Effect of Bolus in Post-Mastectomy Chest-Wall Irradiation: A Retrospective Cross-sectional Study

Md. Fajle Rabby
Medical Physicist
TMSS Cancer Center
Bogura, Bangladesh

Objectives

- Assess the impact of bolus on surface dose and target coverage
- Compare dosimetric parameters with and without bolus
- Evaluate the effect on organs at risk (OARs)
- Discussion on absolute effect of bolus

Patient Selection

- Number of cases: 30
- Clinical characteristics: Post-mastectomy patients
- Radiotherapy Dose and Techniques: 50Gy in 25 fractions by 3DCRT
- Bolus Application: Whole Chest-Wall and Partial Application (15 patients for first 12 days-daily use vs. 15 patients for alternate-day use). The node positive or prophylactic node irradiation was done in almost every patients without the bolus.

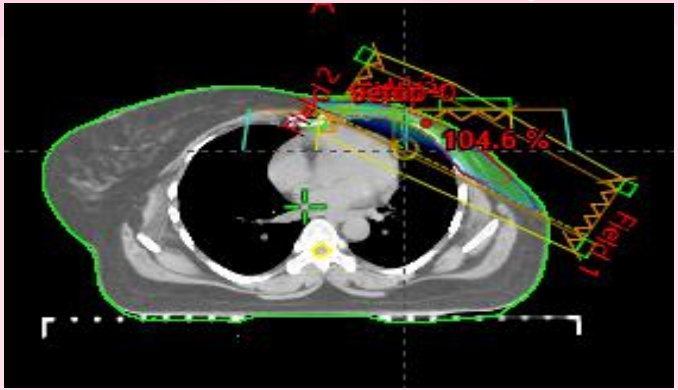
Method of Dosimetric Analysis

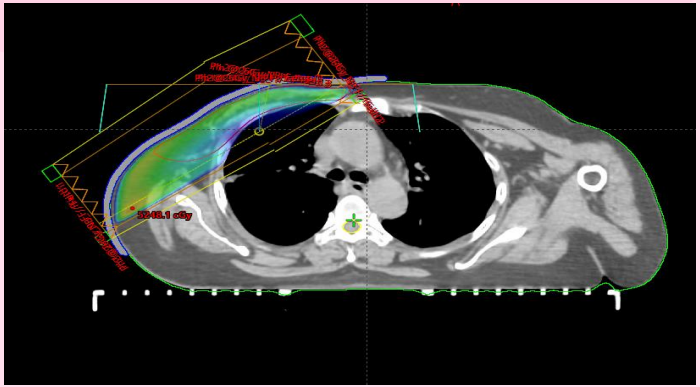
We planned the patients in two different groups:

1. First 12 fractions daily bolus out of the 25 fractions
2. Every alternate day bolus starting with the non bolus plan

No. of bolus fractions is same in two groups. So, the two manners of planning is similar in terms of local control.

Treatment Planning Example





Results – Target Coverage

We observed the target coverage as -

- D95
- Dmax
- Dmean

Same for a particular patients. Because the no. of bolus and non bolus fractions is same in the two settings.

Results – Skin Dose

We observed the skin and subcutaneous dose at different pre-defined points and regions.

In every point, dose is same for a particular patients.

Results – Organs at Risk (OARs)

We observed-

- Ipsilateral Lung Mean Dose
- Contralateral Lung Mean Dose
- Heart Mean Dose
- Contralateral Breast Dose
- Spinal Cord Maximum Dose

All the OAR dose were same for a particular patients in first 12 days bolus and every alternate day bolus plans

Results – Toxicity

- We found much differences in terms of skin toxicity in the two groups.
- The patients who received treatment in alternate day bolus settings are found with less skin toxicity.
- On the other hand, the patients who are treated with first 12 days bolus found grade 2 and grade 3 skin toxicities at the end of the treatment.

Results – Toxicity

Patient received every alternate day bolus plan at the end of the treatment

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Discussion

- Surface dose is similar for the two treatment type because of the same number of bolus and non-bolus fractions.
- Local control is therefore also same but the skin toxicity is higher for the first 12 fractions daily bolus treatment than alternate day bolus use.

This may be because of the normal skin tissue have greater time to recover themselves in alternate day bolus use.

Conclusion & Recommendations

- Use of bolus on **whole chest-wall** can cause severe skin toxicity especially in the patients with hypersensitive skin or allergic patients. Sometimes it becomes a boomerang. (Tieu, Minh thiu et al.)
- **Bolus can be used on the surgery scar marks only to reduce the chance of local recurrence.**
- If there is a positive margins or skin involvement then use of a bolus is a must to build surface dose.
- Alternate day bolus is more effaceable because the normal cells of skin get more time to recover.
- Monitoring the skin reaction carefully.
- Appropriate thickness of bolus and proper placement is very important.
- **In the Tomotherapy application, there is a plus point that no bolus is needed.**

Tomotherapy Dose Distribution

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Previous Study

International Journal of Radiation Oncology*Biology*Physics
Volume 81, Issue 3, 1 November 2011, Pages e165-e171

Clinical Investigation

The Effect of Adjuvant Postmastectomy Radiotherapy Bolus Technique on Local Recurrence

Minh Thi Tieu M.B.B.S., B.Sc.(Med),
Peter Graham M.B.B.S., Cert Bioeth, GradDipMedStat, F.R.A.N.Z.C.R.,
Lois Browne B.Sc., Ph.D., MMedStats, AStat,
Yaw Sinn Chin M.B.B.S., B.Sc.(Med), M.P.H., F.R.A.N.Z.C.R.

Cancer Care Centre, St.George Hospital, Kogarah, Sydney, NSW, Australia

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Previous Study

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Original Article

Outcomes in Patients Treated with Post-mastectomy Chest Wall Radiotherapy without the Routine Use of Bolus

M.L. Yap * †, M. Tieu * †, J. Sappiatzer * †, T. Panzarella ‡, J. Cuartero * †, D. McCready §, A. Fyles * †

* Radiation Medicine Program, Princess Margaret Cancer Centre, Toronto, Ontario, Canada
† Department of Radiation Oncology, University of Toronto, Toronto, Ontario, Canada
‡ Department of Biostatistics, Princess Margaret Cancer Centre, Toronto, Ontario, Canada
§ Department of Surgery, Princess Margaret Cancer Centre, Toronto, Ontario, Canada

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Thank You