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TRENDS IN STRICTURE MANAGEMENT AMONG MALE MEDICARE BENEFICIARIES: UNDERUSE OF URETHROPLASTY?

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Abstract

Objectives—We sought to analyze trends in male urethral stricture management through the use of 1992–2001 Medicare claims data, and to determine whether certain racial and ethnic groups bear a disproportionate burden of urethral stricture disease.

Methods—We analyzed Medicare claims for fiscal years 1992, 1995, 1998, and 2001. ICD-9 diagnosis codes were used to identify men with urethral stricture. Demographic characteristics assessed included patient age, race, and comorbidities as measured by the Charlson index. Treatments were identified by CPT-4 procedure codes and stratified into four treatment types: (1) urethral dilation, (2) direct vision internal urethrotomy (DVIU), (3) urethral stent/steroid injection, and (4) urethroplasty.

Results—Overall rates of stricture diagnosis decreased from 10,088 per 100,000 population in 1992 to 6,897 in 2001 (1.4% to 0.9%). Stricture prevalence was highest among African American and Hispanic men, although urethroplasty rates were highest among Caucasians. DVIU was the most common treatment, followed by urethral dilation, urethral stent/steroid injection, and urethroplasty. Urethroplasty rates remained stable, but quite low (0.6–0.8%), over the period of study.

Conclusions—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, urethroplasty rates were the lowest of all treatments. Although we cannot determine treatment success with these data, these findings suggest an underuse of the most efficacious treatment for urethral stricture disease, urethroplasty.

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Keywords

DVIU; urethrotomy; urethral dilation; claims data; codes

Introduction

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

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 for urethral stricture disease, and may 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 scar and into healthy tissue to allow the scar to expand (release of scar contracture) and the lumen to heal enlarged through secondary intention.

Unfortunately, both urethral dilation and internal urethrotomy have a very high failure rate. The overall success rate of urethrotomy for anterior urethral strictures is 32–40% with long-term (>24 month) follow-up[2–5]. Risk factors for failure include penile urethral strictures (vs. bulbar) and long strictures. Success rates can be as high as 77% in bulbar strictures less than 1cm in length and as low as 18% in penile strictures greater than 1 centimeter[2–5]. Finally, urethral stents placed in the anterior urethra are known to have complication rates up to 58%[6, 7]. Experts have abandoned the use of urethral stents for anterior urethral strictures other than bladder neck contractures.

The literature is clear that repeat urethrotomy or dilation for urethral stricture is neither curative[2, 4, 5] nor cost-effective[8, 9]. Yet, 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 patterns of care for urethral stricture disease. Whether there is underutilization of urethroplasty or overuse of urethral dilation and internal urethrotomy is presently unknown.

In this study we sought to assess the overall burden of stricture disease using a national dataset. We hypothesized that there exists an overuse of less effective modalities such as urethrotomy and dilation and an underuse of urethroplasty. We also sought to understand the demographics of patients diagnosed with stricture disease, including age, race, and region in the United States.

Materials and Methods

We analyzed claims data for 1992, 1995, 1998, and 2001 from the Centers for Medicare and Medicaid Services (CMS) to estimate utilization of care for the male Medicare population aged 65 and over diagnosed with urethral stricture disease.

Data from the three Medicare Standard Analytic files were linked to determine utilization 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. National estimates of service use were obtained by multiplying counts by a constant weight of 20[12].

Descriptive tables were generated using International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) diagnosis codes for urethral stricture disease (Appendix 1). Treatments were identified by Physician Current Procedural Terminology Coding System (4th edition, CPT-4) procedure codes and stratified into four 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 two procedures were categorized together. Demographic characteristics (patient age, race, and comorbidities) were obtained by linking encrypted beneficiary identification numbers from the Medicare Standard Analytic Files. Patient comorbidity burden was measured with the Charlson Index, which represents the sum of weighted diagnosis codes for each comorbid condition[13].

Exclusion criteria included Medicare beneficiaries younger than age 65, who represent a disabled population that is 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, rather than true anterior urethral strictures. Men with a diagnosis of BPH or previous TURP were not excluded.

Results

In 1992, 10,088 men were diagnosed with a stricture, which extrapolates to 201,760 Medicare beneficiaries. Overall rates of stricture diagnoses decreased from 1992 to 2001 (1.4 to 0.9%). In 2001, 6,897 men were diagnosed with a stricture (137,940 Medicare beneficiaries, Table 1). The frequency of stricture diagnoses increased with age, from 0.6% at age 65–69 to 1.9% at age 85+ (2001 data). The majority of stricture cases occurred among Caucasian men in all years studied. However, the rate of diagnosis of stricture per 100,000 male Medicare beneficiaries was more common among African Americans and Hispanics than among Caucasians and Asians. A diagnosis of stricture was more common in the South and Midwest than in the West and Northeast. Thirty percent of stricture patients were diabetic. Among 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 presented in Table 2. DVIU was the most common treatment performed in all years studied, and the rate of its use rose from 51% in 1992 to 58% in 2001. The use of urethral dilation decreased over time, from 44% in 1992 to 35% in 2001. Urethral stenting and steroid injection rose from 0.3% to 1.9% over the 1992–2001 time period. Urethroplasty rates remained stable, but very low (0.6–0.8%), over the period of study.

Characteristics of men who underwent urethroplasty during the 1992–2001 time period were also analyzed. Because of the very low numbers, data from the four years analyzed were combined. Urethroplasty rates rose with patient age, from 24 cases per 100,000 male beneficiaries age 65–69 to 40 per 100,000 beneficiaries age 85 and over. Although Caucasian men had the highest number of urethroplasties performed, rates of urethroplasty per 100,000 Medicare beneficiaries were highest among Hispanic and black men (39 and 36

per 100,000 beneficiaries, respectively, vs. 28 per 100,000 among Caucasians). The largest number of urethroplasties were performed in the Southern US.

Comment

Our study has 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 rates of stricture diagnosis may possibly be due to earlier detection and better treatments of sexually transmitted illnesses known to cause strictures, such as gonorrhea. We also found a higher rate of stricture disease among older men, indicating that age may be a risk factor for stricture disease. The age-related increase in stricture diagnosis we identified may be due to the fact that men who age are more likely to undergo instrumentation, such as cystoscopy, endoscopic procedures, and urethral catheter placement, that may result in later stricture development. In addition, aging urethral tissue may be inherently more susceptible to stricture development. Overall diagnosis and treatment rates were highest among Caucasian men, but rates of treatment and diagnosis per 100,000 Medicare beneficiaries were highest among black and Hispanic men. Whether these racial differences in stricture diagnoses are related to the higher rate of sexually transmitted diseases in the black community[14] is unknown to date. It should be noted that 42% of men fit 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 a 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 about the quality of care provided to men with stricture disease. Despite the reported higher success rate of urethroplasty over 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. indicated that the most cost-effective management algorithm for a bulbar urethral stricture of < 2cm is a single internal urethrotomy followed by urethroplasty if the urethrotomy fails[9]. In that study, effectiveness of urethroplasty and initial urethrotomy were assumed to be 95% and 50%, based on a review of the relevant literature[9]. The underutilization of urethroplasty is illustrated as follows: if the estimated 50% success rate for urethrotomy is correct, then there should be no more than two urethrotomies performed for every urethroplasty. As the success rate of urethrotomy decreases, the rates should be more equal (i.e. 20% success rate = 5 urethrotomies for every 4 urethroplasties). Although this estimation is limited by a lack of clinical information provided from claims data, the 50:1 ratio identified in this study certainly represents underutilization of urethroplasty. Urethral stents and steroid injections, procedures that have been abandoned at high volume centers, were performed more often than the definitive urethroplasty. These practice patterns lead 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. There are few such centers in the US, which means that many Americans may have problems accessing specialized centers of care for urethral stricture. This potential access-to-care barrier may decrease the likelihood that patients receive treatment with curative intent (urethroplasty). Instead, they are more likely to receive less effective palliative treatment (repeat urethrotomy or dilation). Another potential barrier to urethroplasty includes a delay in referral to a specialist who performs urethroplasty. Some urologists choose to perform

repeated urethrotomy or dilations, rather than referring the patient to a specialist. Repeated endoscopic procedures will not only delay cure, but may also worsen stricture characteristics by increasing the length of the stricture and causing more spongiofibrosis[15]. This may ultimately result in the need for a more complex urethroplasty that carries a higher failure rate than a straightforward anastomotic repair. Patient preferences for less invasive endoscopic treatments of urethral stricture may also influence treatment patterns. Despite good results of urethroplasty among elderly men[16], many older men may not wish to undergo an operation. Surgeons may also consider patient age and co-morbidities in the decision-making process.

Medicare claims data allow for the assessment of medical care for a large, heterogeneous, nationwide sample of the population across various clinical settings. However, claims files are designed primarily to provide billing information, not detailed clinical information, and therefore this 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, and therefore not all patients treated for stricture are correctly identified. This can result in both underestimation and overestimation of utilization, depending on the sensitivity and specificity of the diagnosis and procedure codes. Our estimates are not population-based; we cannot include prevalent cases of stricture disease for which an individual has not sought care. We were also unable to determine treatment success with these data, and were unable to follow individual patients over time. Also, our use of Medicare claims restricts our analyses to beneficiaries age 65 and over. Our findings therefore may not be generalizable to younger men with stricture disease.

Conclusions

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 over other treatments, urethroplasty rates remained the lowest of all treatments. Although longitudinal data are needed to follow 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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References

1. Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. J Urol. 2007; 177:1667–74. [PubMed: 17437780]
2. Pansadoro V, Emiliozzi P. Internal urethrotomy in the management of anterior urethral strictures: long-term followup. J Urol. 1996; 156:73–5. [PubMed: 8648841]
3. Steenkamp JW, Heyns CF, de Kock ML. Internal urethrotomy versus dilation as treatment for male urethral strictures: a prospective, randomized comparison. J Urol. 1997; 157:98–101. [PubMed: 8976225]
4. Greenwell TJ, Castle C, Andrich DE, et al. Repeat urethrotomy and dilation for the treatment of urethral stricture are neither clinically effective nor cost-effective. J Urol. 2004; 172:275–7. [PubMed: 15201793]
5. Heyns CF, Steenkamp JW, De Kock ML, et al. Treatment of male urethral strictures: is repeated dilation or internal urethrotomy useful? J Urol. 1998; 160:356–8. [PubMed: 9679876]

6. Fisher MB, Santucci RA. Extraction of UroLume endoprosthesis with one-stage urethral reconstruction using buccal mucosa. Urology. 2006; 67:423.e9–423.e10. [PubMed: 16461110]
7. Baert L, Verhamme L, Van Poppel H, et al. Long-term consequences of urethral stents. J Urol. 1993; 150:853–5. [PubMed: 8345599]
8. Rourke KF, Jordan GH. Primary urethral reconstruction: the cost minimized approach to the bulbous urethral stricture. J Urol. 2005; 173:1206–10. [PubMed: 15758749]
9. Wright JL, Wessells H, Nathens AB, et al. What is the most cost-effective treatment for 1 to 2-cm bulbar urethral strictures: societal approach using decision analysis. Urology. 2006; 67:889–93. [PubMed: 16698347]
10. Bullock TL, Brandes SB. Adult anterior urethral strictures: a national practice patterns survey of board certified urologists in the United States. J Urol. 2007; 177:685–90. [PubMed: 17222657]
11. Saigal, CS.; Joyce, GF.; Geschwind, SA.; Litwin, MS. Methods. In: Litwin, MS.; Saigal, CS., editors. Urologic Diseases in America. US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; Washington, DC: US Government Publishing Office; 2004. p. 283-316.NIH Publication No. 04-5512
12. Anger JT, Rodriguez LV, Wang Q, et al. The role of provider volume on outcomes after sling surgery for stress urinary incontinence. J Urol. 2007; 177:1457–62. [PubMed: 17382752]
13. Charlson ME, Pompei P, Ales KL, et al. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987; 40:373–83. [PubMed: 3558716]
14. Newman LM, Berman SM. Epidemiology of STD disparities in African American communities. Sex Transm Dis. 2008; 35:S4–12. [PubMed: 18971796]
15. Roehrborn CG, McConnell JD. Analysis of factors contributing to success or failure of 1-stage urethroplasty for urethral stricture disease. J Urol. 1994; 151:869–74. [PubMed: 8126813]
16. Santucci RA, McAninch JW, Mario LA, Rajpurkar A, Chopra AK, Miller KS, Armenakas NA, Tieng EB, Morey AF. Urethroplasty in patients older than 65 years: indications results outcomes and suggested treatment modifications. J Urol. 2004; 172:201–3. [PubMed: 15201773]

Table 1

Rates of urethral stricture per 100,000 male Medicare beneficiaries in 2001 (95% CI)

	Rate per 100,000
TOTAL	895 (873–916)

AGE	Rate per 100,000
< 65	338 (312–364)
65–69	599 (563–635)
70–74	952 (904–1,001)
75–80	1,286 (1,228–1,345)
81–84	1,635 (1,529–1,740)
85+	1,895 (1,779–2,012)

RACE	Rate per 100,000
Asian	752 (584–919)
Black	992 (920–1,064)
Hispanic	1,011 (868–1,154)
North American	480 (148–813)
Other	1,226 (1,025–1,427)
Unknown	1,666 (1,031–2,300)
White	876 (853–898)

REGION	Rate per 100,000
Midwest	943 (900–987)
Northeast	838 (791–884)
Other	726 (611–842)
South	924 (889–959)
West	846 (795–897)

Diabetes (250.xx)	Rate per 100,000
Yes	268 (257–280)

Charlson Score	Rate per 100,000
0	241 (231–252)
1–2	316 (303–328)
3+	75 (69–82)

Table 2

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

	Dilation	DVIU	Stent/ Injection	Urethroplasty
1992	596/1,354 44.0%	692/1,354 51.1%	3.9/1,354 0.3%	7.3/1,354 0.5%
1995	480/1,196 40.1%	653/1,196 54.6%	4.2/1,196 0.4%	6.2/1,196 0.5%
1998	373/1,017 36.7%	571/1,017 56.2%	19/1,017 1.9%	8.4/1,017 0.8%
2001	309/895 34.5%	516/895 57.7%	17/895 1.9%	6.2/895 0.7%

Appendix 1

Codes Used for Analysis

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
CPT procedure codes-Dilation	
53600[a]	Dilation of urethral stricture by passage of sound or urethral dilator, male; initial
53601[a]	Dilation of urethral stricture by passage of sound or urethral dilator, male;' subsequent
53605[a]	Dilation of urethral stricture or vesical neck by passage of sound or urethral dilator, male
53620[a]	Dilation of urethral stricture by passage of filiform and follower, male; initial
53621[a]	Dilation of urethral stricture by passage of filiform and follower, male; subsequent
53640[a]	Passage of filiform and follower for acute vesical retention, male
53675	catheterizaiton, uretha; complicated
CPT procedure codes- Urethrotomy	
52281[a]	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
53020[a]	Meatotomy, cutting of meatus (separate procedure); except infant
53025[a]	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 urehtal 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

[a] Included only in definition of hospital outpatient and physician office visits