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Breast workshop

Breast interstitial implant with rigid needles and plastic tubes: Plesiobrachytherapy

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Breast brachytherapy (BT) with rigid needles was the first way to boost the bed tumor avoiding skin. Several long-term studies have shown that HDR-BT can be used in 1–2 fractions in one day, on an outpatient basis, which is far more comfortable than LDR-BT. The needles, fixed with templates, allow an excellent dose-homogeneity with the optimization of HDR. Clips are useful to delineate the tumor bed, performing a CT for dosimetry, but it is not easy to draw it when an open cavity has disappeared. Most studies define the tumor bed by clinical assessment, according to the mammography, patient and surgeon's initial description, and palpation. The target is defined as the tumor bed plus a margin of 1–2 cm, avoiding 1 cm from skin and from the entrance of the needles. If the tumor location is not clearly defined, a larger implant is used to avoid a geographical miss. The shape of the breast can be modified if needed because the templates keep the needles in place. Dosimetry calculations are theoretical, making a reconstruction of catheters, because the distance between needles is constant. The total procedure is easy and quick, takes around 2–3 h, and is called "Fast-boost".

Historically, like rigid needles, breast brachytherapy with plastic tubes is performed in the operating room. This was either done at the time of lumpectomy or as a separate procedure following lumpectomy with pathologic evaluation completed and information available. Although there are different techniques of catheter placement, general guidelines of catheter placement are consistent. Stainless steel guide needles are introduced into the breast tissue at the appropriate locations. Once its placement is complete they are replaced with button-ended flexible after loading plastic tubes and secured with proper fixation buttons. Implant construction is governed by basic breast brachytherapy principles with the goal of optimizing target coverage and dose homogeneity and it is easily when it is done in intra – operative time because we can see tumor bed and discuss with surgeon tumor localization. For both, intra or postoperative implants, dosimetric planning can be managed with a two or three dimensional planning process utilizing dummy source strands in each catheter with subsequent orthogonal films or more recently using a CT. The main advantages of plastic tube are that the implant is probably better tolerated by the patient, but is more difficult to contain the optimal geometry (parallelism, inter catheter spacing and distance to the overlying skin).

The plesiobrachytherapy consist of an applicator containing an array of radioactive sources usually designed to deliver a uniform doses distribution to skin. It can be used only for very superficial lesions (up to 5 mm target depth). The applicator must be adapted to the topography of the tumor. Irregular and curved areas can be treated. Fixation and immobilization are crucial. Indication is breast cancer recurrences after mastectomy (inoperable) in already irradiated areas. The guide system consisted of plastic tubes inserted at 1.5 cm intervals into flexible silicone plates that were applied to skin surface to maintain the actives lines 0.5 cm above the skin surface. The high dose sleeves surrounding the actives lines were contained within the thickness of the silicone plate. The length of the sources has to be adapted to the length of the PTV, calculated previously to the application. Computations for the doses desired are carried out, and optimal placement of the

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sources is determined. It requires more thorough studies to establish optimum time, dose y fractionation. The patients were treated with a doses de 5 Gy per fraction, twice a week for three to four weeks to deliver a total dose 30–40 Gy in six to eight fractions (HDR). A total dose of 60 Gy was delivered a reference isodoses located 2–4 mm under skin surface, using two or three courses (PDR). Total treatment is spread over a time period and tumor regression as well as radiation reactions can be observed and if required, treatment modification can easily be made.