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Trends in the Surgical Management of Stress Urinary Incontinence among Female Medicare Beneficiaries

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Abstract

Objectives—To identify patterns in the surgical management of women with stress urinary incontinence in the United States from 1992 to 2001.

Methods—As part of the Urologic Diseases in America Project, we analyzed data from a 5% national random sample of female Medicare beneficiaries age 65 and older. Data were obtained from the Centers for Medicare and Medicaid Services carrier and outpatient files from 1992, 1995, 1998, and 2001. Women in the sample with a diagnosis of urinary incontinence were identified by ICD-9 codes. Surgical procedures were identified by CPT-4 codes. Patterns of care were then analyzed over the 10-year period.

Results—The overall number of surgical procedures increased from 18,820 to 32,480 over the 10-year period, likely due to the growing population of Medicare beneficiaries. The needle suspension was the most commonly performed incontinence procedure in 1992 and 1995, while collagen injection gained rapid popularity and became the most common procedure in 1998. A drastic increase in the numbers and rates of slings occurred between 1995 and 2001.

Conclusions—The 1990s saw a rapid shift in the surgical management of stress urinary incontinence. The rapid increase in utilization of sling procedures corresponded with a decrease in utilization of the many other available anti-incontinence procedures. As in years prior, we identified a trend toward minimally invasive approaches to surgery, without the presence of randomized controlled clinical trials to support these trends. We anticipate that analysis of Medicare claims from 2004 and onward will demonstrate a further increase in the use of sling procedures.

Keywords

claims data; sling; stress incontinence; surgery

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INTRODUCTION

The treatment of stress urinary incontinence (SUI) encompasses both behavioral as well as surgical therapies. For women who continue to suffer from symptoms of incontinence after non-surgical management, there exists an array of surgical options. The surgical treatment for incontinence has evolved rapidly for several decades, when controversies over which approach was optimal engendered debate between proponents of different procedures. Over the years, various surgical treatments have fallen out of favor while newer methods have risen to the forefront. We hypothesize that the relatively minimal morbidity of the sling procedure along with the publication of several large case series documenting its effectiveness would make the sling the most common anti-incontinence procedure. In this study we used Medicare claims data to analyze and explain treatment trends in the surgical management of stress urinary incontinence over the 10-year period between 1992 and 2001.

MATERIAL and METHODS

The use of Medicare claims data allows for the assessment of medical care for a large, heterogeneous, nationwide sample of the population across various clinical settings. We analyzed claims data for 1992, 1995, 1998, and 2001 from the Centers for Medicare and Medicaid Services (CMS) to estimate utilization of surgical procedures for stress incontinence by the female Medicare population age 65 and over with an International Classification of Diseases, 9th edition (ICD-9) code for urinary incontinence (Appendix 1). Data on surgeries performed were obtained from the Medicare Provider Analysis and Review (MEDPAR) files, which contain records of hospital inpatient services, as well as CMS outpatient and ambulatory surgery files. Enrollment information on Medicare beneficiaries was obtained from the CMS Denominator file. Data from these files were linked to determine utilization in the inpatient, ambulatory surgery center, and hospital outpatient settings.

Data was obtained from a 5% national random sample of Medicare records. National estimates of service use were then obtained by multiplying counts by a constant weight of 20, as previously described¹. Treatments were identified by Current Procedural Terminology, 4th edition (CPT-4) procedure codes reflecting physician billing, combined with ICD-9 procedure codes (ICD-9 CM), reflecting hospital billing. Treatments were stratified into treatment types (Appendix 2).

RESULTS

During the 10-year period between 1992 and 2001, the overall number of surgical procedures performed for stress urinary incontinence increased from 18,820 to 32,480 (Table 1). The rates of surgical procedures per 100 women actually decreased slightly from 1992 to 2001. In 1992, the most common surgical procedure for SUI was the needle suspension (7,840 procedures, or 2.4 procedures per 100 Medicare beneficiaries with a diagnosis of incontinence) followed by the anterior urethropexy (7,080). Only a small number of slings (640) were being performed in the early 1990's, and both laparoscopic and collagen injections had yet to enter the anti-incontinence armamentarium. In 1995, the needle suspension still remained the most common surgical procedure for stress urinary incontinence, with 10,540 procedures performed in that year.

Between 1995 and 1998, collagen injection began to rise quite rapidly in popularity and became favored over previously common procedures such as the needle suspension, while the urethropexy remained the same. In 1998, 12,040 (3.7 per 100 women) injections were performed in this population of Medicare beneficiaries, making collagen injections the most

popular anti-incontinence treatment in the late 1990's. In this same year, the number of needle suspension procedures declined precipitously to 5,160 procedures, its numbers less than half of what they were in 1995. The popularity of collagen injections was short-lived. By 2001, the pubovaginal sling (CPT-4 code 57288) swiftly rose to the forefront and became the dominant surgical procedure for stress urinary incontinence, with 17,680 procedures performed that year alone. This drastic increase in utilization of sling procedures between 1992 and 2001 corresponds to a steady decline in once commonplace procedures such as the needle suspension and the anterior urethropexy (Table 1).

COMMENT

This study demonstrates important trends in the management of stress urinary incontinence over a ten-year period. The overall number of surgical procedures performed for stress urinary incontinence increased during the 10-year period between 1992 and 2001. This was likely due to the rapidly growing population of Medicare beneficiaries during that timeframe. Also, increased physician and patient awareness of urinary incontinence may have led to more procedures performed overall.

Throughout the history of the surgical management of SUI, one procedure after another gained popularity and ultimately faded into relative disuse, without the presence of strong evidence to support these changes. For the procedures studied, evidence-based recommendations are lacking due to the limited number of randomized clinical trials comparing the various surgical procedures and the absence of standardized outcome measurements across study designs^{2,3}. Despite this, drastic shifts in utilization of the various surgical options occurred, reflecting new technology and a quest for procedures that are less invasive, less morbid, and ultimately more efficacious.

Kelly Plication

The first effective surgical treatment for stress urinary incontinence, the Kelly plication, was published in 1914 by Kelly and Dunn, and remained the leading treatment for many years. This operation was developed as a corrective procedure for incontinence associated with a cystocele^{4,5}. In a Cochrane literature review of anterior colporrhaphy with Kelly plication, 10 studies involving 1012 women showed that anterior repair was less effective than retropubic approaches for the treatment of SUI, even in women with concomitant genitourinary prolapse.⁶ As a result, current practice guidelines for the treatment of genuine SUI recommend against the use of the Kelly plication.²

Anterior Urethropexy

The Marshall-Marchetti-Krantz (MMK) anterior urethropexy, first performed for the treatment of stress incontinence in 1944, involves the direct fixation of the urethra and bladder to the periosteum of the symphysis pubis.⁷⁸ In a 1956 article review by Mainprize and Drutz, the success rate for the 2,712 MMK procedures performed through 1988 was found to be as high as 86.1%.⁹ However, the complications associated with periosteal suture placement, the approach's inability to effectively reduce a cystocele,¹⁰ and the procedure's higher long-term failure rate of 36.1% (compared to the Burch failure rate of 15.2%)¹¹ led to the decline in its popularity. The Burch retropubic urethropexy is perhaps one of the most extensively studied surgical procedures for SUI, and has become the "gold standard" procedure against which other operative managements of SUI are now compared. The Burch, first performed in 1958, was developed as a modification of the MMK. It eliminated the complication of osteitis pubis and also provided an approach that could concurrently manage a cystocele.¹⁰ In a Cochrane review of the literature including 39 trials and

involving a total of 3301 women, they found overall cure rates were 69% to 88.0% at follow-up of one to five years.¹²

Needle Suspensions

The Pereyra needle suspension was introduced in 1959 as an improvement upon the MMK retropubic urethropexy.¹³ The operation has been modified several times over the years by Pereyra and others such as Stamey, Raz, and Gittes^{14,15}. For years, needle suspensions were considered the most appropriate treatment for cases of SUI associated with urethral hypermobility. In a 2004 Cochrane review looking at nine trials of 784 women who underwent open retropubic suspension or needle suspension operations, found that needle suspensions had a higher one year failure rate, 29% versus 16%.¹⁶ Bergman et al. also found that the Pereyra procedure had a lower cure rate compared with Burch suspension, 43% vs. 82% at five years, respectively.³ Due to its high failure rate and poor long-term results, the needle suspension has fallen out of favor for the treatment of SUI.

Periurethral Bulking agents

The use of injectable materials into the urethra for the management of stress incontinence traces back to the 1930's.¹⁷ Collagen injections are currently the most widely used injection material.² Injections offer distinct benefits over surgery, as they can be done on an outpatient basis and have allowed urologists to expand incontinence treatment to women who are not ideal surgical candidates due to advanced age or medical comorbidities. In a cohort study of 181 women with genuine SUI by Herschorn et al., 23% of patients were cured, 52% had significant improvement and 25% failed collagen injections entirely.¹⁷ A Kaplan-Meier curve generated from their study population demonstrated that the probability of remaining continent without additional collagen injections was 72% at 1-year, 57% at 2-years, and 45% at 3-years.¹⁷ Although suburethral injections had a rapid rise and subsequent decline in popularity, they will likely remain an important adjunct for the treatment of SUI in select patient populations.

Sling

The sling procedure has undergone many modifications in both technique and materials over the years, from autologous rectus fascial slings to minimally invasive mid-urethral synthetic slings. Until recently there were no rigorously designed trials to compare what had become the two gold standard procedures for the treatment of SUI, the sling and the Burch colposuspension. However, Albo et al. performed a multi-center randomized control trial of 655 women, comparing Burch colposuspension with the autologous pubovaginal sling.¹⁸ They found higher success rates for the sling group in both overall incontinence measure as well as stress incontinence specific measures. At 24 months follow-up, women in the pubovaginal sling had a 66% success rate for stress incontinence compared to the Burch's 49% rate of success. However, the study did find that pubovaginal sling procedures were more frequently complicated by minor complications such as voiding dysfunction, urge incontinence and recurrent urinary tract infections. Despite this increased morbidity rate, slings have clearly demonstrated increased efficacy and ease of placement, making them the current gold standard in the treatment of stress urinary incontinence.

Limitations

The use of Medicare claims data allows for the assessment of medical care for a large, heterogeneous, nationwide sample of the population across various clinical settings. However, claims-based data is reliant on CPT-4 codes, and therefore is subject to inaccuracies. For example, the codes used for anterior urethropexy included patients receiving both an MMK procedure and a Burch colposuspension. Therefore we could not

compare treatment patterns between these two procedures. Also, clinicians may choose a different code for the same procedure. We did not include patients who underwent a combined anterior colporrhaphy and urethropey (CPT-4 code 57289), because this code does not differentiate those who underwent an isolated cystocele repair from those who underwent a combined urethropey and cystocele repair. Hence, we did not include all Medicare beneficiaries who underwent urethropexies.

Also, we could not differentiate between bladder neck fascial slings and midurethral synthetic slings. Although the use of midurethral synthetic slings has likely surpassed bladder neck slings, we could not determine the frequency of each type of procedure given that they share the same CPT code. Nonetheless, we can see how SUI management trends clearly reflect the desire for lower morbidity and high efficacy on the part of urologists and gynecologists.

CONCLUSIONS

Despite the relative lack of randomized clinical trials comparing various anti-incontinence procedures, the 1990's witnessed a dramatic wave of change in the surgical management of stress urinary incontinence in women. In the period from 1992-2001, procedures such as the needle suspension, MMK anterior urethropey, and Kelly plication were superseded temporarily by less invasive procedures such as collagen injections and eventually entirely overwhelmed by sling procedures. In tracing through the historical trends in the surgical management of stress incontinence, it becomes obvious that the popularity and decline of various surgical options is only partially explained by the relevant scientific literature. Instead, these swings in practice may reflect a widespread surgical evolution towards more minimally-invasive procedures that have lower patient morbidity yet durable efficacy. Ultimately, the rapid rise in sling procedures over the 1990's best attests to physicians' and patient's preferences for procedures that engender these qualities.

Appendix 1

ICD-9 Codes for Urinary Incontinence

596.51	Hypertonicity of bladder
596.52	Low bladder compliance
596.59	Other functional disorder of bladder
599.8	Other specified disorders of urethra and urinary tract
599.81	Urethral hypermobility
599.82	Intrinsic (urethral) sphincter deficiency (ISD)
599.83	Urethral instability
599.84	Other specified disorders of urethra
625.6	Stress incontinence, female
788.3	Urinary incontinence
788.30	Urinary incontinence unspecified
788.31	Urge incontinence
788.33	Mixed incontinence, male, female
788.34	Incontinence without sensory awareness
788.37	Continuous leakage

Appendix 2

ICD-9 CM and CPT codes for Stress Urinary Incontinence Surgeries

Surgical Procedure	CPT code	ICD-9 CM code
Anterior Urethropy (Marshall-Marchetti-Krantz/Burch)	51840 simple 51841 complicated	59.5
Abdomino-vaginal vesical neck suspension (Stamey, Raz, modified Pereyra)	51845	59.5
Laparoscopic urethral suspension Laparoscopic sling procedure	51990 51992	59.5
Injection of implant into urethra/bladder neck (Collagen implant)	51715	59.72
Vaginal hysterectomy with colpo-urethropy (MMK/Burch)	58267	70.51 anterior colporrhaphy with urethrocele repair 68.5 vaginal hysterectomy
Sling operation for stress incontinence, fascia or synthetic	57288	59.5
Plication of urethrovesical junction Kelly plication	57220	59.3

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Table 1

Rate of surgical procedures used among female adult Medicare beneficiaries with a diagnosis of urinary incontinence, count^a (rate^b)

PROCEDURE	1992	1995	1998	2001
Anterior Urethropexy (e.g. Burch/MMK)	7,080 (3.9)	8,180 (3.3)	7,800 (2.4)	4,220 (1.2)
Hysterectomy with Colpo-Urethropexy (e.g. Burch/MMK)	1,920 (1.1)	2,220 (0.9)	1,480 (0.5)	2,120 (0.6)
Needle-type suspension	7,840 (4.4)	10,540 (4.2)	5,160 (1.6)	1,400 (0.4)
Laparoscopic Repair	0 (0.0)	0 (0.0)	0 (0.0)	280 (0.1)
Collagen Injection	0 (0.0)	9,300 (3.7)	12,040 (3.7)	6,340 (1.7)
Pubovaginal Sling	640 (0.4)	1,560 (0.6)	9,160 (2.8)	17,680 (4.9)
Kelly Plication	60 (0.0)	260 (0.1)	220 (0.1)	180 (0.1)
TOTAL	18,820 (10.5)	32,880 (13.1)	36,400 (11.1)	32,480 (9.1)

^aUnweighted counts multiplied by 20 to arrive at numbers in the table

^bRate per 100 female adult Medicare beneficiaries with a diagnosis of urinary incontinence