Trends in the Usage of Contrast Allergy Prophylaxis for Endourologic Procedures

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OBJECTIVE To characterize current practice patterns of urologists in the management of intravenous (IV) contrast allergy in the setting of endourologic procedures.

METHODS A survey was administered to all members of the Endourological Society to assess management of IV contrast allergy prior to ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL). Treatment regimens, reports of adverse outcomes, and demographics of respondents were also collected. Data were analyzed using chi-square tests.

RESULTS The response rate was 15% (325/2100). A total of 21% and 28% of respondents reported giving prophylaxis prior to URS and PCNL, respectively. Nearly 3% of respondents reported having observed a severe adverse reaction to intraluminal contrast in the past. Approximately half reported giving prophylaxis only 1 hour prior to the procedure. Most respondents (77%) completed a fellowship, the most common being endourology. Chi-square analysis revealed a significant difference between giving prophylaxis for URS or PCNL and the respective case volumes (for URS, $X^2 = 8.3$, $P = .004$; for PCNL, $X^2 = 8.5$, $P = .003$) where urologists with the lowest and highest case volumes were more likely to give prophylaxis (Fig. 1). There was no significant difference between giving prophylaxis for URS or PCNL and recency of residency, fellowship training, practice setting, or practice type.

CONCLUSION Most urologists do not give prophylaxis for patients with IV contrast allergy prior to URS and PCNL. Further studies are needed to evaluate the necessity of prophylaxis as well as to establish clear guidelines. UROLOGY 131: 53–56, 2019. © 2019 Elsevier Inc.

Radiographic iodinated contrast media (ICM) is utilized in more than 75 million diagnostic procedures annually worldwide and is one of the leading causes of iatrogenic adverse events.[1] The incidence of adverse reactions following intravenous (IV) administration of ICM ranges from 3% to 15%, with severe anaphylactoid reactions occurring in less than 1% of cases.[2,3] The introduction of low-osmolality contrast agents has significantly reduced the risk of severe reactions in recent years.

The use of a prophylaxis regimen in patients with history of contrast allergy prior to IV administration for imaging studies is well-established. However, there is little evidence on giving these patients prophylaxis prior to administration of contrast directly into the urinary tract, and no guidelines exist. In current literature, the rate of adverse reactions following intraluminal injection of ICM into the urinary tract has been documented as between 0.26% and 0.48%, the majority being mild reactions.[4]

We aimed to characterize current practice patterns of urologists in the management of IV contrast allergy in the setting of endourologic procedures.

METHODS

Survey Administration and Audience

An electronic survey was designed to assess the characteristics of urologists, their clinical practices, and their management of patients with a history of IV contrast allergy undergoing endourological procedures. Duration of prophylactic treatment regimens, reports of adverse outcomes, and demographics of respondents were also collected. The survey assumed use of antihistamines and steroids for prophylaxis and did not differentiate between treatment with oral vs IV medications. The survey can be viewed in Appendix 1.

Institutional Review Board approval was not required for this project. The survey was administered through Qualtrics. It was distributed to all members of the Endourological Society with a registered email address. A unique URL ensured that each recipient could only respond once. A follow-up email was sent after 2 weeks to those who had not responded.

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Statistical Analysis

Chi-square test of independence compared characteristics and clinical practices of urologists who give prophylaxis for ureteroscopy (URS) and those who do not. The same was done for percutaneous nephrolithotomy (PCNL). Statistical significance was determined to be $P<.05$. All statistical analyses were performed using Matlab 2017.

RESULTS

Respondent Characteristics

Of the 2100 surveys distributed, there were 325 respondents, a response rate of 15%. Demographics of the respondents and their practices are detailed in Table 1. Most respondents (77%) completed a fellowship, the most common being endourology. Nearly two-thirds of respondents completed residency at least 10 years ago, and nearly half of those who completed fellowship did so at least 10 years ago. Most respondents belonged to an academic practice (62%) and worked in a metropolitan area (84%).

Management of Contrast Allergy Prophylaxis

Of the 325 respondents, 21% and 28% reported giving prophylaxis prior to URS and PCNL in patients with history of IV contrast allergy, respectively. Approximately half reported giving prophylaxis only 1 hour prior to the procedure. Rates of respondents having witnessed an allergic reaction from contrast use in URS or PCNL were 6% for mild reactions, 5%-6% for moderate reactions, and 2%-3% for severe reactions (Table 2).

Chi-square analysis revealed a significant difference between giving prophylaxis for URS and a urologist's case volumes ($X^2 = 8.3$, $P= .004$) where urologists with the lowest and highest case volumes were more likely to give prophylaxis. The same trend was noted for PCNL ($X^2 = 8.5$, $P= .003$) (Fig. 1). There was no significant difference between giving prophylaxis for URS or PCNL and recency of residency, fellowship training, practice setting, or practice type.

COMMENT

To the best of our knowledge, this survey is the first of its kind to understand current practices among urologists regarding prophylaxis treatment prior to intraluminal administration of ICM during endourological procedures. To date, there are no guidelines that exist to aid physicians in their decision making. We found that a majority of respondents do not provide prophylaxis in patients with a known history of IV contrast allergy. Respondents with the highest case volumes gave prophylaxis more often likely because of greater exposure to prior contrast

Table 1. Respondent training and practice characteristics with corresponding rates of premedicating for URS and PCNL

Variable	Respondents	Premedicate for URS	*P* Value	Premedicate for PCNL	*P*Value
Residency time frame	N = 296				
0-5 years ago	42 (14%)	12%	.23	26%	.21
6-10 years ago	68 (23%)	15%		21%	
10 or more years ago	186 (63%)	19%		30%	
Completed fellowship	N = 224				
Endourology	194 (87%)	15% no fellowship	.56	27% no fellowship	.69
Oncology	11 (5%)	18% any fellowship		30% any fellowship	
Reconstructive	3 (1%)				
Transplant	3 (1%)				
Research	2 (1%)				
Other	10 (4%)				
Fellowship time frame	N = 222				
0-5 years ago	50 (23%)	17%	.47	26%	.32
6-10 years ago	63 (28%)	14%		25%	
10 or more years ago	109 (49%)	20%		33%	
Practice type	N = 294				
Academic	183 (62%)	17%	.47	26%	.32
Nonacademic hospital-based	56 (19%)	14%		25%	
Private practice	55 (19%)	20%		33%	
Practice surroundings	N = 293				
Metropolitan	246 (84%)	17%	.94	27%	.63
Nonmetropolitan	47 (16%)	17%		23%	
URS performed per month	N = 295				
5 or fewer	16 (5%)	31%	.004		
6-10	78 (26%)	13%			
11-20	111 (38%)	12%			
21-30	49 (17%)	27%			
More than 30	41 (14%)	24%			
PCNL performed per year	N = 295				
5 or fewer	50 (17%)			40%	.003
6-10	46 (16%)			27%	
11-20	58 (20%)			12%	
21-30	39 (13%)			33%	
More than 30	102 (35%)			26%	

Table 2. Respondent practices for contrast allergy premedication

Variable	Respondents	
	URS	PCNL
Respondents who premedicate (N = 325)	67 (21%)	86 (28%)
Premedicate for what degree of contrast allergy?		
	N = 55	N = 80
Mild	23 (42%)	29 (36%)
Moderate	39 (71%)	60 (75%)
Severe	39 (71%)	64 (80%)
Premedication protocol used		
	N = 55	N = 80
1 hour	28 (51%)	38 (48%)
4 hour	7 (13%)	13 (16%)
13 hour	20 (36%)	29 (36%)
Witnessed allergic reaction to GU contrast procedure?		
	N = 285	N = 278
Any	34 (12%)	35 (13%)
Mild	17 (6%)	17 (6%)
Moderate	15 (5%)	16 (6%)
Severe	5 (2%)	7 (3%)

reactions; those with the lowest case volumes likely gave prophylaxis more often due to fear driven by inexperience.

In the largest retrospective cohort study to date, Blackwell et al reported the incidence of adverse reactions following intraluminal injection of ICM to be 0.48%, 87% of which were mild reactions, such as urticaria.[4] Patients with adverse reactions were older with chronic comorbidities, more likely to be on Medicare, and with a documented history of IV contrast allergy. Interestingly, multivariate analysis showed no relationship between prior documented history of IV contrast allergy and adverse reaction to intraluminal contrast after controlling for patient demographics and comorbidities. However, the use of prophylaxis medications for these patients may have confounded the analysis, a factor that could not be accounted for in the study. In a more recent study by Moses et al, 1 patient out of 113 with IV contrast allergy had an allergic reaction after intraluminal injection of ICM. While one-third of their patients with IV contrast allergy received prophylaxis beforehand, the 1 patient who had an allergic reaction did not.[5]

Adverse reactions following non-IV administration of ICM has been observed in various settings, not only the urinary tract. A review by Davis describes several cases of rash and anaphylaxis after ICM use in arthrography, hysterosalpingography, sialography, and in the gastrointestinal tract.[6] While the incidence of adverse reactions following intraluminal administration of ICM during urological imaging procedures including endoscopy appears to be markedly less than with IV administration, the risk still exists. Currently, there is limited evidence supporting the use of prophylaxis medications during urological procedures for patients with documented history of IV contrast allergy. Techniques to help maintain urothelial integrity, such as low-pressure intraluminal injection, may mitigate the risk of contrast extravasation and adverse reactions.[7] Additionally, there may be increased theoretical risk when bleeding occurs, such as in PCNL or tumor resection cases.

Our study has several limitations. Surveys are inherently biased due to low response rates limiting the ability to capture practice patterns from the targeted audience. While our survey had a relatively high response rate, it was still a fraction of those queried. Additionally, surveying only members of the Endourological Society likely resulted in a higher rate of respondents who are endourology-trained and practice in academic institutions. Nonetheless, almost half of the respondents were in a nonacademic setting, and with no differences found between these groups, it may be representative of general practice patterns. Finally, our study could not determine

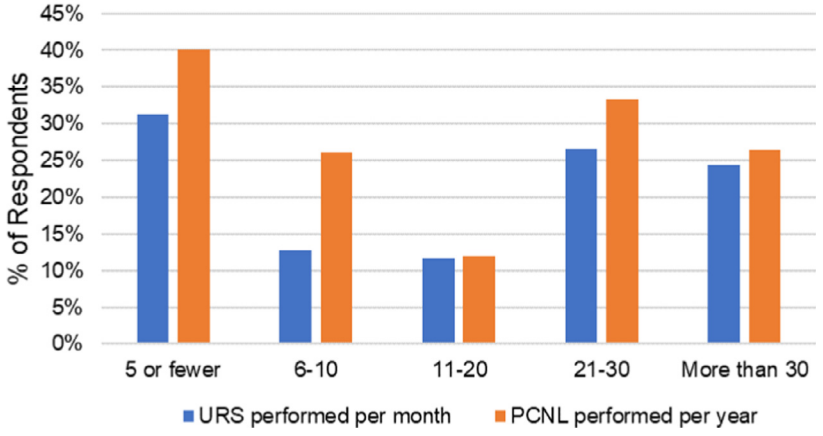

Figure 1. Respondents giving prophylaxis by case volume. (Color version available online.)

whether the benefits of contrast allergy prophylaxis outweigh the risks, especially considering the very low incidence of adverse reactions due to intraluminal contrast.

This study demonstrates variation in practice patterns in an area where guidelines and evidence are lacking. Our data show that approximately a quarter of urologists administer prophylaxis to patients with documented history of IV contrast allergy regardless of experience. Further studies are needed to determine the necessity of contrast allergy prophylaxis as well as the most appropriate prophylaxis regimen for endourologic procedures. Establishing guidelines from high-quality research would also be helpful to the urologic community.

CONCLUSION

Many urologists give prophylaxis medications for patients with IV contrast allergy prior to URS and PCNL, but supporting evidence for practice patterns is lacking. Although the risk of adverse reactions to intraluminal administration of ICM is low, urologists should still exercise caution during endoscopic procedures and be prepared to manage severe anaphylactoid reactions, as this was reported by 2%-3% of our respondents. Further studies are needed to evaluate the necessity of prophylaxis as well as to establish clear guidelines.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.urology.2019.05.010.

References

1. Bottinor W, Polkampally P, Jovin I. Adverse reactions to iodinated contrast media. *Int J Angiol*. 2013;22:149–154. PubMed PMID: 24436602. Pubmed Central PMCID: PMC3770975. Epub 2014 January 18.
2. Morcos SK, Thomsen HS. Adverse reactions to iodinated contrast media. *Eur Radiol*. 2001;11:1267–1275. PubMed PMID: 11471623. Epub 2001 July 27.
3. Thomsen HS, Bush Jr. WH. Adverse effects of contrast media: incidence, prevention and management. *Drug Saf*. 1998;19:313–324. PubMed PMID: 9804445. Epub 1998 November 6.
4. Blackwell RH, Kirshenbaum EJ, Zapf MAC, et al. Incidence of adverse contrast reaction following nonintravenous urinary tract imaging. *Eur Urol Focus*. 2017;3:89–93. PubMed PMID: 28720373. Epub 2017 November 20.
5. Moses RA, Vollstedt AJ. "Allergic-like" reaction risk in patients undergoing non-intravenous contrast urography. *Can J Urol*. 2018;25:9601–9605.
6. Davis PL. Anaphylactoid reactions to the nonvascular administration of water-soluble iodinated contrast media. *Am J Roentgenol*. 2015;204:1140–1145.
7. Pooli A, Brush T, Belle JD, LaGrange CA. Delayed severe anaphylactoid reaction following retrograde pyelogram: a case report. *SAGE Open Med Case Rep*. 2017;5:1–3. 2050313X17745212PubMed PMID: 29230290. Pubmed Central PMCID: PMC5718306. Epub 2017 December 13.