British Journal of Urology (1998), **82**, 171–173

REVIEW

Four decades of needle bladder neck suspension

J. BIDMEAD and L. CARDOZO
King's College Hospital, London, UK

Introduction

Twenty-five years ago, Thomas Stamey made this statement his paper describing a modification of endoscopic bladder neck suspension:

'The advantages of the endoscopic suspension of the bladder neck are the accurate placement of the suspending sutures exactly at the vesical neck ... the gain in urethral length ... minimal morbidity and the avoidance of pelvic operations in patients with massive scarring from previous surgical failures.' [1].

Since the introduction of needle suspension procedures, the initial enthusiasm with which they were hailed has diminished as the longer term results have not stood the test of time. However, there is still a great deal of controversy surrounding their effect, with many publications giving apparently conflicting results. This is often the case with innovations in medicine; early caution gives way to enthusiastic optimism and widespread adoption of a new technique, followed by initial disillusionment and then finally by reappraisal and more appropriate use. The evolution of bladder neck suspension follows this pattern.

The first description of a needle bladder neck suspension procedure was made by Pereyra in 1959 [2]. He described the use of a long needle to suspend sutures from the vagina to the fascia of the anterior abdominal wall. Originally these sutures were of wire, but because these wire loops eventually cut through the vaginal wall this technique was modified to include a helical plication of the paraurethral tissues. The degree of dissection was also extended to enter the retropubic space and mobilize the urethra, and the suture material was changed to proline in a series of modifications culminating in 1982 [3].

In 1973 Stamey [1] described the use of specially developed needles to suspend nylon sutures from the paraurethral tissues to the anterior abdominal fascia. He placed particular emphasis on the use of the cystoscope to ensure accurate placement of these sutures at the vesical neck and not the proximal urethra. Originally, buffers of woven Dacron were recommended to prevent the sutures cutting through weak paravaginal tissue.

Many other variations on the theme of needle suspension have also been proposed, the most notable of these by Raz in 1981 [4], who suggested extending the dissection laterally and including paravaginal tissue within the helical suture. Further variations in technique have been suggested by many authors; Mundy [5] recommended inserting sutures vaginally with cystoscopy only after suture placement and Jarvis, after a review of the literature in 1995 [6] concluded that the use of the cystoscope had little effect on the outcome. Silastic rather than Dacron buffers have been suggested to reduce the infection rate, and were used by Hilton and Mayne, who also suggested an additional bite of the suture through the paravaginal tissue [7].

The fundamental principle of all the procedures and various modifications described is that they seek to achieve elevation of the bladder neck to its correct anatomical position and restore the vesico-urethral angle, thereby improving pressure transmission. The use of needle suspension offers a minimally invasive means of achieving this, with or without the use of the cystoscope to verify suture placement.

During the 1980s, bladder suspensions were commonly undertaken because they are easy to perform and it was considered unlikely that they would compromise the results of future surgery should it be required. In addition the short hospital stay and low complication rate seemed attractive. Most of the published series give little information on the number and type of complications associated with needle suspension, although these are usually described as 'few'. In his original paper, Stamey reported no infections when using monofilament sutures. Jones *et al.* [8] reported an overall complication rate of 46%, with a 16% infection rate and 9% of 76 patients requiring removal of the buffer due to infection. Hilton and Mayne [7], in a series of 100 cases, reported no wound or buffer infections using Silastic buffers (although one buffer was passed vaginally), a 3% urinary tract infection rate and one deep vein thrombosis. Only in one case in this series was the blood loss >200 mL. Shah and Holder [9] found a higher incidence of post-

Accepted for publication 15 April 1998

operative bleeding, (12%) after Pereyra than after Stamey procedures, but a 13% infection rate of the Silastic buffer after the latter procedures. In general, the perioperative complication rates for needle suspension procedures appear consistently low, although certainly not negligible, the commonest being infection of the buffers.

Several studies have assessed the urodynamic outcome of these procedures. In his original paper, Stamey described an increase in urethral length of 1–2 cm and restoration of the vesico-urethral angle assessed by lateral-bead chain cystometry. The change in functional urethral length is not consistently borne out in later urodynamic studies. Griffith-Jones and Abrams [10] assessed 21 elderly women and found a significant increase in urethral length, but no change in maximum urethral closure pressure or maximum flow rate. Faysal *et al.* [11] found no change in maximum urethral closure pressure and an improved pressure transmission. This was also reported by Ashken *et al.* [12] who noted no significant changes in flow rate, voiding pressures or urine residual volume in a study of 60 women after a successful Stamey procedure. Hilton and Mayne [7] found an increased functional urethral length and improved pressure transmission, but no significant changes in resting urethral profile or voiding pressure. All these results are at variance with those of Mundy [13], who found a higher incidence of voiding difficulties and irritative symptoms compared with colposuspension.

Of particular importance in any procedure to correct stress incontinence is the incidence of *de-novo* detrusor instability, with a 15% incidence reported after Burch colposuspension [14]. Hilton and Mayne [7], and Shah and Holder [9] found no evidence of *de-novo* detrusor instability, whilst Mundy [12] found an increase. The variation amongst these results may well to be caused by technique; in general, bladder neck suspension appears to improve pressure transmission to the urethra without causing obstruction, and with a low incidence of voiding difficulties and detrusor instability.

Most importantly, do needle suspensions work? Many studies have examined the success of needle suspension procedures. Stamey [15] reported an initial cure rate of 91% at 6 months, but these values have not been supported by studies with longer follow-up. Leach and Raz [16] reported 94% continence rates after at least 2 years of follow-up of the modified Raz procedure performed as a secondary continence procedure. In women over the age of 65 years, Griffith-Jones and Abrams [10] showed an objective cure rate of 80% after one year, while Peattie and Stanton [17] reported a 61% objective cure rate.

In 100 women considered unsuitable for colposuspension, Hilton and Mayne [7] conducted a close urodynamic and clinical follow-up over 4 years. They showed an objective cure rate of 83% 3 months after a Stamey procedure, but medium-term subjective cure rates of 53% in patients aged under 65 years and 76% in older patients. Ashken [18] reported an objective cure rate of 75% in 40 patients after 5 years, although the subjective cure rate was 90%.

Longer term follow-up studies have been undertaken; these tend to be retrospective and report subjective results or are based on questionnaires. Mills *et al.* [19] reported a 10-year follow-up of 46 patients who had undergone a Stamey procedure; only 25% remained totally dry but overall, 80% of those reviewed remained at least subjectively improved. O'Sullivan *et al.* [20] conducted a questionnaire-based survey at intervals after surgery. Immediately after surgery 70% were dry and 15% much improved, but after one year these values were 31% and 28%, respectively, and after 5 years only 18% were dry. Kevelighan *et al.* [21], in a study of 259 patients who underwent the Stamey procedure at St James' Hospital Leeds from 1985 to 1995, used life-table analysis to assess the long-term results. The subjective cure rates were 45% at 2 years, 18% at 4 years and only 6% at 10 years. The recent report by Kuczyk *et al.* [22] in Hannover describes the German experience. The results, although based on questionnaires, confirm the poorer long-term results compared with alternative procedures.

Thus the published data suggest that needle suspensions have reasonable success rates, at least approaching those of colposuspension initially [23]. Compared with a suprapubic procedure the morbidity is low, although not negligible. The poorer long-term results are predictable when examining the mechanical properties of the tissues and materials used; monofilament sutures and buttresses or anchoring sutures have been selected to minimize the 'cheese-wiring' effect of a single suture under tension in suboptimal tissues. However, monofilament sutures are notorious for their tendency to fail, particularly at sites where stress is multiplied, e.g. knots or areas of damage. The minimally invasive nature of these procedures also means that little permanent fibrosis occurs. It may be that alternative suture materials would prolong the efficacy of these procedures and provide a more valuable alternative in the management of stress incontinence.

The use of bone anchoring devices in recently developed procedures avoids the potential weakness at the rectus fascia. However, where the cause of failure is known it appears to be more often due to paravaginal tissue failure or stress fracture of the monofilament suture. In most cases the cause of failure is unknown but it remains to be seen whether the long-term results of the minimally invasive bone anchoring procedures, which still rely on a monofilament suture, will be similarly poor.

Initial enthusiasm for needle suspension procedures has been tempered by their much poorer long-term results when compared with alternative procedures. However, the apparently low rates of voiding difficulty and *de-novo* detrusor instability, together with their low morbidity, make these procedures more suitable for women where these are areas of concern. They would therefore seem to have a place in patients unsuitable or unfit for suprapubic surgery and perhaps in the elderly woman, where the long-term results may be better and low operative morbidity carries greater weight than long-term objective cure. Alternatively, as it is well known that the first operation for stress incontinence offers the best chance of a cure, should we continue to search for a better option?

References

1 Stamey TA. Endoscopic suspension of the vesical neck for urinary incontinence. *Surg Gynaecol Obstet* 1973; **136**: 547–54

2 Pereyra AJ. A simplified surgical procedure for the correction of stress incontinence in women. *West J Surg* 1959; **67**: 223–6

3 Pereyra AJ, Lebherz TB. Pubourethral supports in perspective: modified Pererya procedure for urinary incontinence. *Obstet Gynaecol* 1982; **59**: 643–8

4 Raz S. Modified bladder neck suspension for female stress incontinence. *Urology* 1981; **17**: 82–4

5 Mundy AR. A trial comparing Stamey bladder neck suspension with colposuspension for the treatment of stress incontinence. *Br J Urol* 1983; **55**: 687–90

6 Jarvis GJ. Long-needle bladder neck suspension for genuine stress incontinence — does endoscopy influence results? A structured overview. *Br J Urol* 1995; **76**: 467–9

7 Hilton P, Mayne C. The Stamey endoscopic bladder neck suspension: a clinical and urodynamic investigation including actuarial follow up over four years. *Br J Obstet Gynaecol* 1991; **98**: 1141–9

8 Jones DJ, Shah PJ, Worth PH. Modified Stamey procedure for bladder neck suspension. *Br J Urol* 1989; **63**: 157–61

9 Shah PJ, Holder PD. A comparison of Stamey and Pererya-Raz bladder neck suspensions. *Br J Urol* 1989; **64**: 481–4

10 Griffith-Jones MD, Abrams P. The Stamey endoscopic bladder neck suspension in the elderly. *Br J Urol* 1990; **65**: 170–2

11 Faysal HH *et al*. The impact of bladder neck suspension on the resting and stress urethral pressure profile. *J Urol* 1981; **125**: 55–60

12 Ashken MH, Abrams PH, Lawrence WT. Stamey endoscopic bladder neck suspension for stress incontinence. *Br J Urol* 1984; **56**: 629–34

13 Mundy AR. A trial comparing the Stamey bladder neck suspension with colposuspension for the treatment of stress incontinence. *Br J Urol* 1983; **55**: 687–90

14 Cardozo LD, Stanton SL, Williams JE. Detrusor instability following surgery for genuine stress incontinence. *Br J Urol* 1979; **51**: 204–7

15 Stamey TA. Endoscopic suspension of the vesical neck for urinary incontinence in females: a report of 203 consecutive patients. *Ann Surg* 1980; **192**: 465–71

16 Leach GE, Raz S. Modified Pererya bladder neck suspension after previously failed anti-incontinence surgery. *Urology* 1984; **23**: 359–62

17 Peattie AB, Stanton SL. The Stamey operation for correction of genuine stress incontinence in the elderly woman. *Br J Obstet Gynaecol* 1989; **96**: 983–6

18 Ashken MH. Follow up results with the Stamey operation for stress incontinence of urine. *Br J Urol* 1990; **65**: 168–9

19 Mills R, Persad R, Handley-Asken M. Long-term follow-up of the Stamey operation for stress incontinence of urine. *Br J Urol* 1996; **77**: 86–8

20 O'Sullivan DC, Chilton CP, Munson KW. Should Stamey colposuspension be our primary surgery for stress incontinence. *Br J Urol* 1995; **75**: 457–60

21 Kevelighan E, Aagaard J, Jarvis GJ. The Stamey endoscopic bladder neck suspension — a 10 year follow up. ICS Annual Meeting 1997

22 Kuczyk MA, Klein S, Grunewald V *et al*. A questionnaire-based outcome analysis of the Stamey bladder neck suspension procedure for the treatment of urinary stress incontinence: the Hannover experience. *Br J Urol* 1998; **82**: 174–180

23 Stanton SL, Cardozo LD. Results of colposuspension for incontinence and prolapse. *Br J Obstet Gynaecol* 1979; **86**: 693–7

Authors

J. Bidmead, NBBS, MRCOG, Research Fellow.

L. Cardozo, MD, FRCOG, Professor of Urogynaecology.

Correspondence: Professor L. Cardozo, 8 Devonshire Place, London W1N 1PB, UK.