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Original Research Article

A Comparative Study of Effectiveness of Caudal Block using Lignocaine and Lignocaine Combined with Ketamine in Adults Undergoing Anorectal Surgeries

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ABSTRACT

BACKGROUND

This study aims to document the characteristics of caudal epidural block with lignocaine in adults undergoing anorectal surgeries, to assess the effect of adding ketamine as an adjuvant to lignocaine in caudal epidural block, in adults undergoing anorectal surgeries. We also wanted to compare the characteristics of caudal epidural block in lignocaine group and lignocaine with Ketamine group, along with the side effects of lignocaine group and lignocaine with ketamine group.

MATERIALS & METHODS

This was a Randomized control study conducted in the Department of Anesthesiology, Sri Venkateshwara Ramnarayan Ruia (SVRRGGH), Tirupati for 1 year from the date of approval from IEC and scientific committee. Total of 50 patients were selected and divided into two groups and were classified as Group L (n=25) (30 mL of 1.5% lignocaine caudal) and Group LK (n=25) (30ml of 1.5% lignocaine +ketamine 0.5 mg/kg). Patients of age between 20-60 years who were undergoing anorectal surgeries are included and classified as Grade 1 and 2. People who were hemodynamically and neurologically unstable, morbid obese patients, and who did not agree to give written informed consent are excluded.

RESULTS

The mean time to onset of anesthesia was 6.04 and 5.16 in Group C & Group T respectively. Both the groups were compared and found statistically significant (P value < 0.05).Group C had 2.56 and Group T had 3.08 as mean sedation score. Both the groups were compared and found statistically significant (P value < 0.05).

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CONCLUSION
The caudal epidural block (CEB) using 30ml of lignocaine was demonstrated to be safe, reliable, and simple technique for anorectal surgeries in this study involving 50 adult patients. When administered as an adjuvant in sub- anesthetic doses, ketamine significantly enhances both quality and duration of the caudal block, as well as improves patient comfort.

KEYWORDS
Caudal Block, Lignocaine, Ketamine, Anorectal Surgeries, Brewer-Luckhardt Reflex, whoosh Test.

INTRODUCTION

Anorectal disease is widespread in the adult population. They account for approximately 4-5% of the Western literature, of which 10-15% require surgery. Although the procedure itself is brief, anorectal disease requires a very deep level of anesthesia and the shared innervation of the pelvic organs can lead to severe pain, bladder, bowel, and sexual dysfunction. It is unique in that the latter problem is general.[1] The trend in many Western and non-Western countries is to perform minor anorectal surgeries in day care, which is cost effective in developing countries like India.[2] Anorectal surgeries can be performed under general, regional and local anaesthesia. Neither of these methods are ideal. Each has advantages and disadvantages. Appropriate patient selection is critical to the success of these methods. The caudal epidural block in adult patients was perceived as a difficult procedure to perform due to highly variable anatomy of the sacral hiatus in adult patients (unlike pediatric patients), has recently become popular among anesthesiologists after being unpopular for some time.

The predictable degree of block depending on the drug dose, the hemodynamic stability, the ability to create selective block in the anorectal region without inducing leg motor block (and the consequent ability to walk immediately after surgery), lack of posts Dural Puncture Headaches, prolonged postoperative analgesia with long-acting local anesthetics and adjuvants have recently sparked interest in caudal epidurals. As a result, the safety and efficacy of caudal blocks in various surgical and non-surgical procedures have been reported. Caudal blocks have been used successfully in anorectal surgery,[3] orthopedic surgery, urological surgery (such as TURP), gynecological surgery, varicose veins, back and leg pain, and more.

Ketamine, an NMDA (N-methyl-D-apartate) receptor blocker, has been extensively studied as an adjuvant in pediatric caudal as well as epidural block in adults. Studies have been published using ketamine as the sole anesthetic for pediatric caudals. However, in adult populations, results are inconsistent. Some studies have concluded that ketamine prolongs the duration of anesthesia, but some other studies have not confirmed this. Any setbacks due to technical issues can overcome with experience and practice caudal blocks are particularly suitable for ambulatory surgery where early mobilization and lack of postoperative complications are key concerns.

Aim & Objectives

This study aims to document the characteristics of caudal epidural block with lignocaine in adults undergoing anorectal surgeries, to assess the effect of adding ketamine as an adjuvant to lignocaine in caudal epidural block, in adults undergoing anorectal surgeries. We also wanted to compare the characteristics of caudal epidural block in lignocaine group and lignocaine with

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ketamine group, along with the side effects of lignocaine group and lignocaine with ketamine group.

MATERIALS AND METHODS

This was a Randomized control study conducted in the Department of Anesthesiology, Sri Venkateshwara Ramnarayan Ruia (SVRRGGH), Tirupati for 1 year from the date of approval from Institutional Ethics Committee (IEC) and scientific committee. This study was conducted in 50 ASA 1 and 2 patients between 20-60 years who were scheduled for anorectal surgeries. They were randomly divided in to 2 groups 25 each. The proposed study was conducted in the Department of Anesthesiology.

Inclusion Criteria & Exclusion Criteria

Patients of age between 20-60 years who were undergoing anorectal surgeries were included and classified as Grade 1 and 2 under American Society of Anesthesiology and patients who had given valid informed consent. People who were hemodynamically and neurologically unstable, morbid obese patients and lack of written informed consent were excluded. Materials includes were Lignocaine - 1.5%, Preservative free Ketamine, 18-gauge needle, Syringe -10 ml, Povidone Iodine, Spirit, Sterile drapes and gloves.

Methods

After obtaining approval from the Ethics Committee of hospitals, 50 patients with ASA 1 and 2 were enrolled in the study with their consent. Patients were randomly assigned to one of two groups by means of a computer-generated random table and sealed opaque envelopes. Randomization was performed prior to study initiation. During the study period, 50 patients were recruited. Blinding was ensured by having an independent anesthesiologist not participating in the study who prepared the medication in a total volume of 30 ml of drug in a ready-to-inject form. The two groups were classified as Group L (n=25): 30 mL of 1.5% lignocaine caudal and Group LK (n=25): 30ml of 1.5% lignocaine +ketamine 0.5 mg/kg. All patients were visited as part of pre-anesthetic management. A general and systemic survey was performed. All patients were informed about the procedure. Demographics such as age, sex, weight, body mass index, and American Society of Anesthesiologists (ASA) physical condition were recorded. All patients received Tab.alprazolam 0.25 mg and Tab. ranitidine 150 mg orally the night before surgery and the morning of surgery.

Study Procedure

Upon arrival at the operating room, an 18 G peripheral IV line was secured and monitored vital signs. Lactated Ringer's solution was infused intraoperatively at a rate of 6 mL/kg/h. After the patient was placed in the semi-prone position on the table, sacral region was painted thoroughly with povidone-iodine solution and then with surgical spirit, a sterile towel was used to expose the sacral landmarks. Anatomical landmarks were examined both by inspection and palpation.

After locating the sacral hiatus by palpating the cornua, local anesthetic was infiltrated intradermally around the hiatus using a small gauge needle. Sacrococcygeal membrane was punctured using an 18-gauge needle at a 90 degree angle to the skin. The needle was then descended to 60 degrees towards the coccyx and advanced a few centimeters, not more than 4 centimeters. Loss of resistance was used to confirm the epidural space. The WHOOSH test is also performed by keeping a stethoscope to the lumbar spine. After confirming by the above method and aspirating CSF or blood, a test dose of 2 mL of local anesthetic was injected and

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waited for side effects. Patients were continuously monitored for pulse rate and other vital signs. After making sure no medicine has entered the subarachnoid space or vein, the rest of the medicine was injected under supervision. Attention was paid to the development of subcutaneous swelling.

After a successful drug injection, the patient was placed in a supine position. After 5 minutes, perineal sensation was tested for temperature and touch. After the appropriate level of sensory loss was achieved, the patient was placed in the lithotomy position and surgery was started. If after 20 minutes the anesthesia has not worked or the anesthesia is weak, the patient can detect the needle prick, the caudal block is considered unsuccessful and another anesthetic technique such as a subarachnoid block or general anesthesia was used and the patient was excluded from the study. Study parameters were, time to first appearance of Anaesthesia, time to start surgery, sensory dermatome level, motor blockade in the lower limbs, presence of pain due to lithotomy position, anal sphincter relaxation, sedation score, intra operative complications, patient satisfaction level, surgeon satisfaction level, duration of analgesia, post-operative complications, hypotension during surgery. Sensory level was assessed clinically. Dermatome – Score was assessed based on T 8 – 8; T 9 - 9 T10 - 10 T 11 - 11 T 12 - 12 L 1 -13 L2 – 14. Motor blockade was assessed with Modified Bromage Scale. Intraoperative complications included pain, bradycardia, tachycardia, hypertension, hypotension, cardiac arrest, arrhythmia, bronchospasm, laryngospasm, seizures, and Brewer-Luckhardt reflex. Duration of Analgesia: Time from initial onset of anesthesia to first postoperative pain sensation. Postoperative Complications such as urinary retention, nausea, vomiting, permanent nerve injury, and meningitis were observed. Additionally, a decrease in systolic blood pressure (Intraoperative hypotension) was observed.

RESULTS

All the collected data was double checked to exclude any clerical errors, statistical analysis was performed using the statistical package for the social sciences version 24.0. Statistical analysis was performed using Student's t-test -mean of control and test groups for each parameter examined with the baseline data. There were 2 errors out of 50 investigated, resulting in a failure rate of 4%. This is mainly due to difficulty in identifying sacral landmarks. Among the total cases, 12 cases in Group C and 18 cases in Group T were males. 13 cases in Group C and 7 cases in Group T were females. The mean age of Group C cases was 39.92 and in Group T cases it was 47.160. The mean weight of Group C was 52.2 and for Group T was 52.4. The mean duration of surgery for Group C was 40.2 and in Group T was 40.4(table 1).The mean time to onset of anesthesia was 6.04 and 5.16 in Group C & Group T respectively. Both the groups were compared and found statistically significant (P value < 0.05) (table 2).The mean time to start surgery was 11.44 and 10.48 in Group C & Group T respectively. Both the groups were compared and found statistically significant (P value < 0.05) (table 2). Among the total cases, 18 cases were at L4, 7 cases were at L3 in Group C with respect to dermatomal level at 5 minutes. The same with Group T: 7 cases were at L3 and 18 cases at L2. Both the groups were compared and there was a statistical significance (p value < 0.05) (table 3). Among the total cases, 9 cases were at L3, 15 cases were at L2 and 1 case at L1 in Group C with respect to dermatomal level at 10 minutes. The same with Group T: 15 cases were at L1 and 10 cases at T12. Both the groups were compared and there was a statistical significance (p value < 0.05)(table 3).Among the total cases, 12 cases were at T12 and 13 cases were at T10 in Group C with respect to dermatomal level at 15 minutes. The same with Group T: 3 cases were at T12 and 22 cases at T10. Both the groups were compared and there was a statistical significance (p value < 0.05) (table 3).Both the groups were compared

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with regard to motor blockade at 5 minutes and all the cases showed 0. Both the groups were compared with regard to motor blockade at 10 minutes and all the cases showed 1(table 4).Both the groups were compared with regard to motor blockade at 15 minutes and all the cases showed 2.(table 4).Group C had 1.80 and Group T had 1.92 mean sphincter relaxation score. Both the groups were compared and found statistically significant (P value < 0.05). The mean positional pain score was 0.16 and 0.08 in Group C & Group T. Both the groups were compared and found statistically significant (P value < 0.05) (table 5).The mean patient satisfaction score in Group C was 1.80 and in Group T was 1.84. Both the groups were compared and found statistically significant (P value < 0.05) (table 5).Group C had mean satisfaction score 1.52 and Group T had 1.84 for the same. Both the groups were compared and found statistically significant (P value < 0.05)(table 5)**.**Among the study population, mean time to perception of post OP pain was 251.2 and 262.4 in Group C & Group T respectively. Both the groups were compared and found statistically significant (P value < 0.05).5 cases in Group C & no cases in Group T were found to be hypotensive. Group C had 2.56 and Group T had 3.08 as mean sedation score. Both the groups were compared and found statistically significant (P value < 0.05) (graph 1).

Duration of Surgery (In Minutes)	**Group C**	**Group T**
	Mean ± SD	**Mean ± SD**
	40.200 ± 12.540	40.400 ± 12.741
Table 1: Duration of Surgery Distribution		

Mean Time to Onset of Anesthesia (in Minutes)	**Group C**	**Group T**	**P Value**
	Mean ± SD	**Mean ± SD**	0.045
	6.04 ± 1.51	5.16 ± 1.75	
Mean Time to Onset of Anesthesia			
Mean Time to Start Surgery (in Minutes)	**Group C**	**Group T**	**P Value**
	Mean ± SD	**Mean ± SD**	
	11.44 ± 1.83	10.48 ± 1.64	0.008
Mean Time to Start Surgery Distribution			
Table 2			

Dermatomal Level at 5 Minutes	**Group C**		**Group T**		**P Value**
	No of Cases	**Percentage**	**No of Cases**	**Percentage**	
L4	18	28.0	-	-	0.000
L3	7	72.0	7	28.0	
L2	-	-	18	72.0	
Total	25	100.0	25	100.0	
Mean Sensory Dermatomal Level at 5minutes					
Dermatomal Level at 10 Minutes	**Group C**		**Group T**		**P Value**
	No of Cases	**Percentage**	**No of Cases**	**Percentage**	
L3	9	36.0	-	-	0.000
L2	15	60.0	-	-	
L1	1	4.0	15	60.0	
T12	0	-	10	40.0	
Total	25	100.0	25	100.0	
Mean Sensory Dermatomal Level at 10minutes					

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Dermatomal Level at 15 Minutes	Group C		Group T		P Value
	No of Cases	Percentage	No of Cases	Percentage	
T12	12	48.0	3	12.0	0.000
T10	13	52.0	22	88.0	
Total	25	100.0	25	100.0	
Mean Sensory Dermatomal level at 15 minutes					
Table 3					

Motor Blockade at 10 Minutes	Group C		Group T		P Value
	No of Cases	Percentage	No of Cases	Percentage	
1	25	100.0	25	100.0	--
Total	25	100.0	25	100.0	
Motor Blockade At 10 minutes					
Motor Blockade at 15 Minutes	**Group C**		**Group T**		**P Value**
	No of Cases	**Percentage**	**No of Cases**	**Percentage**	
2	25	100.0	25	100.0	--
Total	25	100.0	25	100.0	
Motor Blockade at 15 minutes					
Table 4					

Mean Positional Pain Score	Group C	Group T	P Value
	Mean ± SD	Mean ± SD	
	0.16 ± 0.37	0.08 ± 0.28	0.035
Mean Positional Pain Score Distribution			
Mean Patient Satisfaction Score	**Group C**	**Group T**	**P Value**
	Mean ± SD	**Mean ± SD**	
	1.80 ± 0.41	1.84 ± 0.37	0.002
Mean Patient Satisfaction Score Distribution			
Mean Surgeon Satisfaction Score	**Group C**	**Group T**	**P Value**
	Mean ± SD	**Mean ± SD**	
	1.52 ± 0.51	1.84 ± 0.37	0.002
Mean Surgeon Satisfaction Score Distribution			
Table 5			

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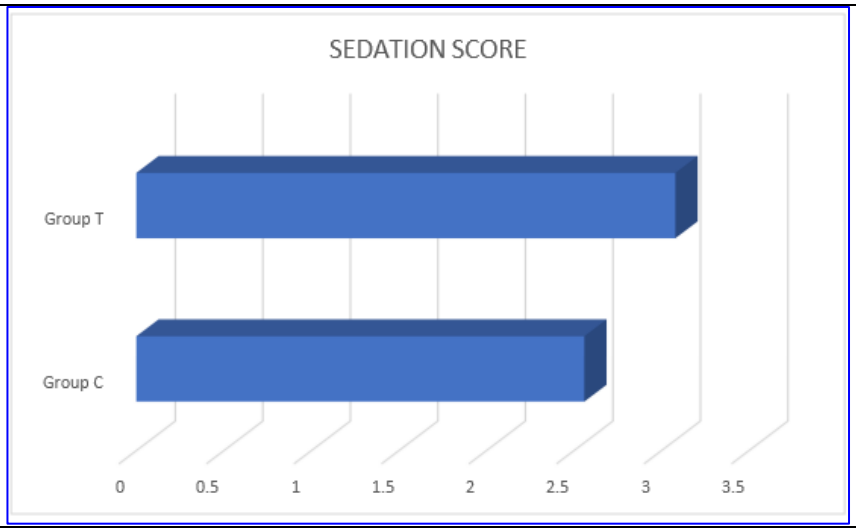

Graph 1: Sedation score

DISCUSSION

This study was conducted in Sri Venkateshwara government general hospital, a double-blind randomized control trial in 50 adults undergoing anorectal surgeries aged 20-60 years, falls under ASA grade 1 and 2. The aim was to compare the result of caudal blockade in adults undergoing anorectal surgeries using lignocaine (1.5%) and lignocaine with ketamine (0.5mg/kg). The findings substantiate the conclusions reached by a number of other research projects regarding the security and ease of caudal epidural block administration during anorectal procedures. It is important to emphasise that none of the patients who received caudal blocks experienced any serious complications either during the operation or during the subsequent recovery period.. In this study, an attempt was made to evaluate the effectiveness of caudal blocks in adult anorectal operations using lignocaine alone and in combination with ketamine.

O Tahsein Simsek[4] et al (2021) in his study found that when comparing the caudal group with saddle group, both the amount of post-operative analgesic medication used and the number of patients requiring analgesic medication were significantly lower in the caudal group (p less than 0.05). It was discovered that the first analgesic demand time in the saddle group was a significantly shorter than the caudal group (p 0.05). In this particular trial, the caudal group with ketamine got findings that were considerably superior with (p-< 0.05) to those of the dorsal group in terms of post-operative analgesic consumption, the number of patients who needed analgesic agent, and the amount of time that their initial analgesic requirements were met. The current study the ketamine group had total analgesia time of mean 262.4+/-24.37 which was more than lignocaine group 251.2+/- 28.77 significant statistically, this study was carried out for anorectal procedures which are more painful postoperatively. Researchers from Locaitellie et al. (2008) attempted to reduce the amount of levobupivacaine that was given during caudal anaesthesia without compromising the therapeutic effectiveness of the medication.[5] The results of the research indicated that there was no appreciable difference in terms of effectiveness between the groups at the time of the primary surgical incision. In Group 2, the need for analgesic medicine was significantly decreased at awakening, 180 minutes, and 360 minutes after the procedure when compared to Group 3. The amount of time it took for patients in Group 2 to obtain their initial rescue analgesia was significantly longer when compared with the amount of time it took for patients in Group 1 or Group 3. Here we compared the satisfaction level of patient regarding

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procedure in both groups where the test group had a mean of 1.84+/-0.37 and 1.80+/-0.41 in control group. P – value 0.02 significant statistically. We conducted our study in procedures of average 40-45min duration within 2 groups, which had a significant patient satisfaction in test group compared to control. Polushin et al. (1998)[6] investigated and found that the mean muscle power in the Ketamine group is significantly higher when compared to the control group.[6] This could be because of the early onset of sensory block in the ketamine group, which occurred prior to the onset of motor block. In our study the motor blockade score was 0 according to Modified Bromage scale in both groups at 5min duration, score 1 in 10 minutes, 2 in 15 minutes of after giving anaesthesia. Here we come to a conclusion that there was no significant variation in motor blockade in both groups. That is with ketamine there was a significant higher sensory blockade but no difference with in the motor blockade according to our study. However, it should be noted that none of the patients described the discomfort associated with posture as being very severe. The level of discomfort was easily bearable. This was confirmed by the findings of the current research, where we compared the mean positional score in both groups, it is 0.16+/-0.37 in lignocaine group, 0.08+/-0.28 in ketamine group. The test group had less pain than control group which signifies that ketamine had better effect in reducing the positional pain. We compared the patient satisfaction score based on this, in which ketamine group had significant 1.84+/-0.37 mean value superior to that of control group 1.80+/-0.41. Additionally, in the earlier study, the incidence of hypotension has never happened in the ketamine group, however in the control group there was a mean decrease of 4.3 mm of Hg which is not significant. In the current investigation, there were 5 cases found to be hypotensive in the control group, whereas there were no cases found to be hypotensive in the ketamine group. David M Polaner conducted studies with 0.25% bupivacaine with and without epinephrine in 2006[7] found that addition of epinephrine prolonged duration of analgesia.

A study by Sanghvi et al in 2022[3] reported that caudal anesthesia can be used as the only anesthetic technique in subumbilical procedures, chronic low back pain and radiculopathy avoiding the risks associated with general anesthesia. Here in the present study we used caudal block as a sole anaesthetic technique for anorectal procedures like hemorroidectomy, fistula in ano. In our study we had not supplemented with any sedation medication. In 2019, Marion Wiegele performed a caudal epidural block in a pediatric patient and found that ketamine[8] binds to spinal opioid and N- methyl-D-aspartate receptors without respiratory side effects. Wong et al.[9] reported the excellent success rate of 95.9% for the caudal epidural block. A study was performed by Chen et al.[10] indicated that his ultrasound-guided needle placement for epidural block was 100% successful. Michael Gropper study on caudal anaesthesia in 2020,[11] taken various advanced caudal techniques as primary study used prone position for caudal block in adults. We in our study used semi prone position for caudal technique, as it allows good access to airway along with sacral hiatus landmarks. Kenneth D Candido in 2005.[12] used 1% lignocaine and 0.25% bupivacaine for caudal anaesthesia, studied anal sphincter laxity as a secondary outcome in his study. Studies resulted that group B had good relaxation than group L, with sensory analgesia up to T_{12}. In the present study, ketamine group had mean sphincter relaxation score of 1.92+/-0.28 with statistical significant difference compared to lignocaine group 1.80$\pm$0.41 .However, such studies on the efficacy of ketamine in prolonging postoperative analgesia in adult patients are rare. The current study was conducted to clarify this controversial aspect.

CONCLUSION

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The caudal epidual block (CEB) using lignocaine 30 ml was shown to be a safe, reliable, and simple technique for anorectal surgeries in this study involving 50 adult patients. When used as an adjuvant in sub- anesthetic doses, ketamine significantly enhances the quality and duration of the caudal block and improves patient comfort. However, this technique can be challenging to perform in obese patients and is limited by the wide variations in sacral anatomy. ,

REFERENCES

[1] Foxx-Orenstein AE, Umar SB, Crowell MD. Common anorectal disorders. Gastroenterol Hepatol (NY) 2014;10(5):294-301.
[2] Lacy BE, Weiser K. Common anorectal disorders: Diagnosis and treatment Curr Gastroenterol Rep 2009;11(5):413-9.
[3] Sanghvi C, Dua A. Caudal anesthesia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing 2024.
[4] Şimşek T, Saraçoğlu A, Zengin Ü, Yılmaz M, Saraçoğlu KT. Regional anesthesia for anorectal surgeries: what is the best solution? Southern Clinics of Istanbul Eurasia 2021;32(2):195-200.
[5] Locatelli BG, Frawley G, Spotti A, Ingelmo P, Kaplanian S, Rossi B, et al. Analgesic effectiveness of caudal levobupivacaine and ketamine. Br J Anaesth 2008;100(5):701-6.
[6] Polushin IS, Rostomashvili ET, Levshankov AI, Kostiuchenko AL, Bogatova GP. Prospects of the use of caudal epidural anesthesia. Anesteziologiia i reanimatologiia 1998;(5):42-4.
[7] Polaner DM. Anaesthesia for paediatrics same day procedures. Chap- 19, In: Davis PJ, ed. Smith's Anaesthesia. 7th edn. Philadelphia: Elsevier 2006:488-9.
[8] Wiegele M, Marhofer P, Lönnqvist PA. Caudal epidural blocks in paediatric patients: a review and practical considerations. Br J Anaesth 2019;122(4):509-17.
[9] Wong SY, Li JY, Chen C, Tseng CH, Lion SC, Tsai SC, et al. Caudal epidural block for minor gynecologic procedures in outpatient surgery. Chang Gung Med J 2004;27(2):116-21.
[10] Chen, S., Wei, A., Min, J. Li L, Zhang Y. Comparison of ultrasound-guided caudal epidural blocks and spinal anesthesia for anorectal surgery: a randomized controlled trial. Pain Ther 2022;11(2):713-21.
[11] Brown DL. Spinal, Epidural, Caudal anaesthesia. Chap- 51. In: Gropper MA, ed. Miller's anesthesia. 7th edn. Philadelphia: Elsevier 2020:1614-22.
[12] Candido KD. Caudal anaesthesia. Chap- 13. In: Essentials of pain medicine and regional anaesthesia. 2nd edn. Philadelphia: Elsevier 2005:339-42.