Purpose: A new CT/MRI vaginal multichannel applicator was introduced by Elekta/Nucletron® recently. The multi-lumen cylindrical device intends to improve and optimize treatment of local advanced vaginal cancer. The design of this applicator includes several inner peripheral channels in equal spacing isotropically 5 mm from the surface of cylinder. The central tube provides the unique function as it was in traditional single channel treatment.

Methods: Nineteen CT image sets of six patients were taken with multichannel applicator inserted. The single channel plan was planned before multichannel plan to justify the dose coverage to the prescribed volume and the doses received by bladder and rectum. The Oncentra® Brachytherapy planning system was employed to generate forward plan in single channel and inverse plan in multichannel where doses to bladder and rectum were evaluated and weighted by using Inverse Planning Simulated Annealing (IPSA) algorithm.

Results: Figure.1 shows plan result from single channel and Figure.2 shows multichannel result with IPSA. The comparison confirms multichannel provides better coverage of V90, V95 and V100 to the prescribed 5 mm vaginal cuff rind. The maximal doses delivered to bladder and rectum were reduced and the mean dose was lowered in average by 5-9% and 7-11% respectively.

Conclusions: The nature of Brachytherapy is to take advantages of short fall off of radiation dose outside the intended treated tumor and minimize dose to surrounding tissues and critical organs. However treatment technique and plan optimization could be improved and be enhanced to benefit cancer treatment from advanced design of the applicators. This study demonstrates a new multichannel applicator affords promising conformal treatment to the tumor and liberates the doses to the critical structures by using optimization to meet our objectives.