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# The Use of URYX for Reversible Vasectomy in a Rabbit Model

CATHY K. NAUGHTON*, JONATHAN MYLES† AND ANTHONY J. THOMAS, JR.‡

*From the * Division of Urological Surgery, Washington University School of Medicine, St. Louis, Missouri; and the † Department of Anatomic Pathology and ‡ Glickman Urological Institute, The Cleveland Clinic Foundation, Cleveland, Ohio.*

Correspondence to: Cathy K. Naughton, Assistant Professor, Division of Urologic Surgery, Director of Male Infertility and Microsurgery, Washington University School of Medicine, Infertility and Reproductive Medicine Center, 4444 Forest Park Avenue, Suite 3100, St. Louis, MO 63108 (e-mail: naughtonc {at}msnotes.wustl.edu).

URYX is a biocompatible polymer of ethylene vinyl alcohol dissolved in a dimethyl sulfoxide (DMSO) carrier to allow injection of a very low-viscosity fluid into tissue. Once the material comes into contact with body tissue or fluid, the DMSO rapidly dissipates from the polymer, which results in a precipitate of a coherent solid mass. The purpose of the present study was to determine whether URYX can effectively occlude the vas deferens and whether patency can be restored by redissolving the URYX in vivo using the solvent DMSO. Eight male New Zealand White rabbits (age range, 25–41 weeks; mean age, 33.9 ± 7.5 weeks; mean weight, 4.0 ± 0.2 kg) were used in 2 experiments (E1 and E2). In E1, 3 rabbits underwent unilateral vasectomy, and the contralateral vas was injected with either 0.05 or 0.10 mL of URYX, to determine the amount of URYX required to cause obstruction. Two animals underwent bilateral vasectomy, to serve as controls. In E2, 3 animals underwent bilateral URYX injection and were compared with the bilateral vasectomy control rabbits used in E1. After 1 month of initial bilateral URYX treatment, all animals in E2 underwent attempted unilateral reversal with 1.5 mL of DMSO injected into 1 occluded vas deferens. Two end points were evaluated—a clinical end point assessed by semen analyses and a pathological end point assessed by histological analysis of treated tissues, to assess for safety. A 1.5-cm infrapubic incision was made to expose both vasa in anesthetized rabbits. The vasal injection of URYX was performed with a 30-gauge needle. Vasectomy was performed by excision of a 1-cm segment of the vas deferens and subsequent ligation with a 6-0 prolene suture. Semen was collected using an artificial vagina 2–3 times/wk before and 1 month later, after injection treatments and vasectomy. Manual sperm counts were performed. All animals were sacrificed, and tissues (distal vas, injection site, proximal vas, cauda epididymis, caput epididymis, and testis) were harvested and examined for the presence of URYX. The inflammatory response of the wall and adventitia of the vas deferens was given a score (0–15) based on the sum of grades (0 = none, 1 = mild, 2 = moderate, and 3 = severe) for the following categories: foreign body giant cell reaction, granulation tissue, lymphocytes, eosinophils, and scarring, as evaluated by a single pathologist (J.M.). Vasal injection with 0.05 mL of URYX was not sufficient to cause occlusion. Both animals injected with 0.1 mL of URYX were effectively occluded. The injection of occluded vasa with DMSO did not dissolve the URYX plug in the vas lumen. There was no significant

difference in vasal inflammatory response scores between vasal units treated with URYX only and vasal units in the vasectomy model. Vasal units subjected to URYX followed by DMSO demonstrated greater inflammatory response scores than vasal units treated with URYX followed by normal saline, URYX alone, or vasectomy. Epididymal and testicular histology remained unaffected in all vasal units in E1. The vasal units in E2 subjected to URYX followed by normal saline showed no histological abnormalities of the epididymis and testis. However, those vasal units subjected to URYX followed by DMSO in E2 showed evidence of adhesions, necrosis, and degenerating cells in the epididymis and a focal foreign body giant cell reaction in the testis. The bilateral vasal injection of URYX can result in azoospermia in the rabbit model. Reversal with subsequent DMSO injection was not achieved. A minimal inflammatory response of the vas deferens was observed with URYX injection alone; however, DMSO following URYX injection resulted in increased vasal inflammation, in addition to epididymal and testicular changes.

Key words: DMSO, vas deferens, testicle, epididymis