



ORAL PRESENTATION GROUP 3 – PRESENTATION 1

Peri-Prosthetic Capsule Formation and Contracture in a Rodent Model of Implant-Based Breast Reconstruction with Delayed Radiotherapy

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Purpose: Capsular contracture (CC) is the most common complication of breast implantation, with an incidence of nearly 50% in patients undergoing breast reconstruction with subsequent radiotherapy. While the move toward submuscular (SM) device placement led to a decreased incidence of CC, subcutaneous (SQ) implantation has seen a resurgence. The purpose of this study is to utilize a rodent model of breast reconstruction with smooth silicone implants and delayed radiotherapy to assess the occurrence of CC in SQ versus SM implantation.

Methods: Custom 2cc smooth round silicone implants were placed bilaterally into twelve female Sprague Dawley rats that were randomized into four groups of three, with each group differing by implantation plane (SQ versus SM) and irradiation status (irradiated versus nonirradiated). Rats from the SQ group received implants bilaterally underlying the skin on the flank. Rats in the SM groups received implants bilaterally under the latissimus dorsi muscle. Irradiated rats received 20 Gray localized to each implant on postoperative day ten. One rat from each group was imaged with a microCT scanner at baseline and at explant three months later, whereupon capsules from all rats were examined histologically.

Results: Rats in the SQ group showed evidence of contracture on gross examination and greater evidence of morphologic disruption per microCT scan. There was no evidence of contracture or morphologic disruption in either SM group. Mean capsule thickness was $39.0 \pm 9.0 \mu\text{m}$ in the SQ versus $37.6 \pm 9.8 \mu\text{m}$ in the SM nonirradiated groups and $43.9 \pm 14.9 \mu\text{m}$ in the SQ versus $34.3 \pm 8.3 \mu\text{m}$ in the SM irradiated groups (all $p > 0.05$).

Conclusions: In a rodent model of smooth silicone breast implantation and delayed radiotherapy, although there did not appear to be differences in capsule thickness regardless of device placement plane, SQ implants demonstrated gross evidence of CC. These data indicate that capsule thickness is only part of a larger pathogenetic picture which should take into consideration the contribution from all peri-implant tissue.

