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Dosimetry and efficacy analysis of ¹²⁵I radioactive seeds implantation for cervical cancer with pelvic recurrent after radiotherapy

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Purpose: Pelvic recurrent after radiotherapy of cervical cancer was difficult to treat. The implantation of radioactive ¹²⁵I seeds was suitable for recurrent patients after radiotherapy. Therefore, we evaluated the efficacy of radioactive ¹²⁵I seeds implantation for pelvic recurrent cervical cancer after radiotherapy. The dosimetric parameters affecting outcome were further analyzed to guidance therapy.

Methods: A retrospective analysis was made with pelvic recurrent cervical cancer after radiotherapy from July 2005 to October 2015 in our hospital with ¹²⁵I seeds implantation, under ultrasound or CT guidance. Treatment planning was performed before implantation to estimate the number, activity of the seeds. The seeds numbers ranged from 10-140 with a median numbers of 62.5 and the activity of seeds ranged from 0.5-0.8 mCi with a median activity of 0.7 mCi. Dosimetric verification was performed using CT scan immediately after ¹²⁵I seeds implantation. D_{90} , D_{100} , V_{100} , V_{150} and V_{200} was evaluated in postoperative plan. The Kaplan-Meier method was used to calculate the local progression free survival (LPFS) rate and overall survival (OS) rate. The Log-rank test and Cox regression were used for univariate and multivariate analysis.

Results: All of the 36 patients received pelvic radiotherapy previously, 13.88%(5/36) of the patients received re-irradiation. The median dose of cumulative radiotherapy was 56 (42-107) Gy EQD2. The interval time of the last radiotherapy to ¹²⁵I implantation was 12 (2-60) months. 15 cases were central recurrence (41.67%, 15/36), and 21 cases were pelvic wall recurrence (58.33%, 21/36). The median follow-up time was 11.5 months (2-30 months). Vaginal fistula occurred in 1 case. No other severe adverse effects. The downgrade rate of pain was 79.2% (19/24). The short-term local control rate was 88.9% (32/36). 1-year and 2-year local progression-free survival (LPFS) rate were 34.9% and 20%, respectively. 1-year and 2-year OS rate were 52% and 19.6%, respectively. Multivariate analysis showed that the location of the recurrence volume of lesion and D_{90} was significantly related to LPFS ($P<0.05$). And the location of the recurrence was also significantly related to OS ($P<0.05$). 33 cases were entered in dosimetric analysis. D_{90} was 128.5 ± 47.4 Gy, D_{100} was 50.4 ± 23.7 Gy, and V_{100} was $86.7\%\pm12.9\%$. Univariate analysis showed that D_{100} , D_{90} , V_{100} were significantly associated with LPFS ($P<0.05$). $D_{90}>105$ Gy and <105 Gy, 1-year LPFS were 53.3% and 0% ($P<0.05$), respectively. $D_{100}>55$ Gy and <55 Gy, 1-year LPFS were 49.2% and 15.8% ($P<0.05$), respectively. $V_{100}>91\%$ and $<91\%$, 1-year LPFS were 55% and 15.6% ($P<0.05$), respectively. Multivariate analysis showed D_{100} was the independent factors.

Conclusions: Radioactive ¹²⁵I seeds implantation was a safe, effective salvage treatment for pelvic recurrent cervical cancer after radiotherapy. It could relieve the pain for patients undergone multiple treatment after relapse. ¹²⁵I radioactive seed implantation was recommended for patients with recurrent in pelvic wall, compared with recurrent in central pelvic. $D_{100}>55$ Gy or $D_{90}>105$ Gy or $V_{100}>91\%$ could significantly improve the local control.

Biography

Qu Ang is the Attending Physician of the Department of Radiation Oncology, Peking University Third Hospital. Her research direction is on radiotherapy on gynecologic cancer, including EBRT, HDR and LDR brachytherapy.

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