INTRODUCTION

The injection of bulking agents within urology has primarily confined itself to the urethra and the uretero-vesical junction. Since their inception, the injection of these materials has demonstrated both therapeutic benefit with the advantages of being minimally invasive with reductions in hospital stay, morbidity, and cost (1). From relatively simple beginnings (2,3), there has been a significant increase in available materials, with many more undergoing clinical trial and investigation.
Their relative abundance along with the amount of research being performed testifies to the fact that none of these agents are ideal. While the search continues, today’s urologist has multiple choices regarding the material that best fits their patient’s needs. Choosing which bulking agent to use can depend upon the clinical setting, the surgeon’s training, and the availability of materials and instruments. This chapter will detail the multiple aspects involved with injection therapy including the pathophysiology of urethral and uretero-vesical junction dysfunction, patient evaluation, injection techniques, and postoperative care. Following is a detailed comparison of injectable materials, including a review of published results along with the ongoing research of newer agents.

**CONTINENT MECHANISMS IN MEN AND WOMEN**

Continence requires that the urethral transluminal pressure exceeds that of the bladder. Multiple factors are responsible, with significant differences between men and women. The female urethra measures approx 3 cm in length, with its mucosal surface cushioned by the pliant subepithelial tissue formed by the lamina propria and elastic connective tissue. Surrounding this are the bladder neck smooth muscle fibers and slow twitch striated rhabdosphincter, which are present along the proximal two-thirds of the urethra. This complex rests upon the anterior vaginal wall, suspended along the arcus tendinius within the levator musculature. Marked deficiencies in a significant portion of these elements will result in stress incontinence.

The role of the “intrinsic” urethral mechanisms—the seal provided by the mucosal surface bolstered by the underlying connective tissue along with the closure provided by the rhabdosphincter—has gained increasing appreciation in the maintenance of continence. Alterations in this mechanism have been termed Intrinsic Sphincter Deficiency (ISD). Female ISD can develop from multiple causes such as inadequate development, neurologic compromise, vaginal delivery, surgical trauma, estrogen deficiency, or pelvic radiation. Depending on the degree of compromise, the intrinsic sphincter mechanisms can be augmented with the injection of bulking agents beneath the submucosa.

The “intrinsic” sphincter mechanisms of the male are anatomically distinct from the female. The continent mechanisms of the male urethra lie within the bladder neck, prostate, and external sphincter. The bladder neck and prostate form an integral mechanism, with circular fibers extending from the detrusor forming the “internal” sphincter. Distal to this lies the external sphincter, which has an internal component with circular slow twitch muscle fibers that surround the anterior two-thirds of the urethra with elastic connective tissue along the posterior aspect.