

Ürolitiazise bağlı renal kolik tedavisinde hızlı ve etkin bir yaklaşım: İntrakütan steril su enjeksiyonu etkinliğinin araştırılması

investigation of the effect of intracutaneous sterile water injection: A rapid and effective approach in urolithiasis-related renal colic treatment

Bekir Aras¹, Fatih Uruç², Hasan Erçelik³, Mehmet Korkmaz¹, Mehmet Sevim¹, Mehmet Yücel¹

¹ Department of Urology, Dumlupınar University Faculty of Medicine, Kutahya, Turkey

² Department of Urology, Fatih Sultan Mehmet Training and Research Hospital, İstanbul, Turkey

³ Department of Emergency Medicine, Dumlupınar University Faculty of Medicine, Kutahya, Turkey

Özet

Amaç: Bu çalışmada ürolitiazise bağlı renal kolik tedavisinde intrakütan distile steril su enjeksiyonunun etkinliğini değerlendirdik.

Gereç ve Yöntem: Üroloji polikliniğine renal kolik tanısı konulan hastalara çalışmaya alındı. Tüm hastalara işlem öncesi bilgilendirilmiş onam verildi ve enjeksiyondan önce ve sonra Visüel Analog Skala (VAS) skorlaması yapıldı. Yapılan enjeksiyon tarif edilerek intrakütan distile su enjeksiyonu yapıldı. İşlem sonrası ek olarak, katılımcılara tekrarlayan renal kolik olması durumunda enjeksiyonun tekrar edilebilirliği ve hasta memnuniyet düzeylerini soruldu.

Bulgular: Hastaların yaş ortalaması 36.8 idi. Tedavi öncesi ve sonrası VAS skorları sırasıyla 9.25 ve 0.75 idi. Tüm hastaların 25'inde (% 80.65) tedaviden sonra herhangi bir tekrarlayan ağrı görülmezken, altı hastada (% 19.35) tekrarlayan ağrı mevcuttu. Aynı tedaviyi tekrarlayan ağrı için tekrar kabul edip etmeyeceği sorulduğunda, % 87 (n = 27) hasta olumlu yanıt verirken, % 13 (n = 4) hasta tekrar enjeksiyonu yaptırmayacağını belirtti.

Sonuç: Ürolitiazise bağlı renal kolik tedavisinde intrakütan distile su enjeksiyonunun hızlı, uygulanabilir ve etkili bir tedavi yaklaşımı olduğunu göstermektedir.

Anahtar Kelimeler: Ağrı, Renal Kolik, Steril Su Enjeksiyonu, Ürolitiazis, VAS

Abstract

Objective: We have achieved a retrospective analysis of 31 patients who were treated with intracutaneous injections of distilled water for renal colic in order to evaluate the efficacy of intracutaneous sterile water injection in urolithiasis-related renal colic pain.

Materials: Whole patients were given informed consent prior to the treatment. Visual Analog Scale (VAS) scoring was performed before and after the injection. In addition, participants were asked whether they would consider the injection as treatment again in case of recurrent pain, to determine patient satisfaction levels.

Results: The mean age of the patients was 36.8 years. VAS scores were 9.25 and 0.75 before and after the treatment respectively. Of the whole patients, 25 (80.65%) have had no recurrent pain after the treatment, whereas there was a recurrent pain in six (19.35%). When questioned about the likelihood of accepting the same treatment again for recurrent pain, 87% (n=27) replied that they would, while 13% (n=4) said they would not.

Conclusion: Gathered data suggest that intracutaneous distilled water injection is a quick, feasible and effective treatment approach in urolithiasis-related renal colic pain.

Keywords: Pain, Renal Colic, Steril Water Injection, Urolithiasis, VAS

Geliş tarihi (Submitted): 14.01.2017

Kabul tarihi (Accepted): 20.04.2017

Yazışma / Correspondence

Assist. Prof. Dr. Bekir Aras, MD
Dumlupınar University Faculty of
Medicine, Evliya Çelebi Training and
Research Hospital

Department of Urology Kutahya, Turkey
(43100)

E-mail: bekiraras1@gmail.com

Introduction

Pain is widely recognized as one of the most important factors influencing patients' quality of life and rapid effective pain control with possible minimum side effects is a key goal in acute medical and surgical management. Renal colic is the most commonly encountered urological emergency and pain relief is the first aim of treatment (1). According to the treatment guidelines published by The European Urology Association, non-steroidal anti-inflammatory drugs (NSAIDs) are the first choice in treatment, while other analgesics including hydromorphone, pentazocine and tramadol may be considered as second-line agents (2). Aside from pharmacological interventions, alternative modalities including acupuncture, aroma therapy (e.g. with rose essential oil) and sterile water injection have also been used (3-5). Sterile water injection is a method which is known to relieve terrible pain in various cases such as delivery (6) and myofascial pain (7). Under these kinds of circumstances, it has been reported that sterile water rapidly relieved pain. Renal colic pains of the genitourinary tract are mainly arisen from kidney stones and this pain may be projected to other sites of the lower abdominal region. Even it can be misdiagnosed as acute appendicitis. However, it has also been reported that sterile water injection did not relieve the acute appendicitis pain. Beside this, there is no related article in the literature so far on the effectiveness of sterile water applied with four-points injection in reflecting colic pains along with urogenital tract, which in turn may cause somewhat unbearable situation. In this study, we aimed to investigate the efficacy of sterile water injection in the context of renal colic, and to assess patient satisfaction of this mode of intervention in urolithiasis-related renal colic pain.

Methods

A total of 31 patients (18 males and 13 females) who have admitted to the emergency service with renal colic complain and who were diagnosed as having urolithiasis were included in this study. Ethical approval was granted from Clinical Studies Ethical Committee of Fatih Sultan Mehmet Research and Training Hospital and signed written consent form was provided for each patient prior to the study. The data were collected prospectively and analyzed retrospectively. Routine diagnostic tests including

urine biochemistry analysis, renal tract radiographs and if required, ultrasonography and computerized tomography were performed. Visual analogue scale (VAS) scoring was used to determine the pain level before the injection and at 10 seconds, first and fifth minutes, at 30th, 60th and 120th minutes after injection. Patients were treated with a four point sterile water injection to the lumbar region in our urology clinics. VAS scores were evaluated after the injection. An additional question of "would you want to take this injection treatment again in case of recurrent colic pain?" asked at fifth minute after injection was used to evaluate the patients' satisfaction level.

Injection method

First, the lumbar region was marked to demonstrate the renal colic side. Sterile water was intracutaneously injected to four points at 0.1 cc each, until a raised papule was clearly observed (Figure-1). In some patients, pain was experienced by the third injection, though this typically abated within 10 seconds following the injection. A sensation of local heat was generated, which generally lasted for up to three minutes. Papules have disappeared within 5 minutes after the injection (Figure-1).

Statistical Analysis

SPSS For Windows software was used for statistical analysis. VAS scores were compared before and after the injection via using paired samples t test and results were given as mean \pm standard deviation. P values less than 0.05 were considered as statistically significant.

Results

Mean age of the participants was 36.8 years. Calculi locations were various and affected the following sites: Kidney with obstruction (n=9), proximal ureter (n=3), middle ureter (n=5), distal ureter (n=13) and ureteropelvic junction (n=1). Of the whole patients, nine have received intramuscular NSAID administration and 22 did not receive any treatment. Nine patients have also been treated with sterile water injection just as the remaining 22 participants, as their pain has not been resolved two hours after the NSAID treatment. Patients were informed about the injection procedure. The mean pain duration was 215 minutes prior to the injection. The mean VAS score was 9.25 prior to the intervention. In whole patients, there was a terrible pain lasting approximately 10 seconds and immediate relief just after this period. Post-

injectional VAS scores were 3 and 0.75 at 30th second and first minute, respectively (Figure-2). In 25 (80,65 %) patients, the colic pain has totally resolved after the injection, however only a relatively mild pain persisted in six (19.35 %) patients, which required low dose analgesic agent. No side effects were observed during or after the injection. Of the 31 patients, four (13 %) stated that they did not want to receive injection treatment again because of the pain that occurred during the application, while the remaining 27 (87 %) patients said that they would accept the injection treatment again in case of recurrent colic pain. There was a statistically significant difference between VAS scores 9.25 and 0.75, which were recorded before and after the injection ($p < 0.001$).

Discussion

Effective relief of any disease-related pain has crucial importance for patient comfort and confidence. NSAIDs and opioids are widely used agents in severe renal colic pain treatment. While the most commonly used pain-relieving opioids are morphine and meperidine, the great abuse potential and broader side effect profile of the latter agent mean that morphine may be preferred (8). NSAIDs constitute a valuable alternative to opioids and it has been reported that opioids and NSAIDs both able to decrease pain scores in renal colic (9). Nausea and vomiting are less likely to occur as a consequence of NSAID administration than opioids, but this is countered by the potential for gastrointestinal bleeding and renal impairment that may caused by NSAID use [10]. Although opiates have a strong and rapid anodyne effect, they have common side effects including sedation, dizziness, nausea, constipation, respiratory depression, physical dependence and addiction [11]. Furthermore, opiates are relatively contraindicated under some conditions like pregnancy. In such cases, analgesic options may be limited to acetaminophen-derived drugs only with limited effectiveness in severe pain (85). Immediate surgical intervention may be needed where many analgesics are contraindicated (e.g. pregnancy, childhood, renal failure) or when pain is unresponsive to the available analgesics (12).

For this reason, there is an ongoing search effort to find an alternative pain relief strategy. When it come to renal colic issue, sterile water injection was firstly introduced in 1885 by Halstad, who reported the analgesic ef-



Figure-1: Papul are obviously seen at four injecton sites.

fects of this approach (13). Later in 1904, a further report of sterile water injection was described as a local anesthetic in small interventions (14). Beside this, sterile water injection has been reported to relieve back pain during delivery in Scandinavia and England. For this purpose, water is subcutaneously injected at four points on the sacral region especially during delivery (6,15-17). This method has also been used in myofascial pain treatment (7). In present study, we aimed to investigate whether sterile injection of water has significant amelioration effect in patients with renal colic pain.

Although the mode of action has not been clearly described, Melzack proposes a “gate control” theory. According to this theory, the superficial pain triggered by a subcutaneously or intracutaneously administered irritant agent blocks a deeper visceral pain at spinal medulla level via monosynaptic reflex mechanism. In another alternative theory, it has been postulated that the sensation of deep pain is reduced through closing the “signaling gateway” in cerebral cortex (18).

The method we have employed was firstly introduced by Sigirci et al. during European Urology Congress held in 2005. In this presentation, authors have described the superiority of intracutaneous sterile water injection when compared with diclofenac: Rapid and dramatic effectiveness as a monotherapy, the long lasting analgesia duration of 6 to 12 hours, the absence of adverse effects (other than an initial feeling of warmth and spontaneously resolving papules), cost-effectiveness and ease of use

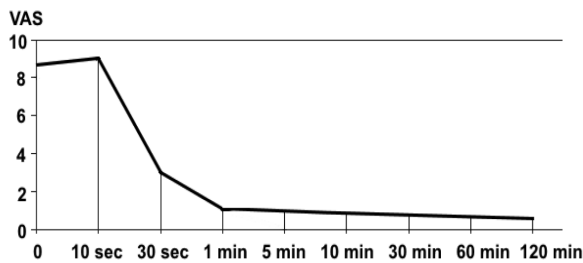


Figure-2: Time-dependent mean VAS scores of the patients.

with repetitive application (19). In our study, pain ceased after only 10 seconds in whole participants and permanent resolution of pain was established in 83.9% of the patients. The mean duration of analgesia was 1.35 hours and six patients (16.1%) required additional analgesic treatment. Ahmadnia et al. have reported that intracutaneous sterile water injection was very effective in acute renal colic pain management (20). Bengtsson et al. have described the treatment of urolithiasis-induced pain by the injection of four papules of sterile water where pain projected from the kidney and reported a response rate of 89% (21). Intracutaneous injection of water can result in a severe local pain with very short duration, but following resolution of the renal colic, only a slight warmth is felt at injection site. Of the whole participants, 87% have stated that they would agree to take this treatment again in case of a recurrent colic. When the sterile water is injected under the skin, a small papule forms which gives rise to robust sensory stimulation of the dermal nociceptors for approximately ten seconds. In addition, a hyperemic zone is observed around the papule for several hours afterwards, demonstrating a prolonged irritation of the cutis. While the physiological mechanisms underlying the analgesic state induced by this stimulation remains poorly understood, it is possible that “gate control” at spinal level may be relevant. As a result, our report highlights the ease-of-use, cost-effectiveness and efficacy of this strategy in patients with renal colic.

Acknowledgements

The authors declare that they have no financial grants and other fundings.

Conflict of Interest Statement

None declared.

References

1. Phillips E, Kieley S, Johnson EB et al. Emergency room management of ureteral calculi: current practices. *J Endourol* 2009;23:1021-4.
2. Türk C, Knoll T, Petrik A et al. EUA guidelines on urolithiasis 2014;4:16-8.
3. Ju BJ, Niu LL. Analysis of therapeutic effect of acupuncture at neiguan (PC 6) and zusanli (ST 36) on acute renal colic. *Zhongguo Zhen Jiu* 2012;32:975-8.
4. Ayan M, Tas U, Sogut E, et al. Investigating the effect of aromatherapy in patients with renal colic. *J Altern Complement Med* 2013;19:329-33.
5. Kaynar M, Koyuncu F, Buldu I et al. Comparison of the efficacy of diclofenac, acupuncture, and acetaminophen in the treatment of renal colic. *Am J Emerg Med* 2015;33:749-53.
6. Martensson L, Nyberg K, Wallin G. Subcutaneous versus intracutaneous injections of sterile water for labour analgesia: A comparison of perceived pain during administration. *Br J Obst Gynecol* 2000;107:1248-51.
7. Byrn C, Borenstein P, Linder LE. Treatment of neck and shoulder pain in whip-lash syndrome patients with intracutaneous sterile water injections. *Acta Anaesthesiol Scand* 1991;35:52-3.
8. O'Connor A, Schug SA, Cardwell HJ. A comparison of the efficacy and safety of morphine and pethidine as analgesia for suspected renal colic in the emergency setting. *Accid Emerg Med* 2000;17:261-4.
9. Holdgate A, Pollock TC. Nonsteroidal anti-inflammatory drugs (NSAIDs) versus opioids for acute renal colic. *Database Syst Rev* 2004;1:CD004137.
10. Ghuman J, Vadera R. Ketorolac and morphine for analgesia in acute renal colic: Is this combination more effective than monotherapy? *CJEM* 2008;10:66-8.
11. Benyamin R, Trescot AM, Datta S et al. Opioid complications and side effects. *Pain Physician* 2008;11:105-20.
12. Sarica K, Tanriverdi O, Aydin M, et al. Emergency ureteroscopic removal of ureteral calculi after first colic attack: is there any advantage? *Urology* 2011;78:516-20.
13. Halsted W. Water as a local anaesthetic. *Med J* 1885; 3:23-7.
14. Anon A. Anaesthesia with sterile water. *Med Press* 1904; 24: 217-8.
15. Martensson L, Wallin G. Labour pain treated with cutaneous injections of sterile water: a randomised controlled trial. *Br J Obstet Gynaecol* 1999;106:633-7.
16. Lytzen T, Cederberg L, Moller-Nielsen J. Relief of low back pain in labor by using intracutaneous nerve stimulation (INS) with sterile water papules. *Acta Obstet Gynecol Scand* 1989;68:341-3.

17. Labrecque M, Nouwen A, Bergeron M, Rancourt JF. A randomized controlled trial of non-pharmacologic approaches for relief of low back pain during labor. *J Fam Pract* 1999;48:259-63.
18. Melzack R, Wall PD. Pain mechanisms: a new theory. *Science* 1965;150:971-79.
19. Sigirci AR, Seymen T, Karadağ S et al. Comparison of diclofenac sodium and intracutane sterile water injections in renal colic: a randomized trial. 20.EAU Congress-Istanbul, 2005, Turkey
20. Ahmadnia H, Younesi Rostami M. Treatment of renal colic using intracutaneous injection of sterile water. *Urol J* 2004;1:200-3.
21. Bengtsson J, Worning AM, Gertz J et al. Pain due to urolithiasis treated by intracutaneous injection of sterile water. A clinically controlled double-blind study. *Ugeskr Laeger* 1981;14;143:3463-5.