Under real-time ultrasound guidance, the tumor and a 5mm margin of surrounding breast tissue were treated with RF ablation (Radionics CoolTip®, Burlington, MA) followed by immediate surgical resection. Pathologic and immunohistochemical stains (NADH-diaphorase cell viability analysis) were performed to assess tumor viability. We also examined whether there was any loss of ER and PR receptor expression following RF ablation to reflect non-viability.
Results: Fifteen patients completed the treatment: one patient was not treated because the tumor could not be visualized intraoperatively with ultrasound. The mean tumor size was 1.28 cm (range, 1–1.5 cm). The mean ablation time was 21 minutes (range, 9–36 minutes) using a mean power of 35.5 watts (range, 14–53 watts). During ablation, the tumors became progressively echogenic until the tumor margin could not be discerned. The echogenic response corresponded to the region of severe electrocautery injury at pathological examination. In 13 of 14 patients (92.8%), the ablated tumor showed no evidence of viable malignant cells. In one patient, the tumor was difficult to visualize by ultrasound and histological examination showed that non-tumor area had been ablated. Compared to pre-therapy biopsy, 8 patients showed complete loss of ER expression ($p = 0.0006$) and in remaining 6 patients there was a mean 42% reduction in ER expression. For PR expression, complete loss of expression was seen in 7 patients ($p = 0.008$) with a mean 66% reduction in the remaining patients. Following RF ablation, 2 patients developed skin puckering that required a narrow *enbloc* skin excision during lumpectomy but none developed skin necrosis. RF ablation did not interfere with sentinel node mapping. At a median follow-up of 25 months, there have been no adverse events in the ablated area and no evidence of local recurrence.
Conclusions: RF ablation is a promising minimally-invasive treatment of small breast carcinomas, as it can achieve effective cell killing with a low complication rate. Further research is necessary to optimize this image-guided technique and evaluate its future role as the sole local therapy.

359 POSTER

Risk factors for anastrozole-induced bone loss in breast cancer patients pretreated with tamoxifen: results of digital radiogrametry of clavicle

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Background: Newly developed aromatase inhibitors decrease concentrations of circulating estrogens to nearly undetectable levels. This phenomenon raises the possibility of increased risk of hypoestrogenemia-related diseases, including the bone loss. In two previous studies we stated that non-steroidal aromatase inhibitors such as letrozole (*Breast Cancer Res Treat*, 2003, 82, suppl. 1, abst. 445) and anastrozole (ANS) (*Eur J Cancer*, 2003, suppl. 1(5), abstr. 393) significantly enhance the radiological features of bone mass loss. The aim of current study is to verify above results on more representative group of patients and identify risk factors for ANS-related osteopathy.
Material and methods: Data for analysis were collected from 48 women (median age: 65, range: 55–80 years) with breast cancer, being postmenopausal for at least 5 years (median: 15, range: 5–27) and pretreated with tamoxifen (TAM; median: 22, range: 6–60 months). To study the influence of ANS on bone, we used radiogrametrical digital analysis of clavicle based on chest PA X-rays radiograms routinely taken in each patient before and at least 6 months of treatment afterwards (median: 18, range: 7–28) and digitally processed using image analyser. The quantitative analysis was performed in the digital profiles of grey levels plotted perpendicularly to the axis of the bone shadow.
Results: The comparative analysis of the pairs of data taken before and during treatment revealed that the linear spongious/cortical width ratio (S/C) increases significantly in patients being under ANS treatment ($p = 0.001$). Another typical features observed after ANS were the increase of the contrast between cortical and spongious part of bone shadow as well as the coefficient of variance of grey levels profile (differences not significant). The following risk factors of osteoporosis were related to the radiogrametrical features of bone loss: age at the beginning of anastrozole administration, duration of menopause, initial body mass index (BMI), changes in BMI values during therapy, duration of ANS and TAM therapy, history of cigarette smoking, previous hormone replacement therapy and non-traumatic bone fractures. Only duration of ANS therapy (6–12 vs 12–24 vs >24 months) was significantly ($p = 0.045$) associated with increased risk of radiological signs of bone loss (increase in S/C).
Conclusion: Our data confirm preliminary clinical data that ANS administration increases the risk of bone mass loss, particularly in patients under long-term therapy.

360 POSTER

Single duct nipple discharge and underlying breast malignancy

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Background: In the present study we have reviewed all the surgically treated cases referred for single duct nipple discharge to our Breast Clinic during the last twelve years, in order to identify specific discharge factors related to breast malignancy. Nipple discharge is a quite common disorder presented by women attending to breast clinics, and it is reported in up to 3% of breast cancer patients.
Patients and Methods: Single duct nipple discharge was the presenting symptom of 127 patients. Clinical examination and radiologic assessment did not reveal any other significant breast abnormality. The patients' mean age was 47 years, ranging from 23 to 78 years. The discharge was spontaneous in 104 and elicited in 23 patients. In 58 (45.7%) cases the discharge was bloody/serosanguineous, in 48 (37.8%) cases it was serous/watery, and in the remaining 21 (16.5%) cases it was either green or yellow. Cytology of the fluid was performed in all cases.
Results: After surgical intervention (excision of the involved duct) benign breast disease was found in 106 (83.5%) patients. The usual findings were papillomas ($n = 73$), duct ectasia ($n = 19$), and papillomatosis ($n = 14$). The remaining 21 (16.5%) cases were found to have malignancy and underwent additional operation. Ductal in situ, lobular in situ, and early invasive cancer was found in 14, 3 and 4 cases respectively. Among the 58 patients with bloody discharge, 11 (19%) found to have cancer in histology. Papillomatosis and DCIS were observed mainly in older patients. Cytology was positive or suspicious for malignancy in 4 cases with benign histology, and in 13 cases (61.9%) found to have in situ or invasive carcinoma.
Conclusion: Older women with spontaneous, single duct nipple discharge, mainly when it is bloody/serosanguineous, should have cytological examination of the fluid and mammography depending on their age or additional clinical findings. Most of them will require a microdochectomy, as the possibility of finding a carcinoma among them is about 15%. However, single duct papilloma is the most common cause of bloody discharge.

361 POSTER

Semi-automatic setup system for breast irradiation

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Background: A feasibility study to analyze and correct setup errors by on-line correction using a semi-automatic setup system (SAS) during breast irradiation.
Materials and methods: A graphical user interface, called SAS was in-house developed. This system was added to the free-movable treatment couch (Hercules, Precitron AB, Uppsala, Sweden). It allows viewing a reference (digitally recontructed radiograph or DRR) and an active image (EPID), drawing a contour on the reference image that is simultaneously visible on the active image, moving the contour in the active image and automatically calculating the required table corrections. Correction factors are expressed in lateral (cross-plane) and longitudinal (in-plane) directions of the treatment field, viewed from the beam axis. The couch is moved by remote control from outside the treatment room. For each patient the systematic error is calculated after 4 sessions, the patient is repositioned and new laserlines are drawn on her skin. Afterwards monitoring can be continued, by verification EPID, to evaluate residual errors.
Results: A total of 108 measurements were perfoprmed. The maximum correction was 14 mm in lateral direction and 10 mm in longitudinal direction. The mean systematic error was 3.5 mm (SD = 2.5 mm) in lateral and 1.0 mm (SD = 0.4 mm) in longitudinal direction. The mean SSD value was 99.98 (range 100.5–99.3). Mean treatment time using SAS was 11.6 minutes versus 9.8 minutes without.
Conclusion: The SAS repositioning tool seemed to be a fast and easy to use graphical user interface. The additional time needed per session was acceptable to allow for implementation of this system in routine practice. The corrected errors are small and this can be explained by the fact that to shorten the learning curve all consecutive patients were included. More measurements need to be made to evaluate the hypothesis that on-line daily positioning is useful in "difficult-to-position" patients and that for other patients the SAS system can be used to detect and correct the systematic error. Another interesting application of this system is the routine use of the SAS system to replace treatment portal films.