Purpose: Stereotactic Radiosurgery (SRS) program commissioning is currently relied on Radiological Physics Center (RPC) Head Neck phantom with Thermo Luminescent Dosimeters (TLDs) for dose verification. However, due to the limited accessibility of RPC Head Neck phantom, ongoing QA or patient specific dose verification is not performed in most clinics. In this study, we proposed an SRS dose verification approach for both SRS commissioning and patient specific dose verification with widely available clinical instruments.

Methods: SRS treatment plans were imposed onto a 14cm thick conventional solid water phantom (30cm x 30cm), with a PTW micro-chamber in the middle. Treatment couch angles were renormalized to 90 or 270 degrees for two reasons: 1) micro-chamber's axis was parallel to gantry rotation axis during all the arc beam delivery, which minimizes the angle dependence effect (axis tilt) of micro-chamber. 2) Any collision between the cone and conventional solid water phantom would be avoided and there would be minimum attenuation effect from the couch. The arc verification plan was then recalculated and compared to the measured absolute dose by PTW micro-chamber. An End-to-End test with a CyberKnife Head Neck phantom and GAFChromic EBT2 film was utilized as secondary dose delivery verification.

Results: Cones with all twelve different sizes in SRS commissioning were tested. For the cone size from 10mm to 30mm, the micro-chamber measurements agreed with the computer calculations within 3%. However, when the cone size was reduced to 5mm, micro-chamber measurement was 10% lower than planned dose, indicating underdose effect for small cone size. Additional measurements with Cyberknife head phantom confirmed the dose delivery accuracy was within 5%.

Conclusions: A simple SRS dose verification method which only requires micro-chamber and conventional solid water phantom has been presented and verified. This approach will be valuable for SRS commissioning and ongoing SRS QA.