NEW TECHNIQUE OF COMBINED SPINAL-EPIDURAL ANESTHESIA IN LOWER LIMB SURGERY

HAIDAR N. MOHAMMED, MBCHB, FIBMS, ANESTHESIA & I.C.*
WAHID M. HASSAN, MBChB, FIBMS (Ortho)**

***Submitted 12/9/2018; accepted* 28/12/ 2018**

ABSTRACT

Background: There are several theories to explain the action of local anesthetic in combined spinal-epidural anesthesia (CSE), this study is to examine a technique of (CSE) that depends on the theory of leakage of epidural drugs to the subarachnoid cerebrospinal fluid (CSF).

Patients and Methods: After approval of local medical ethics committee and obtaining informed consent, 60 patients (18-80 years, ASA physical status I to IV) who listed for orthopedic lower limb surgery under CSE were included in this study. The study design was prospective Cross-Section comparative one. It was done in Gulan General Hospital and Gian Private Hospital in Duhok Governorate in Kurdistan Region of Iraq in the period from 01/01/2017 to 28/2/2018.

Results:the volume needed to get maximum sensory block (MSB) and the frequency of top-up doses are greater in group A than B.The onset time of group A is longer than group B. The mean arterial pressure was much stable in group A with less nausea and vomiting in the same group. Addition, more patients in group A than group B were able to move against gravity.

Conclusions:the effect of this technique in combined spinal-epidural anesthesia can be compared to that of separate needle with more stable vital signs and less complications but with more allover doses of local anesthetics.

Duhok Med J 2019; 13 (1):9-21.

Keywords: Combined Spinal-Epidural Anesthesia, Leakage of local anesthetics, and Spinal needle stylet through Tuohy needle.

This study was performed to examine the efficacy of making just a tiny hole in subarachnoid membrane on the outcomes of combined spinal-epidural anesthesia based on the first theory of mechanism of action of CSE out of the four well mentioned ones in the references [spillage of epidural local anesthetic into the subarachnoid space through the dural hole, spread of initial subarachnoid block regardless the epidural injection, enhancement of already exist "subclinical" analgesia at a higher level by perineural or transdural spread of epidural local anesthetics and the last one is the effect on volume and circulation of CSF by increase in epidural pressure as it becomes atmospheric and squeezing of the CSF with local anesthetics more cephalic due to compression of subarachnoid space by the presence of epidural catheter and or the volume of epidural anesthetic[1, 2, 3, 4].

The best way to improve effectiveness and reduce side effects of neuroaxial anesthesia is to give it by two different routes[5]. Spinal anesthesia gives quick and dependable segmental anesthesia with low toxicity, while long acting perioperative analgesia can be provided by epidural anesthesia[6]. For that Combined Spinal Epidural (CSE) anesthesia can decrease some problems, such as unpredictable

*Lecturer, Department of anesthesia, College of Health Sciences, University of Duhok, Kurdistan Region, Iraq.
** Assistant professor, Department of Surgery, College of Medicine, University of Duhok, Kurdistan Region, Iraq.***Correspondence author to:*** *HaiderN. Mohammed, haider_june@hotmail.com, Mobil +9647503514121*

level of blockade for spinal anesthesia on one side, and the missed segments, incomplete motor block, poor sacral spread and local anesthetic toxicity for epidural anesthesia on the other side[6]. That's why CSE anesthesia is widely used nowadays in orthopedic, urologic and gynecologic surgery. Addition, CSE anesthesia decreases the doses of medications that needed, gives good motor and sensory blockade, provides the ability to elevate the area of blockade if the surgical field needs to be extended, and gives excellent analgesia. However, CSE anesthesia or analgesia is not out of complications, like technical failure, altered spread of epidural drugs due to lumbar puncture, and change the spread of subarachnoid drugs due to the epidural injection[2].

CSE Techniques that are used now a day:

A. Needle-through-needle technique

It was described by Coates. First epidural needle is inserted then a fine spinal needle is advanced through it until spinal needle punctures the dura. Anesthetic are first injected in the subarachnoid space, and then the epidural catheter is inserted after removing the spinal needle[7].

B. Separate needles

In any order and in the same or different inter-vertebral spaces this technique, the spinal and epidural injections are done by separate needles[6].

C. Special single CSE needles

The Eldor needle that was introduced in 1990 has an 18G epidural needle with a 20G spinal conduit, and the epidural catheter can be inserted before the spinal injection[7].

D. Dual catheter technique

This has the advantage, that both spinal anesthesia and epidural analgesia can be extended by insertion of two catheters, one in the epidural space and the other in the subarachnoid space[6].

MATERIALS AND METHODS

After approval of local medical ethics committee and obtaining informed consent, 60 patients (18-80 years, ASA physical status I to IV) who listed for orthopedic lower limb surgery under CSE were included in this study[8].

The study design was prospective Cross-Section comparative one. It was done in Gulan General Hospital and Gian Private Hospital in Duhok Governorate in Kurdistan Region of Iraq in the period from 01/01/2017 to 28/2/2018. Patients with preexisting neurological, spinal diseases, vertebral column deformity, failure in technique, not anesthetized or needed another type of anesthesia (2 patients) were excluded from the study. The cross section method was used to distribute the samples into two groups each one of 30 patients; that if the patient make the agreement for the new CSE technique the anesthesiologist would put this prepared patient in group A (new CSE technique) but if the patient refuse to participate, he or she would be put in group B (separate needles technique of CSE). If the second consequence patient also didn't accept, he or she would be excluded from the study and so that all the disagreed patients. The group A next patient would be that one who gave consent and he/she hadn't have the above precautions.

A peripheral IV line was done for all patients, and they were preloaded with 20ml/kg of ringer lactate. Without any given premedication. In sitting position,

 https://doi.org/10.31386/dmj.2019.13.1.2

after sterilization, local anesthesia had been injected subcutaneously (2ml of 2% plain lidocaine) at the site of consequence epidural block. The identification of epidural space was by loss of resistance technique with standard Tuohy needle sized 18 G, length 10cm at the interspace L3-L4.

For patients in group A, a stylet of spinal needle (Quincke) of 22 G (length 20 cm) was withdrawn from its needle inserted through the Tuohy needle till felt the pop sensation of pricking the dural membrane then the stylet was removed, then a single shot of 10 ml plain 0.5% bupivacaine was given through the epidural needle.

While in group B, the spinal needle (Quincke) of 22 G was inserted at the interspace L4-L5(below and after the insertion of the Tuohy needle at the interspace L3-L4) till felt the pop sensation of pricking the dural membrane, the stylet was withdrawn and after making sure of correct spinal needle position by seeing the CSF dripping, 2 ml of 0.5% hypertonic bupivacaine were given then the spinal needle were removed and 10 ml of plain 0.5% bupivacaine were injected through the Tuohy needle (on the rule that every dermatome need 1-2 ml of anesthetic solution to be blocked*)[9].

For both groups A and B then appropriate gage (20) catheter is inserted (through the Tuohy needle while the bevel facing cephalic) to let about 4cm of the catheter in the epidural space then the patient was asked to take the supine position. The assessment of the level and degree of sensory block was by blunt 21 Gage needle's pinprick every 2 minutes (1 minute after giving top up dose of 1.5 ml of 0.5% plain bupivacaine in addition to the priming dose that was given at the beginning (10ml) with time interval of 2 minutes) on the epigastric region (dermatome no.T6) (maximum sensory block MSB) by the hand of operating anesthesiologist. The later would stop giving the top up dose if the patient denied pain sensation at T6.

In group B the giving of the anesthetic solution to reach the maximum sensory block (T6) was on the base that, the needed epidural dose to extend the spinal block ranges from 1.5 to 3 ml for each segment want to be add which is less than for ordinary epidural anesthesia[4].

The test dose that composed of (1 ml of 2% lidocaine with 1:100.000 epinephrine) is given through epidural catheter to exclude the subdural or intravascular placement of the tip of needle. The anesthesiologist would proceed to give the remaining volume to reach the maximum sensory block (T6) only if there was neither lower limbs anesthesia nor tachycardia[10].

*(dorsal=6) + (lumbar=5) + (sacral=1) =12×1ml of plain bupivacaine=12ml so start of 10 ml. The Modified Bromage scale**[11] was used for the motor block assessment everyone minute by other than the anesthetizing hand.

The anesthesiologist gave permission for surgeon to do skin incision or any other painful maneuver only after getting grade 2 according to Bromage scale in addition to sensory block (no pain to blunt needle gage 21) at the epigastric region.

**Modified Bromage scale is composed of 6 grades

1 = complete motor blockade;

2 = almost complete motor blockade: moving the feet only;
3 = partial motor blockade: moving the knees and the feet;
4 = detectable weakness of hip flexion: elevate the leg but unable to keep it raised;
5 = no detectable weakness of hip flexion: elevate the leg and can keep it as for 10 s at least;
6 = no weakness at all: can bend the knee while supine.

The top-up dose (of 3 ml of 0.5% plain bupivacaine) would be given if obtained maximum sensory block (T6) was abate by 2 segments.

The monitoring of heart rate and pulse oximetry were continuously while the noninvasive arterial blood pressure was every 5min.

Side effects were recorded, but the patient's ability to stand unaided wasn't assessed because in most of the operations this was contraindicated (orthopedic operation) instead the movement antigravity was hourly after the operation.

The onset of block to surgical intervention time as mean +/ - SD, the anesthetic volume to get the maximum sensory block (MSB) which selected to be (T6) and frequency of top-ups were estimated.

Paired *t* test was used for statistics analyses and the appropriate P value of <0.05 was considered to be significant.

RESULTS

The volumes that were needed to reach the maximum sensory block (MSB) in group B were less than that in group A with (mean +/- SD**)** of 17.65+/- 1.75 and 12.15+/- 1.6 for group B and A respectively, **Figure** 1.

The mean, standard deviation and paired *t* test of the differences in volumes between group A and B were 5.5, 2.16 and 13.95 respectively which means that there is significant need of larger anesthetic volume in group A than in group B to get maximum sensory block (MSB). The mean frequency per hour of Top-Up doses in the epidural catheter were 1.05 for group B and 1.23 for group A. This result introduce that patient of group A would get 2 segment regression time less than that in patient of group B.

Regarding the time onset of action the mean, standard deviation and paired *t* test for the differences in time to get the MSB between group A and B were 7.3, 1.044 and 38.42 which delights that this time in patients of group B were significantly much less than that in patients of group A.

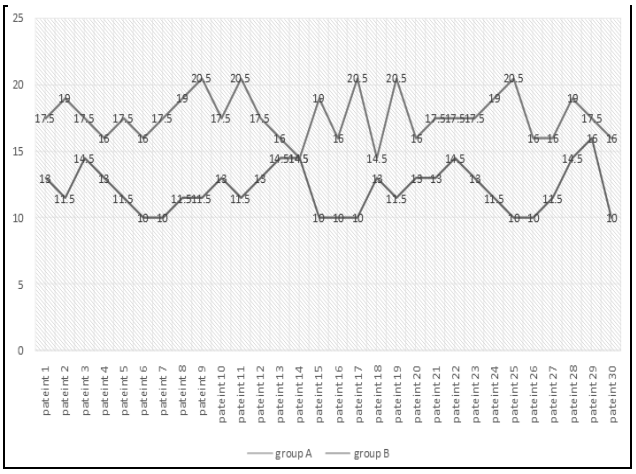

Figure 1:The Volumes of Anesthetics Used to Reach the MSB in Groups A andB

Among the 30 patients in group A no patient was getting the MSB in a time less than 6 minutes while in group B no patient took more than 8 minutes to get the same MSB, **Figure** 2 and 3.

By comparing the differences of mean arterial blood pressure 15 minutes after epidural injection, the mean, standard

 https://doi.org/10.31386/dmj.2019.13.1.2

deviation and *t* value between group A and B were 11, 9.07 and 6.63 respectively that results stated that the mean arterial pressure in group A was significantly more stable than that in group B, **Figure** 4.

Addition only 3 patients in group A were in need of ephedrine all over the operation compare to 12 patients in group B. No major side effects weren't noticed in both groups.22 patients in group A moved against gravity in the first hour while in group B were 5 patients.The patients' satisfaction in the current study was significantly greater in A 87% than in B 62%.

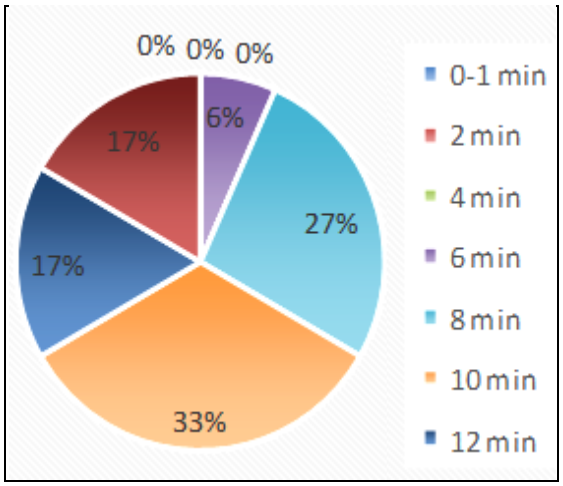

Figure 2: A Distribution of Percentage of the Patients in Time to Get the MSB of Group A

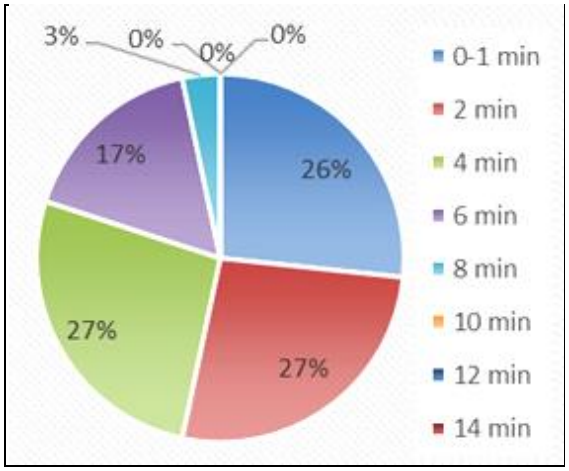

Figure 3: A Distribution of Percentage of the Patients in the Time to Get the MSB of Group B

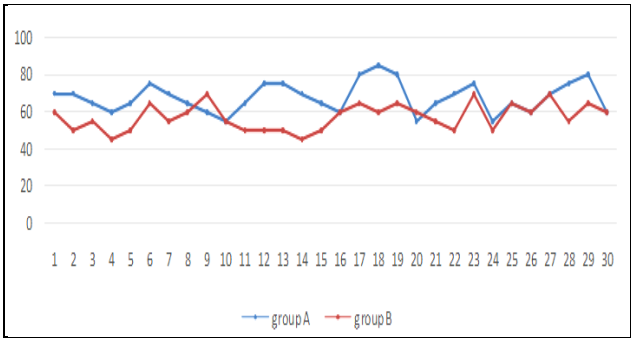

Figure 4: Percentage of Decreasing means Arterial Pressure in both Groups, 15 Minutes after Epidural Full Dose

DISCUSSION

Technically each type of introducing CSE anesthesia has its characteristics and drawback. The needle through needle technique has the disadvantages of liability to pass the epidural catheter into the subarachnoid space and the spinal needle to damage the internal of epidural needle by friction. The above could be solved by "all in one" kit that has in addition to Tuohy needle, long thin spinal needle to decrease the friction and the possibility of epidural catheter to enter its tiny hole in the dura, but this makes the feeling of dura perforation difficult[12]. Also, in this kit they add "backeye" which is a hole in the curvature of Tuohy needle that direct the spinal needle away from the Tuohy needle orifice which again reduce the chance of epidural catheter to advance through the dural hole[13]. In the current study the needle had been replaced by very thin stylet that solved the problem of friction and the percentage of the catheter to pass through its hole would decrease to the minimum.

In the Espocan CSE set they added a plastic sleeve inside the epidural needle to lead the spinal needle and isolate it from the epidural catheter[14]. While the Epistar needle constructed with two channels the big one for the epidural catheter and the

small one for the spinal needle. In the last, the spinal anesthesia could perform after the epidural catheter has been inserted and another advantage is that the test dose can be given to confirm proper epidural catheter placement before introducing the spinal needle[15].

To decrease the damage possibility of epidural catheter by spinal needle Cook introduced a modification in the separate needle technique which is to keep the spinal needle as caudal as possible whereas the epidural catheter as cephalic as possible in the vertebral interspace and the subarachnoid injection should be the last to perform[16].

The two different interspaces needles technique has the privilege of placing the epidural catheter in the site of expected pain (thoracic or lumbar) meanwhile the subarachnoid injection is kept in the safe lumbar area[17]. Also, in this technique the epidural test dose can be done to confirm appropriate placement of the epidural catheter before the subarachnoid injection and prevent to some degree the risk of puncture of the catheter by the spinal needle. Despite this superiority and in the absence of life threatening complications, the separate interspaces technique compared to the "needle-through-needle" technique has more CSE Anesthesia and Analgesia discomfort, trauma, backache, epidural venous puncture, hematoma, infection and technical difficulties[2]. Although the multi-lumen epidural-spinal needle devices like Eldor and Coombs needle are representing a new solution to needle friction, misplacement of epidural catheter and postdural puncture headache, they have technical difficulty as its big size[6, 18].

Regarding time saving, there is no difference if the two segment technique has been used or CSE variable sets (with interlocking device or with backeye)[19]. However, for the dual catheter technique, there is a potential for serious errors, especially when the epidural drugs doses are injected in the subarachnoid catheter. This was the cause why this technique is rarely used nowadays[20].

In contrast this study carry no difficulties at the level of technique as there is only the stylet of the spinal needle which pass easily through the epidural Tuohy needle without making any damage or friction to its inner surface, that passage is used to make only a tiny hole in the dura and subarachnoid membranes together then the injection of priming dose of bupivacaine (10ml) is to push the dura as far as possible from the epidural needle to decrease the possibility of epidural catheter to enter in the subarachnoid hole and to increase the epidural pressure enough to push some of the anesthetic drugs which is already in the priming dose. Then the other steps are just like normal epidural anesthesia with noticing that the bevel of the Tuohy needle should face cephalic to much more decrease the chance of introducing the catheter through that hole. And when the epidural space was filled with the anesthetic drug through the catheter there would be some leak of this drug to the subarachnoid space which is enough to deepen the anesthesia density, **Figure, 5.**

Figure 5: Demonstrate Spinal Needle Stylet through Epidural Tuohy Needle

 https://doi.org/10.31386/dmj.2019.13.1.2

Depending on the facts that the site of action of any neuroaxial local anesthetic is the spinal roots and there is relevant amount of this drugs injected into epidural space appear in CSF with peak concentration 10-30 minutes after epidural injection, it was decided that diffusion of local anesthetic from epidural to subarachnoid spaces is a corner stone in initiation sensory and motor blockade after single epidural injection[21]. So, by making a hole in the dura and arachnoid membrane as in this study will add a mechanical way in addition to the already existing chemical one for the anesthetics to be distributed in the CSF.

Among the mechanisms that were suggested to explain the elevation of the existing spinal sensory blockade after administration of epidural top-up doses in CSE, is the passing of epidural anesthetic through the hole made by spinal needle[22]. This theory strengthens current study.

Some author had faced a problem in the acceptance the cephalic shift of local anesthetic in CSF after epidural injection by theory of squeezing of dural sac by the volume injected epidurally, because of that some patient of epidural saline group had no change in level of MSB[23]. This would turn the explanation to the whole theory that the current study depends on it.

While in the following studies there is some controversy with the current study, first in a study did done on cadaver, after injection of 15ml of epidural dye they were unable to note any in the subarachnoid space after dural puncture with a 29G Quincke needle[24]. Second, it was mentioned that the radiopaque dye would pass to the subarachnoid space only in one of three patients in not less than 1 hour when injected into an epidural catheter of needle-through-needle CSE[25]. Third, using 26G pencil point spinal needle for a study that was repeated on 15 patients, they noted no subarachnoid dye up to 3h after needle-through-needle CSE[26].

A case of cardiopulmonary arrest following needle through needle CSE for Caesarean Section that was reported and explained by some due to opioid transfer from the epidural space to the subarachnoid via the dural hole[27]. The same explanation was put for a case of respiratory depression 6h after epidural morphine 3.5mg, given as part of needle-through-needle CSE[28]. It was also reported that epidural top-ups were much more in epidural than CSE for labor who then needed Caesarean section[29]. The drippling of CSF through epidural needle after removing spinal needle in CSE in needle through needle technique support the theory that this patent hole could give away to transfer drugs according to pressure gradient[1].

There is pressure gradient of 5–15 cmH_2O between subarachnoid pressure and epidural pressure[30]. Although this will cause an obstacle to drug flux into the subarachnoid space, there is transient but dramatic decrease in this gradient to the minus value[30, 31]. As the rise in epidural pressure exceed that in subarachnoid pressure for short time[32]. The above add some strength to the current study as the volume of epidural anesthetic that pass through the membrane hole is directly related to the pressure gradient of epidural to subarachnoid spaces which in turn directly related to the volume of fluid in the epidural space.

Some authors demonstrated that the presence of dural puncture without drug injection would change the dermatome distribution of the next epidural blockade[33].

The clinical importance of local anesthetic transfer through dural hole depends on the character of spinal needle character and the drug (volume and concentration)[2]. It was found that low concentration infusion of local anesthetic is more secure than boluses of high concentration[34].

By random comparative study of obstetric patients anesthetized in sitting position by either needle-through-needle or separate-needle CSE, it was found that the first technique was performed more quick than the second without notable differences between the two techniques. The hypotension was 23% and 13% in the needle-through-needle group and in the separate-needle group respectively. Patient acceptance was (85% and 64%) in preferred to needle-through-needle technique[35].

In this current study regarding hypotension the result was comparable with that of Jingchun Guo et al. as it was 37.5% in group B (separate needle) while it was only 10% in group A (new technique) that is modification of needle-through-needle technique.

The effect of this technique in combined spinal-epidural anesthesia is comparable to that of separate needle with more stable vital signs and less complications but with more allover doses of local anesthetics.

REFERENCES

1. Kamiya Y, Kikuchi T, Inagawa G, Miyazaki H, Miura M, et al. Lidocaine Concentration in Cerebrospinal Fluid after Epidural Administration: A Comparison between Epidural and Combined Spinal-Epidural Anesthesia. Anesthesiology. 2009, 110(5): 1127-1132.
2. Lee R. A., Van Zundert A.A.J., Visser W. A., Lataster L. M. A., Wieringa P. A. Thoracic Combined Spinal-Epidural (CSE) Anaesthesia, Southern African Journal of Anaesthesia and Analgesia. 2008, 14:1, 63-69.
3. Koht A., Sloan T. B., Toleikis J. R. Monitoring the Nervous System for Anesthesiologists and Other Health Care Professional. 2011, 6: 115-36.
4. Loubert P., O'Brien R., Fernando N., Walton S., Philip T., Addei M., Columb O., et al. Epidural volume extension in combined spinal epidural anaesthesia for elective caesarean section: a randomised controlled trial. Anesthesia 2011; 66(5): 341-347.
5. Foreman M. D., Milisen K, Fulmer T. T. Critical Care Nursing of Older Adults. 2010, Third Edition, 18; 363-404.
6. Jankovic D., Peng. P. Regional Nerve Block in Anesthesia and Pain Therapy. 2015, v. 43, no. 4, p. 576-81.
7. John J. Nagelhout, Karen L. Plaus. Technology related to anesthesia practice: Anesthesia Equipment: Nurse Anesthesia. 2014, v. 15, no. 5, p. 242-291.
8. Kodeih, M. G., Al-Alami A. A. , Atiyeh B. S., anazi G.E. Combined spinal epidural anesthesia in an asthmatic patient undergoing abdominoplasty: Plast.Reconstr.Surg. 2009, v. 123, no. 3, p. 118e-120e.

9. Miller R. D., Cohen N. H., Eriksson L. I., Fleisher L. A., Wiener-Kronish J. P., Young W. L. Spinal, Epidural, & Caudal Anesthesia: Epidural Anesthesia. 2014, Factors affecting the level of block. In 8th edition Miller's Anesthesia, no. 56, p. 1684-1720.
10. Suresh M., Fernando R., et al. Local Anesthetics in Obstetrics: Evidence-based Applications, Controversies, Toxicity and Current Therapies. Anesthesia for Obstetrics. 2013, 8, 9: 104-119.
11. Brenda A. Bucklin, David R. Gambling, David Wlody.: Impact of Analgesia on labor and Delivery Outcomes. A Practical Approach to Obstetric Anesthesia 2009, 12:169–184.
12. Stamenkovic D., Karanikolas M., Combined Spinal Epidural Anesthesia and Analgesia: a new "hanging drop": Epidural Analgesia – Current Views and Approaches. 2012, no. 8, p. 119-120.
13. Tsukada S., Wakui M., Hoshino A.Pain Control after Simultaneous Bilateral Total Knee Arthroplasty: A Randomized Controlled Trial Comparing Periarticular Injection and Epidural Analgesia: JB & JS The journal of bone and joint surgery. 2015, v.97, no. 5, p. 367-373.
14. Saigal D., Wason R. Paramedian epidural with midline spinal in the same intervertebral space: An alternative technique for combined spinal and epidural anaesthesia: Indian J Anesth. 2013, v. 57, no. 4, p. 364-370.
15. Stamenkovic D., Geric V., Djordjevic M., Raskovic J., Slavkovic Z., Randjelovic T. et al. Subarachnoid morphine, bupivacaine and fentanyl as part of combined spinal-epidural analgesia for low anterior resection. A prospective, randomised, double-blind clinical trial: Anaesth.Intensive Care. 2009, v. 37, no. 4, p. 552-560.
16. Cook T. M., Counsell D., Wildsmith J. A. W. Major complications of central neuraxial block: report on the Third National Audit Project of the Royal College of Anaesthetists: British Journal of Anaesthesia 2009, v. 102, no. 2, p. 179-190.
17. Stamenkovic D. M., Geric V., Slavkovic Z., Raskovic J., Djordjevic M. Combined spinal-epidural analgesia vs. intermittent bolus epidural analgesia for pain relief after major abdominal surgery. A prospective, randomised, double-blind clinical trial: Int.J.Clin.Pract. . 2008, v. 62, no. 2, p. 255-262.
18. Todorov L., Boncouer T. V. Etiology and Use of the “Hanging Drop” Technique: A Review: Pain Research and Treatment. 2014, Article ID 146750, p. 1-10.
19. Magar J. S., Bawdane K. D., Patil R. Comparison of Efficacy and Safety of Unilateral Spinal Anaesthesia with Sequential Combined Spinal Epidural Anaesthesia for Lower Limb Orthopaedic Surgery: J Clin Diagn Res. 2014, v. 11, no. 7, p. 17-20.
20. Benhamoua D., Bertib M., Brodnerc G., De Andresd J., Draiscie G., Moreno-Azcoitaf M. et al. Postoperative Analgesic Therapy

Observational Survey (PATHOS): A practice pattern study in 7 Central/Southern European countries: Pain. 2008, v. 136, no. 1-2, p. 134-141.

21. Amann M., Proctor L. T., Sebranek J. J., Eldridge M.W., Pegelow D.F., Dempsey J. A. Somatosensory feedback from the limbs exerts inhibitory influences on central neural drive during whole body endurance exercise: Journal of Applied Physiology. 2008, v. 105, no. 6, p. 1714-1724.
22. Soens M. A., Birnbach D. J., Ranasinghe J. S., Zundert A. V. Obstetric anesthesia for the obese and morbidly obese patient: an ounce of prevention is worth more than a pound of treatment. Acta Anaesthesiol Scand. 2008, 52(1):9-19.
23. Karmakar M. K., Li X., Ho A. M.-H., Kwok W. H., Chui P. T. Real-time ultrasound-guided paramedian epidural access: evaluation of a novel in-plane technique. Br J Anaesth. 2009, 102(6):845-854.
24. Van deVeldea M., Berendsa N., Kumara A., Devroea S., Devliegerb R., Vandermeerscha E. et al. Effects of epidural clonidine and neostigmine following intrathecal labor analgesia: a randomized, double-blind, placebo-controlled trial. International Journal of Obstetric Anesthesia. 2009, 18(3): 207–214.
25. Nadir Sh., Brendan C., Ashraf S. H., Lindsay B., Jill M. M., Pervez S. A Systematic Review Evaluating Neuraxial Morphine and Diamorphine-Associated Respiratory Depression After Cesarean Delivery. Anaesthesia & Analgesia. 2018, 127(6): 1385-1395.
26. Gupta D., Srirajakalidindi A., Soskin V. Dural Puncture Epidural Analgesia is not Superior to Continuous Labor Epidural Analgesia. M.E.J. Anaesth.2013, 22(3): 309–316.
27. Carvalho B. Respiratory Depression after Neuraxial Opioids in the Obstetric Setting. Anesthesia & Analgesia: September 2008, Volume 107 - Issue 3 - p 956-961
28. Chakravarthy M., Mattur K., Reddy K., Kumar S., Khaber S. Modified combined spinal and epidural anesthesia. Anesthesia and Intensive Care. 2008, v. 36(5):746-748.
29. Dresner M., Pinder A. Anesthesia for caesarean section in women with complex cardiac disease: 34 cases using the Braun Spinocath® spinal catheter. International Journal of Obstetric Anesthesia. 2009, 18(2): 131-136.
30. Iff I., Franz S., Moens Y. Measurement of the puncture profile and extradural pressure of cattle during extradural anesthesia. Veterinary Anesthesia & Analgesia. 2009, 36(5): 495–501.
31. Higuchi H., Takagi Sh., Onuki E., Fujita N., Ozaki M. Distribution of Epidural Saline upon Injection and the Epidural Volume Effect in Pregnant Women. Anesthesiology. 2011, 114(5): 1155-1161.
32. Okada K, Okada S, Nitshitani K. Effect of epidural pressure gradient on buprenorphine flux through the dural hole after combined spinal–epidural anesthesia. Comparison

between bolus injection and continuous infusion. Masui. 1998, 47: 64–8.

33. Anthony Ch., Carolina B., Chuan-Chin H., Kelly E., Eric C, Julian R. et al. Dural Puncture Epidural Technique Improves Labor Analgesia Quality With Fewer Side Effects Compared With Epidural and Combined Spinal Epidural Techniques: A Randomized Clinical Trial. Anesthesia and Analgesia. 2017, 124(2): 560–569.

34. Wadlund D. L. Local Anesthetic Systemic Toxicity. Aorn Journal: 2017. v. 106(5): p 367-377.

35. Guo J., Sheng R., Yan Ch., Zhao Q., Wei Y., Cao Y. et al. Combined epidural/spinal anaesthesia with new needle-beside-needle technique for caesarean section: a randomized controlled trial. Int J Clin Exp Med. 2018, 11(7):6840-6847.

ثوختة

تەكنيكەكا نوي دژەنجا دەرظەى عەنكەبوتى وستركى يا تێكەل دنەشتەرطەريێن هەستيا يا لەژێن خوارىَ دا.

ئامانج: مەرەم ذ ظيَ ظەكولينىَ تاقي كرنا تەكنيكا ژەنجىَ ية ذ دەرظەي عەنكەبوتى وستركى يا تێكەل ب ژشت بەستن لسەر تيوريا ليَضوويا ضارەسەريا دەرظەى عەنكەبوتى وتيريَذا ستركى.

بابەت**و شێواز:**ژشتي رازيبونا ليذنا رەوشتيَن ژيشكى ورازيبونا نەخوشى، 60 نەخوش يێن ذيىَ وان دناظبەرا 18- 80 سالى داهاتنة ژەنج كرن وباريَ وان يىَ فيزيكى ذ 1-4 لدويف جوينكرنا كومەلا نوذداريَن ژەنجىَ يا ئەمريكى، ب ژەنج كرنا دەرظەى عەنكەبوتى وستركى يا تێكەل بمەرەما ئەنجامدانا نەشتەرطەريێن هەستيكيَن لەژێن خواريَ. ظەكولينىَ ريَكا بەراوردكرنا بەشيَن بەرامبەر ئێكا ضاظەريَكري بكارئينا ونەخوش بؤ دوو طروثا هاتنة دابەش كرن، بؤ هەر طروثەكى 30 نەخووش، دطروثىَ (أ) دا تەكنيك ل جهىَ ظەكولينىَ هاتة بكارئينان ودطروثى (ب) دا ريَكا دەرزيێن جودا جودا هاتة بكارئينان، ظەكولين ل ثاريَزطەها دهوك هاتة ئەنجامدان ل هەر ئێك ذ نەخوشخانەييَن طولان يا طشتى وذيان يا تايبەت ل بەرواري 2017/1/1 تا 2018/2/28.

ئەنجام:قەباريَ بەنجا ژێدظى بو بەرزترين ئاستىَ ژەنجكرنا هەستيارى ودووبارەبونا ذەمەدەرمانيَن لىَ زيَدەكرى ودەمىَ كارتيَكرنا دروست ژتر بو دطروثىَ (أ) دا، ودەربارەى ژەستانىَ دطروثىَ (أ) جيَطيرتربو، هەر وەسا عيَلنجي ودلرابون ذي كيَمتر بو دظى طروثى دا ونەخوشيَن وى شيان لايىَ خؤ يىَ خواريَ زويتر بلظلظينن ذ نەخوشيَن دطروثى (ب) دا.

دەرئەنجام:بكارئينانا ظىَ تەكنيكىَ دژەنجىَدا يا دەرظەى عەنكەبوتى وستركى يا تێكەل دشيان داية بيَتة بەراوردكرن دطەل تەكنيكا دەرزيێن جودا جودا كو جيَطيرترة دضالاكييَن زيندى دا وزيَدەيەكا بەرضاظــ دقەباريَ ژەنجا ژێدظى بو دەرظەى عەنكەبوتى

 https://doi.org/10.31386/dmj.2019.13.1.2

الخلاصة

تقنية جديدة في التخدير خارج العنكبوتية والشوكي الممزوج في عمليات العظام في الاطراف السفلى

الخلفية والأهداف:الغرض من هذه الدراسة هو لاختبار تقنية في التخدير خارج العنكبوتية والشوكي الممزوج اعتمادا على نظرية التسريب الدوائي من خارج العنكبوتية الى السائل الشوكي.

المواضيع و طرق البحث: بعد اخذ موافقة لجنة الاخلاقيات الطبية وموافقة المرضى, تم تخدير 60 مريض تتراوح اعمارهم من 18-80 سنة وحالتهم الفيزياوية من 1-4 حسب تصنيف جمعية اطباء التخدير الامريكية, بالتخدير خارج العنكبوتية والشوكي الممزوج لغرض اجراء عمليات جراحية عظمية للاطراف السفلى. اتبعت الدراسة طريقة مقارنة الاقسام المتقابلة المتوقع وتم تقسيم المرضى الى مجموعتين من 30 مريض لكل واحدة. في المجموعة أ تم استخدام التقنية محل البحث اما المجموعة ب فقد تم استخدام طريقة الابر المنفصلة. تم اجراء الدراسة في محافظة دهوك في العراق في كل من مستشفى كولان العام و مستشفى زيان الاهلي للفترة من 2017/1/1 الى 2018/2/28.

النتائج: كان حجم المخدر اللازم للوصول الى التخدير الحسي الاقصى وتردد الجرعات المضافة والوقت حتى التأثير الفعلي اكثر في المجموعة أ. أما بالنسبة للضغط فقد كان اكثر استقرارا في المجموعة أ. كما كانت هذه المجموعة الاقل في الغثيان والتقيوء واستطاع مرضاها تحريك اطرافهم السفلى اسرع من اقرانهم في المجموعة ب.

الاستنتاجات: ان استخدام هذه التقنية في التخدير خارج العنكبوتية والشوكي الممزوج يمكن مقارنته بتقنية الابر المنفصلة مع استقرار اكثر في الفعاليات الحيوية وزيادة ملحوضة في حجم المخدر اللازم خارج العنكبوتية.