Purpose: A treatment planning study was performed to compare volumetric-modulated arc radiotherapy against conventional fixed field IMRT on pituitary adenomas cancer patients.

Methods: CT datasets of 10 patients affected by carcinoma of the pituitary adenomas were included and four plans were generated for each case: fixed five-Fields and seven-Fields IMRT, single (RA1) and double (RA2)-modulated arcs with the RapidArc technique. The radiation dose was prescribed as 45 Gy in 25 fractions. DVHs were adopted for the statistics of above parameters, as well as conformal index (CI), homogeneity index (HI), dose-volumetric parameters of normal tissues, total accelerator output MUs and total treatment time.

Results: Target coverage resulted basically equivalent among four plans. CI and HI were 0.84±0.04, 0.84±0.03, 0.86±0.03, 0.85±0.04 and 9.03±1.05, 8.39±1.55, 10.02±1.30, 10.59±1.30, respectively. The the V20Gy (in %) and V40Gy (in %) of brainstem were 30.48±16.84, 10.23±7.47, 21.34±12.2, 26.4±12.1 and 5.06±4.37, 4.27±4.49, 3.97±4.45, 4.49±4.56, respectively. The max dose(Gy) of Optic nerve-right and Optic nerve-left were 31.87±12.04, 33.23±12.65, 28.96±13.42, 28.68±12.63 and 33.15±12.51, 34.15±11.51, 30.37±12.41, 30.09±11.34. Concerning the healthy brain tissue: V20Gy (in %) was 7.11±2.1, 7.92±2.7, 8.12±1.8 and 8.0±2.0, respectively. The number of computed MU/fraction were 580±69 (5-IMRT), 598±112 (7-IMRT), 474±43 (RA1), and 477±77 (RA2).

Conclusions: In our study, rapidarc showed improvement in organ at risk sparing with uncompromised target coverage. Rapidarc could lead to the less MU and shorter delivery time compared to IMRT.