Purpose: To evaluate the entire spine SBRT process and perform comprehensive quality assurance (QA) for RPC Spine Phantom irradiation.

Methods: A RPC spine phantom was obtained for RTOG0631 protocol credentialing. A 7 beam, 6MV photon, step-and-shoot IMRT treatment plan was generated using Pinnacle3 treatment planning system (TPS). Total 6Gy in 1 fraction was prescribed to the target PTV. Stringent objectives for OARs were set during plan optimization. Treatment table attenuation factor was measured for all posterior beams penetrating through the table. A comprehensive quality assurance (QA) of the plan was performed: I’mrt phantom (Scanditronix Wellhoffer, Germany) -based ion chamber point-dose measurement and GAF chromic film axial plane dose measurement, and Mapcheck planar dose measurements. The treatment plan was loaded on the front part of the I’mrt phantom and the planar dose at planned film location was generated for 2D gamma comparison. Similarly, the treatment plan was loaded on the rear part of the I’mrt phantom and point dose at ion chamber location was recorded. A routine beam-by-beam IMRT planar dose QA was performed.

Results: The treatment plan has met protocol requirement of PTV coverage and OAR constraints. Greater than 90% of the PTV received prescribed dose. Max point dose of cord, heart and esophagus were 3.23, 1.74 and 5.20Gy, respectively. 1000cc lung received 0.75Gy. Table attenuation factors were 0.043, 0.052 and 0.08. Ion chamber measurement was agreed with TPS PTV point dose within 0.1%. Axial film measurement had excellent agreement with plan, the gamma index pass rate was 98.6% with 3% and 3mm criteria.

Conclusion: Spine SBRT requires accurate TPS commissioning, careful planning and good image guidance before final patient treatment. The comprehensive QA effort needed for spine SBRT was more than the regular fractionated IMRT cases but was warranted by its potential high gain and high risk nature.