

A Case Report on Brachytherapy in Extremity Soft Tissue Sarcoma (STS)

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ABSTRACT

STS represents a heterogenous group of malignancies with varying pathological grades, sites of origin and histologies. In the olden days, treatment consisted of resections and amputation which led to significant detriment in quality of life(QoL) and structural functions. Here we present a case of 49 year old patients who came with complaints of painless, progressive swelling in the right upper arm. He underwent WLE followed by intraoperative brachytherapy catheter application. He was then planned for HDR brachytherapy 34 Gy in 10 fractions 4 days following surgery. He tolerated the treatment well, the surgical scar healed by primary intention with no complication during or after the procedure. It can be concluded that brachytherapy in soft tissue sarcoma is a feasible option and an effective modality in the treatment of extremity soft tissue sarcoma with adequate local control.

KEYWORDS: Soft tissue sarcoma, brachytherapy, extremity soft tissue sarcoma.

ARTICLE DETAILS

Published On:
03 June 2023

Available on:
<https://ijmscr.org/>

PURPOSE

To assess the role of brachytherapy in extremity soft tissue sarcoma.

INTRODUCTION

STS represents a heterogenous group of malignancies with varying pathological grades, sites of origin and histologies. Almost 50% of the cases arises in the extremities and since they don't cause pain, they do not have any characteristic symptoms. Every tumor, especially fast growing ones, located beneath the fascia requires special attention and is always an indication of the biopsy final surgical intervention. In the olden days, treatment consisted of resections and amputation which led to significant detriment in quality of life(QoL) and structural functions. This led to the change in the approach or the treatment hoping to improve the QoL. At present amputation is considered only in cases where the sarcomas are infiltrating the neurovascular bundle where limb salvage surgery is not going to preserve the extremity function. The addition of radiation therapy i.e EBRT or brachytherapy improved the local control by almost 20-30% along with limb sparing WLE. Brachytherapy is a good option for the treatment of soft tissue sarcoma as it can be delivered in a short duration of time and it

provides and the advantage of rapid dose fall off. But brachytherapy is not considered as a standard method of adjuvant treatment despite its benefits and effectiveness. The reason is mostly due to its limited accessibility and technical limitations even though it has been used in the treatment of soft tissue sarcoma for almost 30 years. There are publications which have compared different types of brachytherapy i.e HDR (high-dose-rate), LDR (low-dose-rate) and a recent one Ultra low dose. The major advantage is the increased recurrence free five year survival and better local control which ranges between 50-32%. The adverse effects include peripheral nerves, less frequently skin and very rarely radiation induced muscle damage and bone loss. There are studies which have compared EBRT and brachytherapy, but couldn't come to a conclusion as to which method is superior.

A CASE REPORT

A 49 year old presented with complaints of rapidly progressive swelling of size 4cmx3cm on the inner aspect of right upper arm. There was no complaints of pain over the swelling. He was a known case of type 2 diabetes mellitus on regular medication. He had no other co-morbidities. On examination there swelling was mobile horizontally and showed restriction of movement

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vertically, there were no signs of local rise of temperature, skin was pinchable over the swelling, tenderness was not elicited over the swelling. He underwent FNAC which was suggestive of STS

TREATMENT DETAILS

He was planned for wide local excision with intra operative insertion of the brachytherapy catheters. Following the resection of the tumor, 7 hollow brachytherapy double ended catheters were placed covering the tumor bed as per the tumor bed localized by the surgical oncologists. The catheters were placed with a separation of 1 to 1.5 cm to each other. Catheters were implanted to extend 2 cm cranio-caudally and 1.5 cm lateral to tumor bed. There were anchored in position with the help of absorbable sutures. Radio opaque surgical clips were placed around the tumor bed to help in target delineation. The caudal end of the catheters were not fixed intraoperatively in view of seroma developed and were planned to be fixed 4 days after surgery during CT planning. The patient was discharged the next day with advice to limit the movement of the right shoulder to avoid displacement and kinking of the hollow brachytherapy catheters.

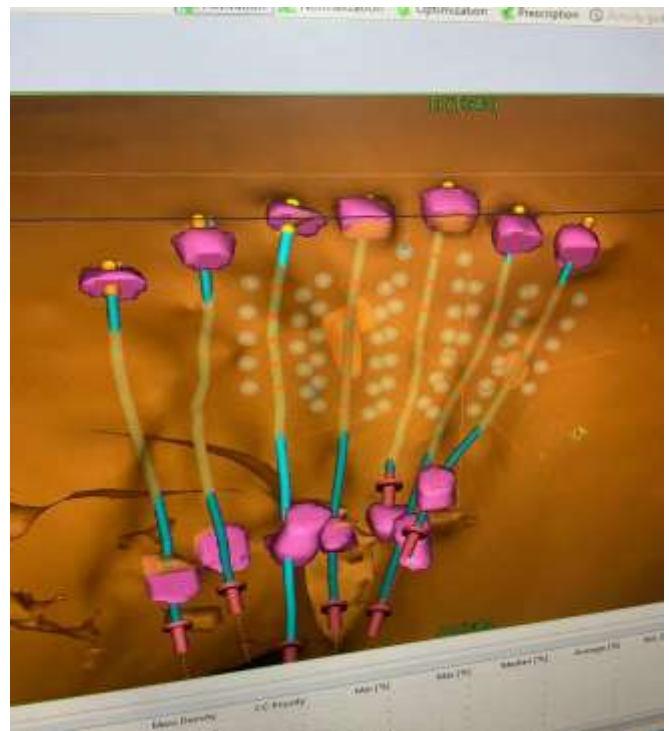


PICTURE 2: seven hollow brachytherapy applicators placed under the tumor bed 1 to 1.5 cm from each other.

Following 4 days post WLE, he was planned for HDR with an Ir ¹⁹² radioactive source 34Gy in 10 fractions. Treatment planning was based on CT images. The total dose was 34 Gy delivered twice daily with a minimum of 6 hour inter-fraction interval. Only 5 catheters were loaded and it adequately covered the tumor bed.



PICTURE 1: Tumor bed in the right upper arm and securing the applicators for brachytherapy

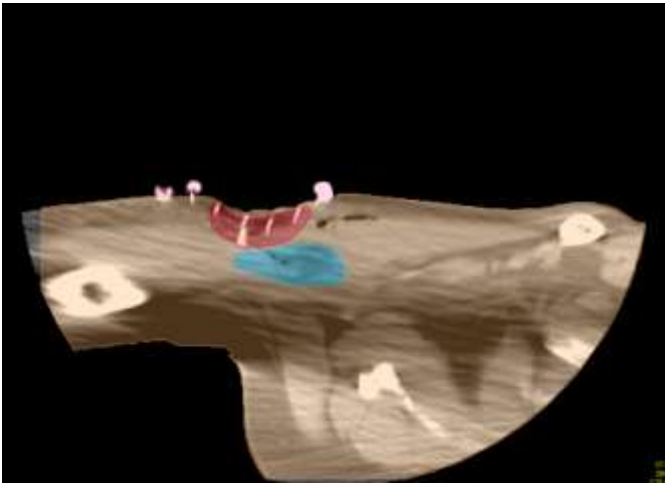


Picture 3: 3D reconstruction of the catheters

TARGET VOLUME:

HRCT: tumor bed + 2.5 to 3 cm craniocaudally and 1.5 to 2 cm lateral to the tumor bed

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PICTURE 4: Target volume (red), nerve structures (blue)



PICTURE 5 : Day 1 of treatment

Daily dressing was done using povidine iodine solution was used to sterilize the catheters and the skin neighboring the catheters following it with sterile dressing.

No complications were reported during the surgery as well as the postoperative period and brachytherapy. After the completion of treatment of 10 fractions, catheter removal was done under aseptic precautions. Double ended catheters pose a risk of introducing bacteria into the surgical cavity unlike the single blind ended catheters. The patient was advised T. Amoxicillin + clavulanic acid 650 mg BD for 5 days. The wound healed by primary intention and no signs of peripheral neuropathy were observed.



PICTURE 6: day 5 of treatment



PICTURE 7: 1 week after applicator removal

DISCUSSION

Surgery remains the mainstay of treatment for extremity soft tissue sarcoma. For G1 and G2 graded tumors, R0 resection provides an optimal solution while larger tumors and those graded G3 require resections with an adequate safety margin and hence requires complimentary therapy. The most common being neoadjuvant and adjuvant radiation therapy. Brachytherapy is rarely used as an adjuvant treatment due to its technical requirements and limited accessibility. The main advantage of brachytherapy is the fact that it can be applied under direct visual control which leads to greater precision and thereby decreasing the number of complications. Brachytherapy is well tolerated by most patients and the compliance is also better. The complication rate is estimated to be around 10% and peripheral nerve damage is the major adverse effect comprising 5%.

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Brachytherapy in extremity STS significantly decreases the number of local recurrences but with no direct effect to the distant metastases. Post operative brachytherapy takes 5 to 10 days whereas the EBRT takes almost 4 to 6 weeks to start after the surgery. Radical brachytherapy with HDR is still an effective and safe treatment method

CONCLUSION

Brachytherapy in extremity soft tissue sarcoma is a very simple and easy treatment with almost 20-30% improved local control and it seems to be a good method of adjuvant therapy. The number of complications also relatively small. Since implant areas are located peripherally, accessibility is also very good.

ABBREVIATIONS

EBRT – external beam radiation therapy ; STS – soft tissue sarcoma ; BT – brachytherapy ; QoL – quality of life ; LC – local control ; HDR – high dose rate ; Ir – iridium ; HRCTV – high resolution clinical target volume

ACKNOWLEDGEMENT

Dr Geeta S.N

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