

**2765 Dosimetric Comparison between Single-lumen Balloon (MammoSite) and Multi-lumen Balloon (Contura) in Partial Breast Brachytherapy**

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**Purpose/Objective(s):** Single-lumen balloon device (MammoSite) has been widely used in the partial breast HDR brachytherapy after lumpectomy for early-stage breast cancer. Recently a multi-lumen balloon device (Contura) has become available, which has 5 fixed lumens in the shaft: one centered and four offset by 5 mm. In this study, we report the dosimetric comparison between treatment plans using single lumen and those using multi lumens.

**Materials/Methods:** Planning CT scans of 12 previously treated patients formed the study set. Cavity size ranged from 40 cc to 57 cc. Skin-balloon distance ranged from 0.6 cm to 2.1 cm. Rib-balloon distance ranged from 0.1 cm to 2.2 cm. For each patient, a single-lumen plan (SLP) and another multi-lumen plan (MLP) were created respectively via 3D planning based on CT images. The MLP was created by matching scanned Contura balloon of proper size to implanted MammoSite balloon. In SLP, the standard single dwell loading in balloon center was used. In MLP, all dwell positions in 5 lumens were used and loaded based on dose optimization. 3.4 Gy per fraction was prescribed to PTV, i.e. 1 cm cavity expansion excluding chest wall muscles and within 5 mm from skin.

**Results:** In both plans, 95% of PTV is covered by 95% of prescription. Total dwell time is comparable between the two plans (difference ~ 3.4%). Max skin dose is 2.1-4.9 Gy in SLP and 1.9-4.1 Gy in MLP. For patients with skin-balloon distance less than 1 cm (6 patients), skin dose reduction of  $0.9 \pm 0.3$  Gy is achieved using MLP. Max rib dose is 2.0-7.6 Gy in SLP and 2.0-6.2 Gy in MLP. For patients with rib-balloon distance less than 1 cm (10 patients), rib dose reduction of  $0.8 \pm 0.3$  Gy is achieved using MLP. However, dose homogeneity within PTV is worse in MLP than in SLP. The volume receiving 150% of prescription (V150) is similar between the two plans (26 cc vs. 27 cc on average). The volume receiving 200% of prescription (V200) increases from 3.4 cc in SLP to 6.8 cc in MLP. While no volume receives more than 9 Gy in SLP, this volume in MLP is about 1.5 cc. For patients with both rib-balloon and skin-balloon distance greater than 1 cm (2 patients), the difference between the two plans is quite small.

**Conclusions:** Multi-lumen balloon has more potential in dose optimization. For patients with lesion very close to skin or rib, optimized loading of offset lumens can significantly reduce skin/rib dose. However, this is at the cost of reduced dose homogeneity within PTV. For patients with lesion neither close to skin nor to rib, single dwell loading in balloon center, as in the case of single-lumen balloon, is desirable even though multi-balloon is implanted.

Author Disclosure: M. Gao, None; K. Albuquerque, None.