Brachytherapy for Cervical Cancer in an Asymptomatic Patient with Confirmed COVID-19 Diagnosis

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CASE SUMMARY

A 58-year-old postmenopausal woman was diagnosed with FIGO IIB moderately differentiated invasive squamous cell carcinoma of the cervix. She underwent external-beam radiation therapy to the whole pelvis with concurrent weekly cisplatin chemotherapy from the first week of March to the second week of April 2020 during the height of the COVID-19 pandemic in New York City. At the end of pelvic radiation therapy, she was scheduled for a 4-fraction high-dose-rate (HDR) tandem and ring brachytherapy (BT) course. She did not exhibit any symptoms concerning for viral infection per our physician phone screening the evening before nor by nurse screening the morning of her first BT treatment.

At this time during the pandemic, our institution mandated COVID-19 nasopharyngeal swab RT-PCR testing prior to procedures involving anesthesia airway manipulation. While this patient required only intravenous sedation, a negative COVID-19 test was obtained at the recommendation of the anesthesia team prior to her first treatment. Over the next few days following her first treatment, the patient isolated at home with no sick contacts. On the morning of her second treatment, another COVID-19 test was obtained, and surprisingly detected COVID-19.

Given the high priority of the patient's therapy, it was decided with our radiation oncology COVID leadership team to proceed with her treatments donning full personal protective equipment (PPE) consisting of layered N-95 and surgical masks, disposable gown and face shield. The patient also wore a surgical mask while sedated during the procedure. The brachytherapy treatment team participated in a simulation drill to review workflow and roles to minimize staff exposures. Additionally, measures taken to minimize the patient's footprint in our department included clearing the transport route between the brachytherapy and imaging suites of noninvolved personnel and terminal cleaning of both areas. She was treated during the regular workday, and recovered from anesthesia post-treatment in the brachytherapy suite.

We were unable to perform MRI-based HDR-BT with the tandem and ring applicator in situ for her subsequent fractions due to her COVID status and the elevated exposure risk posed to other patients and staff. A second outpatient MRI of the pelvis, however, was obtained in between her second and third fractions with a Smit sleeve in place to help optimize computed tomography (CT)-based treatment planning (**Figure 1**). The Smit

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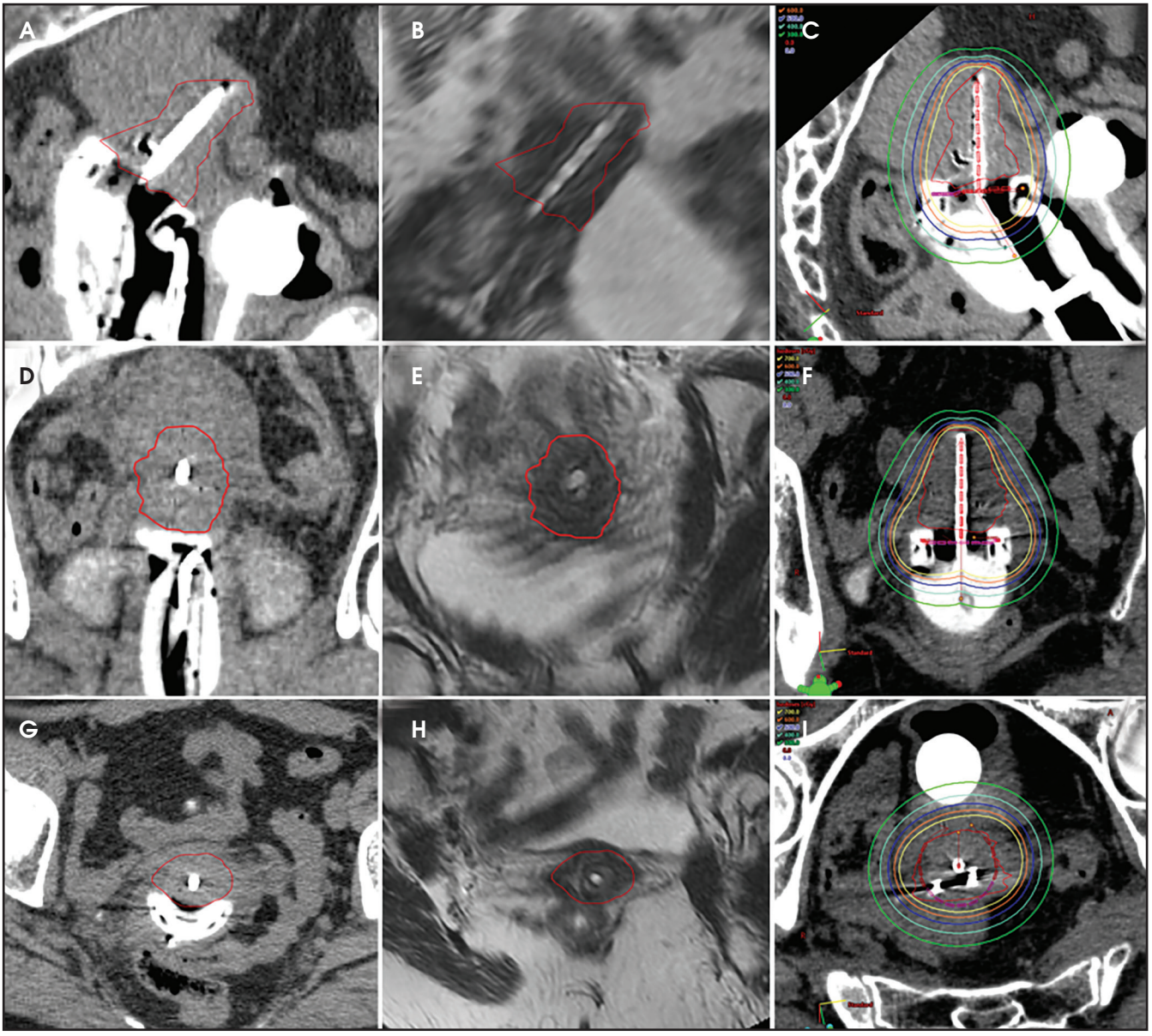

FIGURE 1. *Sagittal view of (A) computed tomography (CT) simulation scan with high-risk clinical target volume (CTV) in red, (B) co-registered T2-weighted MRI with Smit sleeve only, and (C) treatment plan. Coronal (D-F) and axial (G-I) views. Isodose lines in C, F and I: 7 Gy – yellow, 6 Gy – orange, 5 Gy – blue, 4 Gy – teal, and 3 Gy – green.*

sleeve was useful as a marker to help guide optimal delineation of the high-risk clinical target volume and to allow for dose escalation in the absence of MRI. Our goal was to deliver dose efficiently given the possibility that the patient could develop infectious symptoms necessitating treatment cessation prior to completing her intended 4 fractions.

As the patient remained asymptomatic from her COVID-19 infection, she was ultimately brought back for her fourth and last fraction of treatment. Prior to her last treatment, the patient underwent another COVID-19 test that did not detect virus. In total, her treatment was completed within 8 weeks from the initiation of external-beam treatments with no significant treatment delay, and she remained asymptomatic from her transient COVID-19 infection.

IMAGING FINDINGS

Interfraction T2-weighted MRI revealed a well-delineated cervical canal with a Smit sleeve in place that was co-registered to a CT simulation scan for target delineation.

DIAGNOSIS

Cervical squamous cell carcinoma FIGO IIB, with asymptomatic COVID-19 infection

DISCUSSION

Definitive concurrent chemoradiation therapy is a standard-of-care treatment for women with FIGO IB2 or greater squamous cell cervical cancer.[1] Multiple analyses have demonstrated a strong correlation between total chemoradiotherapy treatment time and pelvic disease control.[2,3] Optimal brachytherapy fractionation has not been identified;[4,5] total treatment time, patient anatomy, risk of toxicity and practitioner familiarity all influence selection of a given fractionation.

On March 24, 2020, the American Brachytherapy Society released a statement recommending against any treatment break for cervical cancer patients asymptomatic from a COVID-19 infection,[6] and the European Society for Medical Oncology soon thereafter attached "high priority" to initiation of definitive treatment.[7] Our institutional policy was to proceed with both external-beam and HDR-BT radiation therapy for cervical cancer given the impact of total treatment time on disease control. With a lack of data describing COVID-19 virus shedding and transmission in asymptomatic patients,[8] as well as reported 30% test false negative rate,[9] the decision was made to perform all brachytherapy procedures in our department with full PPE, regardless of COVID-19 status.

At the beginning of the COVID-19 pandemic, our department instituted a nightly telephone physician symptom screen of all scheduled clinic patients to minimize COVID-19 exposure to patients and staff. Screen-positive patients were referred for COVID-19 RT-PCR testing the next morning and their appointments were rescheduled pending results. All phone screen-negative patients, including this patient at the start of her treatment, were additionally screened by nurses at the department entrance with temperature measurement and provided with a surgical mask and gloves.

Infection modeling suggests the asymptomatic COVID-19 positive rates range from approximately one-fifth to one-half of all cases.[10,11] These estimates vary with incubation time, which itself is reported to range from days to weeks.[8] Prediction of where this patient was in her asymptomatic incubation period at the time of her COVID-19 diagnosis was made more difficult by recent publication of high false-negative test rates,[9] calling into question the validity of her initial negative test result. There was concern at the time of diagnosis that she might subsequently develop symptoms necessitating delay or termination of her treatment.

The patient underwent a total of 3 nasal swab COVID-19 RT-PCR tests over 17 days from her first to final HDR-BT fraction. Only the second test was positive. She likely had an asymptomatic and transient infection that was rapidly cleared if test results are accurate. While her original 4-fraction HDR-BT was ultimately implemented as planned, we adapted our approach as described due to her COVID-19 infection. This case also highlights the practice of COVID-19 testing in asymptomatic patients undergoing aerosol-producing procedures, as frequent testing allowed us to proceed in the safest manner possible.

CONCLUSIONS

Completing HDR-BT on schedule is recommended in the treatment of cervical cancer during the COVID-19 pandemic. The brachytherapy team must implement strategies to help minimize patient and staff exposure, and navigate changes in resource availability during a challenging time. Depending on the patient's clinical course following COVID infection, reduction in the number of HDR-BT fractions should be considered to facilitate timely completion of therapy.

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