

INTRODUCTION

Penile erection is a psychoneurovascular phenomenon that depends on the relaxation of smooth muscle in the corpora cavernosa. The erectile event is initiated by a central or a peripheral neurological stimulus, followed by dilatation of the cavernous arteries and the cavernous sinusoids, and finally activation of the veno-occlusive mechanism.¹ Erectile dysfunction (ED) is a prevalent and often neglected problem. In a survey of men from 40 to 70 years of age, 52% reported some degree of erectile dysfunction.² In the general adult population, the prevalence of erectile dysfunction ranges from 4% to 9%.³ Usually, this is due to organic factors or diseases, such as pelvic vascular diseases, diabetes mellitus, neurodegenerative disorders, side effects of medications, or trauma.^{4,5}

Current treatments for ED include oral medications, vacuum pumps, vascular surgery, penile prostheses, and intracavernosal injections. Oral medications, such as yohimbine, have limited efficacy but are an attractive therapeutic option because of the ease of use and lack of invasiveness.⁶ Vacuum pumps may be difficult for some men to use and may cause penile trauma if used improperly.⁷ The success rate of vascular surgery ranges from 31% to 80%; revascular surgery is more effective in younger men with discrete lesions of the pudendal or common penile artery.^{8,9} The implantation of a penile prosthesis is invasive, expensive, and irreversible, and can cause deformity.¹⁰ Intracavernosal injections of vasoactive drugs are satisfactory or effective in 30% to 90% of men,^{11,12} but can be associated with pain, priapism, penile hematomas, and fibrosis.¹³

Recently, transurethral delivery of vasoactive drugs, such as prostaglandin E₁ (PGE₁), for absorption into erectile bodies (the corpora cavernosa and the corpus spongiosum) was proposed.^{14,15} It has been reported that PGE₁ administered via this route is well tolerated and effectively restores the capacity for erections and sexual intercourse in a substantial proportion of men with chronic erectile dysfunction.¹⁶ A proprietary drug system called MUSE (VIVUS, Menlo Park, CA, USA) was the first commercial product of this type, and was used to administer PGE₁, contained in a

semisolid pellet medication, to the distal urethra.

Gelucire[®] is a saturated polyglycolized glyceride consisting of mono-, di-, and triglycerides and of mono- and di-fatty acid esters of polyethylene glycol (PEG). The nature and proportion of each component are specific to a given grade of Gelucire[®] and are consistent from batch to batch. These Gelucire[®] grades provide novel solutions to the problems of solubilization, absorption, and bioavailability of complex molecules such as enzyme inhibitors and peptides. In the present study, the cavernous artery circulation and erectile capacity after transurethral delivery of PGE₁ were evaluated for Gelucire[®]-based formulations in men with erectile dysfunction. Patients treated with an intracavernous injection of PGE₁ were evaluated for comparison.

MATERIALS AND METHODS

Patients with chronic erectile dysfunction seen at our impotence clinic were eligible to enter this study. All patients underwent a comprehensive examination including a detailed sexual history, physical examination, and laboratory analyses including determination of serum glucose, cholesterol, triglycerides, testosterone, and prolactin levels. Particular attention was given to determining the presence of risk factors, including smoking, coronary artery occlusive risk factor, peripheral or pelvic trauma, hypertension, diabetes, and hyperlipidemia. On completion of the initial examination, the experimental design of the study was extensively explained to all patients, and they were requested to sign a consent form for participation in the study.

Fifty patients with erectile dysfunction were enrolled in a study of the cavernous artery circulation by color Doppler sonography after intracavernous injection of PGE₁. The patient was placed on an examination couch in a quiet and semi-darkened room to minimize test-related anxiety. By means of a 27-gauge needle, 20 mcg of PGE₁ in saline solution was directly injected into the corpus cavernosum through the dorsal side of the penis deeply enough to penetrate the cavernosal tissue; the injection site was then com-