Patient Case Study:
SCC of Right Index Fingernail

SCRIPPS M.D. ANDERSON CANCER
Department of Radiation Oncology
San Diego, CA, USA

Overview

Adaptiiv Medical Technologies Inc. (Adaptiiv) provides cancer centers with regulatory cleared software to design patient-specific radiotherapy accessories that can be 3D printed.

The following patient case demonstrates the application of Adaptiiv's technology in clinical radiation oncology through the design and fabrication of customized bolus to improve the efficacy of treating complex target volumes with electron beams. This case is an excellent example of how a custom modulated electron bolus (MEB) allowed for a uniform dose distribution of a complex treatment volume while sparing underlying critical structures.

ADAP-CS-04 V00 2022-05-27

ADAPTIIV

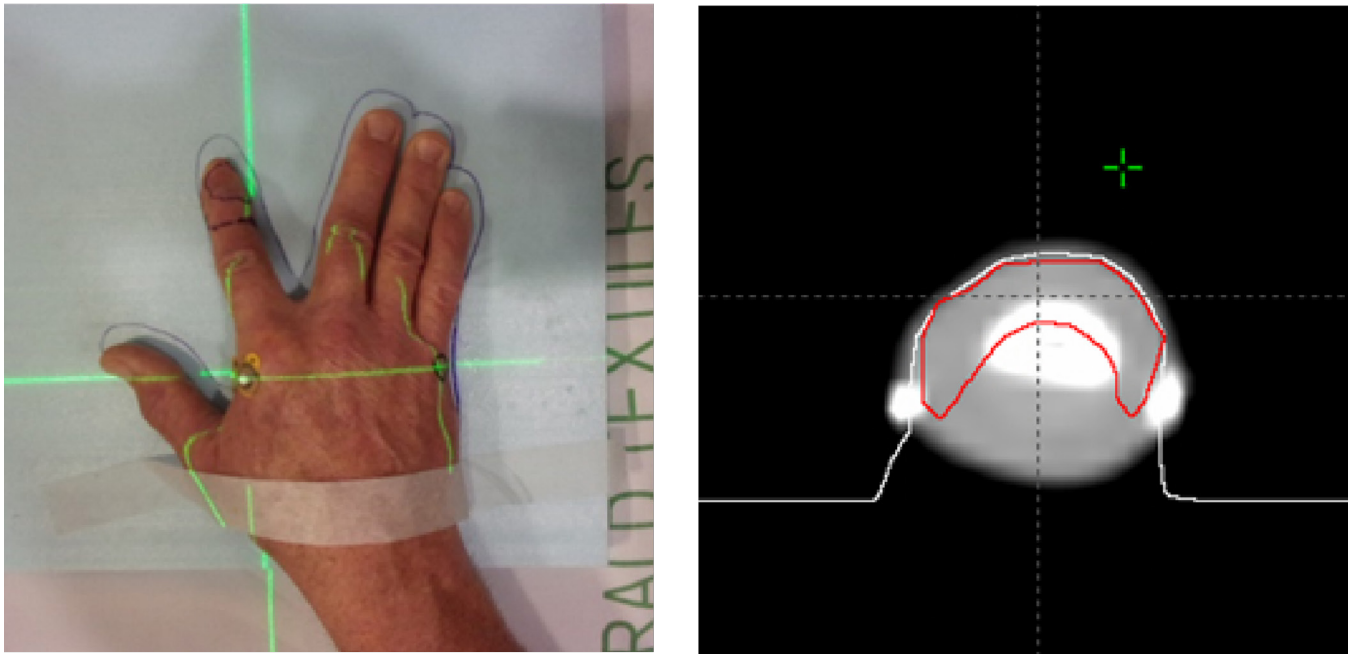
Description

A 60-year-old male presented with a recurrent squamous cell carcinoma (SCC) of the right index fingernail bed.

Fabrication and Treatment

The goal for this case was to deliver a uniform dose to the tumour volume while sparing the underlying bone of the finger. The solution chosen was to design a customized MEB. Using a traditional bolus would have been able to treat the tumour volume but would result in full dosage to the entire underlying bone.

An additional challenge, in this case, was the non-standard patient setup, which is commonly required when treating extremities. Support structures were included when designing the modulated bolus, which significantly improved reproducibility of the daily treatment setup.



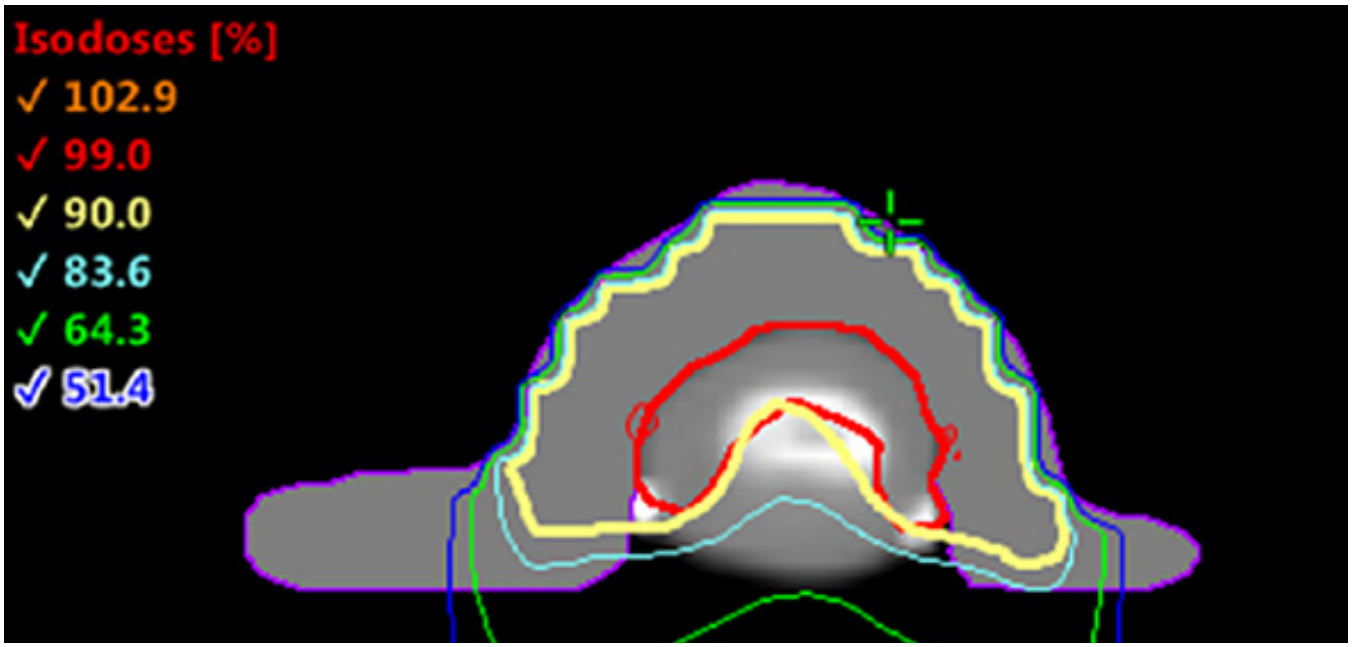
Patient was simulated with hand on a piece of foam to provide a flat surface for the bolus. The contoured treatment volume is shown on the CT image, along with the inclusion of the foam support within the body contour to allow the 3D printed bolus to fit snugly against the support.

Dose

70 Gy in 35 fractions using a 9 MeV electron beam prescribed to the 90% volume.

Results/Findings

The use of custom MEB allowed us to treat the right index fingernail bed to a uniform dose while sparing a large portion of the underlying tissues. In this case, the use of standard bolus would not have allowed us to conform the dose around the underlining bone tissue and would have resulted in the entire volume of bone being treated with the full prescription dose. The custom electron bolus also allowed for the reproducible setup of the patient in this unconventional position.



The isodose distribution shows how the modulated electron bolus could conform the prescription isodose line to the PTV while sparing the underlying bone.

Summary

The clinical advantages of the 3D printed custom modulated electron bolus are as follows:

1. Reproducible positioning for non-standard treatment techniques.
2. The bolus conforms better to the patient than traditional bolus, with minimal air gaps.
3. Uniform dose with minimal hot spots can be achieved.
4. Measurements to verify bolus placement and calculated dose is easily achieved.

ADAPTIIV

Adaptiiv Medical Technologies Inc.
1969 Upper Water Street, Suite 906
Halifax, NS B3J 3R7

info@adaptiiv.com
adaptiiv.com

ADAP-CS-04 V00 2022-05-27

Visit our website at adaptiiv.com or contact us to learn how Adaptiiv software can meet your clinical needs.