

**Dieses Dokument ist eine Zweitveröffentlichung (Verlagsversion) /
This is a self-archiving document (published version):**

Clemens M. Rosenbaum, C. Philip Reiss, Hendrik Borgmann, Johannes Salem, Margit Fisch, Johannes Huber, Marianne Schmid, Sascha A. Ahyai

Management of Anterior Urethral Strictures in Adults: A Survey of Contemporary Practice in Germany

Erstveröffentlichung in / First published in:

Urologia Internationalis. 2017, 99 (1), S. 43 – 50 [Zugriff am: 19.05.2020]. Karger. ISSN 1423-0399.

DOI: <https://doi.org/10.1159/000471928>

Diese Version ist verfügbar / This version is available on:

<https://nbn-resolving.org/urn:nbn:de:bsz:14-qucosa2-706175>

„Dieser Beitrag ist mit Zustimmung des Rechteinhabers aufgrund einer (DFGgeförderten) Allianz- bzw. Nationallizenz frei zugänglich.“

This publication is openly accessible with the permission of the copyright owner. The permission is granted within a nationwide license, supported by the German Research Foundation (abbr. in German DFG).

www.nationallizenzen.de/

Management of Anterior Urethral Strictures in Adults: A Survey of Contemporary Practice in Germany

Clemens M. Rosenbaum^a C. Philip Reiss^a Hendrik Borgmann^c
Johannes Salem^d Margit Fisch^a Johannes Huber^e Marianne Schmid^b
Sascha A. Ahyai^b

^aDepartment of Urology, University Medical Center Hamburg-Eppendorf, Hamburg, ^bDepartment of Urology, University Medical Center Göttingen, Göttingen, ^cDepartment of Urology, University Hospital Mainz, Mainz, ^dDepartment of Urology, University Hospital Cologne, Cologne, and ^eDepartment of Urology, Medical Faculty Carl Gustav Carus, TU Dresden, Dresden, Germany

Keywords

Practice patterns · Survey · Urethral stricture · Urethroplasty

Abstract

Introduction: Treatment methods of anterior urethral strictures in adults have undergone considerable changes in the recent past. Our goal was to determine national practice patterns among German urologists and to compare results with the results of prior international surveys. **Methods:** We conducted a survey on the management of urethral strictures among German urologists. **Results:** Eight hundred forty-five urologists, representing about 14.6% of German urologists, answered the survey. Most common procedures were direct vision internal urethrotomy (DVIU; 87.2%), blind internal urethrotomy (57.5%), dilatation (56.3%), ventral buccal mucosa graft urethroplasty (31.6%) and excision and primary anastomosis (28.9%). In case of a 3.5-cm bulbar stricture and in the case of a 1-cm bulbar stricture after 2 failed DVIUs, a consecutive urethroplasty was significantly more often favoured compared to transurethral treatment options (44.9 vs. 21.3%

and 59.4 vs. 8.3%, both $p < 0.001$). **Conclusion:** Open urethral reconstruction reveals to be a more common method in practice nowadays. Adherence to recommended treatment algorithms improved in comparison to prior surveys.

© 2017 S. Karger AG, Basel

Introduction

Male urethral stricture disease is a relevant urologic condition with prevalence rates of up to 0.6% in western countries [1, 2]. It is considered to be even more common among developing countries [3]. Consensus exists that open urethral reconstruction should be applied early [4, 5] and endourological techniques such as direct vision internal urethrotomy (DVIU) and urethral dilation should be performed only for short, single, bulbar urethral strictures [6, 7]. This is, on the one hand, due to high

M.S. and S.A.A. contributed equally.

success rates of anastomotic and substitution urethroplasties reaching up to 91 and 88% respectively [8, 9]. On the other hand, it is because of low success rates of DVIU and dilatation, especially in longer and more complex urethral strictures [10–12].

The adherence to these recommendations has been investigated in prior national surveys among urologists from the United States, the Netherlands and Italy [13–15]. These surveys revealed little experience with reconstructive surgery and implied unfamiliarity with the current literature and recommended treatment algorithms by expert panels [4, 16].

These data prompted us to investigate national practice patterns among German urologists. Our aim was to obtain information of current treatment strategies followed in Germany and to compare our data to the data of prior surveys in course of time.

Material and Methods

The Survey

A survey of German urologists using a non-validated 18-items questionnaire was performed between September 2015 and January 2016 (see Appendix). The applied questions were based on prior performed surveys in the United States, the Netherlands and in Italy [13–15]. The questionnaire prompted respondent demographics, diagnostic work-up, treatment and follow-up of urethral strictures. Members of our working group piloted the survey. We modified certain portions of text in terms of making changes to the wording in order to improve understanding. Finally, the survey showed high face validity and was successfully tested with several volunteers.

For distribution of the survey, we used the online platform www.surveymonkey.com (SurveyMonkey, Portland, OR, USA). Urologists were contacted in September 2015 by email using mailing lists provided by the German Society of Residents in Urology, the German Society of Urology and the Federation of German Urologists. A link to the survey was attached. In January 2016, one reminder was sent to all urologists. The collector was open until February 2016. The survey was additionally conducted at the annual German Urologic Association meeting in September 2015. At the meeting, the survey was conducted in a web-based manner using the mobile device.

Statistical Analyses

Frequency tables of total groups or subgroups were generated. Continuous values were expressed as mean \pm SD or median plus interquartile range. Categorical variables values were expressed as percentages. Pearson's chi-square test was used for categorical variables to assess differences between groups. Multivariable analysis adjusted for age, hospital setting, hospital location, level of education and number of strictures treated annually. All statistical analyses were performed on all completed and partially completed surveys using SPSS® 20.0 (SPSS Inc., Chicago, IL, USA). Significance level was set at $p < 0.05$.

Table 1. Characteristics of respondents

Characteristics	% (n)
Age, years	
<30	8.8 (74)
30–39	29.1 (246)
40–49	22.2 (188)
50–59	28.9 (244)
60–69	9.5 (80)
>70	1.5 (13)
Hospital setting	
Academic/University Medical Center	20.0 (169)
Non-academic teaching	34.6 (292)
Non-academic non-teaching/community hospital	11.8 (100)
Practice	33.6 (284)
Hospital location	
Major city (>100,000 inhabitants)	54.7 (462)
Medium-sized city (20,000–100,000 inhabitants)	35.9 (303)
Provincial town (5,000–20,000 inhabitants)	8.0 (68)
Rural commune (<5,000 inhabitants)	1.4 (12)
Level of education	
Head of department	15.9 (134)
Senior physician/consultant	19.8 (168)
Board-certified urologist	40.7 (344)
Resident	23.6 (199)

Results

Eight hundred forty-five urologists answered the survey. As there are 5,771 Urologists in Germany, the total response rate of all German Urologists was 14.6%. Respondents' characteristics (i.e., age, hospital setting, hospital location, level of education) are shown in Table 1.

Urethral Stricture Disease in Germany

Overall, half of the respondents stated to treat between 20 and 50 patients for urethral strictures in their hospital or practice office (<20: 24.6%, <194/845/; 20–50: 50.8%, 401/845/; 51–100: 15.9%, 126/845/; 101–150: 4.9%, 39/845/; 151–200: 0.9%, 7/845/; >200p: 2.9%, >23/845/). Table 2 shows the number of strictures treated annually, the type of procedures performed and the number of urethroplasties performed by the respondents during the last year prior to the survey. The percentage of respondents who treated 1–10 urethral strictures by themselves was 51.5%. Most commonly performed procedures were DVIU (87.2%), blind internal urethrotomy (57.5%) and dilatation (56.6%). Most commonly performed urethroplasties were ventral buccal mucosa graft urethroplasty (BMGU) in 31.6%, excision and primary end-anastomosis (EPA) in 28.9% and dorsal BMGU in 21.3%. Urolo-

Table 2. Number of strictures treated annually, type of procedures and number of urethroplasties

	Germany 2016, % (n)	Italy 2013, % (n)	Netherlands 2011, % (n)	USA 2007, % (n)
Number of strictures treated annually				
None	10.9 (86)	8.6 (45)	+	0.7 (3)
1–5	27.7 (219)	43.6 (228)	10.6 (24)	12.5 (54)
6–10	23.8 (188)	29.3 (153)	27.9 (63)	32.5 (140)
11–20	17.6 (139)	12.6 (66)	31.4 (71)	30.6 (132)
>20	20.0 (158)	5.9 (31)	30.1 (68)	13.7 (59)
Procedures performed				
Urethral dilation	56.3 (445)	62.5 (327)	83.6 (189)	92.8 (400)
DVIU	87.2 (689)	65.8 (344)	97.3 (220)	85.6 (369)
Blind internal urethrotomy	57.5 (454)	42.4 (222)	81.4 (184)	19.0 (82)
Laser-DVIU	17.8 (141)	14.3 (75)	22.1 (50)	15.3 (66)
EPA	28.9 (228)	8.6 (45)	16.4 (37)	15.3 (66)
Ventral BMGU	31.6 (250)	13.8 (72) [‡]	8.4 (19)	2.6 (11)
Dorsal BMGU	21.3 (168)		6.6 (15)	1.4 (6)
Ventral penile skin graft urethroplasty	1.5 (12)	1.3 (7)	4.4 (10)	5.6 (24)
Dorsal penile skin graft urethroplasty	3.7 (29)	2.7 (14) [‡]	3.1 (7)	6.5 (28)
Fasciocutaneous flap	2.0 (16)		1.8 (4)	1.9 (8)
Two-staged mesh-graft urethroplasty	7.6 (60)	6.9 (36)	3.5 (8)	0.7 (3)
Perineal urethrostomy	15.1 (119)	6.1 (32)	10.2 (23)	8.1 (35)
Number of urethroplasties performed annually				
None	73.2 (578)	60.8 (318)	77.0 (174)	57.8 (249)
1–5	14.6 (115)	30.8 (161)	17.3 (39)	35.4 (153)
6–10	6.8 (54)	5.2 (27)	3.1 (7)	3.5 (15)
11–20	2.7 (21)	3.2 (17)	2.7 (6)	0.5 (2)
>20	2.8 (22)	0.6 (3)	+	0.2 (1)

+ No data available; [‡] only data given about BMGU and penile skin graft urethroplasty in general. BMGU, buccal mucosa graft urethroplasty; DVIU, direct vision internal urethrotomy.

gists stated that they have performed the following numbers of transurethral procedures during the previous year: 0: 15.2%, 1–5: 34.1%, 6–10: 22.4%, 11–20: 14.7%, more than 20: 13.7%. The majority (87.7%) performed less than 6 urethroplasties annually. Table 2 further displays results of prior studies.

Stricture Treatment

Of the respondents, 77.4% stated that the maximum length of urethral strictures that can be treated by DVIU was 2 cm or less (<1.0 cm: 36.7%; <1.5 cm: 22.3%; <2.0 cm: 18.4%; <2.5 cm: 3.1%; <3.0 cm: 5.8%; >3.0 cm: 13.8%). Transurethral catheter after DVIU was retained 1–2 days by most of the urologists (no catheter: 1.1%; removal at day of surgery: 2.4%; 1 day 38.0%; 2 days: 28.6%; 3 days: 16.7%; 1 week: 5.4%; 2 weeks: 1.6%; “various”: 6.1%). Asked for an evidence-based treatment strategy of anterior urethral strictures, 569 urologists (76.8%) favoured an initial minimal invasive approach like DVIU or dilata-

tion at first and, in case of failure, an urethroplasty afterwards. One hundred eighty (24.3%) urologists stated that a minimal invasive approach as long as possible is an evidence-based treatment strategy and 194 (26.2%) urologists considered an initial urethroplasty as evidence-based.

In the case of a 34-year-old man with a 3.5-cm bulbar stricture of unknown aetiology and a peak flow of 7 mL/s, the largest proportion of respondents favoured a ventral BMGU (33.7%). Frequencies and a comparison to prior given data are listed in Table 3. Urethroplasties were significantly more favoured compared to minimal invasive treatment strategies (44.9 vs. 21.3%, 559/845/, $p < 0.001$). In multivariable analysis, urologists working in non-academic, non-teaching hospitals or private practice revealed to less likely select open reconstructive treatment options compared to urologists working at university/academic hospitals (OR 0.21, 95% CI 0.10–0.46, $p < 0.001$ or OR 0.30, 95% CI 0.13–0.70, $p = 0.005$).

Table 3. Management of a 3.5-cm bulbar urethral stricture of unknown aetiology in a 34-year-old man

	Germany 2016, % (n)	Italy 2013, % (n)	Netherlands 2011, % (n)	USA 2007, % (n)
Referral to another urologist in the same hospital	6.3 (47)	+	17.0 (38)	29.0 (125)
Referral to another urologist in another hospital	18.2 (135)	+	26.3 (59)	
Dilatation	0.4 (3)	9.0 (47)	1.8 (4)	+
DVIU	20.5 (152)	41.9 (219)	43.8 (98)	33.0 (142)
Blind internal urethrotomy	1.1 (8)	+	0.4 (1)	+
Laser-DVIU	2.3 (17)	+	2.7 (6)	0.7 (3)
EPA	0.9 (7)	2.7 (14)	2.2 (5)	0.5 (2)
Ventral BMGU	33.7 (250)	35.4 (185) [‡]	3.1 (7)	3.9 (17)
Dorsal BMGU	14.3 (106)		2.2 (5)	2.3 (10)
Fasciocutaneous flap	0.1 (1)	1.3 (7)	1.8 (4)	5.8 (25)
Ventral penile skin graft urethroplasty	0.1 (1)	4.8 (25) [‡]	1.3 (3)	11.1 (48)
Dorsal penile skin graft urethroplasty	0.3 (2)		1.3 (3)	3.0 (13)
Two-staged mesh-graft urethroplasty	1.6 (12)	13.4 (70)	+	0.7 (3)
Perineal urethrotomy	0	4.6 (24)	+	+

+ No data available; [‡] only data given about BMGU and penile skin graft urethroplasty in general. BMGU, buccal mucosa graft urethroplasty; DVIU, direct vision internal urethrotomy; EPA, excision and primary end-anastomosis.

Table 4. Management of a 1-cm bulbar urethral stricture after 2 failed DVIUs in a 26-year-old man

	Germany 2016, % (n)	Italy 2013, % (n)	Netherlands 2011, % (n)	USA 2007, % (n)
Referral to another urologist in the same hospital	5.5 (41)	+	24.6 (55)	20.0 (86)
Referral to another urologist in another hospital	17.3 (128)	+	26.8 (60)	
Dilatation	1.5 (11)	4.0 (21)	5.4 (12)	2.8 (12)
DVIU	5.9 (44)	20.1 (105)	12.1 (27)	28.9 (125) [§]
Blind internal urethrotomy	0.5 (4)	+	+	+
Laser-DVIU	1.5 (11)	+	2.7 (6)	+
EPA	31.0 (230)	22.6 (118)	25.0 (56)	43.0 (185)
Ventral BMGU	23.5 (174)	38.4 (201) [‡]	3.6 (8)	+
Dorsal BMGU	12.0 (89)		1.3 (3)	+
Fasciocutaneous flap	0	2.3 (12)	0.4 (1)	+
Ventral penile skin graft urethroplasty	0.3 (2)	10.5 (55) [‡]	0.9 (2)	+
Dorsal penile skin graft urethroplasty	0.3 (2)		0.4 (1)	+
Two-staged mesh-graft urethroplasty	0.7 (5)	9.0 (47)	+	+
Perineal urethrotomy	0	1.1 (6)	+	+

+ No data available; [‡] only data given about BMGU and penile skin graft urethroplasty in general; [§] data includes different procedures: only DVIU, DVIU + stent, DVIU + steroid injection, DVIU + intermittent self catheterisation.

BMGU, buccal mucosa graft urethroplasty; DVIU, direct vision internal urethrotomy; EPA, excision and primary end-anastomosis.

In the case of a 26-year-old man with a 1-cm stricture of the bulbar urethra and 2 failed treatment attempts by DVIU, again urethroplasties were significantly more favoured by the respondents compared to transurethral treatment options (59.4 vs. 8.3%, 572/845, $p < 0.001$). The most preferred procedure was EPA in 31.0%. Frequencies are listed in Table 4.

Diagnostic Workup and Follow-Up after Stricture Treatment

For diagnostic workup in case of a suspected urethral stricture, most urologists (87.3%) favoured a retrograde urethrogram. Uroflowmetry and postvoid residual urine measurement are demanded by 86.6% of the urologists.

Regarding methods of evaluating stricture treatment outcomes, uroflowmetry and postvoid residual urine measurement are the most commonly performed (83.4%) methods.

Discussion

Our survey suggests an enhanced adherence to urethral stricture treatment algorithms when compared to prior surveys. Endoscopic treatment still plays a major role, but implementation of recommended stricture treatments has improved. In the last decades, treatment algorithms for urethral stricture disease have undergone considerable change. Open urethral reconstruction is recommended to be the gold standard [4]. As success rates of minimal invasive procedures such as dilatation or DVIU are low [10–12], these procedures only seem justifiable as initial treatment in short bulbar strictures, in patients not willing to undergo urethral reconstruction or as a palliative treatment [6]. These recommendations slowly find their way into clinical practice. Lacy et al. [17] described a shift towards a higher utilization of urethroplasties. Xu et al. [18] illustrated an increase of both anastomotic and substitution urethroplasties. Our survey describes the current management patterns of adult anterior urethral strictures in Germany. Similar to prior international studies, only a minority of German urologists treat more than 20 urethral strictures annually. In contrast to the above-mentioned surveys, open urethral reconstructions are found to be considerably more common among German urologists nowadays. About one third of respondents claim to perform urethroplasties such as EPA and BMGU. In prior surveys, less than a sixth of respondents performed these operations [13–15]. It is arguable that these findings may indicate a change in practice over time or perhaps simply a different practice pattern specific to Germany. Practice patterns likely differ between different continents. Nevertheless, treatment patterns in central European countries seem comparable. Therefore, we conclude that the body of evidence given by the literature slowly is finding its way into daily clinical practice in Europe. However, the number of German urologists performing more than 5 urethroplasties annually is beginning to get low. But underlining the above-mentioned trend with around 10% of respondents claiming to perform 6 or more urethroplasties annually, this number is higher as in former published surveys (USA [2007]: 4.2%; the Netherlands [2011]: 5.8%; Italy [2013] 9.0%). Still in our cohort, minimally invasive treatments

are significantly more performed. As recommended by given guidelines, about three fourth of urologists think that the maximum length of a stricture that can be treated by DVIU is 2 cm or less. A better adherence to treatment recommendations is displayed in the case of a long bulbar stricture as well as in the case of a bulbar stricture recurrence after 2 minimal invasive treatment attempts: In both cases, open reconstruction was preferred significantly more often than endourological strategies.

When queried for evidence-based treatment strategies of anterior urethral strictures, prior surveys only offered the possibility of one answer to the respondents. But, we offered the possibility of multiple answers, as the question seemed to us too general to be answered with only one single answer. Three fourth stated that one minimal invasive treatment should be applied and in case of failure, urethroplasty should be performed. Prior studies discussed this as a false assumption of a reconstructive ladder [13, 15]. From our point of view, in short bulbar strictures, this approach is at least justifiable. The success rate of DVIU is in these more simple cases described as reaching up to 77% [10, 12] and Barbagli et al. [19] showed that previously failed single urethrotomy did not influence the long-term outcome of urethroplasty. Additionally, this approach seems to be the most cost-effective approach [7].

Still 24.3% of the respondents stated that a minimally invasive approach should be applied as long as possible, but this hypothesis is not supported by current literature and recommendations. The success rate of repeat urethrotomy or dilation is low and repeated minimal invasive approach does not seem to be cost effective [20, 21].

Our study provides an insight into the current thoughts of urologists in a large European country regarding evaluation, treatment and follow-up of urethral strictures. Still dilatation and urethrotomy play a major role in treatment, which can be explained by different reasons. First, as displayed in our survey too, most urologists treat less than 10 urethral strictures per year. This makes urethral stricture disease an uncommon problem to most of the respondents. Second, this small number of patients may not be enough to achieve or maintain reasonable skills in open reconstructive treatment modalities. Mundy stated that a minimum of 15 urethroplasties are needed annually to guarantee a sufficient quality [22]. Recently, Fossati et al. [23] demonstrated that even after a very high number of urethroplasties, the learning curve does not reach a plateau. In our survey, only 5.5% of respondents claim to perform more than 10 urethroplasties per year. From a surgical point of view, these results lead to

the conclusion that a structure with training programmes and specialised centres is needed to treat patients in a proper manner. This requirement has been demanded in prior studies. Nevertheless, German urologists seem to be familiar or at least are becoming more familiar with current recommended treatment algorithms: In both given cases, urethroplasty is regarded in the current literature as the treatment of choice. In our cohort, a majority of respondents favoured urethroplasties in both cases.

Our survey has some limitations. First, the response rate is relatively low. Still the response rate is comparable to that of other online surveys [24] and a total number of respondents in our survey is considerably higher than that in the prior performed surveys. Second, a selection bias is likely. Missing out on a relevant percentage of urologists might skew the findings of our survey. Non-respondents possibly do not care about patients with urethral strictures, thereby overestimating the number of urologists treating patients as recommended by guidelines and underestimating the use of endourethral treatments.

Conclusion

Our survey suggests that adherence to urethral stricture treatment algorithms has improved when compared to prior surveys. Dilatation and urethrotomy still play a major role in treatment, while urethroplasty is rarely performed by most of the German urologists. Training programmes and specialised referral centres seem necessary to guarantee a sufficient patient-centered care.

Acknowledgement

This work is a collaboration project of GeSRU Academics groups “Reconstructive Urology” and “Health Services Research and Social Media.”

Disclosure Statement

All authors have nothing to disclose.

Appendix

- Age, years:
 - <30
 - 30–39

- 40–49
- 50–59
- 60–69
- ≥70
- Hospital setting:
 - Academic/University Medical Center
 - Non-academic teaching
 - Non-academic non-teaching/Community hospital
 - Private practice
- Level of education:
 - Head of department
 - Senior physician/consultant
 - Board-certified urologist
 - Resident
- Hospital location:
 - Major city (>100,000 inhabitants)
 - Medium-sized city (20,000–100,000 inhabitants)
 - Provincial town (5,000–20,000 inhabitants)
 - Rural commune (Ort mit <5,000 inhabitants)

Urethral Strictures

- How many patients with urethral stricture disease did you follow during the last year?
 - <20
 - 20–50
 - 51–100
 - 101–150
 - 151–200
 - >200
- Number of strictures treated last year:
 - 0
 - 1–5
 - 6–10
 - 11–20
 - >20
- Procedures performed (check all that apply):
 - Direct-vision internal urethrotomy (Sachse)
 - Otis-urethrotomy
 - Urethrotomy with laser
 - Urethral dilation
 - Excision and primary end-anastomosis
 - Ventral buccal mucosa graft
 - Dorsal buccal mucosa graft
 - Ventral penile skin graft urethroplasty
 - Dorsal penile skin graft urethroplasty
 - Fasciocutaneous flap
 - Two-staged mesh-graft urethroplasty
 - Perineal urethrostomy (Boutonnière)
- Number of transurethral stricture treatments last year:
 - 0
 - 1–5
 - 6–10
 - 11–20
 - >20
- Number of open urethroplasties last year:
 - 0
 - 1–5
 - 6–10
 - 11–20
 - >20

- How would you manage a primary 3.5-cm bulbar urethral stricture of unknown etiology in a 34-year-old man with a peak urinary flow rate of 7 mL/s?
 - Referral to other urologists in the same hospital
 - Referral to other urologists in other hospitals
 - Direct-vision internal urethrotomy (Sachse)
 - Otis-urethrotomy
 - Blind internal urethrotomy
 - Laser-DVIU
 - Excision and primary end-anastomosis
 - Ventralbuccal mucosa graft
 - Dorsal buccal mucosa graft
 - Ventral penile skin graft urethroplasty
 - Dorsal penile skin graft urethroplasty
 - Fasciocutaneous flap
 - Two-staged mesh-graft urethroplasty
 - Perineal urethrostomy (Boutonnière)
- How would you manage a 1-cm recurrent bulbar urethral stricture in a 26-year-old man, who has 2 failed prior DVIU procedures in the past 2 years with a peak urinary flow rate of 6 mL/s?
 - Referral to other urologists in the same hospital
 - Referral to other urologists in other hospitals
 - Direct-vision internal urethrotomy (Sachse)
 - Blind internal urethrotomy
 - Laser-DVIU
 - Urethral dilation
 - Excision and primary end-anastomosis
 - Ventralbuccal mucosa graft
 - Dorsal buccal mucosa graft
 - Ventral penile skin graft urethroplasty
 - Dorsal penile skin graft urethroplasty
 - Fasciocutaneous flap
 - Two-staged mesh-graft urethroplasty
 - Perineal urethrostomy (Boutonnière)
- According to you, what is the best evidence-based treatment strategy for urethral stricture disease?
 - Minimal invasive approach as long as possible
 - One minimal invasive treatment, in case of failure urethroplasty
 - Always primary urethroplasty, if indicated.
- What methods do you use to evaluate a urethral stricture when suspected? (check all that apply):
 - Uroflowmetry and postvoid residual urine
 - RUG
 - MCU
 - IPSS (International Prostate Symptom Score)
 - Micturition protocol
- Urethral ultrasound
- Urethral calibration
- Urethrocystoscopy
- According to you, what is the maximum stricture length for which you will typically perform an internal urethrotomy?
 - <1 cm
 - <1.5 cm
 - <2 cm
 - <2.5 cm
 - <3 cm
 - >3 cm
- Do you typically manipulate a ureteral guiding catheter or guidewire through the stricture prior to direct-vision internal urethrotomy?
 - Yes
 - No
- After internal urethrotomy, how long do you typically leave a transurethral catheter in place?
 - No catheter
 - Removal on surgery day
 - 1 day
 - 2 days
 - 3 days
 - 1 week
 - 2 weeks
 - Various
- When do you typically perform an MCU following open anterior urethroplasty?
 - No MCU, only when indicated
 - After 1 week
 - After 2 weeks
 - After 3 weeks
 - After 4 weeks
 - >4 weeks
 - Various
- For routine follow-up after surgery for an anterior urethral stricture, how do you usually re-evaluate the urethra for patency/recurrence? (check all that apply):
 - No standardised follow-up
 - History
 - Uroflowmetry and postvoid residual urine
 - RUG
 - MCU
 - IPSS (International Prostate Symptom Score)
 - Micturition protocol
 - Urethral ultrasound
 - Urethral calibration
 - Urethrocystoscopy

References

- 1 Santucci RA, Joyce GF, Wise M: Male urethral stricture disease. *J Urol* 2007;177:1667–1674.
- 2 Mundy AR, Andrich DE: Urethral strictures. *BJU Int* 2011;107:6–26.
- 3 Latini JM, McAninch JW, Brandes SB, Chung JY, Rosenstein D: SIU/ICUD consultation on urethral strictures: epidemiology, etiology, anatomy, and nomenclature of urethral stenoses, strictures, and pelvic fracture urethral disruption injuries. *Urology* 2014;83(3 suppl):S1–S7.
- 4 Chapple C, Andrich D, Atala A, Barbagli G, Cavalcanti A, Kulkarni S, et al: SIU/ICUD consultation on urethral strictures: the management of anterior urethral stricture disease using substitution urethroplasty. *Urology* 2014;83(3 suppl):S31–S47.
- 5 Wessells H, Angermeier KW, Elliott S, Gonzalez CM, Kodama R, Peterson AC, Reston J, et al: Male Urethral Stricture: American Urological Association Guideline. *J Urol* 2017;197:182–190.
- 6 Buckley JC, Heyns C, Gilling P, Carney J: SIU/ICUD consultation on urethral strictures: dilation, internal urethrotomy, and stenting of male anterior urethral strictures. *Urology* 2014;83(3 suppl):S18–S22.

- 7 Wright JL, Wessells H, Nathens AB, Hollingworth W: What is the most cost-effective treatment for 1 to 2-cm bulbar urethral strictures: societal approach using decision analysis. *Urology* 2006;67:889–893.
- 8 Mangera A, Patterson JM, Chapple CR: A systematic review of graft augmentation urethroplasty techniques for the treatment of anterior urethral strictures. *Eur Urol* 2011;59:797–814.
- 9 Barbagli G, Guazzoni G, Lazzeri M: One-stage bulbar urethroplasty: retrospective analysis of the results in 375 patients. *Eur Urol* 2008;53:828–833.
- 10 Pansadoro V, Emiliozzi P: Internal urethrotomy in the management of anterior urethral strictures: long-term followup. *J Urol* 1996;156:73–75.
- 11 Santucci R, Eisenberg L: Urethrotomy has a much lower success rate than previously reported. *J Urol* 2010;183:1859–1862.
- 12 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.
- 13 Bullock TL, Brandes SB: Adult anterior urethral strictures: a national practice patterns survey of board certified urologists in the United States. *J Urol* 2007;177:685–690.
- 14 van Leeuwen MA, Brandenburg JJ, Kok ET, Vijverberg PL, Bosch JL: Management of adult anterior urethral stricture disease: nationwide survey among urologists in the Netherlands. *Eur Urol* 2011;60:159–166.
- 15 Palminteri E, Maruccia S, Berdondini E, Di Pierro GB, Sedigh O, Rocco F: Male urethral strictures: a national survey among urologists in Italy. *Urology* 2014;83:477–484.
- 16 Morey AF, Watkin N, Shenfeld O, Eltahawy E, Giudice C: SIU/ICUD consultation on urethral strictures: anterior urethra – primary anastomosis. *Urology* 2014;83(3 suppl):S23–S26.
- 17 Lacy JM, Cavallini M, Bylund JR, Strup SE, Preston DM: Trends in the management of male urethral stricture disease in the veteran population. *Urology* 2014;84:1506–1509.
- 18 Xu YM, Song LJ, Wang KJ, Lin J, Sun G, Yue ZJ, et al: Changing trends in the causes and management of male urethral stricture disease in China: an observational descriptive study from 13 centres. *BJU Int* 2015;116:938–944.
- 19 Barbagli G, Palminteri E, Lazzeri M, Guazzoni G, Turini D: Long-term outcome of urethroplasty after failed urethrotomy versus primary repair. *J Urol* 2001;165(6 pt 1):1918–1919.
- 20 Heyns CF, Steenkamp JW, De Kock ML, Whitaker P: Treatment of male urethral strictures: is repeated dilation or internal urethrotomy useful? *J Urol* 1998;160:356–358.
- 21 Greenwell TJ, Castle C, Andrich DE, MacDonald JT, Nicol DL, Mundy AR: Repeat urethrotomy and dilation for the treatment of urethral stricture are neither clinically effective nor cost-effective. *J Urol* 2004;172:275–277.
- 22 Mundy AR: Words of wisdom. Re: outcome of dorsal buccal graft urethroplasty for recurrent urethral strictures. *Eur Urol* 2009;55:991–992.
- 23 Fossati N, Barbagli G, Larcher A, Dell'Oglio P, Sansalone S, Lughezzani G, et al: The surgical learning curve for one-stage anterior urethroplasty: a prospective single-surgeon study. *Eur Urol* 2016;69:686–690.
- 24 Rapp DE, Chanduri K, Infusino G, Hoda ZA, Orvieto MA, Elliott SP, et al: Internet survey of management trends of urethral strictures. *Urol Int* 2008;80:287–290; discussion 290–291.