Purpose:Surveillance MR image procedure has been developed to monitor possible cyst growth of the pediatric craniopharyngioma patients (6 to 14 years old) without anesthesia using the 0.23T PanoramaTM MR Scanner (Philips, Netherlands)

Methods:We developed the MR-safe base-of-skull (BOS) immobilization device made of graphite and generic wood without thermoplastic masks, and optimized the scanning pulse sequences like T1FFE3D (220mm*220, 192*912 matrix, and 2.5mm slice thickess), B-FFE3D (100mm*100mm, 92*92 matrix with 1.5mm slice thickness) , and Dual Turbo Spin Echo (DTSE with 3.5mm slice thickness to generate proton-density images and heavily T2-weighted images). Each sequence has 2 sets: axial and sagittal images to improve better contrast due to the limitation of the slice thickness (1.5 to 3.5mm) for small size (2 to 4cc GTV) of the craniopharyngioma

The plan MR (used to do image fusion with Plan CT, T1 or T2 3D volume images with 1 or 1.5T MR scanners with <1mm3 resolution are commonly used) is used as a reference to monitor the cyst growth during entire treatment session. Within 2-3 days of the proton treatment, the surveillance MR images are taken, and thereafter weekly MR images are taken, and correlated with the Plan MR and previous Surveillance MR images.

Results:The accuracy of the surveillance MR images (T1FFE3D) are found to be ~2mm, the BFFE images are sensitive to inhomogeneous region where the target is located in the brain. Their geometrical distortions are approximately 2mm from another surveillance MR images as well the plan MR.

Conclusions:This technique has been used to monitor 4 patients and the image quality is good enough for clinicians to estimate the possible cyst changes. In the preliminary trails with 4 patients, all the cysts are stable diseases. It will be used to scan the pediatric patients with anesthesia.