

Recent Advances in Radiotherapy of Localised Prostate Cancer

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Localized prostate cancer (PC) includes cases of cancer confined to the organ (T1,T2) and those with minimal extra capsular spread (T3) and without nodal metastasis and no distant spread. Treatment options include watchful waiting, radical prostatectomy (RP), brachytherapy (BT) or external radiotherapy (ERT) with or without androgen deprivation therapy (ADT). Criteria of treatment selection depend on three main factors, namely the overall life expectancy of the patient as determined by his age and co-morbidity, the biological characteristics of the tumor with its predictive behavior and on the preference of the patient with consideration of relative efficacy, adverse effects and quality of life issues. However in good proportion of cases (>30%) treatment is mis-matched as patients might not be receiving the most appropriate treatment (1).

Radical prostatectomy (RP) remained the standard of care for many decades with expected 10 years incidence free from PSA failure of 50-75%. However, RP suffers from serious complications as stress incontinence (8-30%) and impotence (100% in non-sparing RP).

Results of conventional RT used to be inferior to RP with 10 years PSA free survival of 55-60%. However, with much less serious complications (2,3). These inferior results were mainly due to patient selection in RT (mainly those unfit for RP) and to relatively lower dose to prostate (60 Gy) due to limitations imposed by equipments and sensitivity of organs at risk (OAR) that can not be well protected during RT. During the last few decades there were rapid developments in 3D imaging (CT & MRI), fast 3D dose calculations, more accurate dose delivery, rigid patient immobilization, accurate dose delivery as well as verification of treatment given. These advancements made it possible to give ERT with higher precision which allowed for dose escalation (76-80 Gy) and at the same time reducing doses to OAR. High precision RT for PC requires high energy digital accelerator with beam shaping device (MLC) for conformal RT, non-uniform beam fluence for intensity modulated RT (IMRT), electronic portal image (EPID) and more recently image guided RT to account for organ mobility. Modern imaging machines, well-trained staff and quality assurance for equipments and patient planning are essential pre-requisites. The adoption of these recent technologies resulted in significant improvements of results of treatment of PC and meanwhile reduced significantly the severity and frequency radiation-induced complications and improved the QL of these patients.

Results of modern RT are now comparable to those of RP with less side effects and better QL. (4)

Very recently several investigational radiation techniques are introduced and are under clinical trials e.g. pre and post-operative irradiation in high-risk cases (6&7), proton beam therapy (8), neutron therapy and tomotherapy (9).

The most important questions to be asked regarding these investigational therapies are they improving the therapeutic ratio? and are they cost-effective?

Further research along these lines will give an answer in due time.

References

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