Breast Planning Transition from Pinnacle to Eclipse: the B.I. Experience

Jennifer Nguyen[1], Carrie Sampson[1], and Stefano Peca[1]

[1]Department of Radiation Oncology, Beth Israel Deaconess Medical Center (BIDMC), Boston, MA

Introduction

- Introduction of a new Treatment Planning System (TPS) for radiation therapy is both a challenge and an opportunity.
- Due to the approaching EOL for Pinnacle TPS (Philips) we transitioned our planning to Eclipse (Varian).
- Here we share our experience with the breast treatment planning transition to help inform decisions for other clinics undergoing similar processes.

Aim

- Recreate field-in-field breast plans from Pinnacle into Eclipse using Ezfluence (Radformation).
- Compare and contrast the dose uniformity of the PTV and dose to OARs (lung and heart).
- Monitor the impact of TPS change to treatment planning and delivery.

Methods

1. Eclipse replans of Pinnacle cases

- Six Pinnacle-planned right-sided Whole Breast Tangents patients, and
- Five Pinnacle-planned 3-field mono-isocentric Breast+LNs patients

were randomly selected and re-planned in Eclipse. We ensured representation from each Physician and Dosimetrist.

- All aspects of the Pinnacle plan, (contours, points, beam geometry, physician's drawn blocks, beam energies) were exported to Eclipse.
- The Dosimetrist replanned in Eclipse using Ezfluence, retaining all original parameters from Pinnacle plan.
- Eclipse plans were delivered to ArcCheck to ensure deliverability and accuracy.
- We had regular multidisciplinary group meetings to review results and gather perspectives and insights.

2. Pilot planning of new cases

- 10 Whole Breast patients (including left sided breast, DIBH, prone) and 5 Breast+LNs patients were planned in Eclipse and treated through Mosaiq.
- Constant communication among physicians, dosimetrists, therapists, physicists was encouraged.

Results: Pinnacle-to-Eclipse Replans

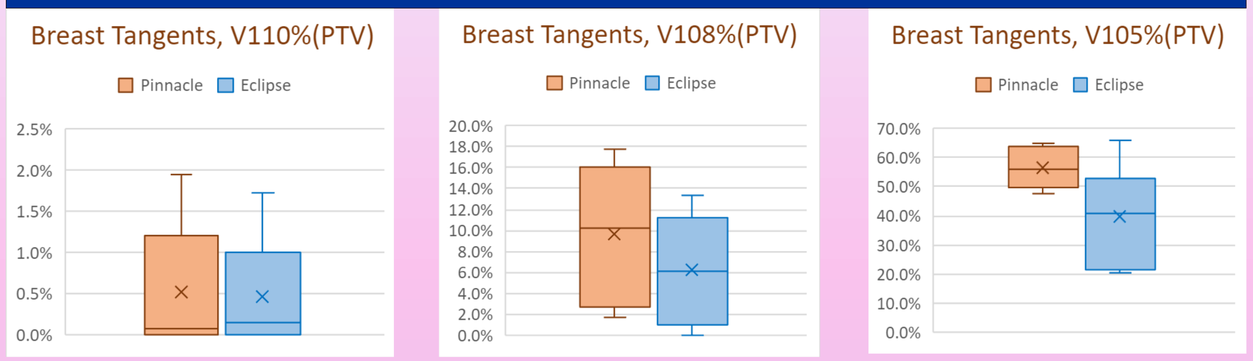

Figure 1. Comparative Analysis: Hotspots of 110%, 108% and 105% in Pinnacle vs Eclipse for right sided whole breast tangents

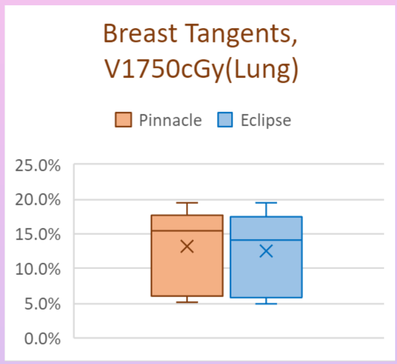

Figure 2. Comparative Analysis: V1750cGy of Ipsilateral lung for whole breast in Pinnacle vs Eclipse

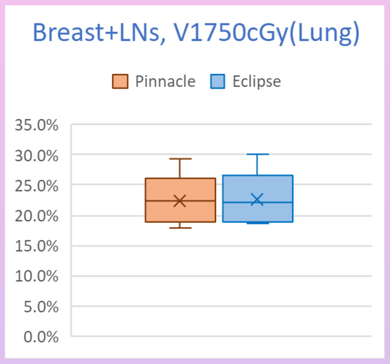

Figure 3. Comparative Analysis: V1750cGy of Ipsilateral lung for three field breast + LNs in Pinnacle vs Eclipse

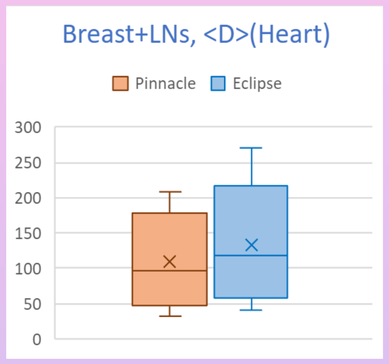

Figure 4. Comparative Analysis: Mean dose of heart for three field breast + LNs in Pinnacle vs Eclipse

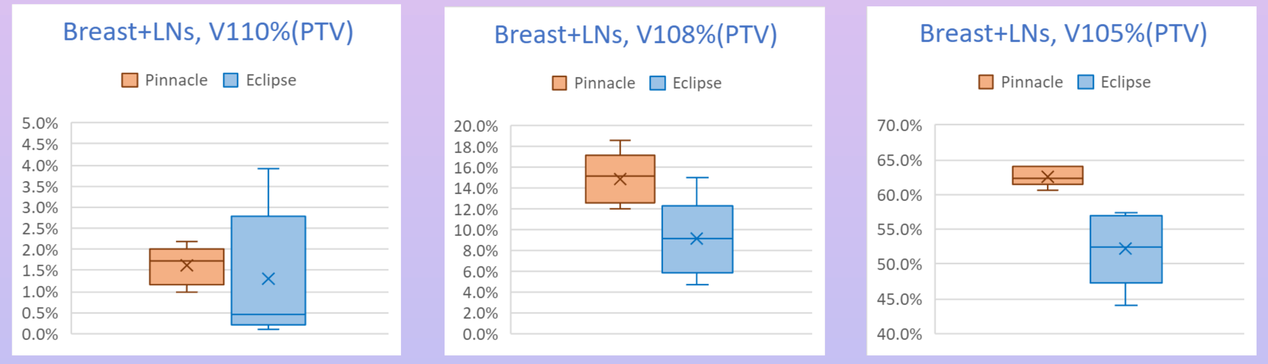

Figure 5. Comparative Analysis: Hotspots of 110%, 108% and 105% in Pinnacle vs Eclipse for three field mono isocentric breast + LNs

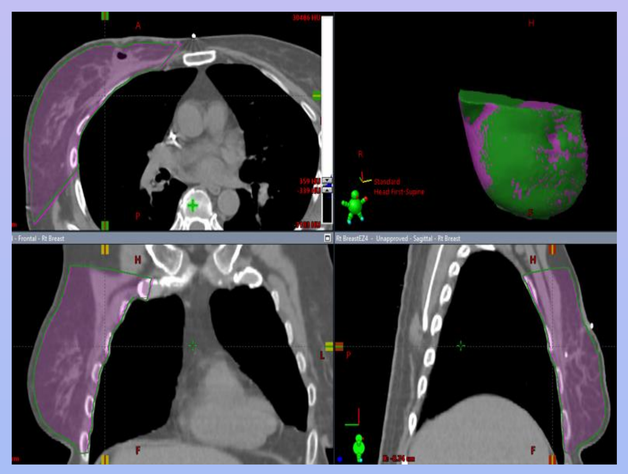

Figure 6. PTV breast contour. Green contour from Pinnacle and Magenta contour from Eclipse

Patient	1	2	3	4	5	6	Avg
Pinnacle PTV_Pinnacle (cc)	825.9	859.4	1392.3	956.3	307.3	1213.5	**925.8**
Eclipse PTV_EZ (cc)	824.03	864.9	1441.8	943	335.1	1160	**928.1**
difference (%)	**-0.23%**	**0.64%**	**3.56%**	**-1.39%**	**9.05%**	**-4.41%**	**1.20%**

Table 1. Comparative Analysis: Volume (cc) of PTV breast in Pinnacle vs Ezfluence (Radformation) Eclipse.

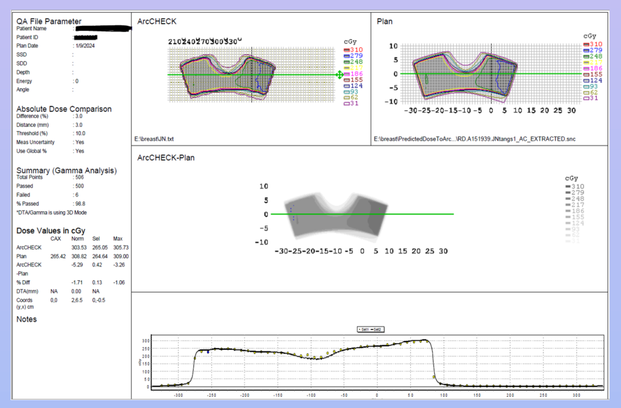

Figure 7. ArcCheck. An example of 1 out of the 6 patients' QA results

Results: Replans

- **Eclipse replans** were comparable or superior to Pinnacle plans. Average V100% and V110% were equal, while V105% and V108% were noticeably improved. Dose to lung and heart unchanged.
- PTV_EZ and PTV_Pinnacle were most similar with EZFluence settings: 6-8mm crop from field edges, 1 mm crop from lung.

Results: Replans and Pilot

- PTV volumes were equal on average, but differed up to 9% for individual patients.
- Replans had very high ArcCheck QA pass rates (>95% of points passed 3%/3mm gamma analysis)
- **Pilot of 10 clinical Breast Tangents patients:** two discrepancies occurred: (1) A plan isocenter was too lateral, not allowing Tx delivery which was interrupted for replan. (2) Two DRRs were inadequate for setup verification; new DRRs were created on the fly, and treatments lengthened by a few minutes.
- **Pilot of 5 Breast+LNs patients:** in two cases the initial isocenter placement was too anterior and did not allow for treatment. This was caught during checks and did not cause treatment delay.

Conclusion

- The transition of radiation planning from a TPS to another can be done safely and efficiently when implementing a multidisciplinary approach that allows all team members to contribute.
- From the dosimetry perspective, Eclipse with EZ Fluence produced field-in-field plans that are as good or better than Pinnacle, and improves dose homogeneity.
- For the first set of clinical patients, it is crucial to implement extra safety tools and training, and have planning staff present at treatment.
- It is advisable to have draft procedures available to all team members, so that lessons learned can be recorded for guidance.

Future Work

Follow up with group to evaluate any valuable insights during planning and understandings of impact in treatment room during delivery

References

Dragojević I, Hoisak JDP, Mansy GJ, Rahn DA, Manger RP. Assessing the performance of an automated breast treatment planning software. J Appl Clin Med Phys. 2021 Apr;22(4):115-120

Li Y, Bai H, Huang D, Chen F, Xia Y. Evaluation of Auto-Planning for Left-Side Breast Cancer After Breast-Conserving Surgery Based on Geometrical Relationship. Technol Cancer Res Treat. 2021 Jan-Dec;20:15330338211033050.

Wells DM, Walrath D, Craighead PS. Improvement in tangential breast planning efficiency using a knowledge-based expert system. Med Dosim. 2000 Fall;25(3):133-8.

Yoder T, Hsia AT, Xu Z, Stessin A, Ryu S. Usefulness of EZFluence software for radiotherapy planning of breast cancer treatment. Med Dosim. 2019 Winter;44(4):339-343.