women invasive breast cancer was diagnosed (9.9 %). In 11/82 women with oncological surgery, invasive cancer was already diagnosed by VAB.

Conclusion: Underestimation of invasive cancer in terms of presurgical DCIS diagnosis can be minimized by the standardized assessment protocol to about 10 %. Underestimation of DCIS is mainly related to presurgical diagnosis of AEPDT.

Zusammenfassung

Ziel: Häufigkeitsbestimmung histopathologischer Brustkrebsunterschätzung nach Vakuumsaugbiopsie (VSB) in der standardisierten Abklärung von Mikroverkalkungen der Brust im Vergleich zur postoperativen Diagnose.


Ergebnisse: Bei 91/119 Frauen (76,5 %) war die endgültige Histologie maligne. Der Anteil des duktalischen Carcinoma in situ (DCIS) betrug 79,1 % (72/91), der Anteil der invasiven Karzinome 20,9 % (19/91). Bei 9/37 Frauen mit diagnostischen Exzisionen änderte sich die präoperative benign, bzw. unklare Dignität zu einer postoperativen malignen Diagnose (24,3 %). In acht Fällen betraf die Diagnoseunterschätzung das DCIS (21,6 %) und in einem Fall invasiven Brustkrebs (2,7 %). Sieben von neun unterschätzte Fälle (77,8 %) resultierten aus der diagnostischen Exzision atypischer epithelialer Proliferationen vom duktal Typ (AEPDT, positiver prädiktiver Wert 30,4 % (7/23)). Bei präoperativer DCIS-Diagnose wurde bei 7/71 Frauen postoperativ invasiver Brustkrebs diagnostiziert (9,9 %). Bei 11/82 Frauen mit einer onkologisch geplanten Operation wurde invasiver Brustkrebs bereits durch die VSB diagnostiziert.

Schlussfolgerung: Die präoperative Unterschätzung einer DCIS-Diagnose nach VSB bei postope-
The standardized use of digital mammographic and sono-
graphic imaging prior to vacuum-assisted biopsy is suitable
for minimizing underestimation of invasive breast cancer.
AEPDT represents a high risk diagnosis for underestimation of
DCIS.

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Key Points:
- The standardized use of digital mammographic and sono-
graphic imaging prior to vacuum-assisted biopsy is suitable
for minimizing underestimation of invasive breast cancer.
AEPDT represents a high risk diagnosis for underestimation of
DCIS.

Materials and Methods

Previous reports have focused on lesion-related and device-relat-
ed factors influencing underestimation after percutaneous biopsy
in relation to postsurgical histology [1] defined as an upgrade
of a benign lesion or a lesion with an uncertain malignant poten-
tial to a malignant diagnosis or upgrade of a diagnosis of ductal
carcinoma in situ (DCIS) to invasive breast cancer. Underestima-
tion of DCIS occurs more frequently with large-core biopsy than
with vacuum-assisted biopsy (VAB) [2]. Further risk factors are
high-grade lesion at diagnostic excision biopsy, lesion size great-
er than 20 mm in diameter at radiological imaging, palpability
and mammographic masses [1].

Purpose

The standardized use of digital mammographic and sono-
graphic imaging prior to vacuum-assisted biopsy is suitable
for minimizing underestimation of invasive breast cancer.
AEPDT represents a high risk diagnosis for underestimation of
DCIS.

Materials and Methods

Study group

The retrospective study included acquired data of 506 consecu-
tively examined women, who underwent VAB for the assess-
ment of pure calcifications after participation in one digital unit of
the national mammography screening program [5, 6] within 30
months (January 2010 to June 2013). After VAB, correlation between imaging characteristics and histo-
pathological morphology was proven in all cases by a multidiscipli-
ary conference.

In 382 of 506 women (75.5 %) after VAB no further surgical proce-
dure was recommended. 358 of these VABs were coded with the
histopathological category B2 (benign lesions: cystic alterations,
adenosis n = 298, fibroadenoma n = 51, fat necrosis n = 6, periduc-
tal mastitis n = 3) and 24 were coded with B3 (lesions of uncertain
malignant potential: lobular neoplasia n = 16, small papilloma re-
moved n = 4, small radial scar not depicted by imaging n = 4) as
described by the European guidelines [5].

Follow-up of women with B2 lesions without recommended sur-
gery was available for 305 of 358 women (85.2 %) as follows: 221
women had a normal screening mammogram two years later, 84
women had follow-up examinations after biopsy at the hospital
during the screening interval; invasive breast cancer ≤ 10 mm in
size was diagnosed in one woman in a different quadrant to the
performed VAB at an interval of 15 months. Follow-up of women
with B3 lesions without recommended surgery was available for
22 of 24 women (91.7 %) with the following results: 15 women
had a normal screening examination two years later, 7 women
had an individual follow-up scheme with shorter intervals than
two years; no cancer occurred. No follow-up was available in 55
women (with B2 lesions n = 53, with B3 lesions n = 2).

In 124 of 506 women (24.5 %) after VAB further surgical proce-
dures were indicated. In 119 of 124 women (96.0 %) surgery
was performed and data were available for evaluation. 37 of
119 women (31.1 %) underwent a surgical diagnostic excision
biopsy. Diagnostic excisions were indicated due to histological
risk lesions (n = 36) or a histological benign lesion in the assess-
ment of linear calcifications (n = 1) [5, 7] (Table 1). 82 of 119
women (68.9 %) had a surgical procedure based on a therapeutic
concept (Table 1).

Standardized assessment of calcifications

Assessment took place at a specialized breast diagnostic unit at a
university hospital. Two breast radiologists performed standard-
ized additional imaging procedures for the assessment of calcifi-
cations, including digital magnification views crano-caudal and
latero-medial (Selenia, Dimensions; Hologic, Bedford, Mass) [8]
and high-resolution ultrasound (Acuson S2000; Siemens Health-
care, Erlangen, Germany). Clinical examination and ultrasound of
the whole breast were added systematically to verify the absence
of an associated mass as well as to assess the axillary lymph
nodes. With knowledge of additional imaging and clinical exam-
ination during the assessment process, radiologists documented
the lesion morphology in the screening software (MaSc; KVIT,
Dortmund, Germany). Calcifications without an additional mass,
identified by described imaging, were called pure calcifications.
For study purposes lesion data were extracted from the screening
software. Diameters of areas of suspicious calcifications were es-
timated on the magnification views pre-VAB. In cases of pure sus-
picious calcifications, vacuum-assisted biopsy was performed by
two breast radiologists (96, mean number of samples 12, range
7 to 20). Post-biopsy mammograms crano-caudal and latero-
medial were obtained. Samples were examined by two special-
ized pathologists. Lesions were categorized according to the B
categories as described by the European guidelines (Table 1).
Surgical excision was defined as follows:

1 Histologically benign lesion in the assessment of linear calcifications, correlation was based on non-comedo calcifications in dilated ducts; surgery revealed that the DCIS had a weak correlation of DCIS with calcifications.

Histologisch gutartige Läsion resultierend aus der Abklärung linearer Mikrokalkkalung, die Korrelation basierte auf Non-Komedonkronen in dilatierten Gängen; die Operation erbrachte, dass das DCIS eine schwache Mikrokalkkorrelation aufwies.

Diagnostic excision biopsy was indicated independently of residual parts of the lesion by imaging.

Diagnostische Exzisionen wurden unabhängig von mammografischen Restverkal- kungen indiziert.

Diagnostic excision biopsy was indicated if residual parts of the lesion were suspected.

Diagnostische Exzisionen wurden in Abhängigkeit von residuvalen Befunden indiziert.

Sizes of areas of suspicious calcifications on magnification views pre-VAB were measured to calculate the median and range. Post-VAB the mammographic complete versus incomplete removal of calcifications was determined.

**Results**

In 91 of 119 women undergoing surgery (76.5%), the final histology was malignant. Among these diagnoses, the rate of ductal carcinoma in situ (DCIS) was 79.1% (72/91) and the rate for invasive carcinoma was 20.9% (19/91).

**Diagnostic excision biopsy**

Of the 37 women who had a diagnostic excision biopsy, the presurgical benign diagnosis was confirmed in 28 cases (75.7%). In 9 of 37 women the final diagnosis was underestimated and the presurgical non-malignant diagnosis changed to a postsurgical malignant diagnosis (24.3%). Of these nine cases, underestimation included the diagnosis of DCIS (mean 9 mm, range 5–32 mm) in eight cases (21.6%) and the diagnosis of an invasive cancer of 5 mm in size in one case (2.7%). Seven of the nine underestimated cases (77.8%) resulted from excision biopsy after the diagnosis of atypical epithelial proliferation of ductal type (AEPDT). The positive predictive value for malignancy of AEPDT was 23.4% (7/23) (Table 2).

In the case of atypical epithelial proliferation of ductal type, the median mammographic diameter of calcifications without

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**Table 1** Distribution of pathological B categories and histological lesions after performance of vacuum-assisted biopsy of women with further recommendation for surgical procedure.

<table>
<thead>
<tr>
<th>Category of vacuum-assisted biopsy</th>
<th>Histological lesion</th>
<th>Number/ Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2: Benign lesion</td>
<td>Adenosis</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>B3: Lesions of uncertain malignant potential</td>
<td>Atypical epithelial proliferation of ductal type</td>
<td>21 (17.6)</td>
</tr>
<tr>
<td></td>
<td>Papillary lesion</td>
<td>9 (7.6)</td>
</tr>
<tr>
<td></td>
<td>Radial scar</td>
<td>2 (1.7)</td>
</tr>
<tr>
<td></td>
<td>Mucocele-like lesion</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td></td>
<td>Flat epithelial atypia</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>B4: Suspicious of malignancy</td>
<td>Atypical epithelial proliferation of the ductal type, suspicious for ductal carcinoma in situ</td>
<td>2 (1.7)</td>
</tr>
<tr>
<td>B5a: Malignant, in situ lesion</td>
<td>Ductal carcinoma in situ</td>
<td>71 (59.7)</td>
</tr>
<tr>
<td>B5b: Malignant, invasive breast lesion</td>
<td>Invasive breast cancer</td>
<td>11 (9.2)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>119 (100)</td>
</tr>
</tbody>
</table>

1 Histologically benign lesion was the assessment of calcifications, correlation was based on non-comedo calcifications in dilated ducts; surgery revealed that the DCIS had a weak correlation of DCIS with calcifications.

2 Diagnostic excision biopsy was indicated independently of residual parts of the lesion by imaging.

3 Diagnostic excision biopsy was indicated if residual parts of the lesion were suspected. Diagnostic excision biopsy were in Abhängigkeit von residuvalen Befunden indiziert.

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**Table 2** Distribution of histopathological pre- and postsurgical lesions of performed diagnostic excision biopsies.

<table>
<thead>
<tr>
<th>Histological lesion</th>
<th>Planned diagnostic excision surgery</th>
<th>Underestimation</th>
<th>Underestimation per lesion type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number N</td>
<td>Number N/pT category (%)</td>
<td>Frequency %</td>
</tr>
<tr>
<td>Adenosis</td>
<td>1 (pTis)</td>
<td>1 (pTis)</td>
<td>100</td>
</tr>
<tr>
<td>Atypical epithelial proliferation of ductal type</td>
<td>23 (pTis)</td>
<td>6 (pTis)</td>
<td>30.4</td>
</tr>
<tr>
<td>Papillary lesion</td>
<td>9 (pTis)</td>
<td>1 (pTis)</td>
<td>11.1</td>
</tr>
<tr>
<td>Radial scar</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mucocele-like lesion</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flat epithelial atypia</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>9</td>
<td>24.3</td>
</tr>
</tbody>
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1 Histologically benign lesion was the assessment of calcifications, correlation was based on non-comedo calcifications in dilated ducts; surgery revealed that the DCIS had a weak correlation of DCIS with calcifications.

2 Diagnostic excision biopsy was indicated independently of residual parts of the lesion by imaging.

Diagnostic excision biopsy were in Abhängigkeit von residuvalen Befunden indiziert.

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All biopsy results were confirmed for agreement between radiological and pathological diagnosis in a multidisciplinary conference [5]. If indicated, therapeutic or diagnostic surgery was planned by the multidisciplinary team. According to our previously described diagnostic protocol, all lesions of atypical epithelial proliferation of ductal type (AEPDT) were recommended for surgical excision. Diagnostic excision was recommended for radial scars (RS), papillary lesions (PAP), mucocele-like lesions (MUC) and flat epithelial atypia (FEA) when lesion remnants were visible on post-interventional imaging [7].

**Analysis**

Histopathological diagnosis after surgery was compared with presurgical histopathological diagnosis of VAB. Underestimation of histological breast lesions after VAB in comparison to further surgery was defined as follows:

- Diagnostic excision biopsy: A histologically benign lesion or a lesion of uncertain malignant potential obtained by VAB changed postsurgery to a malignant histology, including DCIS and invasive breast cancer.

- Therapeutic surgery: A DCIS diagnosis obtained by VAB changed postsurgery to an invasive breast cancer diagnosis.

The rates of underestimation were determined separately for diagnostic excision biopsy and therapeutic surgery. In each case, the presurgical result of VAB was compared with the postsurgical histopathological report.

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<td>100</td>
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<tr>
<td>Atypical epithelial proliferation of ductal type</td>
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<td>Mucocele-like lesion</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flat epithelial atypia</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>9</td>
<td>24.3</td>
</tr>
</tbody>
</table>
Verteilung histopathologischer prä- und postoperativer Diagnosen
tab. 3
durchgeführt enonlogischer Operationen.

<table>
<thead>
<tr>
<th>histological lesion</th>
<th>planned oncological surgery</th>
<th>underestimation</th>
<th>underestimation per lesion type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number N/pT category</td>
<td>number N/pT category</td>
<td>frequency %</td>
</tr>
<tr>
<td>ductal carcinoma in situ</td>
<td>71</td>
<td>7 (pT1a n = 3)</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pT1b n = 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pT2 n = 1)</td>
<td></td>
</tr>
<tr>
<td>invasive breast cancer</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(pT1a n = 6)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(pT1c n = 5)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Invasive ductal carcinoma, grade 1 (n = 2); invasive lobular carcinoma, grade 1 (n = 1).  
2 Invasive ductal carcinoma, grade 2 (n = 2), grade 3 (n = 1).  
3 Invasive ductal carcinoma, grade 2 (n = 1).

Discussion

In 11 of the 82 women who received oncological surgery, an invasive cancer was already diagnosed by VAB. Post-surgical diagnoses included invasive ductal carcinoma (n = 9), invasive lobular carcinoma (n = 1) and invasive micropapillary carcinoma (n = 1). In 71 women surgery was planned on the base of a presurgical DCIS diagnosis. After surgery due to DCIS, invasive breast cancer was diagnosed in 7 of those 71 women (9.9 %) and the pre-surgical result underestimated the presence of invasion (mean diameter 11 mm, range 2 – 37 mm). In 28.6 % (n = 2) of the underestimated cases, the nuclear grade was reported as intermediate, and in 57.1 % (n = 4) as high. In one case the nuclear grade was not available (14.3 %). (Table 3).

The median mammographic diameter of calcifications of DCIS cases without a post-surgical upgrade (n = 16) was 15 mm (range 3 mm to 50 mm), and that of those with a post-surgical upgrade (n = 7) was 28 mm (range 4 mm to 51 mm). In 2 of 10 (20.0 %) AEPDT diagnoses without residuals calcifications post-VAB, an upgrade occurred post-surgically, while 5 of 13 (38.5 %) AEPDT diagnoses with residual calcifications had a post-surgical upgrade.

Oncological surgery

In 11 of the 82 women who received oncological surgery, an invasive cancer was already diagnosed by VAB. Post-surgical diagnoses included invasive ductal carcinoma (n = 9), invasive lobular carcinoma (n = 1) and invasive micropapillary carcinoma (n = 1). In 71 women surgery was planned on the base of a presurgical DCIS diagnosis. After surgery due to DCIS, invasive breast cancer was diagnosed in 7 of those 71 women (9.9 %) and the pre-surgical result underestimated the presence of invasion (mean diameter 11 mm, range 2 – 37 mm). In 28.6 % (n = 2) of the underestimated cases, the nuclear grade was reported as intermediate, and in 57.1 % (n = 4) as high. In one case the nuclear grade was not available (14.3 %). (Table 3).

The median mammographic diameter of calcifications of DCIS cases without a post-surgical upgrade (n = 64) was 24 mm (range 4 mm to 96 mm). Among the DCIS cases with an upgrade (n = 7), the median mammographic diameter of calcifications was 36 mm (range 7 mm to 79 mm).

Of all VAB-related DCIS diagnoses, underestimation occurred in 2 of 16 cases (12.5 %) of mammographic lesion size over 50 mm. In 2 of 15 DCIS lesions (13.3 %) without residual calcifications post-VAB, an upgrade occurred post-surgically (pT1a, pT1b). In 5 of 56 DCIS lesions (8.9 %) with residual calcifications post-VAB, an upgrade was diagnosed post-surgically. 24 % of cases, so that post-surgical modification of histology required oncological surgery. The leading constellation consisted of postsurgical DCIS diagnosis after excision biopsy due to atypical epithelial proliferation of ductal type resulting from vacuum-assisted biopsy. In primary DCIS diagnoses obtained by vacuum-assisted biopsy, 90 % were estimated precisely whereas in 10 % of cases presurgical invasive breast cancer was underestimated.

The assessment of breast calcifications resulted in 28 benign (23.5 %) and 91 malignant (76.5 %) postsurgical diagnoses. Post-surgical malignancy should be monitored, especially since calcification-related breast lesions are known to be associated with higher rates of lesions of uncertain malignant potential (B3) than masses [9] and therefore may carry a higher probability for a benign surgical excision compared to masses or a mixture of mammographic lesion types.

Similarly to previous results, we found AEPDT to be the B3 lesion with the highest rate of finally detected malignancy (40 % [7], 50 % [10]). 30.4 % (7/23) of the diagnoses of AEPDT in minimally invasive biopsy were not proved as atypical ductal hyperplasia (ADH) after excision surgery but were upgraded to a malignant diagnosis, mainly to DCIS diagnosis (85.7 %). Kohr et al. concluded that surgical excision should be recommended even when ADH involves fewer than three foci and all mammographic calcifications have been removed by needle biopsy, because the upgrade rate was still 12 % [11]. Our results support that finding.

Brennan et al. performed a meta-analysis of the underestimation of invasive breast cancer with ductal carcinoma in situ at needle biopsy. The pooled estimate was 25.9 %. Preoperative variables that showed significant univariate association with higher underestimation included the use of a 14-gauge core biopsy device versus the use of an 11-gauge vacuum-assisted biopsy with an under-estimation of 30.3 % versus 18.9 % (P < 0.001), respectively [1]. Our results, using a 9-gauge device, show an underestimation of 10 %. Underestimation occurs in constellation with and without residual calcifications post-VAB. The low rate of underestimation may not only be related to the large biopsy device. The meta-analysis defined risk constellations for underestimation as palpable versus impalpable lesions, presence of mammographic masses versus the absence and stereotactic image guidance of biopsy versus ultrasound or clinical guidance. Our study collective was restricted to cases of pure calcifications. The absence of associated masses was proved by additional magnification imaging and ultrasound. Therefore, we suppose that the standardized imaging protocol was useful to select cases of low risk for underestimation.

After DCIS diagnosis in VAB, the multidisciplinary team has to define a recommendation for surgery including breast surgery and facultative axillary staging by sentinel lymph node biopsy. Guidelines recommend sentinel lymph node biopsy in cases of presurgical DCIS diagnoses and planned mastectomy [12, 13]. For our above described collective without stratification of lesion size or nuclear grade, the risk of underestimation of invasion did not exceed 10 % so that a general recommendation of a sentinel lymph node biopsy in combination with a breast-conserving biopsy in terms of a DCIS diagnosis and sonographically normal axillary lymph nodes does not seem adequate. Kotani et al. concluded that because of a low prevalence of metastatic involvement, the cessation of SLNB is a reasonable consideration in patients initially diagnosed with DCIS by stereotactic VAB [14]. In concordance, the American Society of Clinical Oncology recently updated a clinical practice guideline and recommends that women with DCIS should not undergo SLNB when breast-conserving surgery is planned [12].
Nevertheless, constellations with higher probabilities for invasion of over 50% for palpable lesions should be carefully evaluated by the multidisciplinary team regarding axillary staging [1, 15]. SLNB may be considered as part of the primary surgical procedure when preoperative variables show a tumor larger than 2 cm [1, 16]. The national working group of gynecological oncologists suggests discussion of sentinel lymph node biopsy in the planning of a breast-conserving therapy only for cases of DCIS lesions ≥5 cm or >2.5 cm in combination with high grade subtypes [13]. Our data support that restrictive recommendation since invasive cancer was underestimated in only about 13% of all DCIS lesions ≥5 cm, resulting in a secondary recommendation of SLNB. Despite dedicated imaging before biopsy and the use of large devices, invasive cancer, mostly less than 10 mm in size (85.7%), was still underestimated in 10% of all VAB-related DCIS diagnoses. The frequency of upgrade was comparable for cases with total removal of calcifications by VAB (13.3%). Our study provides a risk estimation which might also be useful for presurgical dialog with patients. In addition, MRI may be a useful tool in mammography screening assessment [17–19]. The strengths of our study are that results are based on a standardized procedure with high quality assurance: clearly defined guidelines, specially trained radiologists and pathologists. Furthermore, we exclusively used direct radiography digital magnification techniques and high-resolution breast ultrasound. A limitation of the study is due to the fact that we analyzed data of one assessment unit only. The possibility to transfer the results is limited. Due to the limited number of cases, we did not evaluate subgroups of risk estimation by statistical tests.

Conclusion

Underestimation of DCIS (21.6%) in diagnostic excision biopsies is mainly related to presurgical diagnosis of AEPDT. Underestimation of invasive cancers in diagnostic excision biopsies is rare (2.7%). Underestimation of invasive cancer in terms of presurgical DCIS diagnosis can be minimized (9.9%) by standardized assessment protocols including mammographic and sonographic imaging prior to vacuum-assisted biopsy.

Acknowledgments

The authors would like to thank Ms. Stefanie Michalk for the administrative help provided.

Clinical relevance

The establishment of digital mammography in breast cancer screening identified and clarified microcalcifications more often compared to the currently outdated analogue mammography technique. Protocols define vacuum-assisted biopsy as the method of choice for assessment of microcalcifications. The accuracy of a preoperative diagnosis compared to the postoperative end diagnosis is relevant for patient counseling, for planning of surgery – especially with the objective to minimize follow-up surgeries, and for the indication of sentinel lymph node biopsy. The integration of additional digital mammography views and high-resolution ultrasound imaging can achieve a selection of low risk for non-identification of invasive breast cancer after vacuum-assisted biopsy.

References


Timpe L et al. Rates of Presurgical... Fortschr Röntgenstr 2015; 187: 445–449