Uji akurasi perencanaan dan pemberian perlakuan volumetric modulated ARC therapy (VMAT) menggunakan acuan AAPM TG 119 = Evaluating volumetric modulated ARC therapy (VMAT) treatment planning and delivery accuracy using AAPM TG 119 protocol / Andreas

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Abstrak

[ABSTRAK
Tujuan dari penelitian ini adalah mengevaluasi akurasi perencanaan dan pemberian perlakuan volumetric modulated arc therapy (VMAT) menggunakan rekomendasi AAPM Task Group (TG) 119 di Departemen Radioterapi MRCCC Siloam Hospitals Semanggi. TG 119 menetapkan dua tes pendahuluan dan lima tes menyerupai kondisi klinis, serta confidence limit (CL) sebagai nilai standar pengujian. Perencanaan intensity modulated radiation therapy (IMRT) dan VMAT dibuat lokal mengikuti preskripsi dosis dan sasaran perencanaan yang ditetapkan oleh TG 119, kemudian hasil perencanaan lokal dibandingkan dengan hasil TG 119. Pengukuran dosis titik dari pemberian perlakuan IMRT dan VMAT pada daerah dosis tinggi dan rendah diukur menggunakan tiga bilik ionisasi dengan volume aktif yang berbeda, sedangkan pengukuran dosis penampang menggunakan detektor 2D array, distribusi dosis penampang dianalisa dengan kriteria indeks gamma 3 %, 3 mm dan 2 %, 2 mm. CL hasil pengukuran dosis titik IMRT pada daerah dosis tinggi dan rendah 1.06 % dan 0.82 % (CC01), 1.19 % dan 1.58 % (CC13), 1.37 % dan 3.02 % (FC65G). Untuk VMAT 1.47 % dan 1.17 % (CC01), 1.71 % dan 1.95 % (CC13), 2.08 % dan 3.96 % (FC65G). Hasil pengukuran menggunakan bilik ionisasi CC01 dan CC13 mampu memenuhi kriteria yang ditetapkan TG 119 dibawah 3 %, sedangkan bilik ioisasi FC65G tidak memenuhi kriteria tersebut. Hasil CL analisa indeks gamma IMRT dengan kriteria gamma 3 %, 3 mm dan 2 %, 2mm sebesar 3.68 dan 11.71 (96.32 % dan 88.29 % pass), sedangkan untuk VMAT sebesar 1.44 dan 6.33 (98.56 % dan 93.67 % pass), kedua hasil indeks gamma tersebut masuk dalam kriteria TG 119 dibawah 12.4. Berdasarkan hasil tersebut, rekomendasi TG 119 dapat diimplementasikan untuk menguji akurasi perencanaan dan pemberian perlakuan VMAT, hasil tersebut juga menunjukkan keakurasian yang cukup dari perencanaan dan pemberian perlakuan VMAT di institusi lokal.
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ABSTRACT
The purpose of this study was to evaluate the accuracy of treatment planning and delivery of Volumetric Modulated Arc Therapy (VMAT) using recommendation of AAPM Task Group (TG) 119 in the Department of Radiotherapy MRCCC

Siloam Hospitals Semanggi. TG 119 establishes two preliminary tests and five tests resemble a clinical condition, as well as the confidence limit (CL) as a benchmark data. Dose prescriptions and planning objectives recommended by TG 119 report were followed to generate Intensity Modulated Radiation Therapy (IMRT) and VMAT treatment planning, and then the local planning results compared with the results of TG 119. Point dose measurements were done using three ionization chambers with different active volume at high dose and low dose regions. The planar dose measurements were measured using a 2D detector array and the planar dose distribution was analyzed for percentage of points passing the gamma criteria of 3 %, 3 mm and 2 %, 2 mm. For IMRT plans, the CLs obtained for point dose measurement in areas of high and low doses were 1.06 % and 0.82 % (CC01), 1.19 % and 1.58 % (CC13), 1.37 and 3.02 % (FC65G), whereas a value of 1.47 and 1.17 % (CC01), 1.71 % and 1.95 % (CC13), 2.08 % and 3.96 % (FC65G) for CL VMAT. Point dose measurement results using ion chamber CC01 and CC13 were able to meet the criteria set by TG 119 below 3 %, while for ion chamber FC65G could not meet these criteria. From gamma analysis, CL IMRT for gamma criteria 3 %, 3 mm and 2 %, 2 mm were 3.68 and 11.71 (96.32 % and 88.29 % pass), while for VMAT were 1.44 and 6.33 (98.56 % and 93.67 % pass), gamma index results falls within the criteria TG 119 under 12.4. Based on the results, TG 119 recommendations can be implemented on commissioning VMAT treatment planning and delivery, these results also indicate adequate accuracy of VMAT treatment planning and delivery in local institution, The purpose of this study was to evaluate the accuracy of treatment planning and
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