**Bladder Adjuvant RadioTherapy (BART): Acute and Late Toxicity from a Phase III Multicenter Randomized Controlled Trial**

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**Purpose/Objective(s):** To report acute and late toxicity from the multicenter phase III randomized trial of Adjuvant Radiotherapy (BART) after radical cystectomy (RC) and chemotherapy in muscle-invasive bladder cancer (MIBC).

**Materials/Methods:** Patients with non-metastatic urothelial MIBC with ≥1 high risk feature after RC- pT3-4, pN1-3, nodal yield <10, positive margin, or neoadjuvant chemotherapy for ≥cT3 disease; were randomized 1:1 to observation (obs) or adjuvant radiotherapy (RT) arms at four participating centers. They were stratified by nodal stage (N0 vs N+) and chemotherapy (neoadjuvant vs adjuvant vs none). The cystectomy bed and pelvic nodal region were irradiated to 50.4Gy in 28 fractions using stoma-sparing intensity modulated RT and daily image guidance. Acute toxicity (within 3 months of RT or randomization) was assessed weekly during RT and late toxicity at every visit using CTCAE v5.0 scale. Toxicity was analyzed per protocol, and compared using chi square test. Patients who did not receive the planned RT were analyzed in the observation cohort. Patients who progressed within 3 or 6 months of RT/randomization were excluded from acute or late toxicity analysis respectively.

**Results:** From June 2016 to May 2024, total 153 patients were randomized (obs = 76, RT = 77). Of the 77 in RT arm, 63 completed RT as per protocol (defaulted RT = 8, progression before RT= 4, no RT due to post-op complications = 2). Overall, 49% patients were node positive, 4.5% had R1 resection, and 28% had a component of variant histology. About 90% patients received chemotherapy (70.6% neoadjuvant, 19.6% adjuvant). No patient received adjuvant immunotherapy. Acute toxicity was analyzed in 134 eligible patients. Grade 3 acute toxicity was seen in 4 patients, 3 in the obs arm and 1 in RT arm. Grade 2 acute bowel toxicity was noted in 11 patients (8.2%) - 10 (15.9%) in RT arm and 1 (1.4%) in the obs arm. Overall, grade 2+ acute toxicity was 19.1% (RT) vs 5.6% (obs), p=0.02. The median follow up was 27 months. Of the 104 patients eligible for late toxicity assessment, grade 3+ adverse events were 10.5% (obs) vs 8.5% (RT), p=0.9. Grade 1-2 late adverse events were 10.5% (obs) vs 27.6% (RT), p=0.02. Severe late adverse events were mainly urinary tract obstruction (UTO) and intestinal obstruction (IO).

**Conclusion:** In the largest RCT of adjuvant RT post cystectomy and chemotherapy in urothelial MIBC, severe acute and late toxicity were low and similar between the two arms. Mild bowel toxicity was higher in the RT arm. The oncological outcomes are awaited.