

Clinical Research



Cold and Touch Stimulation For The Assessment of Block Level At Spinal Anesthesia

Azize BEŞTAŞ^{a1}, Ömer Lütfi ERHAN², Mehmet Nihat OKUDUCU³, Levent AVCI⁴, Mehmet Akif YAŞAR¹

¹Fırat Üniversitesi Tıp Fakültesi Anesteziyoloji ve Reanimasyon Anabilim Dalı,

²Fırat Üniversitesi Tıp Fakültesi Anesteziyoloji ve Reanimasyon Anabilim Dalı, ELAZIĞ

³Sani Konukoğlu Hastanesi Anesteziyoloji ve Reanimasyon Kliniği, GAZİANTEP

⁴Sarahatun Doğum ve Kadın Hastalıkları Hastanesi Anesteziyoloji ve Reanimasyon Kliniği ELAZIĞ

ABSTRACT

Objective: To determine the dermatomal level of sensory block after spinal anesthesia traditionally used method is pinprick test. Pinprick test is an invasive and painful method. We aimed to compare the dermatomal levels of sensory block determined by noninvasive simple tests touch and cold sense loss with routinely used invasive pinprick stimulation test in clinical practice.

Materials and Methods: Spinal anesthesia was performed with the patients placed in the sitting position by injecting 1 mg kg-1 2 % lidocaine intrathecally through a 22 gauge needle inserted at the L3-4 interspace. Spinal anesthesia was performed with the patients 1 2 % lidocaine placed in the sitting position by injecting 1 mg kg intrathecally through a 22 gauge needle inserted at the L3-4 interspace. The levels of block were assessed at 5th and 20th min after the spinal injection. Needle for pinprick, a piece of cotton for touch and ice in a finger of surgical glove for cold sensory were used.

Results: No significant difference was observed between the dermatomal level of loss of pinprick sense and the dermatomal level of loss of either touch sense or cold sense at 5th min. However at 20th min the dermatomal level of loss of touch sense was significantly lower than the dermatomal level of loss of pinprick and cold sensations (p<0.05).

Conclusion: It may be beneficial to use the non-invasive method touch stimulation instead of pinprick test for the assessment of block level at spinal anesthesia. ©2007, Fırat University, Medical Faculty

Key words: Spinal anesthesia, block level, pinprick, cold, touch

ÖZET

Spinal anesteziye blok seviyesinin belirlenmesinde soğuk ve dokunma stimülasyonu

Amaç: Spinal anesteziye sonra duyu blok dermatomal seviyesini belirlemek için geleneksel olarak pinprick testi kullanılır. Pinprick testi invazif ve ağrılı bir yöntemdir. Klinik pratikte rutin olarak kullanılan invazif pinprick uyarısı ile noninvazif basit dokunma ve soğuk duyu kaybı testleriyle belirlenmiş duyu blok dermatomal seviyelerini karşılaştırmayı amaçladık.

Gereç ve Yöntem: Alt abdominal veya alt ekstremitte cerrahi geçiren, 32 yetişkin erkek hasta (ASA-II, 45±8 yaşlarında) bu randomize, prospektif çalışmaya alındı. Oturur pozisyonda, 1 mg kg-1 %2'lik lidokainin 22 gauge iğne ile L3-4 aralıktan enjeksiyonuyla spinal anestezi gerçekleştirildi. Spinal enjeksiyondan sonra 5. ve 20. dak.'da blok seviyeleri değerlendirildi. Pinprick için iğne, dokunma duysusu için pamuk parçası ve soğuk duysusu için bir cerrahi eldiven parmağına konulan buz kullanıldı.

Bulgular: Pinprick duyu kaybının dermatomal seviyesi ile dokunma veya soğuk duyu kaybının dermatomal seviyeleri arasında 5. dak.'da anlamlı fark bulunmadı. Ancak, 20. dak.'da dokunma duyu kaybının dermatomal seviyesi pinprick ve soğuk duyu kaybının dermatomal seviyelerinden anlamlı derecede daha düşüktü (p<0.05).

Sonuç: Spinal anesteziye blok seviyesini değerlendirmek için pinprick testi yerine noninvazif dokunma duyu kaybı yöntemini kullanmak yararlı olabilir. ©2007, Fırat Üniversitesi, Tıp Fakültesi

Anahtar kelimeler: Spinal anestezi, blok seviyesi, pinprick, soğuk, dokunma

To determine the dermatomal level of sensory block after spinal and epidural anesthesia traditionally pinprick, touch and cold discrimination used (1). The testing of pinprick sensation may cause unpleasure results as pain and infection. Patient pleasure is being more popular in the course of time. Many patients have complaint about the discomfort of this method. For the assessment of block level at spinal anesthesia many other methods (skin vasomotor reflex, pressure palpator, pricking pain roller and gas jet method) have been described (2-6).

We aimed to compare the dermatomal levels of sensory block determined by noninvasive simple tests touch and cold sense loss with routinely used invasive pinprick stimulation test in clinical practice.

MATERIALS AND METHODS

After Institutional Ethics Committee approval, written informed consent was obtained from all considered patients. Adult 32 male patients (ASA I-II, aged 45±8 year) undergoing

lower abdominal or lower limb surgery were enrolled in this prospective, randomized study. All patients were given information about the method. Patients with previous neurologic disease, unable to contact were excluded from the study. Each patient experienced three senses before the operation.

All patients were premedicated with oral diazepam 5 mg and famotidine 20 mg, 2 h before their arrival in the operating room. Intraoperative monitoring include noninvasive arterial blood pressure and heart rate monitoring, electrocardiography, and pulse oximetry. After insertion of an intravenous cannula Lactated Ringer's solution administered at a rate of 10 mL kg⁻¹ h⁻¹ in all patients. The anticipated injection site and proceeding outward in a widening circle was sterilized with a povidone-iodine solution. Then, spinal anesthesia was performed with the patients placed in the sitting position by injecting 1 mg kg⁻¹ 2 % lidocaine intrathecally through a 22 gauge needle inserted at the L3-4 interspace. The drug injection was performed without barbotman in 60 seconds. After injection of spinal solution the patients immediately were placed in the supine, and remained level for the duration of the study period.

The dermatomal levels of sensory block to pinprick (18-gauge needle), touch (a piece of cotton), and cold (ice in a finger of surgical glove) were assessed at 5th and 20th min after injection of the spinal anesthetic. The loss of each sensory modality was determined by the patient's verbal response to the stimulus applied midclavicular line starting caudal and moving cephalad, and in the order of cold, followed by touch, followed by pinprick. Sensory block data were recorded as the number of dermatomes cephalad to S-1 that were blocked (e.g. a dermatomal level of T-10 was considered to be 8 blocked dermatomes).

Statistical analysis:

Statistical analysis was performed using SPSS version 10.0. Results were expressed as mean ± standard deviation (S.D.). Differential sensory nerve block was analysed with paired t test. A $p < 0.05$ was defined as significant.

RESULTS

All patients were blocked adequately, and no technical problems were occurred. No significant difference was observed between the dermatomal level of sensory loss pinprick and the dermatomal level of loss of either touch or cold at 5th min after injection of the spinal anesthetic. However at 20th min after injection of the spinal anesthetic the dermatomal level of loss of touch sensation was significantly lower than the dermatomal level of loss of pinprick and cold sensations ($p < 0.05$). But, there was no difference between pinprick and cold sensory loss at 20th min. Mean sensory blockage dermatomal levels at 5th and 20th min showed at figure 1.

DISCUSSION

Differential sensorial nerve blockage occur as a result of different degree blockage of A- β , A- δ and C fibers and also different recovery profiles (7,8). During spinal anesthesia pinprick, touch and cold stimulation commonly used to determine the differential sensory blockage dermatomal level that each of them activate different fiber population.

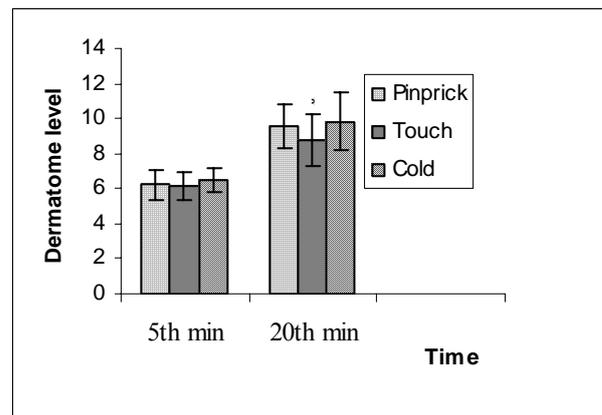


Figure 1. The number of dermatomes blocked levels of three different tests at 5th and 20th minutes (mean±S.D.). * $p < 0.05$ compared with pinprick and cold tests

Touch sensation mediated via A- β , pinprick sensation mediated via A- δ and cold sensation mediated via C fibers (1). Lui et al (8) showed quantitatively that touch, pinprick and cold sensations return correlated by A- β , A- δ and C fibers functional recovery.

Both surgical pain and touch sensation mediated by A- β fibers. The studies made by using transcutaneous electrical stimulation for monitoring anesthesia zone with regional anesthesia showed that, there is correlation between tolerance loss to electrical stimulus that is equal to the surgical incision and surgical anesthesia time and also A- β fiber functional recovery (8,9). Rocco et al (7) monitored the sensorial blockage differential levels of pinprick, touch and cold sensations during whole spinal anesthesia in 50 patients to determine the variations of initial, plato and regression spread degrees. They showed that there were significant differences at pinprick, touch and cold sensation loss dermatomal levels and also touch sensation loss begin later and regress faster. Authors found the level of touch sensation as the sign of spinal anesthesia zone limits.

Hughes et al (6) found that gas jet delivered at room temperature compared favorably with ethyl chloride and pinprick, but not as well as with touch sensation. Another study with warm air sensation which was compared with cold sense from ethyl chloride spray showed that block level assessment results after spinal anesthesia was similar with both methods. This study showed that each method can be used interchangeably (10). Larson et al (11) used pupillary responses to electrical stimulation for the assessment of sensory block level during combined epidural/general anesthesia. They administered noxious electrical stimulation to dermatomal levels and measured pupillary dilatation as response to stimulation (predicted block level). Then measured the actual block level with pinprick test. This study concluded that the level predicted by pupillary responses was within two dermatomal segments of the actual level in all the patients. Another study with different concentrations of lidocaine (1% or 2%) for the quantitative and selective assessment of sensory block level during lumbar epidural anesthesia showed that the dose of lidocaine affected intensity of sensory block. Cutaneous current perception device and also touch, cold and pinprick modalities were used to determine block level. Beyond the effect of lidocaine dose differential neural block

levels were associated with differential effect on nerve fibers of different sizes (12).

Russell (13) determined that there is a two segmental median difference between pinprick, touch and cold sensations differential blockage level, however cold and pinprick blockage level were 1-3 segment upper than touch block level. Our findings showed that pinprick, touch and cold sensation loss dermatomal level are different and also both pinprick and cold sensation loss dermatomal level is greater than the dermatomal levels of touch stimulation. These findings are harmonized with literature discussed above (7,13).

REFERENCES

1. Curatolo M, Petersen-Felix S, Arendt-Nielsen L. Sensory assessment analgesia in humans: A review of methods and applications. *Anesthesiology* 2000; 93: 1517-1530.
2. Ikuta Y, Shimoda O, Ushijima K, Terasaki H. Skin vasomotor reflex as an objective indicator to assess level of regional anesthesia. *Anesth Analg* 1998; 86: 336-340.
3. Fassoulaki A, Sarantopoulos C, Zotou M, Karabinis G. Assessment of the level of sensory block after subarachnoid anesthesia using a pressure palpatori. *Anesth Analg* 1999; 88: 398-401.
4. Shah J, Owen-Smith O, Coley S, Jeyapalan I, Atcheson R, May A. The pricking pain roller for assessment of sensory block after spinal anesthesia. *Int Monit Reg Anaesth* 1998; 10: 16.
5. Bourne TM, Campbell F, Mushambi MC, May AE. Patients' assessment of sensory levels during extradural anesthesia in labor. *Int J Obstet Anaesth* 1997; 6: 239-241.
6. Hughes JC, Harmer M: A new gas jet method for the assessment of sensory block after spinal anaesthesia. *Anaesthesia* 1998; 53: 197-200.
7. Rocco AG, Raymond SA, Murray E, Dhingra U, Freiberger D. Differential spread of blockade of touch, cold, and pinprick during spinal anesthesia. *Anesth Analg* 1985; 64: 917-923.
8. Lui S, Kopacz DJ, Carpenter RL. Quantitative assessment of differential sensory nerve block after lidocaine spinal anesthesia. *Anesthesiology* 1995; 82: 60-63.
9. Sakura S, Sakaguchi Y, Shinzawa M, Hara K, Saito Y. The assessment of dermatomal level of surgical anesthesia after spinal tetracaine. *Anesth Analg* 2000; 90: 1406-1410.
10. Shah J, Ayorinde BT, Rowbotham DJ, Buggy DJ. Warm air sensation for assessment of block after spinal anesthesia. *Br J Anesth* 2000; 84: 399-400.
11. Larson MD, Sessler DI, Ozaki M, McGuire J, Schroeder M. Pupillary assessment of block level during combined epidural/general anesthesia. *Anesthesiology* 1993; 79: 42-48.
12. Sakura S, Sumi M, Yamada Y, Kosaka YS. Quantitative and selective assessment of sensory block during lumbar epidural anaesthesia with 1% or 2% lidocaine. *Br J Anesth* 1998; 81: 718-722.
13. Russell IF. A comparison of cold, pinprick and touch for assessing the level of spinal block at caesarean section. *Intern J Obstet Anesth* 2004; 13: 142-152.

Kabul Tarihi: 29.09.2006