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Electronic Brachytherapy in clinical practice: Implementation and comparison against conventional techniques and electron montecarlo algorithm.

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Purpose: Electronic Brachytherapy (EBX), a technique that utilizes miniaturized X-Rays source, is gaining ground in radiotherapy treatment in presence of small superficial lesions. This work focuses on acceptance test, commissioning, clinical implementation and dosimetric features of the novel EBX system Esteya® (Elekta AB, Stockholm, Sweden).

Methods: Flatness and symmetry of X-Ray beams have been evaluated according IEC60976 using a high definition 2D array equipped of liquid filled ionization chambers (SRS 1000, PTW, Germany). Half Value Layer (HVL), PDD and absolute dose have been measured for each applicator with a soft x-ray parallel plate chamber (T34013 PTW, Germany) and solid water according to IAEA TRS 398[1]. Dose distributions have been compared with the ones calculated for conventional electron treatments. Calculations have been carried out in a virtual water phantom by electron montecarlo (eMc) algorithm implemented in a commercial TPS (Monaco v. 5.11, Elekta) for each applicator.

Results: Flatness, symmetry and penumbra showed excellent performance even if compared with eMC plans. Build up absence and PDDs slopes allow good homogeneity for coverage in superficial targets.

Conclusions: Shielding requirements, patient compliance and global management of Electronic brachytherapy sources are well known advantages[2]. This study demonstrated that EBX could be a valid alternative to electron treatment in case of small skin lesions also from a dosimetric point of view.

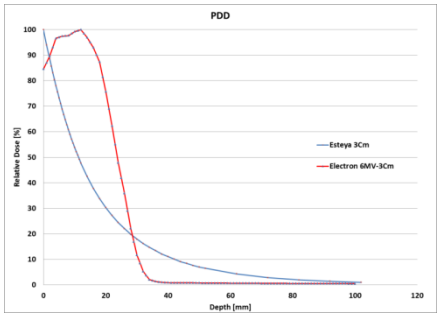

Figura 1 eMC (red) and EBX (blue) PDD

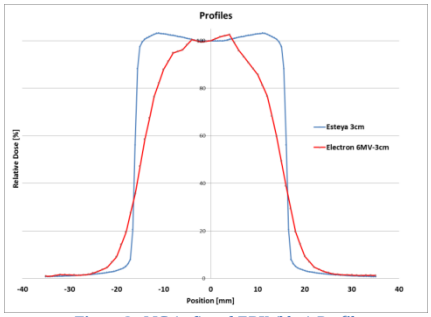

Figura 2 eMC (red) and EBX (blue) Profile

References:

[1] Candela-Juan C, Niatsetski Y, Ouhib Z, Ballester F, Vijande J, Perez-Calatayud J., Commissioning and periodic tests of the Esteya(®) electronic brachytherapy system., J Contemp Brachytherapy. 2015 Apr;7(2):189-95. doi: 10.5114/jcb.2015.51523. Epub 2015 May 13.

[2] Pons-Llanas O, Ballester-Sánchez R, Celada-Álvarez FJ, Candela-Juan C, García-Martínez T, Llavador-Ros M, Botella-Estrada R, Barker CA, Ballesta A, Tormo-Micó A, Rodríguez S, Perez-Calatayud J. Clinical implementation of a new electronic brachytherapy system for skin brachytherapy. J Contemp Brachytherapy. 2015 Jan;6(4):417-23. doi: 10.5114/jcb.2014.47996. Epub 2014 Dec 31.