Initial Clinical Experience with Uni-Directional LDR Brachytherapy in the Treatment of Retroperitoneal Sarcoma

Krisha Howell1, Josh Meyer1, Mark Rivard2, Jacqueline Emrich3, Robert Price1, Jeffrey M. Farma4, Julius Turian5, Jagan Poli6, Dian Wang5

1Radiation Oncology, Fox Chase Cancer Center, Philadelphia, PA 2Radiation Oncology, The Warren Alpert Medical School of Brown University, Providence, RI 3Department of Radiation Oncology, Drexel University College of Medicine, Philadelphia, PA 4Department of Surgical Oncology, Fox Chase Cancer Center, Philadelphia, PA 5Department of Radiation Oncology, Rush University Medical Center, Chicago, IL 6Radiation Oncology, Geisinger Medical Center, Danville, PA, USA

PURPOSE / OBJECTIVE(s)

- Retropertoneal sarcomas (RPS)is constitute 10%-15% of patients diagnosed with soft tissue sarcomas.1
- Despite advances in cancer care and aggressive management, the 5-year overall survival rate is 47%-67%.2,3
- The crude cumulative incidence of local recurrence (LR) is 26%.2,3
- A previous trial combining preoperative external beam radiation therapy with postoperative omni-directional brachytherapy found substantial toxicity, most noted within the upper abdomen.4
- This report demonstrates the utility of directional LDR brachytherapy for treatment of RPS.

RESULTS

Planned implant patients consists of:

- 7 RPS patients
- 4 medical centers
- 6 patients with recurrent sarcoma in the retroperitoneum or pelvic side wall
- 1 patient with locally advanced leiomyosarcoma and no previous treatment
- 3 patients had prior EBRT at first diagnosis (45 – 57.5 Gy)
- 5 patients received neoadjuvant EBRT (35 – 57.5 Gy) prior to surgery plus brachytherapy

MATERIAL & METHODS

- A uni-directional device employed was a permanent, Pd-103 brachytherapy device.
- It was designed to be implanted during surgical resection for the treatment of anticipated positive or close surgical margins.
- The device consists of a plane of sources with an uni-directional gold shield backing to protect normal tissues yet direct radiation to the target margin(s).
- The sources were embedded in a bioabsorbable matrix membrane that may be cut to size to allow for conformal targeting of the surgical tumor bed.
- At surgery, patients were assessed and determined to have close or positive margins.
- The prescribed LDR brachytherapy dose averaged 34.7 Gy (range: 20 – 60 Gy) and covered an average area of 6000 mm² (~58 sources).
- Pd-103 half-life = 16.99 days and delivers therapeutic radiation dose over several weeks.
- The device was attached with sutures and tacks.

Treatment Outcomes:

- One patient was treated for local control on the left side, however existing inoperable right-sided disease was also present at the time of surgery.
- The patients tolerated the implant well with no complications following surgery.
- 0 reports of source movement in the RPS patients.
- At median 15 months (8-24 months) follow-up, 0/7 patients have demonstrated local recurrence as defined as the targeted field of brachytherapy radiation.
- One patient (1/7) recurred outside the surgical/brachytherapy field.
- 0 reported incidences of acute or late radiation toxicity despite the surrounding organs at risk, inclusive of the small intestine, ureter and kidneys.

SUMMARY / CONCLUSION

Summary:

- Median of 15 months
- 100% local recurrence-free survival
- No acute toxicities
- No late-term toxicities

Conclusions:

- Application of uni-directional, planar Pd-103 LDR brachytherapy technology is safe and easy.
- Uni-directional brachytherapy should be considered as a standard option to escalate high dose to the high risk margins of RPS after resection.
- In the setting of previous therapy the directional source distribution allows for re-irradiation or adjuvant brachytherapy boost radiation therapy in patients who have had maximum EBRT dose.

REFERENCES / ACKNOWLEDGEMENTS