Radiation Oncology Investigations 4:48–49 (1996)

I-125 Rapid Strand™ Loading Technique

Wayne M. Butler, Ph.D., and Gregory S. Merrick, M.D.
Schiffler Oncology Center, Wheeling Hospital Medical Park, Wheeling, West Virginia (W.M.B., G.S.M.); Division of Radiation Oncology and Biophysics, George Washington University Medical Center, Washington, DC (G.S.M.)

SUMMARY Permanent brachytherapy seed implants in which the seeds are enclosed within a stiff, braided, absorbable suture material promise faster preparation and less seed migration than alternating loose seeds and spacers. The first commercial product of this sort, I-125 Rapid Strand™ by Amersham Healthcare, often jams in the implant needles when moisture from body fluids softens and swells the suture material. This problem is eliminated by sealing the tips of the implant needles with a durable, moisture-resistant plug formed by dipping the needles into molten Anusol-HC® suppositories. There have been no instances of jammed needles in using this technique in 30 patients and no noticeable side effects from the residual sealing material. *Radiat Oncol Invest 1996;4:48–49.*

Key words: Anusol, brachytherapy, prostate, Rapid Strand™

There has been a resurgence of interest in permanent brachytherapy implants for early-stage carcinoma of the prostate gland as a result of the precision afforded by transrectal ultrasound localization of the needles inserted transperineally through a rigid template. The operative procedure has been developed and described in detail by Blasko and associates [1,2]. Measured in terms of prostate-specific antigen (PSA) failures, the results of conformal brachytherapy have been found to be superior (7% at 5 years) to radical prostatectomy (15–33% at 3 years) [3].

In early 1995, Amersham Healthcare introduced I-125 Rapid Strand™ as a technological enhancement of the technique by encasing the radionuclide seeds at 1 cm spacing within an absorbable suture material. The suture material is braided Vicryl (polyglactin 910), which is stiffened thermally and sterilized by ethylene oxide gas. Rapid Strands not only decrease needle loading preparation time and virtually eliminate errors in seed and spacer count but also minimize seed migration within the implanted volume. Unfortunately, many users in clinical practice have reported jamming of a strand within an implant needle during the operative procedure and the resultant inability to expel the radioactive material from the needle.

The stiffened Vicryl suture material is hygroscopic and softens and swells when exposed to moisture from body fluids. Bone wax, which is commonly used to seal the tip of implant needles containing alternating free seeds and precut catgut spacers, is too hard to expel when the needle contains a Rapid Strand, and the force required usually causes a mechanical collapse of the Vicryl spacing between seeds. Suppositories of Anusol-HC® (hydrocortisone acetate 25 mg; Parke-Davis) are a softer material that partially melts at physiological temperatures (37°C) and, when used as a needle tip sealant, provide a small amount of antiinflammatory and vasoconstrictive agent at the terminal end of an implant. Our technique of applying Anusol-HC

Received original November 29, 1995; revised February 23, 1996; accepted February 23, 1996.

Address correspondence/reprint requests to: Gregory S. Merrick, M.D., Schiffler Oncology Center, Wheeling Hospital Medical Park, Wheeling, WV 26003.

has been used in 30 patients with no instances of jammed needles and no evidence of collapsed spacer material.

Just before the start of the implant procedure, we place three suppositories of Anusol-HC in a 30 ml glass cup or beaker and flash sterilize the Anusol in a steam autoclave for 3 min at 140°C and 2 atm pressure. Because the base material and the bulk of the suppository consist of hydrogenated cocoglycerides with a wide range of molecular weights, melting (and subsequent solidification) is neither homogenous nor isothermal. With aseptic technique, an empty 18 gauge implant needle with its stylet removed is dipped vertically into the clear, molten Anusol to a depth at least covering the needle bevel and preferably covering the burnished echogenic region that extends approximately 6 mm beyond the bevel toward the hub. Upon removing the needle vertically, capillarity and gravity equalize to form a liquid column 7–9 mm long that solidifies in 3–10 min. Although the anisotropy of the melt produces significant variation in solidification time within the needles, differences in the resistance to expelling the Anusol plug and Rapid Strand into the treatment volume are negligible. This comparison applies to needles dipped into the melt moments after removal from the autoclave and those dipped 30 min later, when all but a small volume of Anusol has resolidified.

Once the first needles have cooled for 5 min, appropriate lengths of Rapid Strand are cut behind a leaded plastic shield using either a scalpel or a battery-operated fine-tip cautery tool, and the cut strands are inserted into the needles, followed by the stylet. All the needles are then autoradiographed to verify proper loading and approximate activity. Next, the needles are placed in holes of a sterile, shielded storage box labeled according to the template grid. Finally, each needle is inserted into the patient according to the coordinates and depths of the computed preplan.

After inserting a needle into the patient, moisture resistance of the Anusol seal persists through the often multiple retractions and reinsertions necessary to bring the needle to within 1 mm coincidence of the target site on the ultrasound grid and to verify the superior-inferior positioning fluoroscopically. This process takes a mean of 45 sec and a range of 30–180 sec. Short insertion times result in a higher resistance to expulsion; long-duration insertions are easier to expel. This is probably a result of progressive softening and melting of the plug around its periphery upon exposure to body temperature. Two circumstances may lead to jamming of the strands within the needle, either very rapid insertion or striking the pubic bone, which may dislodge or disrupt the Anusol plug.

Each needle is removed after depositing its seeds to improve ultrasound and fluoroscopic imaging of later insertions. However, we do not consider the final imaging study at the end of the procedure to summarize adequately the quality of the implant. A computed tomography (CT) study and computer postplan should be performed 1–2 weeks after the procedure. This information on coverage and uniformity provides a sound basis for future intervention and improvement of technique.

REFERENCES

1. Grimm PD, Blasko JC, Ragde H: Ultrasound guided transperineal implantation of iodine-125 and palladium-103 for the treatment of early stage prostate cancer. Atlas Urol Clin North Am 2:113–125, 1994.
2. Blasko JC, Ragde H, Schumacher D: Transperineal percutaneous iodine-125 implantation for prostatic carcinoma using transrectal ultrasound and template guidance. Endocuriether Hyperthermia Oncol 3:131–139, 1987.
3. Blasko JC, Wallner K, Grimm PD, Ragde H: Prostate specific antigen based disease control following ultrasound guided iodine-125 implantation for stage T1/T2 prostatic carcinoma. J Urol 154:1096–1099, 1995.