Introduction
Cryosurgery in orthopaedics began in 1969 when Marcove and Miller initially utilized a liquid nitrogen pour technique. In 1996, cryoprobes were designed utilizing the Joule-Thompson expansion to gain freezing temperatures in probes. We began utilizing cryoprobes in the late 1990s and present our last 13 years of data cryoprobes for aggressive bone lesions.

Methods
Following IRB approval, the institutional database at our facility was queried from 2005 through 2017. 115 patients were identified with 105 records available. We collected data including: follow up, histologic diagnosis, and type of secondary fixation when applicable. We utilized a primary endpoint of recurrence, fracture, or infection to identify failures. We also calculated modified MSTS scores based on the clinical chart review.

Results
Of the 105 identified patients with charts available for review: 95 were treated with cryoprobe, 11 were treated with Marcove pour, and in 1 the type wasn’t listed. Average follow-up was 2.8 years. 54 patients had greater than 2 years of follow up and 22 had greater than 5. Most cases were low-grade chondrosarcoma, aneurysmal bone cysts, giant cell tumors, enchondromas, and chondroblastomas. Complications included one fracture (0.9%), one non-union (0.9%), 4 recurrences (3.8%), and no infections. Recurrences were in 2 chondrosarcomas, a chondroblastoma, and a finger phalangeal enchondroma. Average MSTS score was 27.7.

Discussion
Our rate of recurrence and fracture compares well with historical controls. Marcove's initial series had fracture rates of 7-39% from 1969-1977. Though more recently in 2017, a 5% rate of recurrence and 1 fracture was reported in a large series. The Marcove pour and the cryoprobe techniques for chondrosarcoma have been compared with a nonsignificant trend toward lower complications and better functional outcome with the cryoprobe. Cryosurgery with improved techniques has a high success rate with a low complication rate and high functional scores.

Conclusions
Cryosurgery as an adjuvant treatment to initial curettage followed by debridement with a cortical burr is a safe and effective tool for decreasing the recurrence of benign aggressive lesions and low-grade chondrosarcoma. There was an acceptable complication rate of fracture (0.95%), recurrence (3.8%), and infections (0%). Patients have overall good functional outcomes with MSTS scores of greater than 27 on average.