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**Literature search results**

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**Search details**

Patients undergoing neoadjuvant chemotherapy for breast cancer. Ultrasound measurement of lesions compared to histological or physical examination.

**Resources searched**

NHS Evidence; TRIP Database; Cochrane Library; AMED; BNI; CINAHL; EMBASE; HMIC; Health Business Elite; MEDLINE; PsychINFO; Google Scholar; Google Advanced Search

**Database search terms**: breast* adj2 cancer*; breast* adj2 neoplasm*; breast* adj2 lesion*; breast* adj2 (tumor* OR tumour*); breast* adj2 malignan*; exp BREAST NEOPLASMS; ; breast* adj2 carcinoma*; ; breast* adj2 angiosarcoma*; (ductal OR lobular) adj2 carcinoma*; DCIS; LCIS; phyllodes; “cystosarcoma phyllodes”; neoadjuvant* adj2 chemo*; neoadjuvant* adj2 therap*; CHEMOTHERAPY, ADJUVANT; NEOADJUVANT THERAPY; (cancer* OR tumor* OR tumour* OR lesion* OR neoplasm*) adj2 (measur* OR size* OR sizing OR calculat* OR comput* OR assess* OR determin* OR gaug*); (dimen* OR size OR mass) adj2 (cancer* OR tumor* OR tumour* OR lesion*); ultrasound; ultrasonography*; exp ULTRASONOGRAPHY; histolog*; microanatomy; “microscopic anatomy”; exp HISTOLOGY; exp HISTOLOGICAL TECHNIQUES; exp PHYSICAL EXAMINATION; “physical examination”; palpation; palpated; inspection; inspected

**Evidence search string(s)**: (breast OR ductal OR lobular) (cancer* OR neoplasm* OR tumour* OR tumour* OR lesion* OR carcinoma* OR angiosarcoma*) neoadjuvant* (therap* OR chemo*) (ultraso* OR histolog* OR "physical examination" OR palpation OR inspection) (measur* OR size OR sizing OR mass* OR dimension*)

**Google search string(s)**: ~breast (~cancer OR ~neoplasm OR ~tumor OR ~lesion OR ~carcinoma OR ~angiosarcoma) neoadjuvant (~therapy OR ~chemotherapy) (~ultrasonography OR ~histology OR ~"physical examination" OR palpation OR inspection)
Summary

There is quite a lot of research comparing ultrasound with physical or histological examination; however I have also included research on the accuracy of ultrasound and, or the other diagnostic methods requested for completeness. There was also research looking at the accuracy of other diagnostic methods including MRI and PET/CT; I have not included this research but if you do require it, please let me know.

Guidelines

Association of Breast Surgery
Surgical guidelines for the management of breast cancer 2009

Routine methods for assessing the extent of disease in the breast are clinical examination, mammography and ultrasound. In a significant number of cases the true extent of disease is underestimated, particularly with invasive lobular cancer. Selective use of magnetic resonance imaging (MRI) may be useful in planning surgical treatment and in particular if: there is a discrepancy between the clinical and radiological estimated extent of disease; if there is a dense breast pattern on mammography; or the diagnostic core biopsy suggests an invasive lobular cancer.

European Society for Medical Oncology
Primary breast cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up 2011

If preoperative (neoadjuvant) systemic therapy is planned, additional investigations such as chest X-ray, abdominal ultrasound or CT scan and bone scintigraphy should be considered to exclude metastatic disease. These investigations are also recommended for patients with clinically positive axillary nodes, large tumors (e.g. ≥5 cm) or clinical signs, symptoms or laboratory values indicating the presence of metastases, even if preoperative systemic treatment is not planned [III, B].

NHS Cancer Screening Programmes

NICE
CG80 Early and locally advanced breast cancer 2009

1. Patients who are likely to benefit from MRI are those with dense breasts on mammography, lobular carcinoma and occult primary tumour. In non-fatty breasts ultrasound and MRI were more sensitive than mammography for invasive cancer, but both MRI and ultrasound involved a risk of overestimation of tumour extent. Contrast enhanced MRI has the lowest false-negative rate in detecting invasive lobular carcinoma and has the highest accuracy in measuring the size of the invasive lobular carcinoma (Boetes et al., 2004). MRI has been shown to detect occult invasive breast cancers with the sensitivity of 97%-100%. However, intraductal component of breast cancer is more accurately detected by ultrasound than MRI. MRI provided superior correlation between tumour size and pathology. Combined mammography, clinical examination and MRI was more sensitive than any other individual test or routine triad (Chung et al., 2005).

2. Breast MRI is accurate in staging extent of disease in the breasts of patients with histological grade 3 tumours. In 10 patients with histological grade 1 tumours, the MRI findings overestimated their disease. In 11/115 patients, the primary tumour or a second tumour was only seen by MRI. In 170 patients MRI detected 96% multifocal disease and 95% of multicentric disease, whereas mammography detected 37% and 18% respectively and ultrasound detected 41% and 9% respectively. All bilateral breast
cancers were seen on MRI. Both mammography and ultrasound detected 56%.
Evidence-based reviews

**Database of Abstracts of Reviews of Effects**

**The feasibility and accuracy of sentinel lymph node biopsy in clinically node-negative patients after neoadjuvant chemotherapy for breast cancer: a systematic review and meta-analysis** 2012

For patients who were clinically node-negative after neoadjuvant chemotherapy, sentinel lymph node biopsy was technically feasible. Results predict those obtained on axillary lymph node dissection with accuracy comparable to that of sentinel lymph node biopsy for patients with early breast cancer.

**Breast cancer: sentinel node identification and classification after neoadjuvant chemotherapy: systematic review and meta analysis** 2010

Sentinel lymph node mapping and biopsy after neoadjuvant therapy was a reliable alternative to completion axillary lymph node dissection for planning treatment in patients with early-stage breast cancer.

**European Radiology**

**Breast MR imaging in women at high-risk of breast cancer. Is something changing in early breast cancer detection?** 2007

These cancers were small (49% equal to or less than 10 mm in diameter) but aggressive, 82% being invasive and 49% with histologic grade 3; however, only 19% of these invasive cancers were associated with nodal involvement. The pooled sensitivity was 16% for clinical breast examination, 40% for mammography, 43% for ultrasound, and 81% for MR. The positive predictive value (calculated on the basis of the number of invasive diagnostic procedures due to false positives) was 33%, 47%, 18%, and 53%, respectively.

**Public Health England**

**ABS Breast Screening Audit 2011 - 2012** 2013

Axillary ultrasound failed to accurately identify positive nodes for 248 invasive breast cancers. Of the 2,586 invasive breast cancers without neo-adjuvant therapy recorded that were confirmed to be node positive on surgery, 20% had positive nodes diagnosed pre-operatively by means of needle biopsy. This is similar to the proportion of positive nodes found at surgery (17%) for the 12,212 invasive breast cancers without neo-adjuvant therapy in the UK that did not have an axillary biopsy before surgery.

**Published research**

1. **The role of magnetic resonance imaging in assessing residual disease and pathologic complete response in breast cancer patients receiving neoadjuvant chemotherapy: a systematic review.**


**Citation:** Insights Into Imaging, April 2013, vol./is. 4/2(163-75), 1869-4101;1869-4101 (2013 Apr)

**Publication Date:** April 2013

**Abstract:** OBJECTIVES: This systematic review aimed to assess the role of magnetic resonance imaging (MRI) in evaluating residual disease extent and the ability to detect pathologic complete response (pCR) after neoadjuvant chemotherapy for invasive breast cancer. METHODS: PubMed, the Cochrane Library, MEDLINE, and Embase databases were searched for relevant studies published until 1 July 2012. After primary selection, two reviewers independently assessed the content of each eligible study using a standardised extraction form and pre-defined inclusion and exclusion criteria. RESULTS: A total of 35 eligible studies were selected. Correlation coefficients of residual tumour size assessed by
MRI and pathology were good, with a median value of 0.698. Reported sensitivity, specificity, positive predictive value and negative predictive value for predicting pCR with MRI ranged from 25 to 100%, 50-97%, 47-73% and 71-100%, respectively. Both overestimation and underestimation were observed. MRI proved more accurate in determining residual disease than physical examination, mammography and ultrasound. Diagnostic accuracy of MRI after neoadjuvant chemotherapy could be influenced by treatment regimen and breast cancer subtype. CONCLUSIONS: Breast MRI accuracy for assessing residual disease after neoadjuvant chemotherapy is good and surpasses other diagnostic means. However, both overestimation and underestimation of residual disease extent could be observed. MAIN MESSAGES: * Breast MRI accuracy for assessing residual disease is good and surpasses other diagnostic means. * Correlation coefficients of residual tumour size assessed by MRI and pathology were considered good. * However, both overestimation and underestimation of residual disease were observed. * Diagnostic accuracy of MRI seems to be affected by treatment regimen and breast cancer subtype.

Source: Medline

2. Evaluation of tumor extent in breast cancer patients using real-time MR navigated ultrasound: Preliminary study


Citation: European Journal of Radiology, November 2012, vol./is. 81/11(3208-3215), 0720-048X;1872-7727 (November 2012)

Publication Date: November 2012

Abstract: Objectives: To evaluate the accuracy of real-time MR navigated ultrasound (MRnav US) for tumor extent measurements in breast cancer and to investigate variables influencing the accuracy of MRnav US in comparison with US alone. Methods: Fifty-three patients with 60 malignancies underwent preoperative breast MRI and US with or without MRI navigation. Maximum lesion sizes based on MRnav US and US alone were measured, and their relationship with the pathology was analyzed considering the differences in the clinicopathologic variables of the patients. Results: Among 60 breast cancers, mean lesion size at initial breast US without MRI navigation and at MRI-navigated US was 19 mm and 24 mm, respectively, compared with 28 mm on the histopathology. Overall, the tumor size estimated with MRnav US was more strongly correlated with the histologic tumor size than with US alone. Accurate measurements by MRnav US were significantly more frequent in the lesions that were presented as a mass type on MRI. In addition, the accurate measurement of mass extent was improved with MRnav US in patients who had non-mass type lesions on MRI and who had undergone neoadjuvant systemic chemotherapy when compared with US alone. Conclusion: MRnav US was more accurate for tumor extent estimation than US alone, and specific clinicopathologic variables can affect the accuracy of MRnav US. 2012 Elsevier Ireland Ltd. All rights reserved.

Source: EMBASE

3. The sensitivity of magnetic resonance imaging in the identification and sizing of breast tumours

Author(s) Seetharam S., Shukla R., Raju P., Turner M., Al-Murani B., Biswas B., Murali K.

Citation: European Journal of Surgical Oncology, September 2012, vol./is. 38/9(822-823), 0748-7983 (September 2012)

Publication Date: September 2012

Abstract: Background: To determine the sensitivity of MRI in the detection and sizing of breast tumours against the true size obtained from final histology. The size determined by MRI will also be compared against the size on clinical examination (CE), Ultrasound (US) and mammography. Materials and Methods: A retrospective review looking at records of 23 patients who attended a hospital based breast clinic over 3 years and required a breast MRI (+/-Gadolinium) for either pre and post neoadjuvant chemotherapy imaging, visualisation of invasive lobular carcinoma (ILC) clarification of discrepancy between clinical and radiological findings when using other imaging techniques. Exclusion criteria included
patients who attended for familial screening (BRCA1&2), imaging of other breast disease (i.e. PagetOs disease of the nipple) or identification of post-surgical complications (e.g. Silicon implant rupture). Results: 37 Patients were identified of which 23 were suitable for the study and ranged in age from 35-80 years old (median age of 57). 10 patients presented with ILC, 8 with Invasive Ductal Carcinoma, 1 with Ductal Carcinoma In Situ, 1 with Lobular Carcinoma In Situ, 1 with squamous metaplasia and 1 with a metastatic lymph node. All patients had a palpable breast lump which underwent a combination of one of US, mammography and biopsy prior to MRI. MRI imaging was used to formulate a surgical plan in 1 patient and accurately assess tumour size in 22 others. 7 patients required Gadolinium enhancement, 16 did not. 58% of MRI, 47% of US, 43% of Mammograms and 33% of CEOs were within 15mm of actual histological size. Conclusion: MRI is only 11% more accurate at detecting breast tumours than US when compared to the histological sample based on an error margin of +/-15mm. As the error margin was reduced the sensitivity of MRI also reduced so that for an error margin of +/-1mm only 8% of MRI scans of the breast were correctly sized against the final histological specimen. MRI is useful in the detection of occult disease and can significantly aid treatment planning in the absence of mammography, yet its role as a negative predictor of disease is only 65%.

Source: EMBASE

4. Accuracy of MRI, mammography (MG), and 2D and 3D ultrasound (2DUS/3DUS) in determining the pathologic tumor response after neoadjuvant chemotherapy (NACT) in breast cancer patients

Author(s) Hahn M., Siegmann K.C., Meisner C., Steinhoff A.-K., Hattermann V., Fehm T.N., Hartkopf A.D., Wallwiener M., Vogel U., Wallwiener D.

Citation: Journal of Clinical Oncology, May 2012, vol./is. 30/15 SUPPL. 1, 0732-183X (20 May 2012)

Publication Date: May 2012

Abstract: Background: The pathological tumor response in patients with locally advanced breast cancer to NACT is essential for survival and for surgical strategies. Therapy monitoring based on German recommendations is routinely performed by clinical examination, MG and 2DUS. The clinical value of MRI and 3DUS has not been established yet. The aim of the study was to determine the accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) between the different imaging techniques in predicting postoperative histological tumor response after NACT. Methods: Patients with primary breast cancer (cT1-T4, cN0-1, M0) undergoing neoadjuvant chemotherapy between 2005 and 2010 were eligible for this prospective trial. The response was measured by MRI, MG, 2DUS and 3DUS for complete or partial remission versus stable disease after the last cycle of treatment and compared with the final pathological response. Patients with progressive disease were excluded from the study. Statistical analysis was done by calculating the accuracy of each imaging technique and the size difference between imaging and histological tumor size. Sensitivity, specificity, PPV and NPV were calculated for complete or partial pathological response. The study was approved by the local ethic committee (BCD001 194/2004). Results: 103 patients with the mean age of 47.7 (range 24.5 - 71.4) years were evaluated. The accuracy was 0.680 (95%CI: 0.580 -0.768) for MRI, 0.563 (95%CI: 0.453-0.669) for MG, 0.724 (95%CI: 0.618 - 0.815) for 2DUS and 0.710 (95%CI: 0.588-0.813) for 3DUS. Sensitivity, specificity, PPV and NPV were 78%, 47%, 75% and 52% for MRI, 61%, 45%, 69% and 36% for MG, 93%, 23%, 74% and 60% for 2DUS, 94%, 19%, 73% and 57% for 3DUS. The mean (standard deviation) size difference was -1.8 mm (14.8) on MRI, 1.5 mm (26.0) on MG, -9.1mm (19.1) on 2DUS and for the volume difference -6916mm3 (15831) on 3DUS. Conclusions: The data suggest that 2DUS is sufficient in predicting tumor response between NACT treatment. MRI and MG are more accurate the 2DUS in predicting the tumor size for surgical planning.

Source: EMBASE

Available in fulltext from Journal of Clinical Oncology at the ULHT Library and Knowledge Services' eJournal collection
5. Sentinel lymph node biopsy in patients with operable breast cancer treated with neoadjuvant chemotherapy.

**Author(s)**: Rebollo-Aguirre AC, Gallego-Peinado M, Menjon-Beltran S, Garcia-Garcia J, Pastor-Pons E, Chamorro-Santos CE, Ramos-Font C, Salamanca-Ballesteros A, Llamas-Elvira JM, Olea-Serrano N

**Citation**: Revista Espanola de Medicina Nuclear e Imagen Molecular, May 2012, vol./is. 31/3(117-23), 2253-8070 (2012 May-Jun)

**Publication Date**: May 2012

**Abstract**: AIM: To evaluate the accuracy of sentinel lymph node biopsy (SLNB) in operable breast cancer patients treated with neoadjuvant chemotherapy (NAC). MATERIALS AND METHODS: Between January 2008-2011, 88 women, mean age 49.4 years, with infiltrating breast carcinoma, were studied prospectively. Patients were T1-3, N0-1, M0. Prior to surgery, the patients received chemotherapy (epirubicin/cyclophosphamide, docetaxel), and trastuzumab in Her2/neu-positive patients. Axillary status was established by physical examination, ultrasound-guided core needle biopsy of any suspicious lymph node. The day before surgery, 74-111 MBq of (99m)Tc-albumin nanocolloid was injected periareolarly. All patients underwent breast surgery, with SLNB, followed by complete axillary lymph node dissection (ALND). Sentinel lymph node (SLN) were examined by frozen sections, hematoxylin-eosin staining and immunohistochemical analysis or One Step Nucleic Acid Amplification (OSNA). RESULTS: Mean tumor size: 3.5 cm. Histologic type: 69 invasive ductal, 16 invasive lobular and 3 others. Thirty seven patients had clinical/ultrasound node-positive at presentation. Clinical response of primary tumor to NAC: complete in 38, partial in 45, and stable disease in 5 patients. A pathological complete response was achieved in 25. All patients were clinically node-negative after NAC. SLN identification rate was 92.0%. Six of 7 patients in whom SLN was not found had clinical/ultrasound positive axilla before NAC. SLN accurately determined the axillary status in 96.5%. False negative rate was 8.3%. In 69.4% of patients, SLN was the only positive node. The mean number of SLN removed was 1.7 and nodes resected from the ALND were 13.2. CONCLUSION: SLN biopsy after NAC can predict the axillary status with a high accuracy in patients with breast cancer, avoiding unnecessary ALND. Copyright 2011 Elsevier Espana, S.L. y SEMNIM. All rights reserved.

**Source**: Medline

6. A study of clinical and histopathologic differences in T stage of breast cancer diagnosed at vacuum-assisted breast biopsy (VABB)

**Author(s)**: Park H.L., Kwon S.H., Chang S.Y., Huh J.Y., Kim J.Y., Shim J.Y., Lee Y.H.

**Citation**: European Journal of Cancer, March 2012, vol./is. 48/(S194-S195), 0959-8049 (March 2012)

**Publication Date**: March 2012

**Abstract**: Background: Vacuum-Assisted Breast Biopsy(VABB) is a biopsy method that allows a complete removal of target lesions with the same accuracy result as in excisional biopsy, but given it comes as multiple fragments, it is rather difficult to measure a tumor size in histopathology, leading to underestimation of staging and possibly affecting the decision on the use of adjuvant therapy. Authors have undertaken this study in order to determine the difference between clinical T stage based on ultrasound(US) imaging before surgery in VABB diagnosed breast cancer and T stage in histopathology performed after radical mastectomy. Method: Retrospective study analyzed medical records of 168 patients diagnosed with invasive breast cancer among 248 patients who received radical mastectomy after being diagnosed with malignancies at VABB for diagnosis and treatment purposes at Kangnam CHA Hospital between Jan. 2003 and May 2011. Patients with a mammographic lesion underwent VABB under ultrasonographic guidance(USG) with an 8-Gauge needle. Lesion classified as BIRADS 4a or below was completely removed under USG and patients classified as BIRADS 4b or above received VABB for the purpose of incisional biopsy only. Result: When comparing the tumor size measured by clinical T stage based on US and by final pathological T stage after surgery, we found in 10 out of 10 cases (100%) in pT1a, the histologically measured tumor size was smaller than when measured by the US method. The pT1b included 38 cases, in which 31 cases (81.6%) showed a
smaller size in histology than in imaging. 32 out of 62 cases (51.6%) in pT1c, 26 out of 55 cases (47.3%) in pT2 and zero out of three cases in pT3 (0%) reported a smaller size in histology compared to US, indicating that the greater size of primary tumor, the easier it is to have a pathological measurement leading to less occurrence of underestimation because the specimen removal diagnosed at VABB is relatively low and residual lesion remains across a wide area. As a result of classification by ultrasound examination, 23 out of 35 cases (65.7%) at BIRADS 3-4a who underwent complete removal at VABB and 76 out of 133 cases (57.2%) at BIRADS 4b-5 who underwent incomplete excision for biopsy purposes reported a smaller size in histology compared to US, showing that histological underestimation occurs more often when the lesion is confirmed as malignant after complete removal of a target lesion through VABB. Conclusion: In patients diagnosed with breast cancer through VABB, it is confirmed that when primary tumor is smaller at the point of diagnosis and complete removal is performed for the lesion of BIRADS 3-4a, it is more likely to result in underestimation in the histopathological measurement after breast cancer surgery compared with the size measured by presurgery US. Due to this underestimation, patients can miss adjuvant chemotherapy essential to their treatment, so it is necessary to consider the size of the clinical lesion appropriately prior to determining staging.

Source: EMBASE

7. Imaging inflammatory breast cancer

Author(s) Alunni J.-P.

Citation: Diagnostic and Interventional Imaging, February 2012, vol./is. 93/2(95-103), 2211-5706 (February 2012)

Publication Date: February 2012

Abstract: Carcinomatous mastitis is a severe form of breast cancer and its diagnosis is essentially clinical and histological. The first examination to perform is still mammography, not only to provide evidence supporting this diagnosis but also to search for a primary intramammary lesion and assess local/regional spread. It is essential to study the contralateral breast for bilaterality. Ultrasound also provides evidence supporting inflammation, but appears to be better for detecting masses and analysing lymph node areas. The role of MRI is debatable, both from a diagnostic point of view and for monitoring during treatment, and should be reserved for selected cases. An optimal, initial radiological assessment will enable the patient to be monitored during neoadjuvant chemotherapy.

2011 Editions francaises de radiologie. Published by Elsevier Masson SAS. All rights reserved.

Source: EMBASE

8. The effect of accompanying in situ ductal carcinoma on accuracy of measuring malignant breast tumor size using B-mode ultrasonography and real-time sonoelastography

Author(s) Soliman A.A., Wojcinski S., Degenhardt F.

Citation: International Journal of Breast Cancer, 2012, vol./is. 1/1, 2090-3189 (2012)

Publication Date: 2012

Abstract: Objectives. Clinical estimation of malignant breast tumor size is critical for preoperative planning and is crucial for following up the tumor's response to the therapy in case she receives a neoadjuvant chemotherapy. Ductal carcinoma in situ (DCIS) accompanies about 25.4 of detected invasive breast cancers. The aim of this study was to examine the effect of the presence of DCIS on the accuracy of the ultrasonographic measuring malignant breast tumor size using B-mode and real time elastography. Materials and Methods. We recruited histologically confirmed breast cancer patients in a prospective observational study. Results. We recruited 50 breast cancer patients with a median age of 57.5 years. DCIS was confirmed to accompany 42 (n = 21) of the cases. Tumor size estimation using B-mode sonography (P 0.001) as well as using real time elastography (P 0.001). was statistically significant correlated to the actual tumor size. Presence of DCIS in 42 of our recruited patients affected the tumor size estimation using both methods thus losing the correlation between both estimations (P = 0.794). Conclusion. This study shows
that the presence of DCIS significantly affects the accuracy of measuring the sizes of malignant breast tumors when using either B-mode ultrasonography or real time elastography. 2012 A. A. Soliman et al.

Source: EMBASE

9. Use of ultrasound elasticity imaging to monitor the response of a primary breast cancer to neoadjuvant chemotherapy in one patient in a pilot study


Citation: Breast Cancer Research, November 2011, vol./is. 13/(S12), 1465-5411 (04 Nov 2011)

Publication Date: November 2011

Abstract: Introduction Neoadjuvant chemotherapy is used as the primary treatment for locally advanced breast cancer to reduce tumour size and protect against metastatic spread. Monitoring the response to chemotherapy is achieved mainly by clinical assessment, which may prove unsatisfactory. This proof-of-principle study is to determine if changes of size and texture in the elastogram can track tumour response. Methods A young woman with an invasive ductal carcinoma, visible on mammography and ultrasound (US), was treated with seven cycles of chemotherapy. Diagnostic mammography, MRI and core biopsy studies were performed. B-mode US and elastography datasets were collected in two planes prior to each cycle using a coarse calcification within the tumour as a constant reference point. Seven sequential strain images, each 3 weeks apart, were collected in total. The ratio of tissue strain within and outside the mass was calculated as an indicator of tumour response. The findings were compared with the post-chemotherapy MRI and mastectomy histology. Results The tumour showed almost complete histological response to chemotherapy. Sequential elastography studies demonstrated significant ratio changes in stiffness in tumour and peritumoral areas. Conclusion Preliminary results suggest the changes in tumour and peritumour stiffness caused by chemotherapy are detectable by ultrasound elastography. Further investigation is required to evaluate the potential of elastography as a monitoring tool for chemotherapy treatment.

Source: EMBASE

Available in fulltext from Breast Cancer Research : BCR at National Library of Medicine

10. Positron emission tomography with computed tomography scanning as a predictor of pathological complete response after neoadjuvant chemotherapy

Author(s) Moreno A., Roman Santamaria J.M., Garcia Saez J.A., Merchan M.J., Gonzalez Mate A., Furio V., Vidart J.A.

Citation: European Journal of Cancer, September 2011, vol./is. 47/(S343), 0959-8049 (September 2011)

Publication Date: September 2011

Abstract: Background: To determine accuracy of preoperative positron emission tomography (PET) to detect residual disease after neoadjuvant treatment. Material and Methods: Population included 33 patients after neoadjuvant treatment for local advanced breast cancer with axillary metastasis at time of diagnosis. Mammography, sonography, magnetic resonance (MRI), positron emission tomography (PET-CT) were performed. PET-CT considerations: Cuts: Coronal, sagital, transverse, Correction of atenuation: TAC 90 kV 165 mA, Radiotracer: 18F, FDG (Fluoro-desoxi-glucose), Dose: 7.81 mCi. Comparison between mammographic, sonographic, MRI and PET-CT findings and correlation with gold-standard (pathological report). Results: Correlation with tumour size after neoadjuvant treatment: The most accurate tool for tumour assessment was PET-CT (p=n.s.). Percentage of unnecessary mastectomies (no residual tumour in pathological report in mastectomy specimen after chemotherapy) that could be avoided due to PET-CT= 24% (p < 0.05). Capability of PET-CT to predict tumour vitality: Tumour vitality was detected in 21 cases (95.4%). Prediction of tumour complete response to chemotherapy: Mammography: 20%, sonography: 60%, MRI in 40% and PET-CT in 84% (p < 0.05). Conclusions: Tumour size: PET-CT alone can reach equal results as a combination of mammography, sonography
and magnetic resonance. Tumour viability: PET-CT is the most reliable tool to predict tumour viability after chemotherapy. Pathological complete response: PET-CT predicts complete histological response in 80% of patients, better than other studies.

Source: EMBASE

11. Comparisons of predictive values of breast cancer pathology responses after neoadjuvant chemotherapy between physical examination, ultrasound and mammography

Author(s) Han B., Fu T., Wu D., Zhang H.-P., Song D., Bi L.-R., Zheng C., Fan Z.-M.

Citation: Journal of Jilin University Medicine Edition, September 2011, vol./is. 37/5(943-947), 1671-587X (28 Sep 2011)

Publication Date: September 2011

Abstract: Objective: To evaluate the method for predicting breast cancer pathology response through comparisons between application value of physical examination, ultrasound and mammography in measuring the size of tumor before and after chemotherapy and the results of pathological Miller and Payne (MP) grade. Methods: 65 patients who received neoadjuvant chemotherapy (NAC) in our department were selected. All patients received one to six cycles of TAC (Docetaxel, Doxorubicin and Cyclophosphamide) regimen or other regimen after being diagnosed as breast cancer by mammotomy biopsy. The following operation was undergone within 3 weeks after the last chemotherapy. The tumor sizes of all patients were examined by physical examination, ultrasound and mammography before NAC and before the operation. The pathological responses were evaluated by MP grading system criteria by comparing the changes of cancer tissues in biopsy tissues before NAC and after the operation. ROC curve and spearman correlation analysis were used for the analysis between the changes of tumor sizes examined by physical examination, ultrasound and mammography and the results of MP grade. Results: There was a significant correlation between MP grade and the results of physical examination, ultrasound and mammography (r=0.487, P = 0.000; r=0.251, P = 0.044; r=0.351, P = 0.004). The area of pathology complete response (pCR)of MP grade 5 under the ROC curve (Az value) was 0.703 for physical examination, 0.531 for ultrasound, 0.712 for mammography, and 0.727 for combining three techniques. Conclusion: Physical examination and mammography are more useful than ultrasound in predicting the pathologic results of NAC. Combining three techniques has predictive value in pathology response of breast cancer after NAC.

Source: EMBASE


Author(s) Shin HJ, Kim HH, Ahn JH, Kim SB, Jung KH, Gong G, Son BH, Ahn SH

Citation: British Journal of Radiology, July 2011, vol./is. 84/1003(612-20), 0007-1285;1748-880X (2011 Jul)

Publication Date: July 2011

Abstract: OBJECTIVES: The purpose of this study was to determine the relative accuracies of mammography, sonography, MRI and clinical examination in predicting residual tumour size and pathological response after neoadjuvant chemotherapy for locally advanced or inflammatory breast cancer. Each prediction method was compared with the gold standard of surgical pathology.METHODS: 43 patients (age range, 25-62 years; mean age, 42.7 years) with locally advanced or inflammatory breast cancer who had been treated by neoadjuvant chemotherapy were enrolled prospectively. We compared the predicted residual tumour size and the predicted response on imaging and clinical examination with residual tumour size and response on pathology. Statistical analysis was performed using weighted kappa statistics and intraclass correlation coefficients (ICC).RESULTS: The ICC values between predicted tumour size and pathologically determined tumour size were 0.65 for clinical examination, 0.69 for mammography, 0.78 for sonography and 0.97 for MRI. Agreement between the response predictions at mid-treatment and the responses
measured by pathology had kappa values of 0.28 for clinical examination, 0.32 for mammography, 0.46 for sonography and 0.68 for MRI. Agreement between the final response predictions and the responses measured by pathology had kappa values of 0.43 for clinical examination, 0.44 for mammography, 0.50 for sonography and 0.82 for MRI. CONCLUSION: Predictions of response and residual tumour size made on MRI were better correlated with the assessments of response and residual tumour size made upon pathology than were predictions made on the basis of clinical examination, mammography or sonography. Thus, the evaluation of predicted response using MRI could provide a relatively sensitive early assessment of chemotherapy efficacy.

Source: Medline
Available in fulltext from British Journal of Radiology at EBSCOhost

13. Lymphoscintigraphy in breast cancer patients after neoadjuvant chemotherapy. Diagnostic value and the work-up of sentinel node negative patients.

Author(s) Dalus K, Reitsamer R, Holzmannhofer J, Rendl G, Pirich C, Kronberger C, Rettenbacher L

Citation: Nuclear-Medizin, 2011, vol./is. 50/1(33-8), 0029-5566;0029-5566 (2011)

Publication Date: 2011

Abstract: UNLABELLED: The AIM of this study was to evaluate the diagnostic value of lymphatic mapping by lymphoscintigraphy in breast cancer patients undergoing neoadjuvant chemotherapy (NCTX). We assessed the association between clinicopathological factors and nonvisualized sentinel nodes during preoperative lymphoscintigraphy. As secondary aims, we analyzed whether post NCTX axillary ultrasonography and fluorine-18 fluorodeoxyglucose positron emission tomography and computed tomography (F18-FDG-PET/CT) might be useful for staging in case of nonvisualized sentinel nodes. PATIENTS, METHODS: 61 patients with newly diagnosed, invasive breast cancer potentially eligible for NCTX were included in this substudy of a prospective trial on the monitoring of NCTX with 18F-FDG PET/CT. In all patients, lymphoscintigraphy was performed prior to sentinel lymph node biopsy (SLNB). 42 patients received neoadjuvant chemotherapy. 19 patients did not receive NCTX. After SLNB, mastectomy or lumpectomy (breast-conserving surgery) combined with level I and II axillary lymph node dissection were performed. Cases of nonvisualized sentinel nodes were analyzed with respect to tumour and patient characteristics and the results of ultrasonography and 18F-FDG-PET/CT before and after NCTX. RESULTS: Lymphoscintigram successfully identified at least one sN in 55 patients (i.e. identification rate of 90%). The risk of failure to identify the sN was associated statistically with a positive clinical nodal status prior to NCTX (p = 0.021). There was no statistical difference between patients with visualized and nonvisualized sN with respect to age, tumour grade, tumour size, pathological lymph node status or tumour histology. In patients without NCTX the sN identification rate was 100% versus 86% in patients with NCTX (n.s.). The FNR of patients with NCTX was 9.1%. Post NCTX axillary ultrasonography or FDG-PET/CT did not provide accurate information about the lymph node status in case of failing lymphatic mapping. CONCLUSION: On the basis of our findings, SLNB can not yet be recommended as a reliable staging method in breast cancer patients undergoing neoadjuvant chemotherapy. Patients with clinically positive axillary lymph nodes have a higher chance of unsuccessful lymphatic mapping by lymphoscintigraphy. Performing SLNB before NCTX in clinically node-negative patients may identify the subset of patients in whom axillary lymph node dissection can be omitted. Post NCTX axillary ultrasonography and 18F-FDG-PET/CT can not be suggested as valid axillary staging methods in case of a failed lymphatic mapping.

Source: Medline

14. [Importance of mammography, sonography and MRI for surveillance of neoadjuvant chemotherapy for locally advanced breast cancer] [German] Wertigkeit von Mammographie, Sonographie und MRT zur Verlaufsbeurteilung der neoadjuvanten Chemotherapie bei lokal fortgeschrittenem Mammakarzinom
Abstract: The aim of this study is to give an overview on the surveillance of response to neoadjuvant chemotherapy in locally advanced breast cancer with mammography, ultrasound and breast MRI. The results of a recently presented study on surveillance in the course of chemotherapy with contrast-enhanced MRI are compared with ratings based on mammography and ultrasound. Contrast-enhanced MRI correlates best with the histological tumor size when compared with mammography and ultrasound. Tumors with a high HER2 score (2+ with positive FISH test or 3+) show a significantly higher response compared to tumors with a lower HER2 score: size p <0.01, maximum enhancement p <0.01 and area under the curve (AUC) p <0.05. Reduction of tumor size and enhancement are complementary parameters and are not correlated to each other (r=0.22). Contrast-enhanced MRI of the breast is a reliable method for quantification of the response to neoadjuvant chemotherapy. The reductions of tumor size and of tumor enhancement are not correlated. Therefore, it may be reasonable to take both aspects for quantification of therapy response into account. Further studies are needed for evaluation of the value of breast MRI as a prognostic factor.

Source: EMBASE

15. Sentinel lymph node biopsy (SLNB) before primary chemotherapy (PC) in breast cancer patients

Abstract: SLNB prior to PC will minimize risk of a false negative result and allow more accurate initial staging which can guide treatment decisions for adjuvant radiotherapy and axillary surgery. A retrospective analysis was undertaken to examine upfront SLNB amongst 46 patients with clinically node negative, noninflammatory invasive breast cancers measuring between 2 and 5 cm on initial imaging (irrespective of modality). Axillary ultrasound was performed in most patients (43/46), 10 of whom had a negative core biopsy. Mean tumour diameter was 28.5 cm and two patients had axillary lymph node dissection (ALND) prompted by subsequent MRI size estimate (>5 cm). Dual localization methods were employed and micrometastatic foci identified on H&E sections; immunohistochemistry was not routinely performed. The sentinel node was identified in all patients with a mean of 2.7 nodes per patient (range 1-6). A total of 13 patients had positive nodes (28%) with 10 having involvement of a single node (eight macrometastases; two micrometastases) and three patients with two separate nodes, both containing a macrometastasis (two patients) or each a macro- and micrometastasis (one patient). The mean number of nodes removed on completion ALND was 10.9 (range 7-32). Only one patient had tumour (micrometastasis) within a non-sentinel node (NSLN) and one other patient had evidence of fibrosis suggesting tumour response to PC. A group of patients can be selected for SLNB before PC who have a relatively low axillary tumour burden at presentation. Potential downstaging with PC may result in a low incidence of NSLN involvement with viable tumour.

Source: EMBASE

16. Color Doppler ultrasonography for treatment response prediction and evaluation in breast cancer

Abstract: The use of color Doppler ultrasonography (CDUS) in the assessment of therapeutic response of breast cancer is well documented in the literature. The present study was thus undertaken to determine whether CDUS could be used to forecast the likelihood of pathological complete response (pCR) and the extent of residual disease in patients with node-positive breast cancer undergoing neoadjuvant chemotherapy. The study was undertaken on 30 consecutive patients with node-positive breast cancer (T1-3N1; median age 47 years) receiving neoadjuvant chemotherapy. Imaging was performed at three sequential time points: before chemotherapy (T0), immediately after chemotherapy (T1), and 6-8 weeks after chemotherapy (T2). The Van Herwaarden score was used to determine the degree of tumour response. Tumour size, vascularity ratio, solidity, and shape were evaluated using CDUS. Linear regression was used to determine the correlation between parameters, and ROC analysis was used to determine the discriminatory value. Tumour vascularity at T0 had a moderate negative correlation with pCR (r=-0.51). The vascularity ratio at T0 showed a strong negative correlation with pCR (r=-0.71), and tumour vascularity at T0 was the only independent predictor of pCR (P<0.01). In conclusion, a low vascularity ratio at T0 detected by CDUS appears to be strongly predictive of pCR in patients with node-positive breast cancer. Further studies are needed to confirm the findings of this study.

Source: EMBASE
Abstract: Primary systemic therapy is a well-established modality of treatment in locally advanced breast cancer. Assessment of tumor response to chemotherapy not only helps in assessing the efficacy of the regimen used but also predicts the overall outcome of the patient. The tumor vascularity is a surrogate marker of tumor burden and this can be readily assessed by color Doppler ultrasound using various indices (resistivity index, pulsatility index and maximum flow velocity). The pre- and post-chemotherapy indices can be compared with in order assess the response to chemotherapy. Among various imaging modalities, MRI and PET have the highest sensitivity in detecting the tumor response, but they are not cost effective. Color Doppler ultrasound is a promising alternative for tumor response assessment owing to its availability, reproducibility and cost-effectiveness.

Source: EMBASE

17. Resection margins in ultrasound-guided breast-conserving surgery

Author(s) Olsha O., Sibirsky O., Carmon M., Shemesh D., Rivkin L., Ashkenazy I.

Citation: Annals of Surgical Oncology, April 2010, vol./is. 17/(S184), 1068-9265 (April 2010)

Abstract: Objectives: Inadequate resection margin rates range from 4% to 41% following breast-conserving surgery. Inadequate margins on pathologic examination is an important predictor of increased incidence of ipsilateral breast cancer recurrence. Patients with close or involved margins have repeated operations until an acceptable margin is achieved. Two small series have shown that intraoperative ultrasound will result in positive margins in 4% (palpable lesions) and 11% (nonpalpable lesions). We quantified size of margins attained following intraoperative-ultrasound-guided breast conserving surgery and assessed the relationship of the size of these margins to several variables: tumor size, multifocality, palpability, ductal versus lobular histology, and the presence of an intraductal component.

Methods: From June 2008 until October 2009, patients with known breast cancer undergoing breast-conserving surgery, and in whom the operating surgeon visualized the tumor by ultrasound, were included. Patients were excluded if ultrasound margins were not recorded, if margin re-excision was directed by participation in a clinical trial rather than ultrasound findings, or if the patient had neoadjuvant chemotherapy. For nonpalpable cancers, a localizing wire was inserted under ultrasound guidance preoperatively. An ultrasound probe covered by a sterile sleeve was used to guide resection after incision. After excision, sagittal and transverse tumor margins were measured by ultrasound. Additional resections were performed if margins were close, at the discretion of the surgeon. Ultrasound measurements were prospectively recorded and compared with pathologic margins. Results: Thirty-eight patients were included. Mean age was 61.7 (+/- 12.2; range, 30-89). There were 33 (79%) invasive ductal carcinomas, 4 (11%) invasive lobular, 1 (3%) mixed ductal and lobular, and 3 (8%) other histologies. Sixteen (42%) of the patients had additional DCIS associated with their cancers. Twenty-one patients (55%) had palpable tumors and tumor size was 1.7 cm (+/- 0.7; range, 0.7-3.0) clinically and 2.0 cm (+/- 1.0; range, 0.7-4.8) as measured by the pathologist. Nine patients (24%) had multifocal tumors. Of these, only 4 patients were diagnosed with multifocal disease before surgery. Underestimation of margins by ultrasound versus pathology margins was only affected by multifocality (P = 0.004). Tumor size, palpability, histology, and the presence of intraductal carcinoma did not cause significant underestimation of margins by ultrasound. Conclusions: Intraoperative ultrasound may be an effective tool to maintain a low level of re-operation after breast-conserving surgery. The only factor that affects the accuracy of ultrasound appears to be the presence of multifocal tumors that were not detected preoperatively.
18. Adequate histologic sampling of breast core needle biopsies (CNB) in the era of molecular testing - Is more just more?

**Author(s)** Acs G., Esposito N.N., Laronga C.

**Citation:** Laboratory Investigation, February 2010, vol./is. 90/(32A), 0023-6837 (February 2010)

**Publication Date:** February 2010

**Abstract:** Background: CNB is widely used to evaluate clinically and radiologically detected breast lesions. It is current practice to examine at least 3 levels from each block of CNB samples. This recommendation was mainly based on a few studies evaluating the necessary amount of sampling to detect calcifications and adequately evaluate small foci of atypia. In the current era of molecular testing the limited amount of tissue obtained by CNB is highly valuable, especially in cases of carcinomas considered for neoadjuvant therapy. We aimed to determine the amount of sampling necessary to establish an accurate diagnosis for clinical management in a series of unselected CNB of the breast. Design: We prospectively identified 349 consecutive CNB for the study. The indication for CNB was mass (n=237), calcifications (n=80), architectural distortion (n=20) or enhancing lesions on MRI (n=12). CNB were done under ultrasound, stereotactic and MRI guidance in 231, 106 and 12 cases, respectively. Three levels of all blocks were examined routinely. In cases with indications other than mass lesions three additional levels were obtained in each case. Histologic, clinical and radiological findings were correlated. Results: The median number of total cores and cores with diagnostic lesion was 6 (range 1-36) and 4 (range 0-24), respectively. Diagnostic lesion or findings consistent with the clinical/radiologic impression was present on level 1 in 327 (93.7%) cases, including 235 (99.2%), 62 (77.5%), 20 (100%) and 11 (91.7%) CNB done for mass, calcification, architectural distortion and MRI findings, respectively. No mass lesion was identified in 2 CNB done for that indication in 2 (0.8%) cases despite deeper levels. In the 22.5% of cases where calcifications were missed on level 1, they were identified on level 2 in 8 (10%), level 3 in 4 (5%) and additional levels in 4 (5%) cases; no calcifications were identified in 2 (2.5%) cases even on additional levels. One (8.3%) case with MRI findings showed a focus of ADH on level 2 only. Conclusion: Our findings suggest that examination of a single level obtained from CNB of the breast yields accurate diagnosis in the vast majority of cases, especially when CNB is performed for mass lesions under ultrasound guidance. In cases with discordant findings or when small foci of atypia are seen, additional levels should be obtained. Routine examination of a single level of CNB would reduce cost and spare valuable tissue for molecular or other studies.

**Source:** EMBASE

Available in fulltext from Laboratory Investigation at EBSCOhost

19. [Comparison of response evaluation methods of neoadjuvant chemotherapy in breast cancer patients]

**Author(s)** Sun B., Song S.T., Wu S.K., Jiang Z.F., Wang T., Zhang S.H., Zhao Y.B., Yu C.Z., Li X.B., Yang T., Li G.J.

**Citation:** Zhonghua zhong liu za zhi [Chinese journal of oncology], October 2009, vol./is. 31/10(783-785), 0253-3766 (Oct 2009)

**Publication Date:** October 2009

**Abstract:** To compare the efficiency of response evaluation by clinical examination, ultrasonogrphy and mammography in neoadjuvant chemotherapy (NAC) for breast cancer. A retrospective cohort study was conducted to analyze the data of 141 patients treated with neoadjuvant chemotherapy. Response evaluation was performed by clinical palpation, ultrasound and mammography. Only 12 (8.5%) among the 141 patients presented with a stage I tumor. The tumor size determined by palpation was often larger than that by ultrasound before therapy (P < 0.01). Among patients with suspicions axillary nodes checked by ultrasound, 88.3% (53/60) of them had positive nodes by pathology before NAC, and 34.5% (10/29) of patients with negative nodes determined by ultrasound.
had positive nodes by pathology. In all the 141 patients, 21(14.9%) showed pathological complete remission in both the primary tumor and lymph node. For response evaluation, the false complete remission rate judged by clinical examination was 46.8% (22/47), and the false tumor residual rate by ultrasound was 84.0% (21/25). In 53.5% (23/43) of patients the response could not be assessed by mammography due to that the tumors were undistinguishable in size. The range of microcalcification was not reduced in 5 patients with a partial response of the tumor. 25 patients experienced needle puncture during therapy. Among them, in the 9 pathologically negative patients, only 3 achieved pCR, and the other 16 positive patients didn't achieve pCR. Using the puncture or sentinel lymph node biopsy, clinicians should pay enough emphasis on the pathological determination of the node status before chemotherapy. Clinicians will make a quite of false judgment of the tumor by clinical examination, ultrasound or mammography. They may use needle puncture during therapy to evaluate the response of neoadjuvant chemotherapy, and the result should be analyzed synthetically.

Source: EMBASE

20. Breast ultrasound may underestimate tumor size in pregnancy-associated breast cancer

Author(s) Rungruang B., Beriwal S., Kelley J.L., Zuley M., Sukumvanich P.

Citation: Gynecologic Oncology, February 2009, vol./is. 112/2 SUPPL. 1(S37), 0090-8258 (February 2009)

Publication Date: February 2009

Abstract: Objectives: Breast ultrasound imaging has been shown to detect 100% of palpable breast masses in pregnancy-associated breast cancer (PABC). No data currently exist regarding the correlation of tumor size on ultrasound with pathologic tumor size in PABC. The purpose of this study was to evaluate the sensitivity, specificity and accuracy of tumor size on ultrasound imaging in predicting pathologic tumor size in a cohort of patients with PABC. Methods: A retrospective chart review examined patients treated for PABC from 1991 to 2005 at a single institution. Patients were included if they were diagnosed with breast cancer either during pregnancy or within one year postpartum and underwent breast ultrasound imaging prior to surgical treatment. There was no treatment intervention between ultrasound imaging and surgery. Results: A total of 64 patients were identified as having PABC. Thirty-six patients underwent breast ultrasound imaging prior to surgical treatment. Twenty-one patients were diagnosed during pregnancy and 13 were diagnosed up to one year postpartum. Most patients (68%) were diagnosed with stage II disease. All patients had infiltrating ductal carcinoma histology. Five patients underwent neoadjuvant chemotherapy and had a posttreatment ultrasound prior to surgery. Median time from ultrasound to surgical treatment was 24 days (range: 3-113). Mean ultrasound tumor size was 2.0 cm, and mean pathologic tumor size was 2.6 cm. There was a significant difference between ultrasound tumor size and pathologic tumor size (P<0.05). The accuracy of ultrasound in predicting pathologic size to within five and one cm was 51 and 68%, respectively. For all 36 patients, the sensitivity and specificity of ultrasound for the detection of breast cancer were 94 and 50%, respectively. In the 31 patients who did not receive neoadjuvant chemotherapy, breast ultrasound detected 30 of the 31 breast cancers, and there were no patients with negative ultrasound findings. Conclusions: Breast ultrasound appears to be very sensitive for the detection of PABC. However, the accuracy was low, ranging from 51 to 68%. Specificity was also low at 50%, especially in patients who received neoadjuvant chemotherapy. The increased breast density in pregnancy may be a factor in the decrease in accuracy and specificity. Chemotherapy-induced changes in the tumors may have also led to the decrease in specificity. Ultrasound testing alone in these patients may not be adequate in assessing the size of the breast cancer, and if possible, other modalities should also be incorporated into the evaluation of pregnancy-associated breast cancer.

Source: EMBASE

21. Age and HER2 expression status affect the accuracy of preoperative MRI in predicting tumor extent after neoadjuvant chemotherapy
Abstract: Introduction: Neoadjuvant chemotherapy (NAC) can increase the breast conservation rate and provides prognostic information by identifying patients with pathologic complete remission (pCR). While breast conservation can be safely done in patients who show response to NAC, the presence of chemotherapy-induced fibrosis and the heterogeneous patterns of tumor shrinkage may mislead the determination of residual tumor extent during breast conserving surgery. Recent reports show improved preoperative assessment of residual tumor extent after NAC by performing preoperative breast magnetic resonance imagining (MRI) when compared to conventional methods. In this study, we evaluated the accuracy of preoperative breast MRI in predicting residual tumor extent in patients who underwent NAC, and investigated the factors which may influence its accuracy in a relatively large cohort of patients. Materials and Methods: From Jan 2006 to Feb 2008, 195 non-metastatic breast cancer patients received NAC and surgery in Department of Surgery, Seoul National University Hospital. In all patients, preoperative breast MRI was performed in addition to physical examination, mammography, and ultrasonography (USG) to estimate the residual tumor extent. The results were compared to pathologic tumor sizes, and the accuracy of MRI was determined by simple regression analysis. By using the results of immunohistochemical staining, patients were divided into molecular subtypes, and the accuracy of MRI was compared between each subtypes. To identify a subgroup of patients who might benefit from preoperative MRI, the association of MRI accuracy and various clinicopathologic features as well as molecular markers were investigated using linear regression analysis. Results: The mean age of the patients was 45.5 (+/-9.4) and mean pathologic tumor size was 4.9 (+/-2.1) cm. pCR was achieved in 31 patients (15.8%). Preoperative MRI and USG showed similar correlation with pathologic invasive tumor size measured from resected specimens (Pearson Coefficient of 0.492 and 0.462, respectively). However, MRI showed superior correlation with tumor extent when the size of surrounding in situ lesions were taken into consideration (Pearson Coefficient of 0.584 for MRI and 0.495 for USG). MRI showed highest correlation with pathologic tumor size in triple negative subtype and lowest correlation in HER2 subtype. Multivariate analysis showed older age (>45 yrs) and HER2 negativity as independent predictors of MRI accuracy. Mammographic density and initial tumor size did not have significant association with MRI accuracy. Conclusion: Preoperative MRI had high correlation with the extent of residual invasive and in situ tumor size after NAC. The accuracy of MRI was highest in patients with triple negative subtype. Multivariate analysis suggested age and CerbB2 expression as independent predictors of MRI accuracy. Although our results need further validation in a prospective setting, this results may provide a basis for selecting patients in whom the benefit of MRI can be maximized.

Source: EMBASE
Available in fulltext from Cancer Research at Highwire Press

22. Non-image guided fine needle aspiration of palpable axillary lymph nodes in breast cancer patients

Author(s) Marti J.L., Ayo D., Levine P., Hernandez O., Rescigno J., Axelrod D.M.

Citation: Cancer Research, January 2009, vol./is. 69/2 Suppl. S, 0008-5472 (15 Jan 2009)

Abstract: Introduction: While the utility of ultrasound-guided axillary lymph node FNA is well established, there is a paucity of data on non-image guided office-based FNA of palpable axillary lymphadenopathy. We investigate the sensitivity and specificity of non-image guided FNA of axillary lymphadenopathy in patients presenting with breast cancer, and report factors correlating with a positive FNA result. Methods: Retrospective review of 80 consecutive patients who underwent office-based FNA of palpable axillary lymph nodes between 2004-2008, with cytology results compared with histology during axillary sentinel node or lymph node dissection. Pearson correlation, chi-square and Fisher exact tests were used to determine correlation with other clinical and pathologic data. Results: Mean age was 56 with a median tumor size of 2.2 cm and 39% have pNO disease. Non-image
guided axillary FNA was 82% sensitive, 100% specific, and 89% accurate. Positive predictive value was 100% and negative predictive value was 76%. Therefore only 24% of patients who had a negative FNA had axillary involvement compared to 61% for the entire group. A significant correlation or association was identified between positive FNA cytology and breast tumor size (p=0.02), number of pathologic positive lymph nodes (p<0.0001), presentation with a palpable breast mass (p=0.003), radiographic lymphadenopathy (p=0.0005), lymphovascular invasion (p=0.003), stage of disease (P<0.0001), and N stage (p<0.0001). There was a borderline significant association with her2neu receptor status (p=0.08). Age, lymph node size, ER/PR status, Ki-67 index, tumor histology, multicentric disease, degree of differentiation and nuclear grade were all not significantly correlated or associated with positive FNA. Conclusions: Non-image guided FNA of palpable axillary lymphadenopathy in breast cancer patients is a very sensitive and specific test. Prompt determination of lymph node positivity benefits select patients, permitting avoidance of ultrasound, sentinel lymph node biopsy, or delay in receiving neoadjuvant therapy. This results in time and cost savings for the patient and the health care system, and expedites definitive management of the patient.

Source: EMBASE

Available in fulltext from Cancer Research at Highwire Press

23. Using MRI to plan breast-conserving surgery following neoadjuvant chemotherapy for early breast cancer

Author(s) Bhattacharyya M., Ryan D., Carpenter R., Vinnicombe S., Gallagher C.J.

Citation: British Journal of Cancer, January 2008, vol./is. 98/2(289-293), 0007-0920;1532-1827 (29 Jan 2008)

Publication Date: January 2008

Abstract: Contrast-enhanced magnetic resonance imaging (MRI) was used to monitor the response of patients undergoing neoadjuvant chemotherapy for breast cancer with the aim of undergoing breast-conserving surgery (BCS). Patients were prospectively recruited to undergo MRI as well as conventional methods of clinical examination, mammography (MM) and ultrasonography (USS) and response was assessed by each of these methods. Thirty-two patients with primary breast cancer were recruited. Magnetic resonance imaging correlation with histopathological size (r=0.71) was superior to USS (r=0.65) and to MM where tumour size was not measurable following chemotherapy in 71% of patients. Magnetic resonance imaging had 87.5% sensitivity (95% CI=68-97%) and 50% specificity (95% CI=16-84%) for a PPV (positive predictive value) of 99.8% and NPV (negative predictive value) of 80% for the detection of residual invasive cancer. Magnetic resonance imaging displayed 80% sensitivity (95% CI=28.4-99.5%) and 89% specificity (95% CI=71-98%) to detect pathological pCR in the breast. Eighty-four per cent of recruited patients were identified as potentially suitable candidates for BCS following chemotherapy and of those choosing to accept BCS, breast conservation was achieved in 90.5%, or 65.6% of all patients. Of those who proceeded to BCS, 9.5% required a redo mastectomy because of positive margins; however, no residual tumour was found on histological examination of mastectomy specimens. Magnetic resonance imaging appears to be superior to conventional methods for assessing pathological response and the low rate of re-operation for positive margins indicates a valuable role in aiding the decision to undergo BCS or mastectomy. 2008 Cancer Research UK.

Source: EMBASE

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24. [Neoadjuvant chemotherapy of breast carcinomas: what post-therapeutic (preoperative) information is provided by quantitative dynamic MRI?]. [German] Neoadjuvante Chemotherapie des Mammakarzinoms : Welche posttherapeutischen (praoperativen) Informationen liefert die quantitative dynamische MRT?

Author(s) Wasser K, Klein SK, Junkermann H, Sinn HP, Darai S, Neff W, Kauczor HU,
Citation: Radiologe, May 2007, vol./is. 47/5(421-9), 0033-832X;0033-832X (2007 May)

Publication Date: May 2007

Abstract: PURPOSE: The aim of this study was to evaluate whether quantitative changes in contrast enhancement (CE) after neoadjuvant chemotherapy (NC) are associated with histological signs of tumor regression and whether quantitative dynamic MRI (dMRI) is capable of accurately assessing preoperative tumor size compared to mammography (MG) and ultrasound (US).

METHODS: Thirty-one patients with breast cancer underwent MRI before and after NC. Dynamic CE was measured using a turbo-FLASH sequence and quantified by a two-compartment model, where two parameters, k(ep) (distribution constant rate) and A (amplitude), were calculated and color mapped.

RESULTS: When tumors had signs of histological regression in the operative specimen (n=17) decrease of the parameters A and k(ep) was significantly more marked compared to tumors without regression (n=12). The correlation between tumor size measured by dMRI and histopathology was 0.81 when areas of unspecific CE were included; when they were not included the correlation was 0.66 and tumor size was systematically underestimated. In 26 patients dMRI was retrospectively compared with MG (r=0.51; dMRI, r=0.80) and in 22 patients with US (r=0.60; dMRI, r=0.75).

CONCLUSION: Changes in dynamic CE are associated with histological tumor regression. Quantitative dMRI enables a valid assessment of tumor residue and is superior to MG and US. Remaining unspecific CE within the original tumor site should be considered as potentially malignant.

Source: Medline

25. Neoadjuvant chemotherapy of breast carcinomas: What post-therapeutic (preoperative) information is provided by quantitative dynamic MRI? [German]

Neoadjuvante chemotherapie des mammakarzinoms: Welche posttherapeutischen (praoperativen) informationen liefert die quantitative dynamische MRT?

Author(s) Wasser K., Klein S.K., Junkermann H., Sinn H.P., Darai S., Neff W., Kauczor H.U., Delorme S.

Citation: Radiologe, May 2007, vol./is. 47/5(421-429), 0033-832X (May 2007)

Publication Date: May 2007

Abstract: Purpose. The aim of this study was to evaluate whether quantitative changes in contrast enhancement (CE) after neoadjuvant chemotherapy (NC) are associated with histological signs of tumor regression and whether quantitative dynamic MRI (dMRI) is capable of accurately assessing preoperative tumor size compared to mammography (MG) and ultrasound (US). Methods. Thirty-one patients with breast cancer underwent MRI before and after NC. Dynamic CE was measured using a turbo-FLASH sequence and quantified by a two-compartment model, where two parameters, k(sub>ep</sub>) (distribution constant rate) and A (amplitude), were calculated and color mapped. Results. When tumors had signs of histological regression in the operative specimen (n=17) decrease of the parameters A and k(sub>ep</sub>) was significantly more marked compared to tumors without regression (n=12). The correlation between tumor size measured by dMRI and histopathology was 0.81 when areas of unspecific CE were included; when they were not included the correlation was 0.66 and tumor size was systematically underestimated. In 26 patients dMRI was retrospectively compared with MG (r=0.51; dMRI, r=0.80) and in 22 patients with US (r=0.60; dMRI, r=0.75). Conclusion. Changes in dynamic CE are associated with histological tumor regression. Quantitative dMRI enables a valid assessment of tumor residue and is superior to MG and US. Remaining unspecific CE within the original tumor site should be considered as potentially malignant. 2005 Springer Medizin Verlag.

Source: EMBASE

26. Evaluation and indications of ultrasound-guided vacuum-assisted core needle breast biopsy

Author(s) Nakano S., Sakamoto H., Ohtsuka M., Mibu A., Sakata H., Yamamoto M.
**Abstract:** BACKGROUND: The Mammotome is a diagnostic tool used under stereotactic or with ultrasound guidance. A clear indication for Mammotome use under stereotactic guidance is when a non-palpable microcalcification is a target. However, the indications for the use of the Mammotome under ultrasound guidance vary among institutions, and it is difficult to find a place for the Mammotome among conventional biopsy techniques. The Mammotome biopsy has been available in our hospital since July 1999. We assessed the effectiveness and indications of ultrasound-guided Mammotome biopsy.

**METHODS:** We performed Mammotome biopsies in 433 cases requiring histological diagnosis from July 1999 to September 2006, using an 11-gauge articulated arm-type Mammotome under ultrasound guidance. There were 377 mass lesions including 83 non-palpable cases and 56 hypoechoic lesions.

**RESULTS:** The indications for Mammotome biopsy were 162 cases with inconsistent fine needle aspiration (FNA) and imaging findings, 114 cases indeterminate by FNA, 68 cases of an identified pathological type before neoadjuvant chemotherapy and confirmation of hormone receptor status, 36 inadequate cases by FNA, 20 cases of confirmation of fibroadenoma and other benign tumors, 8 removal cases of fibroadenoma, 8 microcalcification cases, and 17 others. The target lesion was obtained in 99.5% of the cases.

**CONCLUSIONS:** Ultrasound-guided Mammotome biopsy is an accurate and useful diagnostic method that enables sufficient amounts of tissue to be obtained with minimal invasion and few complications. The Mammotome is the first choice for obtaining a definitive pathological diagnosis in breast lesions.

**Source:** EMBASE
Abstract: PURPOSE: The purpose was to assess whether patients with clinical multifocal or multicentric (MFMC) breast cancer determined by mammogram, ultrasound, or physical examination have inferior outcome compared with patients with clinical unicentric lesions. PATIENTS AND METHODS: We retrospectively analyzed 706 consecutive patients with stages I-III breast cancer treated at the M.D. Anderson Cancer Center (Houston, TX) from 1976 to 2003 who received neoadjuvant anthracycline-based chemotherapy followed by breast conservation therapy (BCT), mastectomy alone, or mastectomy plus postmastectomy radiation therapy. RESULTS: The mean follow-up was 66 months. At presentation, 97 of 706 patients had clinically MFMC disease (13.7%). The 5-year rate of locoregional failure was 10% for unicentric disease compared with 7% for MFMC disease (P = .78). Subset analyses of patients by treatment groups confirmed no statistical difference in locoregional control regardless of the type of locoregional treatment. Among patients with multifocal disease treated with BCT, there were no in-breast recurrences and one supraclavicular recurrence. Five-year disease-free survival and overall survival was equivalent between patients with MFMC and unicentric breast cancers. CONCLUSION: Patients with clinical MFMC breast cancer at the time of diagnosis treated with neoadjuvant chemotherapy followed by locoregional therapy have similar 5-year rates of locoregional control, disease-free survival, and overall survival as those with unicentric disease. Clinically detected MFMC disease did not predict for inferior outcome.

Source: EMBASE
30. [Assessment of neoadjuvant chemotherapy in breast cancer patients].

**Author(s)** Zhang B, Zhang Q, Zhao L, Long F, Li S, Jiang DQ, Xu H

**Citation:** Chung-Hua Chung Liu Tsa Chih [Chinese Journal of Oncology], November 2006, vol./is. 28/11(867-70), 0253-3766;0253-3766 (2006 Nov)

**Publication Date:** November 2006

**Abstract:** OBJECTIVE: To assess the response of neoadjuvant chemotherapy and its influencing factors in the breast cancer patients.

**METHODS:** 171 patients with stage II or operable stage III breast cancers were treated with neoadjuvant chemotherapy before surgery between January 2004 and May 2005. Of these, 160 received and completed > or =3 cycles of neoadjuvant chemotherapy, 11 received only 2 cycles. The regimens of neoadjuvant chemotherapy were: CEF (CTX, Epirubicin, 5-Fu); NE (Navelbine, Epirubicin); TEC (Taxotere, Epirubicin, CTX). Response of neoadjuvant chemotherapy was evaluated in all patients by palpation, ultrasonography and pathological methods.

**RESULTS:** Complete response rate and clinical objective response rate determined by clinical palpation (cCR, cOR), ultrasonography (sCR, sOR) and pathology (pCR) was 18.7% and 88.3%; 4.1% and 74.9%; 15.2%, respectively. The correspondence rate of the pCR with cCR and sCR was 43.8% and 42.9%, respectively. It was showed by univariate analysis that patient whose tumor was < or =3 cm in diameter, or ER negative or grade 3 were more likely to achieve a pCR than those whose tumor was >3 cm, or ER positive or grade 1. Logistic regression analysis showed that only tumor size was the significant predictive factor for response to neoadjuvant chemotherapy in patients with primary breast cancer.

**CONCLUSION:** Patient with small, or ER negative or grade 3 tumor may have better pathological response to neoadjuvant chemotherapy, particularly, the tumor size is more predictive of pCR. Palpation or ultrasonography may have a tendency either to underestimate or to overestimate pCR. Breast neoplasms/drug therapy;

**Source:** Medline

31. Ultrasonographic compared to histologic sizing of benign and malignant breast lesions

**Author(s)** Ohlinger R., Frese H., Paepke S., Heyer H., Kohler G., Schwesinger G., Grunwald S.

**Citation:** Geburtshilfe und Frauenheilkunde, April 2006, vol./is. 66/4(373-376), 0016-5751 (April 2006)

**Publication Date:** April 2006

**Abstract:** Aim: This study aims to evaluate the correlation between ultrasonographic and histologic sizing of benign and malignant breast lesions. Ultrasonography is an important adjunct, because palpatory findings are insufficient to decide about the surgical management, e.g. tissue-sparing resection versus mastectomy. Neither does the physical examination suffice to determine if to proceed with surgery or primary chemotherapy.

**Method:** Over a two-year period, breast ultrasonographic and the corresponding histologic sizing data were prospectively collected. The largest measurement obtained for each lesion was entered into the analysis. Results: Among a total number of 281 lesions, 152 (54.1%) were benign and 129 (45.9%) malignant. Measured by ultrasonography, 74.6% of tumors up to 10 mm are benign. Both ultrasonographic and histologic size data were available in 199 cases. Seven patients had received neoadjuvant chemotherapy, leaving 192 lesions for final analysis. By ultrasonography, lesions measured between 3 and 86 mm (mean 18.1 mm) in size. The average size of benign lesions was 15.3 mm, the average size of malignant lesions 21.4 mm. All lesions larger than 50 mm were malignant. There is a trend toward slight overestimation of the size of malignant and underestimation of the size of benign lesions by ultrasonography. In 33.9% (n = 65) of all 192 cases, ultrasonographic and histologic measurements agreed to within 2 mm. Conclusion: Due to precise lesion sizing, breast ultrasonography possesses a significant potential as a preoperative staging tool. Georg Thieme Verlag KG Stuttgart.

**Source:** EMBASE
32. Accuracy of physical examination, ultrasonography, and mammography in predicting residual pathologic tumor size in patients treated with neoadjuvant chemotherapy


Citation: Annals of Surgery, February 2006, vol./is. 243/2(257-264), 0003-4932 (February 2006)

Publication Date: February 2006

Abstract: Objective: To assess the accuracy of physical examination, ultrasonography, and mammography in predicting residual size of breast tumors following neoadjuvant chemotherapy. Background: Neoadjuvant chemotherapy is an accepted part of the management of stage II and III breast cancer. Accurate prediction of residual pathologic tumor size after neoadjuvant chemotherapy is critical in guiding surgical therapy. Although physical examination, ultrasonography, and mammography have all been used to predict residual tumor size, there have been conflicting reports about the accuracy of these methods in the neoadjuvant setting. Methods: We reviewed the records of 189 patients who participated in 1 of 2 protocols using doxorubicin-containing neoadjuvant chemotherapy, and who had assessment by physical examination, ultrasonography, and/or mammography no more than 60 days before their surgical resection. Size correlations were performed using Spearman rho analysis. Clinical and pathologic measurements were also compared categorically using the weighted kappa statistic. Results: Size estimates by physical examination, ultrasonography, and mammography were only moderately correlated with residual pathologic tumor size after neoadjuvant chemotherapy (correlation coefficients: 0.42, 0.42, and 0.41, respectively), with an accuracy of +/- 1 cm in 66% of patients by physical examination, 75% by ultrasonography, and 70% by mammography. Kappa values (0.24-0.35) indicated poor agreement between clinical and pathologic measurements. Conclusion: Physical examination, ultrasonography, and mammography were only moderately useful for predicting residual pathologic tumor size after neoadjuvant chemotherapy. Copyright 2006 by Lippincott Williams & Wilkins.

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33. Clinical and radiologic assessments to predict breast cancer pathologic complete response to neoadjuvant chemotherapy


Citation: Breast Cancer Research and Treatment, August 2005, vol./is. 92/3(231-238), 0167-6806 (August 2005)

Publication Date: August 2005

Abstract: Purpose. To prospectively compare the ability of clinical examination, mammography, vascularity-sensitive ultrasound, and magnetic resonance imaging (MRI) to determine pathologic complete response (CR) in breast cancer patients undergoing neoadjuvant chemotherapy. Patients and methods. Participants were women with primary measurable, operable invasive breast cancer (Stages I-III) who presented to the University of Michigan Breast Care Center. Eligibility criteria were based on clinical need for chemotherapy as part of the overall treatment plan. The chemotherapy consisted of doxorubicin and docetaxel administered every 3 weeks for four cycles. Tumor size measurements by physical examination and by the three imaging modalities were performed before chemotherapy was initiated and after its completion, prior to definitive surgery. Response criteria were pre-specified in this prospective design, and study
Radiologists analyzed the mammographic, sonographic and MRI image sets blinded to information from the other modalities and blinded to final histological diagnosis. The pathologic CR rate obtained by the clinical and imaging modalities was compared to pathologic CR as determined pathologically. Results. 41 of 43 enrolled patients had a determination of pathologic response, and 4 patients had a pathologic CR to this chemotherapy (9.8%). The accuracy of physical examination, mammography, ultrasound, and MRI in determining pathologic CR was 75, 89, 82, and 89% respectively (NS). Conclusion. Biopsy after neoadjuvant chemotherapy remains absolutely necessary to determine pathologic CR to neoadjuvant chemotherapy, as the accuracy of current imaging modalities is insufficient to make this determination. The accuracy of mammography, vascularity-sensitive ultrasound, and MRI were not observed to be significantly different. Springer 2005.

Source: EMBASE
Available in fulltext from Breast Cancer Research and Treatment at EBSCOhost

34. Sonographic evaluation of early-stage breast cancers that undergo neoadjuvant chemotherapy

Citation: Journal of Ultrasound in Medicine, July 2005, vol./is. 24/7(885-895), 0278-4297 (July 2005)
Publication Date: July 2005
Abstract: Objective. We prospectively evaluated low-stage breast cancers treated with neoadjuvant chemotherapy using whole-volume sonography and color Doppler imaging. Methods. Thirty-four women with breast cancer (mean maximum size, 2.4 cm) received neoadjuvant chemotherapy with doxorubicin and docetaxel. Targeted whole-volume sonography of tumor sites was performed before and after chemotherapy to assess mass size, color pixel speed-weighted density, and American College of Radiology Breast Imaging Reporting and Data System sonographic characteristics. After chemotherapy, tumor sites were excised by lumpectomy or mastectomy. Results. Three (11.3%) of 34 patients had a complete histologic response. After chemotherapy, correlation was r = 0.716 between final histologic and sonographic sizes. Compared with histologic residual tumors, sonography had 4 false-negative results, 3 false-positive results, and 27 true-positive results (sensitivity, 87%), with no false-negative results among a subgroup of tumors of 7 mm and larger (sensitivity, 100%). The 3 cases with false-positive results were histologic fibrosis or biopsy changes. Mean speed-weighted density was 0.015 before and 0.0082 after chemotherapy (P = .03). After chemotherapy, vascularity was less common within (P = .06) or adjacent to (P = .009) masses or in tumor sites (P = .05). Prechemotherapy variables of gray scale characteristics and vascularity were compared with final histologic size, and all had P > .20. Conclusions. Postchemotherapy sensitivity of sonography was high for residual tumors of 7 mm or larger. Correlation was moderate between histologic and sonographic final tumor sizes. False-positive results were caused by fibrosis or biopsy-related changes. False-negative results occurred with residual tumor size of 6 mm or smaller. After chemotherapy, vascularity usually decreased, and this was not specific for complete response. Before chemotherapy, no vascular or gray scale feature at initial imaging predicted complete responders. 2005 by the American Institute of Ultrasound in Medicine.

Source: EMBASE
Available in fulltext from Journal of Ultrasound in Medicine at Highwire Press

35. Monitoring the response of large (>3 cm) and locally advanced (T3-4, N0-2) breast cancer to neoadjuvant chemotherapy using (99m)Tc-Sestamibi uptake.

Author(s) Marshall C, Eremin J, El-Sheemy M, Eremin O, Griffiths PA
Citation: Nuclear Medicine Communications, January 2005, vol./is. 26/1(9-15), 0143-3636;0143-3636 (2005 Jan)
BACKGROUND AND AIM: (99m)Tc-Sestamibi (MIBI) scintimammography has an established role in the diagnosis of breast cancer. As a functional imaging technique, it may also be useful in assessing the response to chemotherapy. The aim of this study was to assess the effectiveness of the technique for this purpose.

METHODS: Twenty-six patients undergoing neoadjuvant chemotherapy for large or locally advanced breast cancer were monitored using the tumour to background ratio measured on MIBI scintimammograms. Patients were assessed and the size of the tumour was measured by callipers and ultrasonography before and at the end of treatment. Patients were assessed as complete, partial or non-responders. Following chemotherapy, patients proceeded to surgery with pathological evaluation of the operative specimen.

RESULTS: Twenty-four of the 26 patients showed a reduction in MIBI uptake on completion of chemotherapy. Residual tumour was demonstrated on the scintimammogram in four patients and all had significant residual disease on histology. In the remaining 22 patients, the final scintimammogram was negative, although three patients were assessed as non-responders and had large residual tumours on histology.

CONCLUSION: A positive MIBI scan is highly predictive of the presence of significant residual disease on completion of chemotherapy. However, a negative MIBI scan does not rule out the presence of considerable residual tumour. Whereas ultrasound and clinical assessment may underestimate the response to chemotherapy, MIBI imaging tends to overestimate the response.

Source: Medline

36. Accuracy of mammographic and sonographic assessment of preoperative breast cancer size

Author(s) Bui K.L., Lamb T.J., Rapelyea J.A., Schoonjans J.M., Brem R.F.

Citation: Journal of Women's Imaging, August 2003, vol./is. 5/3(128-133), 1084-824X (August 2003)

Publication Date: August 2003

Abstract: Evaluation of breast cancer size is important for preoperative surgical planning and determining response to neoadjuvant chemotherapy. Due to the limitations of clinical breast examination, imaging assessment of tumor size is important. The purpose of this study is to compare preoperative breast cancer size as determined by mammography and sonography and correlate to pathologic size. In 117 invasive breast cancers, tumor size was measured mammographically and sonographically prior to surgery and correlated with postexcisional pathologic measurement by regression linear analysis. The tumor histologic type was considered in the correlations. Mammographic (r = 0.8585) and sonographic (r = 0.8701) measurements of tumor size correlated well with pathologic size. The correlation persisted when evaluating the differing histopathologic types of breast cancer and was greater for infiltrating lobular carcinoma than infiltrating ductal carcinoma. Both mammography and sonography can accurately measure tumor size preoperatively, regardless of breast cancer histopathology.

Source: EMBASE

37. Primary chemotherapy effect in sentinel node detection in breast cancer.

Author(s) Vigario A, Sapienza MT, Sampaio AP, Piao JR, Barros N, Barros A, Pinotti JA, Buchpiguel CA

Citation: Clinical Nuclear Medicine, July 2003, vol./is. 28/7(553-7), 0363-9762;0363-9762 (2003 Jul)

Publication Date: July 2003

Abstract: PURPOSE: Sentinel node (SN) biopsy is a reliable method for improved staging of breast cancer, offering an alternative to routine axillary dissection. Perhaps preoperative chemotherapy could increase the rate of false-negative SN because of induced lymphatic changes. The aim of the study was to evaluate the utility of lymphoscintigraphy and of hand-held probe detection in the SN approach after chemotherapy, correlating it with...
histologic analysis of the axilla. METHODS: Eighty-three patients (mean age, 53 years; TNM stage I) were studied prospectively. They were separated into two groups: group 1 (G1), 37 patients with preoperative chemotherapy and group 2 (G2), 46 patients without chemotherapy. Mean tumor size was 2 cm in both groups. Lymphoscintigraphy was performed 3 to 4 hours after peritumoral injection of Tc-99m dextran 70 in a 0.2-ml volume and activity of 14.8 MBq (0.4 mCi), performed under ultrasound or mammographic control. On the following day, each patient underwent tumor resection with axillary dissection, included the SN. RESULTS: The SN was detected by scintigraphy in 78 patients (94%). The failure of SN to predict the axillary histologic status was significantly higher (P = 0.01) in G1 than in G2 (7 and 1 false-negative result, respectively). CONCLUSION: Preoperative chemotherapy seems to impair axillary evaluation by SN biopsy and should be used cautiously in this subset of patients.

Source: Medline

38. Imaging in evaluation of response to neoadjuvant breast cancer treatment
benefits of MRI

Author(s) Balu-Maestro C., Chapellier C., Bleuse A., Chanalet I., Chauvel C., Largillier R.

Citation: Breast Cancer Research and Treatment, 2002, vol./is. 72/2(145-152), 0167-6806 (2002)

Publication Date: 2002

Abstract: Purpose. To compare the value of conventional imaging modalities and MRI for determination of response to neoadjuvant chemotherapy for breast cancer. Material and methods. Sixty tumors (53 ductal carcinomas, seven invasive lobular carcinomas) in 51 patients were evaluated by physical examination, mammography, ultrasound, and MRI at baseline before therapy, after three courses of chemotherapy, and after six courses prior to surgery. Data from physical examination and imaging studies were compared to histopathological findings. Results. (i) MRI was the most reliable technique for evaluation of residual tumor size; this parameter was correctly estimated in 63% of cases by MRI versus, respectively 52, 38, and 43% by physical examination, mammography, and ultrasound, (ii) MRI correctly identified the response to chemotherapy in all cases of complete response (five cases), and in 45/55 cases of partial response (43 cases) or no response (12 cases), and (iii) among the 32 patients who underwent a mastectomy, MRI correctly revealed the multifocal nature of the disease for 12/15 multifocal lesions found at histological examination; both mammography and sonography were accurate in only six of the 15 cases. Conclusion. MRI appears to be a valuable technique for assessment of response to chemotherapy and identification of multifocal disease prior to surgery.

Source: EMBASE

39. Scintimammography using 99mTc sestamibi - Use and limitations [German] Die szintigraphie der mamma mit 99mTc-sestamibi - Indikationen und limitationen

Author(s) Tiling R., Linke R., Kessler M., Untch M., Sommer H., Brinkbaumer K., Becker I., Hahn K.

Citation: NuklearMedizin, 2002, vol./is. 41/3(148-156), 0029-5566 (2002)

Publication Date: 2002

Abstract: Aim: Until now scintimammography did not achieve any definite role in the assessment of breast lesions. Purpose of this study was to elaborate its use as well as the limitations of scintimammography after 500 examinations completed. Methods: Scintigraphic findings were correlated with the histopathologic outcome of 219 patients, who underwent surgery or biopsy for histopathological confirmation. The results were determined with respect to palpability of the lesion and tumour size. Additionally, a distinct analysis was performed for the patient subpopulation with indeterminate results of previously performed physical examination, mammography, and sonography. Results: Overall sensitivity for scintimammography was 82.1% at a specificity of 87.5%. For palpable lesions sensitivity was 91.7% which was evidently higher as compared to 64.9% for non palpable lesions. For palpable lesions specificity was 81.1% and 88.6% for non palpable lesions. According to tumour size sensitivity ranged between 65.2% for carcinoma...
with a diameter <1 cm and 93.7% for carcinoma >1 cm. In the patients subgroup with indeterminate preliminary diagnosis (n = 143) sensitivity decreased to 71.7% at a specificity of 87.8%. Patients undergoing neoadjuvant chemotherapy showed decreasing sestamibi uptake as early as 8 days after therapy if tumour response was evident. However, small residual invasive tumours in patients with complete remission could not be visualised. Conclusion: Scintimammography is neither suited for screening, nor early diagnosis of breast cancer, nor for the further evaluation of small and unclear mammographic findings. Scintimammography should not be used whenever histopathological clarification of a suspicious lesion is necessary. It is useful to further investigate patients with unclear or probably benign findings in physical examination and/or mammography and to monitor tumour response to neoadjuvant chemotherapy.

Source: EMBASE

40. Locally advanced breast carcinoma: computer assisted semiquantitative analysis of color Doppler ultrasonography in the evaluation of tumor response to neoadjuvant chemotherapy (work in progress).

Author(s) Huber S, Medl M, Helbich T, Taucher S, Wagner T, Rudas M, Zuna I, Delorme S

Citation: Journal of Ultrasound in Medicine, September 2000, vol./is. 19/9(601-7), 0278-4297:0278-4297 (2000 Sep)

Publication Date: September 2000

Abstract: We aimed to evaluate objectively the value of color Doppler flow imaging in the assessment of response of locally advanced breast cancer to primary medical treatment by using a computer assisted semiquantitative method. Prior to and after neoadjuvant treatment, 17 patients with locally advanced breast carcinoma were prospectively evaluated by physical examination and computer assisted semiquantitative color Doppler ultrasonography. The results of clinical and color Doppler examination were finally correlated to the histopathologic evaluation of tumor response. The degree of concordance between posttherapeutic histopathologic results, clinical examination, and color Doppler assessment was evaluated by kappa statistics. Concordance was 0.474 (0.135-0.813) between histopathologic results and clinical posttherapeutic assessment and 0.870 (0.627-1.113) between histopathologic results and semiquantitative color Doppler examination. Objective semiquantitative assessment of tumor vascularity as displayed by color Doppler ultrasonography has potential as a functional tool for measuring tumor response to neoadjuvant chemotherapy.

Source: Medline

Available in fulltext from Journal of Ultrasound in Medicine at Highwire Press

41. Dynamic imaging: Scintimammography

Author(s) Salvatore M., Del Vecchio S.

Citation: European Journal of Radiology, May 1998, vol./is. 27/SUPPL. 2(S259-S264), 0720-048X (May 1998)

Publication Date: May 1998

Abstract: Although mammography remains the technique of choice for the early detection of breast cancer, new emerging breast imaging techniques such as ultrasound, magnetic resonance and radionuclide scanning have been investigated and included in many diagnostic protocols. This overview discusses the current problems related to radionuclide breast imaging trying to define its role in the management of women with suspicious breast lesions at mammography. A number of tumor-imaging agents have been recently used for the differential diagnosis of malignant and benign lesions in radiographically dense breasts and breasts with architectural distortions from prior biopsy or surgery or following radiation therapy. <sup>99m</sup>Tc-MIBI is the most used tracer which has become the paradigm of this new class of compounds suitable for breast imaging. The current sensitivity and specificity rates for breast scintigraphy with <sup>99m</sup>Tc-MIBI depend on a number of factors including lesion size and site. Sensitivity and specificity rates and positive and negative predictive values of 92, 89, 81 and 96%, respectively, have been reported in a
large series of patients with palpable breast lesions, which figures have been confirmed in many other series. On the contrary, lower sensitivity has been reported for nonpalpable breast abnormalities or for lesions smaller than 1 cm. This observation, confirmed by many authors, implies that a new nonpalpable lesion that is suspicious for malignancy at mammography needs a histologic diagnosis. We also report the results of our recent studies on functional imaging with $^{99m}$Tc-MIBI of the multidrug resistance phenotype in breast cancer patients. These studies followed an observation that this tracer is a suitable transport substrate for the P-glycoprotein (P-gp) which is commonly associated with the development of a multidrug resistance phenotype. We examined 30 patients with histologically confirmed breast carcinoma who had received no previous chemotherapy or preoperative local irradiation. We found a positive and significant correlation between the efflux rates of $^{99m}$Tc-MIBI determined by in vivo kinetic analysis and the P-gp levels measured in vitro by quantitative autoradiography in the same tumors ($r = 0.62; p < 0.001$). More recently, we tested whether tumor clearance of $^{99m}$Tc-MIBI can predict the response to neoadjuvant chemotherapy in patients with locally advanced breast cancer. Thirty-nine patients with stage III disease underwent $^{99m}$Tc-MIBI scanning before neoadjuvant chemotherapy and the time to half-clearance of the tracer was calculated. The patients then received epirubicin and underwent mastectomy after completing chemotherapy. This study showed that a rapid tumor clearance of $^{99m}$Tc-MIBI ($\leq 204$ min) can predict the lack of tumor response to neoadjuvant chemotherapy with drugs affected by multidrug resistance phenotype in advanced breast carcinoma patients. However, slower tracer clearance ($\leq 204$ min) did not guarantee an objective tumor response to chemotherapy in all patients, in agreement with the existence of several P-gp-independent mechanisms of drug resistance. We conclude that the preliminary study of this phenotype would allow to predict the response to (neo)adjuvant chemotherapy and select the appropriate treatment regimen for each patient. Finally, radionuclide breast scanning may be helpful in the differential diagnosis of malignant and benign breast lesions as a guide to subsequent chemotherapy.

**Source:** EMBASE

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**42. Relative value of physical examination, mammography, and breast sonography in evaluating the size of the primary tumor and regional lymph node metastases in women receiving neoadjuvant chemotherapy for locally advanced breast carcinoma**

**Author(s)** Herrada J., Iyer R.B., Atkinson E.N., Sneige N., Buzdar A.U., Hortobagyi G.N.

**Citation:** Clinical Cancer Research, September 1997, vol./is. 3/9(1565-1569), 1078-0432 (September 1997)

**Publication Date:** September 1997

**Abstract:** The purpose of this study was to correlate physical examination and sonographic and mammographic measurements of breast tumors and regional lymph nodes with pathological findings and to evaluate the effect of neoadjuvant chemotherapy on clinical Tumor. Node-Metastasis stage by noninvasive methods. This was a retrospective analysis of 100 patients with locally advanced breast cancer registered and treated in prospective trials of neoadjuvant chemotherapy. All patients received four cycles of a doxorubicin-containing regimen and had noninvasive evaluation of the primary tumor and regional lymph nodes before and after neoadjuvant chemotherapy by physical examination, sonography, and mammography and underwent breast surgery and axillary dissection within 5 weeks after completion of neoadjuvant chemotherapy. The correlations between clinical and pathological measurements were determined by Spearman rank correlation analysis. A proportional odds model was used to examine predictive values. Eighty-three patients had both a clinically detectable primary tumor and lymph node metastases. Sixty-four patients had a decrease in Tumor-Node- Metastasis stage after chemotherapy. For 54% of patients, there was concordance in clinical response between the primary tumor and lymph node compartment; for the rest, results were discordant. Physical examination correlated best with pathological findings in the measurement of the primary tumor ($P = 0.0003$), whereas sonography was the most accurate predictor of size for axillary lymph nodes ($P = 0.0005$). The combination of physical examination and mammography worked best for assessment of the primary tumor ($P = 0.003$), whereas combining physical examination with sonography gave optimal evaluation of regional lymph nodes ($P = 0.0001$). In conclusion, physical examination is the best noninvasive predictor of the real size of locally advanced primary breast cancer, whereas sonography correlates better with
the real dimensions of axillary lymph nodes. The combination of physical examination with either mammography or sonography significantly improves the accuracy of noninvasive assessment of tumor dimensions.

Source: EMBASE
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Noninvasive monitoring of breast cancer during neoadjuvant chemotherapy using optical tomography with ultrasound localization
Q Zhu, S Tannenbaum, P Hegde, M Kane… - (New York, NY), 2008 - ncbi.nlm.nih.gov... in part by the differential chemosensitivity of the vasculature or the tumor and host. Gene expression analysis has identified three major breast cancer subtypes [43] that have different prognoses [44]. ... as this could facilitate modification of the regimen to enable the lesion to be ...
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Statement of the science concerning locoregional treatments after preoperative chemotherapy for breast cancer: a National Cancer Institute conference
TA Buchholz, CD Lehman, JR Harris… - Journal of Clinical ..., 2008 - jco.ascopubs.org... a third lesion anterior to the mammographically detected disease, and a contralateral lesion. ... in the diagnosis of axillary lymph node metastases in breast cancer: A systematic ... examination, ultrasonography, and mammography in predicting residual pathologic tumor size in ...
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Feasibility and accuracy of sentinel lymph node biopsy after preoperative chemotherapy in breast cancer patients with documented axillary metastases
J Shen, MZ Gilcrease, GV Babiera, MI Ross… - Cancer, 2007 - Wiley Online Library... by pathologic characteristics, then it may be possible to avoid axillary dissection in women who truly have tumor-free SLNs. ... The rationale for integration of lymphatic mapping and sentinel node biopsy in the management of breast cancer after neoadjuvant ...
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Accuracy of clinical evaluation of locally advanced breast cancer in patients receiving neoadjuvant chemotherapy
R Prati, CA Minami, JA Gornbein, N Debruhl… - Cancer, 2009 - Wiley Online Library... Relative value of physical examination, mammography, and breast sonography in evaluating the size of the primary tumor and regional lymph node metastases in women receiving neoadjuvant chemotherapy for locally advanced breast carcinoma. Clin Cancer Res. ...
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... of invasive lobular breast carcinoma: a prospective and a retrospective study of 57 cases: comparison with physical examination, conventional imaging, and histology
T Caramella, C Chapellier, F Ettore, I Raoust… - Clinical imaging, 2007 - Elsevier... Invasive lobular carcinoma; Breast neoplasm; Magnetic resonance imaging. ... It provides the most accurate estimation of tumor size and is highly sensitive for ... accuracy of mammography, clinical examination, US and MR imaging in preoperative assessment of breast cancer. ...
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Role of sentinel lymphadenectomy combined with intraoperative ultrasound in the assessment of locally advanced breast cancer after neoadjuvant chemotherapy
... with immediate pathologic review in patients receiving preoperative chemotherapy for breast carcinoma. ... Role of axillary node dissection after tumor downstaging with induction chemotherapy ... Ultrasound in the Assessment of Locally Advanced Breast Cancer After Neoadjuvant ...
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Accuracy of ultrasonography and mammography in predicting pathologic response after neoadjuvant chemotherapy for breast cancer

JD Keune, DB Jeffe, M Schootman, A Hoffman… - The American Journal of …, 2010 - Elsevier
... Long-term outcome of neoadjuvant therapy for locally advanced breast carcinoma: effective clinical downstaging allows ... American Joint Committee on Cancer tumor-node-metastasis stage after neoadjuvant chemotherapy and breast … Breast Cancer Res Treat, 69 (2001), pp. ...
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