The Effect of External Beam RadiationTherapy as Heterotopic Ossification Prophylaxis After Acetabular Surgery: A Multicenter Randomized Controlled Trial

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Purpose: There is no Level I evidence on the effect of external beam radiation (XRT) therapy as heterotopic ossification (HO) prophylaxis for surgically treated acetabular fractures. The primary aim of this study was to evaluate the effect of XRT on the development of severe HO after acetabular surgery.

Methods: This is a multicenter randomized controlled trial that included patients that underwent surgical fixation of an acetabular fracture through a posterior, combined anterior and posterior, or extensile exposure. We excluded patients who were treated through an isolated anterior exposure, had an acute total hip arthroplasty at the time of index operation, or had contraindications to XRT. After informed consented was obtained, patients were randomized to receive single dose (7-8 Gy) radiation therapy within 72 hours of surgery versus no XRT. All patients received debridement of devitalized gluteus minimus at the discretion of the treating surgeon. The primary outcome measure was severe HO determined using the Brooker classification and defined as Brooker class III-IV. Postoperative radiographs obtained ≥12 weeks after surgery were examined by a blinded reviewer. Logistic regression models were adjusted for head injury, hip dislocation on presentation, need for mechanical ventilation, and use of trochanteric osteotomy. Data were analyzed in both an intention to treat (randomized to XRT) and an as-treated (received XRT) basis.

Results: At the time of this submission there were 101 patients enrolled into the trial, with 79 patients available for review. 15 patients had not reached the 3-month postoperative window and 7 patients were lost to follow-up. Of the 79 patients, 41 patients were randomized to receive XRT and 38 patients to receive no XRT. On an intention to treat basis, 3 of 41 patients (7%) who were randomized to XRT developed severe HO compared to 7 of 38 patients (18%) randomized to no XRT (odds ratio [OR] 0.24, 95% confidence interval [CI] 0.04-1.06; P = 0.08). On an as-treated basis, only 1 of 30 patients (3%) who received XRT developed severe HO compared to 9 of 49 patients (18%) who did not receive XRT who developed severe HO (OR 0.08, 95% CI 0.00-0.59; P = 0.04).

Conclusion: Based on the available data in this multicenter randomized controlled trial, patients who received XRT after acetabular surgery were significantly less likely to develop severe HO post-operatively.