Factors Predictive of Pain During Cystoscopy: A Prospective Study

Sistoskopi Esnasında Ağrıyı Etkileyen Faktörler: Prospektif Bir Çalışma

Sistoskopi Esnasında Ağrı / Pain During Outpatient Cystoscopy

Ahmet Tunc Ozdemir[1], Serkan Altınova[1], Hakan Koyuncu[2], Ege Can Serefoglu[1], Mevlana Derya Balbay[1],
[1]Ataturk Training and Research Hospital, Department of Urology, Ankara,
[2]Yeditepe University School of Medicine, Department of Urology, Istanbul, Turkey

Özet

Amaç: Bu çalışmada sistoskopi esnasında hastanın konforunu artıran ve ağrı duyusunu azaltan hasta özellikleri ve yöntemler arasındaki etkinlik farkı araştırıldı. Gereç ve Yöntem: Hem kanser hem de benign endikasyonlar nedeni ile sistoskopi yapılan hastalar çalışmaya dahil edildi. İşlemler, sistoskopi esnasındaki ağrı ve rahatsızlık üzerindeki tecrübenin önemini belirtmek için, asistan ve diğer sağlık personellerine anlatılarak yapıldı. Hastalar sözlü anlatım yapılan ve sistoskopi görüntülerini yapan ürologla beraber ekrandan izlemek isteyip istemediklerine göre gruplara ayrıldı. Hastaların ağrıları 10 mm VAS skoruna göre değerlendirildi ve ağrı noktası lokalize edildi. Bulgular: Sistoskopi yapılan 146 hasta (99 rijid, 47 esnek) değerledirildi. Yaş ve VAS skorları arasında farklılık yoktu. Esnek sistoskopi esnasında ortalama VAS skoru rijide göre düşüktü. Univariate analizler gösterdi ki; düşük vücut kitle indeksi, klinisyen tarafından aynı anda hastaya detaylı anlatım yapılması, düşük klnisyen tecrübesi ve ilk sistoskopiler ağrı ile anlamlı derece ilişkili idi. En ağrılı durumlar, esnek sistoskopi esnasında lidokain instilasyonu ve rijid sistoskopi esnasında mesane yan duvarlarının görüntülenmesiydi. Tartışma: Teknik, esnek veya rijid sistoskopi, tecrübe ve ilk sistoskopi ağrıda önemli role sahiptir.

Anahtar Kelimeler

Esnek; Rijid; Sistoskopi

Abstract

Aim: To determine the patient characteristics and surgical conditions which is associated with patient pain and discomfort during cystoscopic procedures. Material and Method: Consecutive patients who had a cystoscopy for cancer-related and benign indications were included. Patients were randomized to undergo either rigid or flexible cystoscopy. Procedures were performed in a teaching setting that included residents and attending physicians to assess the impact of experience on pain/discomfort. Patients were further subdivided into the groups that were received detailed verbal explanation during the cystoscopy and allowed to watch the video screen together with the urologist during the procedure or not. Patients were asked to assess their pain on a 10-mm VAS after the procedure the location of the pain was noted. Results: A total of 146 outpatient cystoscopies (99 rigid, 47 flexible) were evaluated. There was no correlation between patients age and VAS scores. Mean VAS during flexible cystoscopy was lesser than rigid one. Univariate analysis showed that lower BMI, real time detailed verbal explanation by the physician, lesser physician experience and initial cystoscopies were significantly associated with painful cystoscopies. Lineer regression analysis confirmed that type of instrument, detailed verbal information, physicians experience-more than 3 years and history of previous cystoscopy were independent factors related to VAS scores. The most painful localizations were lidocaine injections during flexible cystoscopy whereas visualization of the side wall of the bladder for rigid technique. Discussion: Instrument type (flexible or rigid), explaining the procedure, experience of the physician, number of previos cystoscopies may have an effect on the amount of pain and discomfort during cystoscopy.

Keywords

Cystoscopy; Flexible; Rigid

DOI: 10.4328/JCAM.1268 Received: 18.08.2012 Accepted: 27.09.2012 Printed: 01.05.2014 J Clin Anal Med 2014;5(3): 186-90
Corresponding Author: Serkan Altınova, Ataturk Training and Research Hospital, Department of Urology, Bilkent, Ankara, Turkey.
T.: +905326455226 F.: +90 3122912705 E-Mail: saltinova@yahoo.com

Introduction

Office based cystoscopy is an easy, safe, and effective method for the diagnosis of lower urinary tract symptoms (LUTS) and follow-up of urological malignancies [1]. The ideal goal of outpatient cystoscopy is an accurate and complete examination without patient discomfort and use of sedation. Succesful cystoscopy depends on insertion of the instrument into the bladder, precise observation and minimal patient discomfort during the procedure [2]. Although technical advancements in the cystoscopic procedure have decreased patient pain and discomfort, several studies have demonstrated significant pain and discomfort during cystoscopy due to the procedure and environmental status [1,3].

The aim of this prospective study is to determine patient characteristics and conditions associated with pain and discomfort during cystoscopic procedures.

Material and Method

This study is a randomized prospective clinical trial performed at Ataturk Research and Training Hospital, Department of Urology between November 2008 and March 2009. Ethical approval was obtained from the Ataturk Research and Training Hospital Ethics Committee. The indications for cystoscopy were LUTS, bladder/upper urinary tract cancer surveillance, haematuria and incontinence.

Demographic characteristics of patients including age, height, weight and body mass index (BMI), indications for cystoscopy and number of previous cystoscopies were all recorded before the cystoscopic procedure. Patients were randomized to undergo either rigid or flexible cystoscopy.

Procedures were performed in a teaching setting including residents and attending physicians to assess the physicians' experience in cystoscopy (to evaluate the pysician related bias). Before the cystoscopy no antibiotics were given as prophylaxis. Patients were placed in dorsolithotomy position and after the skin preparation with iodine solution; 12 mL of lidocain gel (Instillagel, Farco-pharma GmbH, Köln, Germany) was instilled into the urethra. Urethra was clamped at the glans for either 5 or 20 minutes before the intitation of cystoscopy for obtaining local anesthesia. Instillation gel temperature was maintained at 4°C using a standard drug refrigerator. Procedures were performed either with a 17F rigid cystoscope (70-degree rod lens, Olympus Keymed, UK), or the 16.2 F flexible digital-chip cystoscope (Wolf, Germany) with digital camera (Wolf, Germany) and color video monitor (Sony, Japan). After 5 or 20 minutes of lidocain treatment, the sheath was liberally lubricated with a standard water-soluble sterile lubricant and the cystoscope was inserted into the bladder.

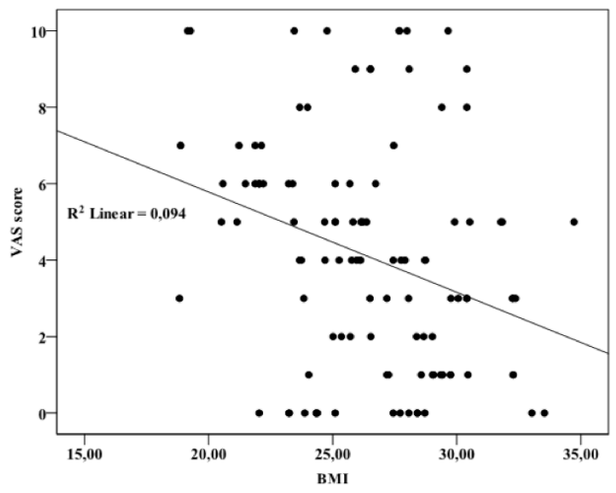
The flexibl and rigid groups were further subdivided into two arms; patients in the first arm were received real time detailed verbal explanation during the cystoscopy procedure the others were allowed to watch the cystoscopy through the video screen together with the urologist during the procedure.

During the procedure, a nurse requested the patient to mark a 100 mm visual analogue scale (VAS). Besides, patients were asked about the location of the pain during the passage of the instrument.

Probable factors affecting VAS scores (i.e. instrument type, BMI, explanation of the procedure to the patient, physicians' experience, patients' previous experience) and painful localizations during cystoscopy were all investigated statistically.

The software SPSS version 17.0 (SPSS, Chicago, IL, USA) was used to analyze the data and statistically significance was set as p value <0.05. Quantitative data were summarized as the mean ± standart deviation. To compare VAS scores between the two groups, independent samples t-test and one way ANOVA test were used and the factors affecting the VAS score were evaluated with linear regression analysis. Chi-square test was used to compare the most painful localization according to cystoscopy technique.

Graphic 1. Association Between BMI and VAS score



Results

A total of 212 consecutive male patients with LUTS, haematuria or referring for cancer surveillance were evaluated at the outpatient clinic. Thirty four patients with the history of recurrent urinary infections and requiring procedures such as the resection of bladder tumor were excluded. Thirty two patients refused to participate or failed to provide requested data were also excluded and a total of 146 patients were included in the study. All patients provided their written informed consent before the participation in the study. Cystoscopy indications of the patients included are summarized in Table 1.

The mean age of patients was 57.9±17.3 (range 25-82 years). Of the patients 99 (67.8%) underwent rigid cystoscopy whereas 47 (32.2%) of them underwent flexible cystoscopy. There was no correlation between patients' age and VAS scores (r=0.80, p>0.05). A total of 127 (86.9%) cases were classified as painful cystoscopies and mean discomfort of those patients during flexible and rigid cystoscopy was 2.91 and 4.33, respectively

Table 1. Cystoscopy indications of the patients included.

Indications	n (%)
LUTS	26 (17.8)
Haematuria	35 (23.9)
Incontinence	10 (6.9%)
Follow-up for TCCof the bladder	68 (46.6)
Follow-up for TCC of the upper tract	7(4.8)
Total	146(100)

(p=0.006). Clinical outcome data is presented in Table 2. Univariate analysis showed that, instrument type (p=0.006), lower BMI (<25 kg/m2, p=0.008), real time detailed verbal explanation by the physician (p<0.0001), physicians experience-(more than 3 years, p<0.0001) and history of previous cystoscopy (first time or repetitive) (p<0.001) were factors significantly associated with painful cystoscopy. However, painful cystoscopy was not associated with age, local anesthesic time, watching the procedure on a real-time video monitor, and the reason for the cystoscopy (diagnostic or repetitive control).

The lineer regression analysis demonstrated that the type of instrument, detailed verbal explanation, physicians experience (more than 3 years) and history of previous cystoscopy were independent factors related to VAS scores (p <0.0001) (Table 3). Besides, there was no correlation with the BMI in the lineer regression analysis.

The most painful part during cystoscopic procedure were the period of lidocaine injection and visualization of the side wall of the bladder for flexible and rigid procedures, respectively (35.9%), (33.8%) (p=<0.05) (Table 4).

Table 2. Factors affecting the VAS score

	n (%)	VAS score		
		Mean±SD	Median (min-max)	p value
Instrument type				
Flexible	47(32.2)	2.91±2.51	3 (0-8)	0.006*
Rigid	99(67.8)	4.33±3.00	4 (0-10)	
BMI				
≤25	57(39.0)	5.0±3.1	5 (0-10)	0.008**
25.01-29.9	72(49.3)	3.7±2.9	4 (0-10)	
≥30	17(11.6)	3.4±2.5	4 (0-10)	
Patients allowed to watch the operation				
Yes	62(42.5)	4.26±2.68	5 (0-10)	0.176*
No	84(57.5)	3.60±3.07	3 (0-10)	
Patients explained Verbally by the physician				
Yes	126(86.3)	3.47±2.75	3 (0-10)	<0.0001*
No	20(13.7)	6.45±2.70	6 (1-10)	
Anesthetic time				
After 5 minutes	81(55.5)	3.62±2.83	3(0-10)	0.232*
After 20 minutes	65(44.5)	4.20±3.02	4(0-10)	
Physicians experience in the cystoscopic procedure				
1 year	35(23.9)	3.09 ± 1.96	3 (0-7)	<0.0001**
2year	36(24.7)	4.28 ± 3.27	4 (0-10)	
3year	23(15.8)	5.91± 3.37	6 (1-10)	
4year	31(21.2)	3.97±2.54	5 (0-8)	
5year	21(14.4)	2.14±2.24	1 (0-6)	
Patients'experience in the procedure				
Diagnostic -first	32(21.9)	5.19 ±3.32	5.50 (0-10)	0.004*
Control-repetitive	114(78.1)	3.51 ± 2.70	3 (0-10)	

*independent samples t-test ** one-way ANOVA test

Table 3. Linear regression analysis of factors affecting the VAS score

	β (95% CI)	p value
Constant	7.805 [4.451-11.159]	<0.0001
Technique (Flexible/rigid)	-1.812 [(-2.917)-(-0.707)]	0.001
Verbal explanation by the physician (yes/no)	-2.158 [(-3.407)-(-0.908)]	0.001
Physicians' experience in cystoscopy (more/less than3 years)	-1.510 [(-2.541)-(-0.479)]	0.004
How many cystoscopy-Patients'experience in the procedure (first/repetitive)	-1.408 [(-0.2.441)-(-0.375)]	0.008
BMI (≥25 / <25)	0.368 [(-0.142)-(0.970)]	0.713

Table 4. The most painful localizations during cystoscopic procedure

	Flexible (n=47) (%)	(n=99) Rigid (%)
During lidocain injection	35.9	11.7
Passing through the bulbous urethra	7.7	7.8
Passing through the membranous urethra	12.8	5.2
Passing through the prostatic urethra	5.1	10.4
Passing through the bladder neck	5.6	26.0
Visualization of the bladder dome	7.7	5.2
Visualization of the bladder side	5.1	33.8

Discussion

Outpatient cystoscopy is one of the most common procedure performed in urology practice and it is usually well tolerated [2]. However, there is limited data on the difficulty of the procedure and the factors associated with significant pain during cystoscopy. In our randomized prospective study, we have demonstrated that the instrument type (rigid cystoscope), real time verbal explanation by the physician (verbal information), experience degree of the physician and first-time cystoscopy were independent factors for the pain felt during the cystoscopic procedure.

Previous studies evaluating flexible and rigid cystoscopy have mostly focused on the complications, tolerability, and effectiveness of the cystoscopic procedures. Several studies have demonstrated similar efficacy between rigid and flexible cystoscopy in identifying tumors [2]. Although excellent tolerability was noted in both techniques, earlier results revealed that male patients prefer flexible cystoscopy in the outpatient clinic rather than rigid cystoscopy in the operating room with general anesthesia [2,4,5]. The major advantages of flexible endoscopy are the ease of performance due to smaller calibre instruments, improved global visualisation of the vesical surface especially in men presumably due to urethral length and the angle required to inspect the bladder, enhanced patient comfort and tolerability.

[2,5]. Denholm et al. compared the tolerability of flexible and rigid cystoscopes and noted that 89% of patients reported flexible cystoscopy as painless [5]. Our results confirm these findings, as we have used small calibred cystoscopes (17F rigid, 16.2F flexible cystoscopes) and demonstrated that instrument type is strongly associated with the pain during cystoscopy.

Cystoscopy may provoke anxiety in patients and sometimes should be requested to be performed under general anesthesia [2]. Prior to the procedure, anxiety may preclude the comfortableness of the patients and decrease the overall tolerability [6,7]. In addition ethical considerations do not permit performing cystoscopies with no explanation [6]. Although previous studies showed that some distraction methods (e.g. playing music) during minimally invasive office procedures such as

bronchoscopy were not helpful for decreasing patient anxiety and pain, detailed verbal explanations during the procedure was shown to be effective in reducing anxiety during minimally invasive procedures such as colonoscopy and bronchoscopy [6,8,9]. In our study, it was shown that detailed verbal explanation by the physician during the operation procedure is associated with less VAS scores.

Patients who underwent cystoscopy for the first time may be more stressful and anxious for the procedure than patients who have experinced cystoscopy previously. Stein and colleagues evaluated anxiety and pain during rigid diagnostic cystoscopy and found that anxiety prior to the cystoscopic procedure was correlated with higher cystoscopy pain scores

[10]. Also Cornel et al. researched the association between the pain during cystoscopy and patients' experience with the procedure and found that the first time cystoscopy is strongly associated with higher pain scores [11]. In our study, patients who underwent cystoscopy for the first time were more stressful and anxious than patients who have experinced cystoscopy previously. The precise mechanism underlying this situation is not clear but we suggest that expections in repetitive cystoscopies are lower due to the previous experiences.

Unlike other studies, cystoscopic examinations were performed by the physicians with different experience levels [2,11]. It was shown that VAS scores related to cystoscopic procedure with experienced physicians was lower than poorly experienced physicians. We suggest that the discomfort during the cystoscopy may be associated with increased training, knowledge and experience of urologists in both anatomical structures and instruments.

In recent studies, age has been found as a predictor for the pain and discomfort during cystoscopy and declared that older patients are able to tolerate cystoscopy [12]. However, in our study increased age was not associated with lesser pain. This result may be due to that more than 75% of our patients were 60 years of age or older and there were not enough younger population, who might be less tolerant of pain, to compare with older patients.

Several previous studies have assessed the efficacy of watching the procedure on a real-time video monitor in reducing pain and discomfort during flexible or rigid cystoscopy in men and women(13,14). Modern video endoscopy equipments allow the surgeon to share the findings with the patient and allow patient to better tolerate the procedure [15]. Patel et al [14] evaluated the effects of watching cystoscopy in male patients and reported a 40% lower VAS scores for men who watched cystoscopy on the video monitor than those who did not watch. A recently published study including 18 female and 33 male patients, demonstrated no effect of watching office-based rigid cystoscopy on anxiety and pain which was measured by VAS and the National Institutes of Medical Health self-rating scale of physical and mental symptoms [6]. Unlike these studies, our study did not demonstrate a difference in the pain scores of patients when they were allowed to watch the diagnostic cystoscopy on a real-time video monitor. We suggest that this difference may be the result of cultural differences between our population and European or American men.

The effect of BMI on the pain scores during outpatient procedures such as colonoscopy was evaluated and lower BMI was not found to be associated with lower pain during the procedure [15]. In contrast with these findings, in our study lower BMI was found as a predictor for the pain during cystoscopy. Solely, the relationship between BMI and pain due to cystoscopy should be evaluated in further and larger series.

Anatomically, distal urethra has a subepithelial plexus of nerves believed to provide only sensorial information [16]. Local anesthetic gels presumably act by these nerves(16). Pharmacokinetically, the absorption of topical lidocaine is slow and incomplete, with a peak level at 15 to 60 minutes [17]. Nevertheless, intraurethral lidocaine instillation for local anesthesia is still controversal. Several studies have evaluated the efficacy of lidocaine gel in regard to the discomfort felt during the instillation of the lidocaine gel before instrumentation, volume of lidocaine used, lidocaine temperature and the time that it was instilled before cystoscopy [13,17,18]. Furthermore, some studies demonstrated no significant difference between lidocaine gel lubrication and plain gel lubrication in decreasing pain and discomfort during cystoscopy [13,19]. Herr and Schneide's study showed no difference in pain relief between cystoscopy performed immediately after lidocaine gel instillation and after 15 min delay [20]. Choong and associates further stated that lidocaine gel was effective in decreasing pain when cystoscopy is performed after 15 min or longer of the instillation [21]. Other previous studies indicated that effective local anesthesia and lubrication of lidocaine gel or plain petrolatum instillation should be done by remaining the gel in the urethra for 10 to 15 minutes before cystoscopy [21,22]. Currently, it is a common practice in busy outpatient clinics to perform cystoscopy within 5 minutes after the intraurethral instillation of lidocaine gel [23]. Considering the results mentioned above, the use of lidocaine gel before cystoscopy in regard to efficient anesthesia time, volume and temperature is not still clear. In our study we did not demonstrate any difference in decreasing pain and discomfort during cystoscopy, related to the anesthesia time prior to cystoscopy, 5 or 20 min.

A recent observational study by Taghizadeh et al found that the most painful part of cystoscopy was the segment which the cystoscope passed through the external urinary sphincter (membranous urethra) [23]. Similar findings have been reported by Chen et al [17]. In addition, a recent randomized study reported that gel instillation itself resulted in significant pain and had no advantage in the pain relief and possible co-morbidities due to the use of lidocaine gel before flexible cystoscopy should be seen [24]. In our study, the painful part of the procedure did not involve any segment of the urethra but, differed according to the instrument type, the time of the visualization of the bladder side in rigid instruments, lidocain

gel instillation among the urethra in flexible instruments and the most painful part was the period of the lidocaine instillation before cystoscopy.

Our study has several limitations: 1) Pain is a subjective phenomenon. We have used a VAS to determine the pain level, as this method is widely used for clinical researches. 2) Previous studies showed that maximal lidocaine absorption takes from 15 to 60 minutes and we have waited for 5 or 20 mins for the absorbtion of the lidocaine gel prior to the cystoscopy

[13,17,18]. Therefore the level of discomfort and pain may be higher than expected.

Instrument type (flexible or rigid), explaining the procedure, experience of the physician, number of previos cystoscopies may have an effect on the amount of pain and discomfort during cystoscopy. Further studies are needed to identify specific methods and factors that would make office cystoscopy more tolerable.

Competing interests

The authors declare that they have no competing interests.

References

1. Burke DM, Shackley DC, O'Reilly PH. The community-based morbidity of flexible cystoscopy. BJU Int 2002;89:347.
2. Gee JR, Waterman BJ, Jarrard DF, Hedican SP, Bruskewitz RC, Stephen Y, et al. Flexible and Rigid Cystoscopy in Women. JSLS 2009;13:135–38.
3. Grossfeld GD, Litwin MS, Wolf JS Jr., Hricak H, Shuler CL, Agerter DC, et al. Evaluation of asymptomatic microscopic hematuria in adults: the American Urological Association best practice policy–part II: patient eval- uation, cytology, voided markers, imaging, cystoscopy, nephrology evaluation, and follow-up. Urology 2001;57:604–10.
4. Geçit İ, Benli E, Keleş İ, Pirinççi , Kavak S, Pirinççi N, Güneş M, Ceylan K. Comparison of the Use of Prilocaine and Lidocaine Gel During the Cystoscopy. J Clin Anal Med 2012;3(4): 398-401 2.
5. Denholm SW, Conn IG, Newsam JE, Chisholm GD. Morbidity follow- ing cystoscopy: comparison of flexible and rigid techniques. Br J Urol 1990;66:152–54.
6. Kesari D, Kovisman V, Cytron S and Benjamin J. Effect on pain and anxiety of patients viewing their cystoscopy in addition to a detailed explanation: a controlled study. BJU Int 2003;92:751.
7. Aksoy FG, Ozdemir A, Yavuz Y. Invasiveness of Radiological Procedures: State-Trait Anxiety in Women Undergoing 3 Different Investigations and 3 Months. Turk J Med Sci 2000;30(6):595-99.
8. Colt HG, Powers A, Shanks TG. Effect of music on state anxiety scores in patients undergoing fiberoptic bronchoscopy. Chest 1999;116:819–24.
9. Morgan J, Roufeil L, Kaushik S, Bassett M. Influence of coping style and precolonosocpy information on pain and anxiety of colonoscopy. Gastrointestinal Endoscopy 1998;48:119–27.
10. Stein M, Lubetkin D, Taub HC, Skinner WK, Haberman J, Kreutzer ER. The effects of intraurethral lidocaine anesthetic and patient anxiety on pain perception during cystoscopy. J Urol 1994;151:1518–21.
11. Cornel EB, Oosterwijk E, Kiemeney LA. The effect on pain experienced by male of watching their office-based flexible cystoscopy. BJU Int 2008102, 1445-6.
12. Van der Aa MN, Steyerberg EW, Sen EF, Zwarthoff EC, Kirkels WJ, van der Kwast TH, et al. Patients' per- ceived burden of cystoscopic and urinary surveillance of bladder cancer: a randomized comparison. BJU Int 2008;101:1106–10.
13. Patel AR, Jones JS, Angie S, Babineau D. Office based flexible cystoscopy may be less painful for men allowed to view the procedure. J Urol 2007; 177: 1843-5.
14. Patel AR, Jones JS, Babineau D. Impact of Real-Time Visualization of Cystoscopy Findings on Procedural Pain in Female Patients. J Endourol 2008;22:2695–8.
15. Chung YW, Han DS, Yoo KS, Park CK. Patient factors predictive of pain and difficulty during sedation-free colonoscopy: A prospective study in Korea. Digestive and Liver Disease 2007:39:872–6
16. Gunendran T, Briggs RH, Wemyss-Holden GD, Neilson D. Does Increasing Hydrostatic Pressure ("Bag Squeeze") During Flexible Cystoscopy Improve Patient Comfort: A Randomized, Controlled Study Urology 2008;72:255–8.
17. Chen YT, Hsiao PJ, Wong WY, Wang CC, Yang SS, Hsieh CH. Randomized double-blind comparison of lidocaine gel and plain lubricating gel in relieving pain during flexible cystoscopy. J Endourol 2005;19:163–6.
18. Kalkan M, Turkan S, Keretli A, Şahin C, Özcan MF, Altınova S, Comparison of different forms of local anesthetic in cystoscopy: A prospective randomized study. J Clin Anal Med 2013; 4(5): 397-9
19. Rodriguez-Rubio F, Sanz G, Garrido S, Sanchez C, Estudillo H. Patient tolerance during outpatient flexible cystoscopy:A prospective, randomized, double-blind study comparing plain lubrication and lidocaine gel. Scand J Urol Nephrol 2004;38:477-80.
20. Herr HW, Schneide M. Outpatient flexible cystocopy in men: A randomized study of patient tolerance. J Urol 2001;165:1971–4.
21. Choong S, Whitfield HN, Meganathan V, Nathan MS, Razack A, Gleeson M. A prospective, randomized, double-blind study comparing lignocaine gel and plain lubricating gel in relieving pain during flexible cystoscopy. Br J Urol 1997;80:69– 73.
22. Goldfischer, ER, Cromie, WJ, Karrison, TG, Naszkiewicz L, Gerber CS. Randomized, prospective, double-blind study of the effects on pain perception of lidocaine jelly versus plain lubricant during out- patient rigid cystoscopy. J Urol 1997;157:90.
23. Taghizadeh AK, El Madani A, Gard PR, Li CY, Thomas PC, Denver SP. When does it hurt? Pain during flexible cystoscopy in men. Urol Int 2006;76:301-03.
24. Kobayashi T, Nishizawa K, Ogura K. Is instillation of anesthetic gel necessary in flexible cystoscopic examination? A prospective randomized study. Urology 2003;61:65.