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ORIGINAL ARTICLE

Selective use of post-mastectomy flap irradiation in high-risk breast cancer patients

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Summary The incidence of local recurrence after mastectomy can be reduced by chest wall radiotherapy. However, only a minority of patients are at substantial risk. No UK national guidelines exist for the use of mastectomy flap radiotherapy.

This study evaluated a protocol, whereby only high-risk patients were treated with post-mastectomy flap radiotherapy; identified histologically by grade, vascular invasion and nodal status.

All women treated by simple mastectomy for invasive breast cancer at the Nottingham Breast Unit from January 1993 to December 1995 were studied ($n = 292$). Postoperative flap radiotherapy was given to 147 high-risk women (50.3%). Median follow-up was 76 months. Overall, 12 women (4.1%) developed a chest wall recurrence; six were single spot recurrences and the remaining six were either multiple spot ($n = 3$) or field change (field change dermal invasion, $n = 3$). The chest wall recurrence rate was 2.7% in those treated with radiotherapy.

A low rate of local recurrence has been achieved with selective use of mastectomy flap radiotherapy.

Introduction

Local and regional recurrence has been reported to occur in up to 27% of patients within 10 years of mastectomy if no adjuvant radiotherapy is given.[1,2] In certain high-risk subgroups this rate is higher.[3] Post-operative chest wall radiotherapy has been shown to reduce this risk, although there is no uniform agreement as to which patients require it. Selection criteria for the use of postmastectomy radiotherapy vary, but have been based upon risk factors for recurrence such as: nodal positivity,[2,4] high grade,[2,4] tumour size,[5,6] patient age,[7] negative oestrogen receptor expression,[8] margin involvement[9] and vascular invasion.[4]

In 2001, the American Society of Clinical Oncology published guidelines for the use of

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post-mastectomy radiotherapy outside of clinical trials.[10] Post-mastectomy radiotherapy was recommended for patients with four or more positive axillary lymph nodes, patients with T3 tumours and positive axillary lymph nodes and patients with operable locally advanced (stage III) tumours. The authors determined that there was insufficient evidence to make recommendations or suggestions for the routine use of post-mastectomy radiotherapy in other subgroups of patients. Based on the same criteria, similar recommendations have been made by the European Society of Mastology (EUSOMA).[11] They suggest that postmastectomy radiotherapy should be used if the expected 10 year local recurrence rate is over 20%. Neither the British nor the European Society of Surgical Oncology (ESSO) guidelines give specific recommendations for post-mastectomy radiotherapy.[12,13] However, they suggest that breast units should have a written protocol to identify those patients at high risk of chest wall recurrence and prophylactic radiotherapy can be employed in these women. Similarly in the Scottish guidelines, a recommendation is made that radiotherapy should be given to the chest wall after mastectomy in those patients judged to be at high risk of local recurrence.[14] The risk is judged to be a summation of certain risk factors.

The Nottingham Breast Unit developed selection criteria for mastectomy flap irradiation based upon a series of studies performed in the Unit. In the study by Williams et al. in 1985, 439 patients were treated with mastectomy alone with lymph node sampling but without systemic adjuvant therapy or prophylactic radiotherapy.[2] 19.2% of these patients developed local recurrences with or without regional recurrences. They identified two significant risk factors for the development of these loco-regional recurrences, namely histological grade and lymph node involvement. In this high risk group 48% had developed local or regional recurrence at 48 months after surgery.

A further study, published in 1994 by O'Rourke et al. was carried out to determine the clinical significance of local flap recurrence (regional node recurrence was not studied) after simple mastectomy without postoperative irradiation or systemic adjuvant therapy.[4] Of the 966 patients treated with simple mastectomy, 223 (23%) developed a local recurrence after a median follow-up of 7 years. On multivariate analysis in addition to the previously identified risk factors for local recurrence: tumour grade, nodal status and the presence of lymphovascular invasion in the primary tumour were identified as significant in dependent predictive factors for these recurrences. Women with two out of these three factors had over 30% chance of mastectomy flap recurrence but with only one factor less than 10%.

Three types of local flap recurrences were identified, as suggested by an earlier study from the unit[15]: single spot, multiple spot and field change (dermal lymphatic invasion) and the clinical significance of these different types was assessed. Local treatment was significantly more likely to be successful and patient survival better in those that developed single spot recurrences compared to multiple spot or field change recurrences. Subsequently, a randomized trial was conducted by our unit on a subset of high risk patients, who had simple mastectomy between 1985 and 1991, to assess the potential benefit of postoperative radiotherapy.[3] Seventy-six patients were randomized. Of the 36 patients randomized to receive postoperative radiotherapy, 9 (25%) developed loco-regional recurrences as opposed to 26 of the 40 (65%) who were randomized to no radiotherapy.

As a result of these studies protocols were established for post-mastectomy radiotherapy. These were different for mastectomy flap and regional radiotherapy. The purpose of the present study is to audit treatment according to the protocol for mastectomy flap irradiation.

Methods

All patients, 70 years or younger, who had either simple or subcutaneous mastectomy for invasive cancers <5 cm at the Nottingham Breast Unit from January 1993 to December 1995 were identified. During this time, nipple sparing subcutaneous mastectomies were also performed in 47 patients who had implant reconstruction. These were excluded from this analysis, which reports recurrence after simple mastectomy with no immediate reconstruction. All had surgical staging of the axilla. Follow up was at 6 monthly intervals for 5 years, and yearly thereafter, indefinitely. Events were recorded prospectively into a database.

Postmastectomy radiotherapy was given to the mastectomy flaps if tumours were *Grade III, node-positive; Grade III, node negative but with vascular invasion or; Grade II with vascular invasion and nodal involvement*.

Patients given radiotherapy were treated on linear accelerators, with one of two techniques. During the early part of the period of this study, a direct 8 MeV electron field was used, the limits of which were chosen to encompass the area previously covered by the breast tissue, and with a