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Urogynecology digest

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Tyagi P, Kashyap M, Majima T, Kawamorita N, Yoshizawa T, Yoshimura N. Intravesical liposome therapy for interstitial cystitis. Int J Urol. 2017;24(4):262–271.

This review presents the available literature evaluating the use of liposomal therapy for the treatment of interstitial cystitis. Liposomes have been used on ocular surfaces with success. Their lipid bilayer structure facilitates adherence to cell membranes, improves diffusion across epithelial surfaces, and enhances drug delivery across poorly permeable membranes such as the urothelium. Empty liposomes are composed of sphingomyelin. They are believed to reduce mucosal inflammation and promote regeneration and repair of tissue by forming a protective barrier on the urothelium. Studies suggest that sphingomyelin also has antiinflammatory and antiapoptotic properties. Four studies have evaluated the effect of empty liposomes on symptoms of interstitial cystitis/painful bladder syndrome (IC/PBS).

Chuang et al. studied 24 patients with IC/PBS in an open-label prospective trial. Patients received either a weekly instillation of liposomes or pentosan polysulfate for 4 weeks. Statistically significant improvements in urgency, pain, frequency, and nocturia in both arms based on questionnaires were noted. A second study by the same group compared weekly and biweekly instillations. In a single-arm study of 14 patients with refractory IC/PBS receiving four weekly instillations, Peters et al. found statistically significant improvements in urgency at 4 and 8 weeks. Pain was improved at 4 weeks but not at 8 weeks.

Liposomes can also be used to facilitate delivery of drugs across the bladder epithelium. Diffusion of intact drug across the urothelium is difficult due to the poor permeability of the epithelium and the hostile environment within the bladder. Structurally a liposome comprises a water-soluble core surrounded by a hydrophobic lipid bilayer that forms a self-sealing vesicle. Liposomes enhance drug delivery by sequestering water-soluble drugs in the core and water-insoluble drugs in the outer bilayer. Botulinum toxin (BoNT-A) delivered via liposomal instillation has been evaluated in one randomized placebo-controlled study of 24 patients. Patients receiving liposomal instillation of 200 IU BoNT-A showed a statistically significant decrease in voiding frequency and urinary urgency from baseline, with no reports of urinary retention. Animal studies suggest that liposomal instillation of tacrolimus reduces inflammation and improves voiding parameters. Liposomes also appear to improve delivery of nucleic acids across the urothelium, but the application of this finding to the treatment of IC is unclear.

The intravesical use of liposomes and liposomal drug delivery platforms appear to show promise based on early studies. Ongoing studies aim to address concerns such as product manufacturability and stability, and additional clinical trials evaluating the efficacy of liposomes for the treatment of IC are warranted.

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