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Vaginal Morbidity and Quality of Life after CT-Guided Hybrid Brachytherapy for Locally Advanced Cervical Cancer

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Abstract
Background: Vaginal morbidity after brachytherapy for locally advanced cervical cancer (LACC) is frequent but inadequately characterised in CT-guided settings. This study examined vaginal toxicity, quality of life (QoL), and predictors of grade ≥ 2 stenosis in a prospectively maintained CT-guided hybrid image-guided adaptive brachytherapy (IGABT) cohort.
Methods: A cohort of 180 LACC patients (FIGO 2018 IB3–IVA) treated with chemoradiotherapy and CT-based hybrid brachytherapy at SANADOR Clinical Hospital (2020-2022) was analysed retrospectively. Vaginal toxicity was graded using CTCAE v5.0; QoL was assessed with EORTC QLQ-C30 and QLQ-CX24 at baseline, 3 months, and 12 months. Exploratory logistic regression identified predictors of grade ≥ 2 stenosis.
Results: Before the 12-month toxicity assessment, 15 patients were censored (10 due to recurrence, 5 due to death), leaving 165 evaluable patients. Among these, overall composite CTCAE grade ≥ 3 vaginal toxicity occurred in 9/165 (5.5%). These findings must be interpreted separately from anatomically graded stenosis: 155/165 evaluable patients (93.9%) had any degree of vaginal stenosis at 12 months, and grade 3 stenosis was observed in 48/165 evaluable patients (29.1%), corresponding to 48/155 patients with any stenosis (31.0%). Global QoL improved significantly at 12 months ($p < 0.05$), driven by pain and fatigue reduction, whereas sexual function declined progressively. Non-use of vaginal dilators (OR 3.1, 95% CI 1.4-6.8) and menopausal status (OR 2.4, 95% CI 1.1-5.1) independently predicted grade ≥ 2 stenosis. HR-CTV D90 EQD2 strongly predicted survival ($p < 0.001$).
Conclusions: CT-guided hybrid IGABT was associated with favourable tumour control. Composite CTCAE grade ≥ 3 vaginal toxicity occurred in 9/165 evaluable patients (5.5%) at 12 months; however, grade 3 vaginal stenosis on clinical examination was observed in 48/165 evaluable patients (29.1%), corresponding to 48/155 patients with any stenosis (31.0%) - a finding that must be clearly distinguished from the composite rate and communicated transparently to patients. A clinically meaningful dissociation between improving global QoL and declining sexual function underscores the need for structured vaginal rehabilitation programmes after IGABT.
Keywords: cervical cancer, brachytherapy, vaginal toxicity, quality of life, CT-guided brachytherapy, IGABT, sexual dysfunction, vaginal stenosis, survivorship