17.1 Introduction

In this book dealing with minimally invasive endoscopic and laparoscopic techniques in gynaecology and obstetrics, a chapter concerning the vaginal approach for incontinence surgery may seem somewhat strange. However, vaginal surgery for stress incontinence and prolapse still plays a pivotal role in this era of minimally invasive surgery. Besides simple anterior colporrhaphy with Kelly plication, abdominal approaches are most popular for the treatment of urinary incontinence. Needle suspension was introduced by Armand Pereyra, a US Navy gynaecologist, and further popularised, modified and widely implemented by American urologists from 1957 on. The term endoscopic needle suspension refers to vaginal needle suspension techniques under cystoscopic control. In this chapter, the techniques, indications and results of vaginal needle suspension techniques will be discussed.

Diagnosing urinary incontinence and planning for treatment imply a thorough understanding of continence mechanisms and urodynamics. For more detailed descriptions of diagnostic procedures, urodynamics and surgical procedures we refer to other sources, as these are beyond the scope of this book.

17.2 History of Needle Suspension

The history of the different types of needle suspensions helps to explain the shortcomings and discouraging results published earlier. First, these techniques are all referred to as endoscopic needle suspensions, despite the important technical differences between, for instance, a Gittes and Raz suspension. Moreover, some authors are redesigning their approach regularly. For example, the current so-called Raz technique with incorporation of a vaginal wall sling is by no means comparable to the original Pereyra–Raz suspension. These changes in concept and design reflect the problems encountered in patients with combined urethral hypermobility and intrinsic sphincter deficiency, who were not cured by conventional bladder neck suspension alone.

Pereyra was the first to describe needle bladder neck suspension in 1959. Originally, a blind manoeuvre was performed, bringing a trocar-cannula from a small suprapubic wound into the vagina, thus delivering the sutures, which were then tied over the abdominal fascia. To address the problem of suture pull-through, Lebherz and Pereyra proposed modifications. In the final Pereyra technique (the modified Pereyra procedure), a midline vaginal incision gave access to the urethropelvic ligament, allowing more precise suture placement. Moreover, the lateral attachments of these ligaments were perforated to allow finger-controlled passage of the trocar through the retro-pubic space.

Cystoscopy to control the placement of sutures was introduced by Stamey in 1973. In this modification, the needle is also moved from the suprapubic region to the vagina. Through the cystoscope the close relationship of the suture with the urethra can be visualised. Then the suture is brought up again from the vagina to the suprapubic area through a second pass of the needle, more lateral to the first. To prevent suture pull-through, the bridge of tissue is often buttressed by a Dacron graft. In 1987, Gittes proposed his “no-incision” modification of the technique. A needle is passed from a suprapubic stab wound through the vagina and the suture ends are transferred to the suprapubic area again, where they are tied over the rectus fascia independently. The vaginal sutures are re-epithelialised after a few days. This technique actually relies on the mechanism of suture pull-through to bury the sutures in the subepithelium.
In 1981, Shlomo Raz published his modification of the original Pereyra technique. He preferred an inverted-U vaginal incision to a midline incision, and he incorporated the vaginal wall without its epithelium in the suture suspending the bladder neck.

Raz continued to publish subsequent modifications on his own technique to deal with problems of intrinsic sphincter deficiency and the concurrent or imminent prolapse.

For the correction of concurrent moderate cystoceles, a four-corner suspension was introduced. Later this was changed to the six-corner suspension, which also includes a bilateral suture suspending the mid-urethral complex. To allow better control of sphincter deficiency, a vaginal wall sling was proposed.

To improve the repair of concurrent grade four cystoceles, a reduction of the central defect with a dexon mesh was also added where needed. Not only did the vaginal approach undergo several changes, but the fixation of the sutures at the suprapubic site was also redesigned. Leach introduced the concept of bone anchoring of the sutures in an attempt to reduce the suprapubic discomfort experienced by some patients.

Another topic in needle suspension techniques is the use of slings. The concept is based on the Goebell-Stoeckel-Frangenheim procedure, which has been known since 1917. Hadley was the first to combine the principles of needle suspensions with those of sling suspensions, when he used a rectus fascia patch. Since then, several modifications have been described using fascia lata and synthetic material such as Mersilene, Marlex, Silastic, Prolene and Gore-tex. Originally, these techniques were indicated for severe or recurrent stress urinary incontinence. Recently, some authors have published promising results in less severe grades of incontinence.

Sling surgery currently receives a lot of attention as a result of inventive marketing by the medical industry of various sling types with different delivery and fixation systems.

It is clear from this short historical review that there is not one, well-defined technique of endoscopic bladder neck suspension and therefore this common denominator covers a wide area of hardly comparable procedures. The differences in suture placement among the different modifications are demonstrated in Figure 17.1.

It is obvious that comparison of results between the different techniques is difficult. Not only do the techniques vary among authors, but the definitions of cure, the timing and duration of follow-up also differ. For some techniques, like the recent modifications of the Raz technique, one can only rely on the authors' publications to obtain an idea about the efficacy and safety of the procedures, as other authors have not yet gained enough experience with the new techniques. Comparing the results of bladder neck suspension with the retropubic approaches such as the Burch colposuspension or the Marchal–Marcetti–Krantz procedure is even more difficult, as the latter procedures have been tested in large series by several independent authors, while this has not been the case for endoscopic bladder neck suspensions.

In our centre, the different Raz modifications are used, as they can be tailored to the needs of the patient, and sphincter deficiency can be treated from the first procedure.

### 17.3 Indications and Patient Selection

Optimal selection of patients for anti-incontinence procedures is the clue for success. Clinically, the degree of concomitant prolapse, the degree of urethral hypermobility, obesity, pulmonary disease, age and menopausal status might be influencing factors in the choice of treatment.

Urodynamic investigation is mandatory in the selection process. Genuine stress incontinence is a