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# Clinical application of 3D-printing individual template assisted HDR $^{192}$Ir interstitial brachytherapy for central recurrence of GYN after pelvic EBRT

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**Purpose:** To evaluate the feasibility of 3D-printing individual template assisted interstitial brachytherapy for recurrence of GYN after pelvic external beam irradiation.

**Materials & Methods:** 11 patients in our center from Aug 9, 2016 to Dec 1, 2017 diagnosed with central recurrence of GYN after pelvic adjuvant EBRT or radical chemoradiotherapy, they all received $^{192}$Ir HDR interstitial brachytherapy under CT guidance with 3D-printing template assisted. They all firstly, undertook CT simulation with lithotomy position. Secondly, preplan with virtual needle insertion and template with needle passage were designed 3D template would be printed and verified by both physicist and physician. Thirdly, the patients accept $^{192}$Ir HDR interstitial brachytherapy under anesthesia. Among them, 5 cases under local anesthesia with 3D-printing vaginal insertion template and 6 cases under epidural anesthesia with 3D-printing combined vaginal and perineal insertion template. GTV prescription doses are 5-6 Gy/f, 2-6 f, 1-2 f/W totally 45 fraction treatment of 11 patients. Dosimetry parameters of GTV $V_{100}$, $D_{100}$ and $D_{90}$, organ at risk D2cc of rectum, bladder and intestine were recorded and analyzed. Complications and early toxicities were analyzed.

**Results:** Totally 229 needles were inserted for 45 applications, median 6 (3-9) needles per fraction, mean inserting depth was 8.3±3.4 cm (2-13.7 cm), mean CT scan 3 (1-5) times, during CT guidance procedure. Actual dosimetry parameters of median $V_{100}$,$D_{100}$ and $D_{90}$ were 83±4.5% 3.0±1.3 Gy and 5±1.7 Gy respectively per fraction; median D2cc of rectum and bladder was 3.4±1.0 Gy and 3.55±2.15 Gy respectively per fraction. There were no acute puncture side effects such as hemorrhea, perforation of bowel and hematuria recorded. Early side effect of grade I/II urethritis were found in 45% patients and relieved after symptomatic treatment.

**Conclusion:** 3D-printing individual template assisted interstitial brachytherapy for recurrence of GYN after pelvic external beam irradiations under CT guidance have good dosimetry parameters. It is clinically feasible and high efficiency with low complications. However long-term clinical outcomes should be further investigated.

A. template design & 3D-printing template B. needle insertion with template C. dose distribution

## Biography

Ping Jiang is an Associate Professor in Radiation Oncology Department in Peking University 3rd Hospital. She works mainly in radiotherapy for malignant tumor, especially in domain of radiation on GYN and thoracic malignant tumor, HDR and LDR brachytherapy in recurrent GYN. She has published many papers as first author. Her research results are oral presented in ESTRO, JASTRO and ABS. She is the member of Youth committee of Chinese Medical Association Radiotherapy Branch and Youth committee of Beijing Medical Association Radiotherapy Branch. She is in charge of national important research and development project, digital diagnosis and treatment equipment research and development.

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