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Remote location interstitial brachytherapy with patient stabilization and subsequent transport to an outpatient center for treatment is safe and effective for the treatment of gynecologic malignancies

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ABSTRACT

PURPOSE: Interstitial brachytherapy is an essential component of definitive treatment for locally advanced gynecological malignancies. Although many outpatient centers are capable of delivering the radiation component of brachytherapy, they are not associated with an operative center for implant placement, limiting the ability to deliver appropriate care. In this study, we report on our experience with noncolocated implant placement and radiation delivery, and the impact of patient stabilization improvements on patient safety.

METHODS AND MATERIALS: Between 9/2010 and 11/2014, 25 patients with gynecologic malignancy underwent interstitial implantation and subsequent transport for high-dose-rate brachytherapy treatment. From 9/2010 to 10/2012, patients were transported using a standard ambulance stretcher; from 11/2012 to 11/2014, patients were placed on a patient positioning board or a WAFFLE support. Potential transport-associated toxicity was assessed, and the association between standard and augmented transport types and toxicity was analyzed.

RESULTS: A total of 234 transports were performed. Median cost of transport was $150 per transport. There were 14 (10 patients) potential transportation-associated toxicities, including two lacerations/local trauma, three infections, and nine ulcers. There were 6 Grade 3 toxicities, all in the standard group. There was no association between stretcher type and laceration or ulcers, but enhanced support was associated with fewer overall toxicities, Grade 3 toxicities, and infections.

CONCLUSIONS: Noncolocated implantation and treatment is safe and facilitates optimal therapy. Toxicities potentially associated with transport are minimal and seem to be reduced by augmented stabilization. Understanding that this is a reasonable way to deliver brachytherapy may allow more stand-alone centers to deliver high-quality care for patients and improve gynecologic cancer outcomes in the United States.

Keywords: Interstitial brachytherapy; Transport; Gynecologic malignancy; Treatment complications

Introduction

Brachytherapy is an essential component in the definitive treatment of many gynecologic malignancies (1). Often the treatment of advanced gynecologic malignancies requires the use of interstitial brachytherapy. Interstitial brachytherapy can be resource intensive and require specialized training, equipment, and placement of interstitial catheters in a controlled environment such as an operating theater.

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Since 1990, there has been a steady increase in the number of free-standing radiation centers (2, 3). Although many of these free-standing centers have physicians with the expertise and sources necessary for brachytherapy treatment, they often do not contain operating rooms or have ready access to facilities that contain surgical suites. Furthermore, even in academic medical centers, there has been a push to create separate cancer centers which separate the radiation oncologists and brachytherapy sources from the main hospital (3). Therefore, optimal brachytherapy treatment would require placement of interstitial catheters at one location with transportation to a remote location for treatment. This separation of resources then requires the patient to be transported with catheters in place which can lead to displacement of catheters, movement of the stabilizing template, or other morbidity associated with transport. This push for free-standing cancer centers may have contributed to the well documented decline the utilization of brachytherapy in the treatment of patients with gynecologic malignancies out of concern for the feasibility and safety of noncolocalized treatment (4–6).

At our institution, the radiation oncology center was moved to a free-standing cancer center separated from the main hospital facilities. With the separation of facilities, the high-dose-rate (HDR) afterloader, CT simulator, and radiation staff are in a separate facility. The current arrangement is such that inpatient care and implantation are performed in one of two hospitals and patients are transported to a separate cancer center for treatment. Out of concern for patient toxicity, we implemented a transportation protocol consisting of the use of transport with a board specifically designed for HDR brachytherapy and stabilization of the interstitial catheters (7). Here, we perform an IRB approved retrospective cohort study to determine the safety and efficacy of noncolocalized interstitial brachytherapy treatment.

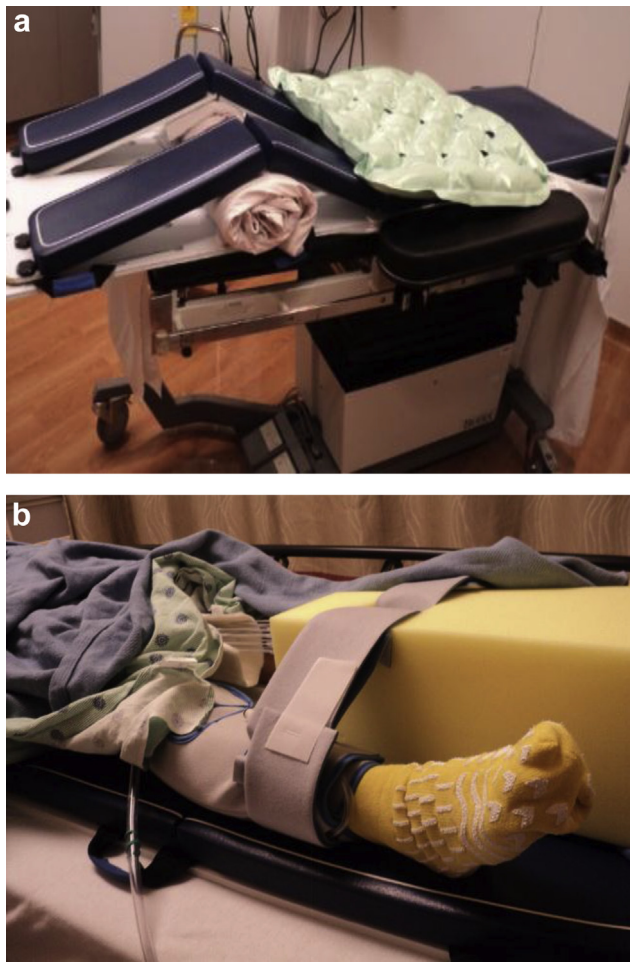

Fig. 1. (a) A representative image of the augmented board for transportation. The augmented board has an excavated hollow that limits catheter impingement. Patients are kept on the board for the entirety of treatment to limit patient transfers and motion. As such, the board has a smooth surface and side handles for ease of movement. (b) A representative image showing orthopedic abduction pillow and sterile wrap used to protect the implant. Underneath the wrap is a series of sterile towels which support the implant and help maintain stability.

Methods and materials

Patients and treatment

Between September 2010 and November 2014, a total of 25 women with a gynecologic malignancy underwent interstitial brachytherapy treatment with subsequent transport. Eight patients were transported using a standard ambulance stretcher. The remaining patients underwent transport using an augmented support method. For patients treated and transported using the supported method, they were kept on a board specifically designed for HDR brachytherapy (Radiation Products Design Inc, Albertsville, MN) or a WAFFLE mattress (EHOB Inc, Indianapolis, IN) during the entirety of treatment (Fig. 1a) (7). Interstitial catheters, when not in use, were supported with sterile towels and held in place with the use of fabric support (Fig. 1b). An orthopedic abduction pillow was also used to separate and support the patients' legs. To prevent pressure ulcers, a strict patient rotation schedule was instituted with skin massage and sacral patches as necessary. Wound care consults were routinely placed as well.

All patients were treated with a HDR after loading technique (Varisource, Varian Medical Systems Palo Alto, CA). Treatment technique was performed as previously described (8, 9). Briefly, patients were prepared and draped in a sterile fashion. General anesthesia was induced, and the patient was placed in the dorsal lithotomy position. A Syed interstitial template was placed, and needles were placed using a preplan generated from a CT or MRI performed before the implantation date. The Syed template was secured by suturing the four corners of the template to the perineum. In cases where an additional tandem was placed, the tandem was sutured to the cervix as well. Needle placement was monitored using fluoroscopy, ultrasound, or laparoscopy at the discretion of treating