Materials and Methods: Data was collected prospectively of all patients who presented to the rapid-access clinic with a history of trauma over a 58-month period. This included mechanism of injury, any history of immediate bruising and when discovery of the lump was made. Information regarding anti-coagulation therapy was also collected. Appropriate imaging was performed and core biopsy was only taken to confirm malignancy, benign lesions unrelated to trauma or where there was diagnostic uncertainty. Lumps related to trauma were followed-up at 3 months to ensure resolution.

Results: A total of 63 patients were seen with a history of trauma, the cause of which were falls (40%), road traffic accidents (17%), miscellaneous (17%) and those of unknown origin (26%). Biopsies were performed in 22 (35%) patients. Of these, 14 proved to be incidental findings following trauma: 8 were malignant (36%) and 6 benign (27%). The remaining results of biopsies were trauma-related with 1 haematoma (5%) and 7 diagnoses of fat necrosis (32%). The table demonstrates our findings.

	Diagnosis	Number	Anticoagulant use	
			Yes	No
Incidental	Malignant	8 (13%)	5 (16%)	27 (84%)
	Benign	24 (38%)		
Trauma related	Fat necrosis	9 (14%)	12 (39%)	19 (61%)
	Haematoma	22 (35%)		

Conclusions: 51% of patients presenting to our breast clinic in this population were found to have incidental findings highlighted as a result of their trauma. The diagnosis of the remaining 49% was directly related to trauma. These patients often presented with an earlier history of bruising and their diagnosis was confirmed radiologically. Thereby avoiding the need for a biopsy and further trauma to the area.

Those presenting with a history of trauma but no bruise and the discovery of a lump are likely to have an incidental finding. In our series, 25% of the patients in the incidental group were found to have an underlying malignancy. Therefore, in this population a complete triple assessment is required.

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Role of axillary ultrasound in staging breast cancer − a prospective study of 417 patients in a specialist breast unit

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Background: In newly diagnosed breast cancer, assessment of the axillary lymph node status is the most important component of the initial staging process, because of its impact on subsequent management and prognosis. Aim of the study was to evaluate the efficacy of Axillary Ultrasound in predicting axillary lymph node metastases and to assist in pre-operative planning in newly diagnosed breast cancer patients.

Methods: All patients with suspected breast cancer from September 2005 to March 2009 underwent Axillary ultrasound evaluation by two experienced breast radiologists. Features of malignancy were systematically assessed in all sites of the axillary lymph node groups. Patients who did not have operative intervention and who had micro-metastases on final histology were excluded from the study. Lymph node positivity on ultrasound was correlated with final histology after surgery. Routine FNAC or core biopsy of abnormal lymph nodes was not undertaken. Patients with equivocal lymph nodes were subjected to ultrasound guided biopsy in the later half of the study.

Results: Sample population was 417(n). Nine patients had micro-metastasis and were excluded. Ultrasound was positive for metastases in 79 patients, out of which 63 (80%) were positive on histology. Ultrasound was negative in 338 patients, out of which 58 were node positive on histology. Overall accuracy was 86% with ultrasound, with a specificity of 95% and sensitivity of 57%. Positive predictive value for the test was 82%. In the second half of the study, ultrasound guided biopsy was performed on equivocal lymph nodes (n = 13) which improved the overall positive predictive value in this group to 97%.

Conclusions: Axillary ultrasound is highly specific in diagnosing lymph node metastases in breast cancer, however less sensitive. A selective approach of ultrasound guided biopsy in equivocal lymph nodes definitely improves positive predictive value of the test and hence should be utilised. Axillary ultrasound has a definite role as an adjunct in staging newly diagnosed breast cancer.

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Diagnostic and prognostic value of 18F-fluorodeoxyglucose positron emission tomography/computed tomography fusion imaging (18F-FDG PET/CT) in detecting multifocality and axillary lymph node metastasis and correlation of clinicopathologic factors in primary breast cancer

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Background: The aims of this retrospective study were to evaluate the diagnostic value of 18F-fluorodeoxyglucose positron emission tomography/computed tomography fusion imaging (^{18}F-FDG PET/CT) for the detection of multifocality and axillary lymph node metastases and would be to determine the predictive value of poor prognosis in primary breast cancer.

Materials and Methods: Fifty female patients with invasive breast cancer were recruited. They underwent ^{18}F-FDG PET/CT before surgery. The sensitivity, specificity, positive and negative predictive value (PPV, NPV) were determined and compared with other image modalities (ultrasonography, USG and magnetic resonance imaging, MRI). Also, clinicophathological correlation with the level of maximum standardized uptake values (SUV) were examined.

Results: In the detection of multifocality, the sensitivity, specificity, PPV and NPV of ^{18}F-FDG PET/CT were 75.0, 95.7, 60.0 and 97.8% and those of USG were 100.0, 89.1, 44.4, and 93.2% and those of MRI were 100.0, 85.7, 50.0, 100.0%, respectively. In the detection of axillary lymph node metastases, the sensitivity, specificity, PPV and NPV of ^{18}F-FDG PET/CT were 57.9, 100.0, 100.0 and 79.5% and those of USG were 57.9, 87.1, 73.3 and 77.1% and those of MRI were 50.0, 100.0, 100.0 and 85.7%, respectively. High maximum SUV level of primary breast cancer was significantly correlated with tumor size ($p = 0.041$), lymph node metastasis ($p = 0.038$), stage ($p = 0.002$) and high histologic grade ($p = 0.023$). However, there were no significant correlation with age, obesity, hormone receptor status, c-erbB2 overexpression and lymphovascular invasion.

Conclusions: ^{18}F-FDG PET/CT showed relatively low sensitivity and high specificity in the detection of multifocality and axillary lymph node metastases of primary breast cancer. And High level of maximum SUV would be predictive of poor prognosis, however large prospective study will be needed that ^{18}F-FDG PET/CT could be a useful tool to determine the biological characteristics of preoperative primary breast cancer.

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Ultrasound guided fine needle aspiration cytology for axillary staging in breast cancer patients − saving time and resources

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Background: Axillary nodal metastasis is one of the most important prognostic factors for breast cancer patients. The methods for detection of nodal metastases include clinical examination, sentinel node biopsy (SNB) and finally axillary lymph node dissection (ALND), the current gold standard. Clinical examination of axilla is an unreliable method due to its subjectivity. ALND is associated with significant morbidity and may be unnecessary in a large number of cases. SNB has emerged as a standard of care in clinically node negative breast cancer patients but is a time and resource intensive procedure. Axillary Ultrasound (AUS) and guided fine needle aspiration cytology (FNAC) may help in identifying a subset of patients who can proceed directly for ALND without undergoing a SNB. The aim of our study was to study the feasibility and accuracy of AUS and FNAC for detecting axillary nodal metastases.

Material and Methods: 70 previously untreated patients with histologically proven breast breast cancer on core needle biopsy were studied. All patients underwent AUS and guided FNAC followed by definitive treatment of the breast cancer including ALND. The results of AUS guided FNAC were compared with final histopathological examination of the axillary nodes to determine sensitivity, specificity and positive and negative predictive values.

Results: AUS guided FNAC and final histopathology were both positive in 41 of 70 cases (58.6%). In 14 of the 70 cases (20%) both were negative. None of the patients had a false positive AUS guided FNAC. 15 patients (21.4%) who were considered node positive on AUS guided FNAC did not show any nodal metastases subsequently on histopathology. The sensitivity and specificity of AUS guided FNAC was 73.2% and 100% respectively with a negative predictive value of 48.3% and a positive predictive value of 100%.

Conclusion: AUS guided FNAC is accurate in predicting the axillary status in over 78% of patients with breast cancer. It is a minimally invasive

technique which is widely available and less time consuming. Patients who are positive on AUS guided FNAC can proceed for ALND directly thereby obviating the need for SNB.

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Detection of extra-axillary lymph nodes with FDG PET/CT in patients with locally advanced breast cancer

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Background: Depicting lymph node involvement in levels or basins other than those addressed by routine axillary lymph node dissection (ALND) may have impact on treatment strategies. Although FDG PET/CT is less sensitive than sentinel node biopsy, its specificity for the detection of axillary lymph node metastases has been shown to be almost 100%. The aim of this prospective study was to assess the incidence of extra-axillary lymph node involvement on baseline FDG PET/CT in patients with stage II-III breast cancer, scheduled for neo-adjuvant chemotherapy.

Material and Methods: Patients with invasive breast cancer of >3 cm and/or lymph node metastasis underwent FDG PET/CT before neo-adjuvant chemotherapy. Baseline ultrasound of the infra- and supraclavicular regions was performed, with fine needle biopsy as needed. FDG PET/CT was performed using a hybrid system (Gemini II, 16-slice CT), 60 minutes after administration of 180–240 MBq 18F-FDG intravenously. Patients were scanned in prone position on a special hanging breast device. Two millimetre slices were obtained of PET and CT. All visually FDG-positive nodes were regarded as metastatic, based on the previous reported high specificity of the technique.

Results: Sixty patients were included. In 17 patients (28%) extra-axillary lymph nodes were detected by FDG PET/CT. Ultrasound guided cytology detected extra-axillary lymph node involvement in 7 of these patients. In 10 patients with positive extra-axillary lymph nodes on FDG PET/CT, ultrasound could not confirm. Lymph nodes outside the axilla on FDG PET/CT were localized in the intra mammary chain (1 lymph node), mediastinal (2 lymph nodes), internal mammary chain (9 lymph nodes), intra- and interpectoral (6 lymph nodes), infraclavicular (5 lymph nodes) and in the contra-lateral axilla (3 lymph nodes).

Conclusion: FDG PET/CT detected extra-axillary lymph node involvement in almost one-third of the patients with locally advanced breast cancer, including in several regions not evaluable with ultrasound. FDG PET/CT may be useful as an additional imaging tool to assess extra-axillary lymph node metastasis, with impact on adjuvant radiotherapy management. Particularly patients with high risk tumours, who are candidates for neo-adjuvant chemotherapy, are candidates for FDG PET/CT.

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MRI characterization of dissected sentinel lymph nodes of breast cancer patients at 7 T

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Background: Axillary lymph node status is the most important factor determining breast cancer prognosis. Assessment of nodal status requires surgical resection. This is associated with morbidity. We started a trial comparing non-invasive 3T MRI-based staging to surgical staging. The performance of the 3T in vivo MRI is controlled by 7T ex vivo MRI of all surgical specimens. This is followed by a node-to-node matching to pathology. Here we describe the results of the 7T MRI characterization of dissected sentinel nodes of breast cancer patients, with pathology as the gold standard.

Materials and Methods: We included 20 consecutive breast cancer (stage $\geqslant$T2) patients about to undergo a sentinel node biopsy. 7T scan protocol included a morphological 3D-T1 weighted (3D-T1W) scan (180μm isotropic resolution). Also the mean absolute T1, T2, T2* relaxation times and apparent diffusion coefficients were determined, as were the 3D nodal dimensions and the presence of a fatty hilus. To maintain accurate correlation of MRI to pathology, the nodes were mapped, numbered and dyed to detail their anatomical orientation. Next they were sliced in 4 mm sections, paraffin embedded, cut into 3μm thick slices and stained with Haematoxylin & Eosin. Statistical analyses; logistic regression analyses according to the generalized estimating equations method.

Table 1. T1, T2*, T2, apparent diffusion coefficient (ADC), and width × height × depth (w×h×d) for all nodes[a]

	Healthy	Metastatic	Significance
T1, ms	1454 (557)	1569 (661)	0.17
T2*, ms	15 (2)	19 (5)	0.01
T2, ms	30 (3)	34 (8)	0.02
ADC, mm^2/s	0.11×10^{-3} (0.1)	0.11×10^{-3} (0.1)	0.91
w×h×d, mm^3	873 (1203)	1725 (1211)	0.23

[a]Values are mean (±standard deviation [SD]).

Results: All 83 nodes could be matched to pathology, allowing correlation of intra-nodal imaging features to pathology. Table 1 shows the quantitative analyses. 77% of benign and 64% of malignant nodes had a fatty center. On the 3D-T1W scans, lymph- and blood vessels, cortical fat, activated b-cell follicles and a metastasis in a lymph vessel were identified. Intranodal metastases could not be localized morphologically.

Conclusion: While the intranodal location of metastases could not be delineated, there was a significant difference in T2 and T2* relaxation times between metastatic and non-metastatic nodes. Also, the very high resolution scans allowed identification of structural nodal details and detection of a small in-transit metastasis in a lymph vessel.

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Contrast-enhanced magnetic resonance imaging as problem solving modality in mammographic BIRADS 3 lesions

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Background: The purpose of this study is to determine whether contrast-enhanced Magnetic Resonance Imaging (MRI) can be used as problem solving modality in breast lesions which were classified as BIRADS 3 with mammography.

Materials and Methods: In this study 191 patients had a mammographic BIRADS 3 lesion. 77 out of the 191 patients underwent a breast MRI as work-up. MRI scans were obtained on a 1.5T MR scanner (Avanto; Siemens) using a dedicated bilateral breast coil. The standard MRI protocol included a T2 Turbo Spin Echo, a T1 3D FLASH sequence before and after intravenous contrast medium and a T1−3D FLASH water excitation. MRI scans were coded using the ordered categories of the ACR BIRADS lexicon. The sensitivity, specificity, positive predict value (PPV), and negative predictive value (NPV) were calculated on the basis of final pathology reports or long-term clinical and radiological follow-up findings over at least 2 years. Lesions which were classified as BIRADS 3, 4 or 5 at breast MRI were considered positive for malignancy.

Results: Fifty-four out of the 77 mammographic BIRADS 3 lesions were correctly classified as BIRADS 1 or 2 with MRI. Eleven lesions were classified as BIRADS 3. Two out of these 11 lesions showed malignancy with pathology. Seven lesions were classified as BIRADS 4. Six out of these 7 lesions were malignant. Five lesions were classified as BIRADS 5 and pathology confirmed malignancy in all cases. The breast MRI had a sensitivity of 100%, specificity of 84.4%, PPV of 56.5% and NPV of 100%. Thirteen (16.9%) out of the 77 mammographic BIRADS 3 lesions were malignant.

Conclusion: Our results indicate that breast MRI can be used as problem solving modality in mammographic BIRADS 3 lesions to rule out malignancy.

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Positron emission tomography combined with computed tomography (PET-CT) in asymptomatic breast cancer patients showing elevation of circulating tumour markers

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Background: Routine tumour marker testing after surgery in the follow-up of asymptomatic patients suffering from breast cancer still remains a controversial issue and international guidelines not recommend the use of carcinoembryonic antigen (CEA) and/or carbohydrate antigen (CA 15−3) to detect recurrence after a primary breast cancer therapy. However, due to multiple factors, several patients and physicians do not accept only monitor