VOLUMETRIC-MODULATED ARC THERAPY IN DIFFERENTIATED THYROID CANCER:
A COMPARISON WITH INTENSITY-MODULATED RADIOThERAPY
Chan, Wing-lok1; Ng, Choryi S1; Law, Martin2; Lee, Victor Ho-fun3; Wan, Koon-yat1; Leung, To-wai1
1Department of Clinical Oncology, Queen Mary Hospital, Hong Kong, Hong Kong; 2Department of
Radiology, Queen Mary Hospital, Hong Kong, Hong Kong; 3Department of Clinical Oncology, The
University of Hong Kong, Hong Kong, Hong Kong

Background/Purpose: Adjuvant radiotherapy is indicated in differentiated thyroid cancer patients with
high risk of local recurrence, either macroscopic residual disease or extensive nodal involvement. While
intensity-modulated radiotherapy (IMRT) is the standard, this study compared the performance of dual-
arc volumetric-modulated arc radiotherapy (VMAT) with fixed 9-field IMRT.

Methods: Planning computer tomography data from 15 patients with differentiated thyroid cancer were
selected. Dose prescriptions were 66Gy to the gross residual tumor, and 60Gy to bilateral cervical lymph
nodes from level II down to level VII, all delivered in 33 fractions. Plans for 9-field IMRT and VMAT for
all 15 patients were optimised and compared. The MU and delivery time were measured for treatment
efficiency.

Results: All 30 plans reached clinical treatment requirement in target coverage. The conformity index
(IMRT vs. VMAT, PTV66: 0.77±0.06 vs. 0.73±0.07, p=0.16; PTV60: 0.78±0.03 vs. 0.80±0.03, p=0.11)
and homogeneity index (IMRT vs. VMAT, PTV66: 3.07±0.61 vs. 3.30±0.63, p=0.35; PTV60: 6.52±1.77
vs. 6.67±1.21, p=0.79) were comparable. For OARs, the mean dose to parotids was significantly
increased by 4.8Gy (14.4%, p=0.014) in VMAT. The maximum dose of spinal cord (D1%), brain stem
(D1%), median dose of esophagus and the integral dose to lung (V5/ V10/ V20/ V30) were not different
between the two methods. Compared to IMRT, the mean MU and delivery time of VMAT were reduced
by 71.6% (IMRT: 1860.53±209.06 vs. RA: 528.27±73.74, p=0.0004) and 63.1% (IMRT: 7.63±0.56
minutes vs. RA: 2.81±1.29 minutes, p=0.004) respectively.

Discussion & Conclusion: For adjuvant radiotherapy for thyroid cancer with target covering level II
lymph nodes, IMRT is preferred for better parotid sparing. Otherwise, VMAT could be an accurate and
efficient alternative.