Trends in Stricture Management Among Male Medicare Beneficiaries: Underuse of Urethroplasty?

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OBJECTIVES To analyze the trends in male urethral stricture management using the 1992-2001 Medicare claims data and to determine whether certain racial and ethnic groups have a disproportionate burden of urethral stricture disease.

METHODS We analyzed the Medicare claims for fiscal years 1992, 1995, 1998, and 2001. The "International Classification of Disease, 9th revision," diagnosis codes were used to identify men with urethral stricture. The demographic characteristics assessed included patient age, race, and comorbidities, as measured using the Charlson index. Treatments were identified using the Physician Current Procedural Terminology Coding System, 4th edition, procedure codes and stratified into 4 treatment types: urethral dilation, direct vision internal urethrotomy, urethral stent/steroid injection, and urethroplasty.

RESULTS The overall rates of stricture diagnosis decreased from 10 088/100 000 population in 1992 to 6897 in 2001 (from 1.4% to 0.9%). The stricture prevalence was greatest among black and Hispanic men, although the urethroplasty rates were greatest among white men. Direct vision internal urethrotomy was the most common treatment, followed by urethral dilation, urethral stent/steroid injection, and urethroplasty. The urethroplasty rates remained stable, but quite low (0.6%-0.8%), during the study period.

CONCLUSIONS The overall rates of stricture diagnosis decreased from 1992 to 2001. Despite the poor overall efficacy of urethrotomy and urethral dilation relative to urethroplasty and despite the known complications of stent placement in this setting, the urethroplasty rates were the lowest of all treatments. Although we could not determine the treatment success with these data, these findings suggest an underuse of the most efficacious treatment of urethral stricture disease, urethroplasty. UROLOGY 77: 481–486, 2011. © 2011 Published by Elsevier Inc.

The demographics of urethral stricture disease are poorly understood and have been sparsely reported in published studies. The 2003 Urologic Diseases of America Project compendium produced the first description of the incidence of urethral stricture in the United States.[1] That report provided perspective on the burden of male urethral stricture disease in the United States, a medical problem responsible for more physician office visits than urolithiasis. The annual economic burden of stricture disease exceeded $200 million in 2000.[1] However, little is known about the practice patterns for this entity.

The management of urethral stricture includes urethral dilation, internal urethrotomy, urethral stent placement, and open reconstruction or urethroplasty. Urethral dilation is the oldest and simplest treatment of urethral stricture disease and might be curative only for some men with very short, uncomplicated strictures. The goal of this treatment is to stretch the scar without producing more scarring. Internal urethrotomy refers to any procedure that opens the stricture by incising or ablating it transurethrally. The goal is to incise through the scar and into healthy tissue to allow the scar to expand (release of scar contracture) and the lumen to heal enlarged through secondary intention.

However, both urethral dilation and internal urethrotomy have a very high failure rate. The overall success rate of urethrotomy for anterior urethral strictures has been 32%-40% with long-term (>24 months) follow-up.[2-5] The risk factors for failure include penile urethral stric-

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ture (vs bulbar) and long strictures. The success rate can be as great as 77% for bulbar strictures <1 cm in length and as low as 18% for penile strictures >1 cm.[2-5] Finally, urethral stents placed in the anterior urethra are known to have complication rates ≤58%.[6,7] Experts have abandoned the use of urethral stents for anterior urethral strictures other than bladder neck contractures.

The published data are clear that repeat urethrotomy or dilation for urethral stricture is neither curative[2,4,5] nor cost-effective.[8,9] However, most urologists do not perform urethroplasty,[10] and most patients with urethral stricture undergo multiple dilations and/or urethrotomies before being offered urethroplasty.[11] Often, they are never offered formal reconstruction. To date, no study has evaluated the patterns of care for urethral stricture disease. Whether urethroplasty is underused or urethral dilation and internal urethrotomy are overused is unknown.

In the present study, we sought to assess the overall burden of stricture disease using a national data set. We hypothesized that the less-effective modalities, such as urethrotomy and dilation, have been overused, with an underuse of urethroplasty. We also sought to understand the demographics of the patients diagnosed with stricture disease, including age, race, and region in the United States.

MATERIAL AND METHODS

We analyzed the claims data for 1992, 1995, 1998, and 2001 from the Centers for Medicare and Medicaid Services to estimate the usage of care for the male Medicare population aged ≥65 years and diagnosed with urethral stricture disease.

The data from the 3 Medicare Standard Analytic files were linked to determine the use in the inpatient, ambulatory surgery center, hospital outpatient, physician office, and emergency room settings, as previously described.[11] A 5% national random sample of Medicare records, which has been shown to be adequate for detecting meaningful differences in demographics, was queried. The national estimates of service use were obtained by multiplying counts by a constant weight of 20.[12]

Descriptive tables were generated using the "International Classification of Diseases, 9th revision, Clinical Modification" (ICD-9-CM) diagnosis codes for urethral stricture disease (see Appendix 1). The treatments were identified using the Physician Current Procedural Terminology Coding System, 4th edition, procedure codes and stratified into 4 treatment types: urethral dilation, urethrotomy, urethral stent placement/injection of steroid, and urethroplasty. Because of the rarity of stent placement and transurethral steroid injection, these 2 procedures were grouped together. The demographic characteristics (patient age, race, and comorbidities) were obtained by linking the encrypted beneficiary identification numbers from the Medicare Standard Analytic Files. The patients; comorbidities were measured using the Charlson Index, which represents the sum of the weighted diagnosis codes for each comorbid condition.[13]

The exclusion criteria included Medicare beneficiaries <65 years old, who represent a disabled population unlikely to be representative of most patients with urethral stricture disease, and men with an ICD-9 diagnosis of prostate cancer (ICD-9 code 185), whose strictures are often bladder neck contractures or membranous urethral strictures and not true anterior urethral strictures. Men with a diagnosis of benign prostatic hyperplasia or previous transurethral resection of the prostate were not excluded.

Table 1. Rates of urethral stricture per 100 000 male Medicare beneficiaries in 2001

Variable	Rate per 100 000
Total	895 (873-916)
Age (y)	
<65	338 (312-364)
65-69	599 (563-635)
70-74	952 (904-1001)
75-80	1286 (1228-1345)
81-84	1635 (1529-1740)
≥85	1895 (1779-2012)
Race	
Asian	752 (584-919)
Black	992 (920-1064)
Hispanic	1,011 (868-1154)
North American	480 (148-813)
Other	1,226 (1025-1427)
Unknown	1666 (1031-2300)
White	876 (853-898)
Region	
Midwest	943 (900-987)
Northeast	838 (791-884)
Other	726 (611-842)
South	924 (889-959)
West	846 (795-897)
Diabetes (code 250. xx)	
Yes	268 (257-280)
Charlson score	
0	241 (231-252)
1-2	316 (303-328)
≥3	75 (69-82)

RESULTS

In 1992, 10 088 men were diagnosed with a stricture, which extrapolates to 201 760 Medicare beneficiaries. The overall rates of stricture diagnoses decreased from 1992 to 2001 (from 1.4% to 0.9%). In 2001, 6897 men were diagnosed with a stricture (137 940 Medicare beneficiaries; Table 1). The frequency of the stricture diagnoses increased with age, from 0.6% at age 65-69 years to 1.9% at ≥85 years (2001 data). Most strictures were diagnosed in white men in all the years studied. However, the rate of stricture diagnosis per 100 000 male Medicare beneficiaries was more common among blacks Americans and Hispanics than among whites and Asians. A stricture diagnosis was more common in the South and Midwest than in the West and Northeast. Of the patients diagnosed with a stricture, 30% had diabetes. Of the men with a stricture diagnosis, 27% had a Charlson score of 0, indicating no comorbidities, 35% had a score of 1 or 2, and 8% had a score of 3.

The number and specific type of procedures performed on men with a diagnosis of urethral stricture is listed in Table 2. Direct vision internal urethrotomy was the most common treatment performed in all the years studied, and its rate of use increased from 51% in 1992 to 58% in 2001. The use of urethral dilation decreased with time,

Table 2. Procedure rates among male Medicare beneficiaries with a diagnosis of urethral stricture

Study Year	Dilation	DVIU	Stent/Injection	Urethroplasty
1992	596/1354 (44.0)	692/1354 (51.1)	3.9/1354 (0.3)	7.3/1354 (0.5)
1995	480/1196 (40.1)	653/1196 (54.6)	4.2/1196 (0.4)	6.2/1196 (0.5)
1998	373/1017 (36.7)	571/1017 (56.2)	19/1017 (1.9)	8.4/1017 (0.8)
2001	309/895 (34.5)	516/895 (57.7)	17/895 (1.9)	6.2/895 (0.7)

DVIU, direct vision internal urethrotomy.
Data in parentheses in parentheses.

from 44% in 1992 to 35% in 2001. Urethral stenting and steroid injections increased from 0.3% to 1.9% during the 1992-2001 period. The urethroplasty rates remained stable, but very low (0.6%-0.8%), during the study period.

The characteristics of the men who underwent urethroplasty during the 1992-2001 period were also analyzed. Because of the very low numbers, the data from the 4 years analyzed were combined. The urethroplasty rates increased with patient age, from 24/100 000 male beneficiaries aged 65-69 years to 40/100 000 beneficiaries aged ≥85 years. Although white men had the greatest number of urethroplasties performed, the rates of urethroplasty per 100 000 Medicare beneficiaries were greatest among the Hispanic and black men (39/100 000 and 36/100 000 beneficiaries, respectively, compared with 28/100 000 among whites). The greatest number of urethroplasties was performed in the Southern United States.

COMMENT

Our study had several key findings. First, we found that the overall rate of stricture diagnosis decreased from 1.4% to 0.9% from 1992 to 2001. The slight decrease in the rate of stricture diagnosis might have resulted from earlier detection and better treatment of sexually transmitted diseases known to cause strictures, such as gonorrhea. We also found a greater rate of stricture disease among older men, indicating that age might be a risk factor for stricture disease. The age-related increase in the stricture diagnosis we identified might have been because older men are more likely to undergo instrumentation, such as cystoscopy, endoscopic procedures, and urethral catheter placement, that could result in later stricture development. In addition, the aging urethral tissue might be inherently more susceptible to stricture development. The overall diagnosis and treatment rates were greatest among the white men, but the rates of treatment and diagnosis per 100 000 Medicare beneficiaries were greatest among black and Hispanic men. Whether these racial differences in stricture diagnoses were related to the greater rate of sexually transmitted diseases in the black community[14] is unknown to date. However, 42% of the men were in the "other" category, making it difficult to analyze these data with respect to race.

We also found that, among men diagnosed with a stricture, the most common procedure performed was urethrotomy, followed by urethral dilation. Given that previous series have shown that the efficacy of urethrotomy is similar to urethral dilation, this finding raises several concerns regarding the quality of care provided to men with stricture disease. Despite the reported greater success rate of urethroplasty compared with other modalities, the use of urethroplasty was minimal in the Medicare population. The very low urethroplasty rate identified likely represents significant underuse in this population. A previous cost-effectiveness model by Wright et al[9] indicated that the most cost-effective management algorithm for a bulbar urethral stricture of <2 cm is a single internal urethrotomy followed by urethroplasty if the urethrotomy failed. In that study, the effectiveness of urethroplasty and initial urethrotomy were assumed to be 95% and 50% from a review of the relevant data.[9] The underuse of urethroplasty can be illustrated as follows: if the estimated 50% success rate for urethrotomy were correct, no more than 2 urethrotomies should be performed for every urethroplasty. As the success rate of urethrotomy decreases, the rates should be more equal (ie, 20% success rate would mean 5 urethrotomies for every 4 urethroplasties). Although this estimation is limited by the lack of clinical information provided from claims data, the 50:1 ratio identified in their study certainly represents an underuse of urethroplasty. Urethral stents and steroid injections, procedures that have been abandoned at high-volume centers, were performed more often than definitive urethroplasty. These practice patterns have led us to believe that the quality of care provided to men with urethral stricture disease in the Medicare population is suboptimal.

Although the incidence of urethral stricture is low among this population, the complexity of urethral reconstruction is high and, in general, should be performed by formally trained urethral reconstructionists. The key to providing patients with optimal care for this disease burden is early referral and access to select centers of excellence in urethral reconstruction. Few such centers are available in the United States; thus, many Americans could have problems accessing specialized centers of care for urethral stricture. This potential access-to-care barrier could decrease the likelihood that patients will receive treatment with curative intent (urethroplasty). These patients would be more likely to receive less-effective palliative treatment (repeat urethrotomy or dilation). Another potential barrier to urethroplasty is the delay in referral to a specialist who performs urethroplasty. Some urologists might choose to perform repeated urethrotomy or dilations, instead of referring the patient to a specialist. Repeated endoscopic procedures will not only delay cure

but could also worsen the stricture characteristics by increasing the length of the stricture and resulting in more spongiofibrosis.[15] This could ultimately result in the need for a more complex urethroplasty with a greater failure rate than a straightforward anastomotic repair. Patient preferences for less-invasive endoscopic treatments of urethral stricture might also have influenced treatment patterns. Despite the good results of urethroplasty among elderly men,[16] many older men might not wish to undergo surgery. Surgeons might also consider patient age and comorbidities in the decision-making process.

The Medicare claims data allow for the assessment of medical care for a large, heterogeneous, nationwide sample of the population across various clinical settings. However, the claims files are designed primarily to provide billing information, not detailed clinical information; therefore, the present type of study has inherent limitations. Medicare claims data are limited by their reliance on administrative coding systems, such as the ICD-9-CM to identify disease burden. Coding is often incomplete; therefore, not all patients treated for stricture will be correctly identified. This can result in both an underestimation and overestimation of use, depending on the sensitivity and specificity of the diagnosis and procedure codes. Our estimates were not population-based; we could not include prevalent cases of stricture disease for which an subject has not sought care. We were also unable to determine the treatment success from these data and were unable to follow-up individual patients. Also, our use of Medicare claims restricted our analyses to beneficiaries aged ≥65 years. Our findings therefore might not be generalizable to younger men with stricture disease.

CONCLUSIONS

The overall rates of stricture diagnosis decreased from 1992 to 2001. Despite data documenting the poor overall efficacy of urethrotomy and urethral dilation, the complications of urethral stent placement for stricture disease and the superior efficacy of urethroplasty compared with other treatments, the urethroplasty rates remained the lowest of all the treatments. Although longitudinal data are needed to follow the patterns of care over time, our findings suggest an overuse of endoscopic procedures and an underuse of urethroplasty. Addressing barriers to urethroplasty will allow for improvement in the quality of care provided to men with stricture disease.

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Appendix 1. Codes used for analysis

Code Number	Description
ICD-9 diagnosis codes	
598	Urethral stricture
598.0	Urethral stricture due to infection
598.01	Urethral stricture due to infective diseases classified elsewhere
598.1	Traumatic urethral stricture
598.2	Postoperative urethral stricture
598.8	Other specified causes of urethral stricture
598.9	Urethral stricture unspecified

Appendix 1. Continued

Code Number	Description
CPT procedure codes	Dilation
53600*	Dilation of urethral stricture by passage of sound or urethral dilator, male; initial
53601*	Dilation of urethral stricture by passage of sound or urethral dilator, male; subsequent
53605*	Dilation of urethral stricture or vesical neck by passage of sound or urethral dilator, male
53620*	Dilation of urethral stricture by passage of filiform and follower, male; initial
53621*	Dilation of urethral stricture by passage of filiform and follower, male; subsequent
53640*	Passage of filiform and follower for acute vesical retention, male
53675	Catheterizaiton, uretha; complicated
CPT procedure codes	Urethrotomy
52281*	Cystourethroscopy, with calibration and/or dilation of urethral stricture or stenosis, with or without meatotomy, with or without injection procedure for cystography, male or female
52275	Cystourethroscopy, with internal urethrotomy; male
52276	Cystourethroscopy with direct vision internal urethrotomy
53000	Urethrotomy or urethrostomy, external (separate procedure); pendulous urethra
53010	Urethrotomy or urethrostomy, external (separate procedure); perineal urethra, external
53025*	Meatotomy, cutting of meatus (separate procedure); infant
ICD-9 procedure codes	Urethrotomy
58.0	Urethrotomy, perineal urethrostomy, excision of urethral septum
58.5	Internal urethral meatotomy, release of urethral stricture, cutting of urethral sphincter, urethrolysis
ICD-9 procedure codes	Other
52283	Cystourethroscopy, with steroid injection into stricture
52282	Cystourethroscopy, with insertion of urethral stent
CPT procedure codes	Urethroplasty
53400	Urethroplasty; first stage, for fistula, diverticulum, or stricture (eg, Johannsen type)
53405	Urethroplasty; second stage (formation of urethra), including urinary diversion
53410	Urethroplasty, one-stage reconstruction of male anterior urethra
53415	Urethroplasty, transpubic or perineal, one stage, for reconstruction or repair of prostatic or membranous urethra
53420	Urethroplasty, two-stage reconstruction or repair of prostatic or membranous urethra; first stage
53425	Urethroplasty, two-stage reconstruction or repair of prostatic or membranous urethra; second stage
53431	Urethroplasty with tubularization of posterior urethra and/or lower bladder for incontinence (eg, Tenago, Leadbetter procedure)
53450	Urethromeatoplasty, with mucosal advancement
53460	Urethromeatoplasty, with partial excision of distal urethral segment (Richardson type procedure)
53505	Urethrorraphy, suture of urethral wound or injury; penile
53510	Urethrorraphy, suture of urethral wound or injury; perineal
53515	Urethrorraphy, suture of urethral wound or injury; prostatomembranous
53520	Closure of urethrostomy or urethrocutaneous fistula, male (separate procedure)
54324	One stage distal hypospadias repair; with urethroplasty by local skin flaps
54326	One stage distal hypospadias repair; with urethroplasty by local skin flaps and urethral mobilization
54328	One stage distal hypospadias repair; with urethroplasty by local skin flaps, skin graft patch, and/or island flap
54344	Requiring skin flaps, urethroplasty
54348	Requiring extensive dissection, urethroplasty
15240	Full thickness skin graft
ICD-9 procedure codes	Complex urethroplasty
58.0	Urethrotomy, perineal urethrostomy, excision of urethral septum
58.42	Closure of urethrostomy

ICD-9, International Classification of Disease, 9th revision; CPT, Physician Current Procedural Terminology Coding System, 4th edition.
* Included only in definition of hospital outpatient and physician office visits.

EDITORIAL COMMENT

This report adds to the ever-increasing body of evidence-based medicine that male urethral stricture disease is disproportionately treated in the United States today using temporizing and palliative measures. Furthermore, it adds to the body of data that definitive urethral reconstruction is rarely performed (0.7%) and corroborates results we previously published on the self-reported practice patterns of U.S. urologists.[1]

The main strength of this report is its large sample size and nationwide sampling of Medicare claims data. The major weaknesses of this report are acknowledged by the authors. The first limitation is the inherent one of using Medicare claims data and "International Classification of Diseases, 9th Revision," coding.