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Anesthetic Management of Wilms' Tumor Patient Using Thoracal Epidural Block: A Case Report

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A B S T R A C T

Introduction: Wilms' tumor or nephroblastoma is an embryonal tumor that develops from the remaining immature kidney and is the fourth most common primary renal tumor malignancy in children. An asymptomatic abdominal mass is present in more than 90% and hematuria in 30% of patients. Preoperative workup includes complete laboratory blood tests and imaging to ensure intrarenal mass. This study aimed to describe the anesthetic management of Wilms' tumor patients. **Case presentation:** A two-year-old girl was diagnosed with Wilms' tumor with the main complaint of intermittent hematuria. An abdominal CT scan showed an enlargement mass in the right kidney with a size of +/- 7.4 x 5.9 x 9.5 cm. The patient was planned for radical nephrectomy. In addition to general anesthesia, an epidural catheter is placed at the 10th-11th thoracic level (T10-T11). **Conclusion:** Epidural placement in pediatrics undergoing abdomen surgery have various beneficial considerations, such as superior analgesia, minimal opioid use, reduced intraoperative bleeding, and decreased postoperative ventilator requirements.

1. Introduction

Wilms' tumor is an embryonal tumor that develops from an immature remnant kidney.[1] Approximately 75-80% of cases occur before the age of 5 years, with a median age of 3.5 years. The majority of patients present with an abdominal mass, abdominal pain, hypertension, or hematuria.[1,2] Preanesthetic evaluation includes ultrasound and computed tomography (CT) scans, complete blood count (CBC), renal function, hepatic function, and coagulation tests.[2] Anesthetic considerations in Wilms' tumor surgery lie in the size of the abdominal mass as it may affect the duration of surgery, potential fluid disturbances, significant bleeding, thermoregulatory disorders, inferior vena cava suppression, history of chemotherapy, and paraneoplastic tumor phenomena such as hypertension and clotting disorders.[4] Pain-free, minimal stress duration of hospitalization are the implications of perioperative pain management through the epidural catheter.[3] This study aimed to describe the anesthetic management of Wilms' tumor patients.

2. Case Presentation

A 2-year-old girl was admitted to Prof. Dr. I.G.N.G Ngoerah General Hospital with a complaint of hematuria which was aggravated by strenuous activity and manipulation of the right abdominal area for 4 months. The patient has undergone a diagnostic evaluation of abdominal CT scan showing a solid mass on the upper to lower pole of the right kidney that extends and constricts the right pelvicalyceal system with claw sign positive, measured +/- 7.4 x 5.9 x 9.5 cm without any other organ involvement.

Although the physical examination revealed hematuria, the blood test revealed hemoglobin 10.90 g/dL and hematocrit 34.1%. Platelets in the patient were found to be elevated, PLT 536,000 /µL without any disturbance in blood clotting function. Laboratory examination of electrolytes, renal function, and hepatic function showed no significant abnormalities.

In preparation for surgery, two intravenous lines, a mattress warmer, plastic wrapping, a fluid warmer, and blood crossmatch preparation was prepared. Before entering the operating room, premedication was given midazolam 1 mg IV (0.1 mg/kg) and ketamine 5 mg IV (0.5 mg/kg). Induction with sevoflurane 8%, fentanyl 25 mcg IV (2 mcg/kg), and intubation facility atracurium 6 mg IV (0.5 mg/kg). After 5 minutes, direct laryngoscopy and endotracheal intubation with a 4.0 cuffed endotracheal tube were performed. After that, the patient was positioned in lateral decubitus with flexion of the knees and chest, identification of the vertebra gap between the T10-T11. After sterile preparation and draping, local infiltration of lidocaine 2% was given in the injection area. A continuous-loss-of-resistance technique with saline fluid was used to confirm the epidural space. This technique uses a 20G Tuohy needle, and a loss-of-resistance of 1.5 cm is obtained. After that, an epidural catheter was inserted in the cephalad direction, and a catheter length of 5 cm was left from the skin. The regimen given was bupivacaine 0.25% volume 8 cc. Maintenance anesthesia using sevoflurane 2-2.5% and controlled with pressure control mode ventilation.

The duration of surgery was 85 minutes, and intraoperative opioids using fentanyl 25 mcg IV at induction only. Intraoperative bleeding was 5 cc with 50 cc urine, while the intravenous fluid given was 50 cc crystalloid. Hemodynamic balance during surgery is summarized in Figure 2. Postoperatively, the patient had no complaints with multimodal pain management, which was epidural bupivacaine 0.1% + morphine 0.3 mg volume 3 ml every 12 hours and paracetamol 150 mg every 8 hours IV. After 1 day in the PICU room and 2 days of hospitalization, the patient had no complaints and appeared active, and the surgeon planned to discharge the patient so that the anesthesiologist removed the epidural catheter in the patient. The epidural catheter was confirmed to be removed intact, and there was no hematoma or signs of infection from the epidural needle puncture. The patient was discharged without any complaints of pain during the postoperative period.

3. Discussion

Perioperative anesthesia management of Wilms tumor in pediatrics requires some special considerations. Preanesthesia evaluation includes genetic abnormalities, paraneoplastic syndrome, signs of complications from tumor compression in the abdominal cavity, use of chemotherapy, and metastases. This will greatly affect the pre-anesthesia preparation and preparation for surgery.[2]

In this patient, from the pre-anesthesia evaluation, almost no significant abnormalities were found that could affect the management of anesthesia durante and postoperatively. Some potential special problems, in this case, need to be identified, such as massive bleeding, hypotension, and hypertension.[2,5] The potential for massive bleeding is due to manipulation and possible adhesions to the blood vessels. Hypertension can occur due to elevated renin levels secondary to renal ischemia produced by mechanical compression of the renal artery, secretion of renin by the tumor itself, and a possible pressor substance produced by the tumor. During surgery, hypertension can occur due to excessive renin release from tumor compression5,6, but this can often be prevented by good communication with the operator. Hypotension can also occur due to massive bleeding or pressure on the vena cava due to manipulation that can decrease venous return.

Figure 1. Hemodynamic monitor before and after epidural block.

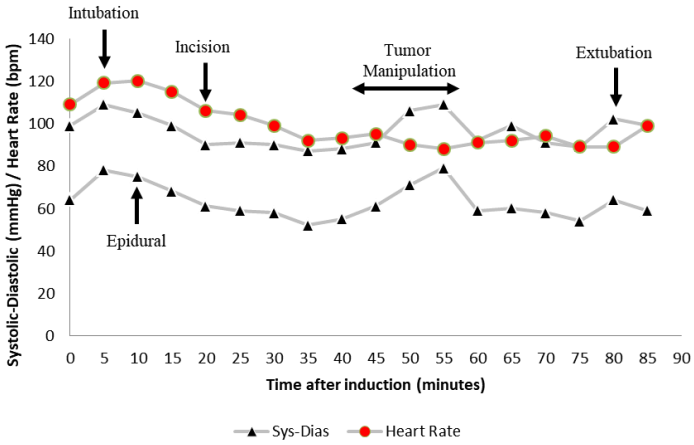

Figure 2. Hemodynamic during operation.

There was a minimal hemodynamic disturbance that occurred while releasing the tumor from the adhesions in this patient. Epidural placement is done with various considerations, such as major laparotomy surgery and manipulation of blood vessels can cause massive bleeding risk, high pain risk, and hemodynamic instability.[6,7] Consideration that the risk of postoperative pain is high so as to minimize the dose of opioids and general anesthetic drugs, using an epidural block is recommended choice.[3,7] The risk of bleeding is controlled due to decreased intra-arterial pressure and decreased venous tone.[8] Decreased intra-arterial pressure due to local sympathetic blockade while decreased venous tone results in venous congestion in more caudal areas.

The use of pediatric epidural is indicated in all abdominal, retroperitoneal, pelvic, and thoracic surgeries. Absolute contraindications such as backbone malformations, blood clotting disorders, infection at the puncture site, allergies, and increased intracranial pressure should be investigated.[7] Tuohy needle depth is estimated by the formula 0.8+(0.05 x weight in kilograms).[3] The epidural target is adjusted to the dermatome and viscerotome, which is T6-T12. Then estimated, the tip of the catheter to T8-T9 with a volume of bupivacaine regimen 0.25% volume of 5 mL and the length of the catheter in the epidural space 3.5 cm to get the expected target dermatome and viscerotome. Determination of 0.25% bupivacaine volume was obtained from 0.75 cc/kg.[7] Meanwhile, the postoperative epidural regimen uses a combination of local anesthesia and opioids, namely bupivacaine 0.125-0.25% volume of 0.1-0.3 cc/kg and morphine at a dose of 30 mcg/kg every 8 hours.[7] In pediatrics, a higher volume of local anesthesia is required, but the level of local anesthesia is lower due to anatomical immaturity.[3,7]

A previous study reported Wilms tumor with a size of 15% larger accompanied by the mass pushing towards the lung, resulting in desaturation.[4] In addition to general anesthesia, an epidural was placed at T9-T10 using a regimen of ropivacaine, opioid fentanyl, and epinephrine, also the addition of parenteral analgetic fentanyl 50 mcg before incision. The use of epinephrine can maximize the analgesic effect obtained from fentanyl in the epidural.[4] In this study, epidural installation used pure local anesthesia, namely bupivacaine 0.25% volume of 8 cc. The addition of opioid analgesic drugs before the incision was also not done. However, the patient's hemodynamics were found to be quite stable without any hypotensive or tachycardia phase due to pain.

The addition of adjuvant epinephrine to the epidural is also recommended as one of the prevention of systemic toxicity of local anesthetics.[3] Physiologically, pediatric patients have relatively higher cardiac output and regional blood flow than adults, so anesthetic drugs can reach peak plasma quickly. Epinephrine administration in the epidural can cause vascular constriction so that the absorption of local anesthetics is slower.[3] While the case report did not use epinephrine with consideration of the use of bupivacaine, 0.25% dose is far from the maximum dose of local anesthetic bupivacaine 0.5% is 2.5 mg/kg.

Epidural placement by Matinyan et al. used a test dose of 0.5 cc lidocaine 2% to exclude extradural placement.[4] This is a shortcoming of our case report, which is that the test dose is quite crucial to determine whether the epidural catheter is properly in the epidural or intravascular space. Test dose using epinephrine 0.5 mcg/kg can also predict intravascular injection. However, this case report uses aspiration tests to avoid total spinal and intravascular injections.[3]

A previous study on anesthesia management in children with Wilms tumors stated that better results of pain control in children with epidural analgesia and reduced epidural complications when the catheter is placed by experienced providers.[10-12] Epidural anesthesia is associated with lower systemic opioid use and better pain scores than intravenous analgesic drug administration.[9,13,14] But on the other hand, there is a greater anesthesia cost in the use of epidural catheters compared to the use of intravenous opioid analgesics through patient-controlled analgesia.[10] Other advantages of using an epidural include an earlier mobilization process, reducing the duration of the catabolic state, and reducing stress hormones. Advantages are also obtained from the hospital itself, such as easier pain-free nursing of pediatric patients and reducing the need for postoperative ventilators, which is very useful in health facilities with limited PICU facilities to shorten hospitalization time.[3,7]

4. Conclusion

Nephrectomy for Wilms tumor is one of the challenges of pediatric anesthesia. Preanesthesia preparation relates to hypertension control, analgesia plan, postoperative care site, transfusion strategy, and management of intravascular extension. The potential for massive bleeding and hemodynamic instability can be mitigated by good intraoperative communication between anesthesiologist and surgeon. In addition, the use of a thoracic epidural block facilitates durante and postoperative anesthesia management, thus improving patient safety and comfort.

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