Anesthetic Management for Lower Extremity Fractures Surgery in a Patient with Eight Weeks of Gestation: Case Report

Sekiz Haftalık Gebeliği Olan Hastada Alt Ekstremite Kırık Cerrahisi İçin Anestezi Yönetimi

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ABSTRACT Both anesthetic techniques and surgery in the first trimester can adversely affect fetal development during pregnancy and may cause premature birth, fetal abnormalities, spontaneous abortion and lower birth weight. Especially, the organogenesis period (from 18 to 58 days after conception) has maximum sensitivity to teratogens and anesthetic agents. A 26-year-old, previously healthy female was admitted to the Emergency Department with shaft fracture of the left tibia and fibula. Eight weeks of gestation was defined via obstetrics ultrasound. Using combined spinal-epidural anesthesia with 2% lidocaine in a graded fashion provided safe anaesthesia for both the mother and the developing fetus. This case presents the anesthetic approach in a patient with first trimester pregnancy that underwent a surgery due to left tibia and fibula fractures. If non-obstetric surgery is inevitable in the first trimester, the safest anesthesia for both the mother and the baby must be preferred.

Key Words: Pregnancy; anesthesia; tibial fractures; surgery

ÖZET İlk trimesterde yapılan ameliyat ve kullanılan anestezi teknikleri, gebelik süresince fetüsün gelişimini olumsuz etkileyebilir ve erken doğum, fetal anormallikler, spontan abortus ve düşük doğum ağırlığına sebep olabilir. Özellikle, organegenezis dönemi (konsepsiyondan sonraki 18'den 58. güne kadar olan dönem) teratojenlere ve anestezik ajanlara en fazla duyarlılığa sahiptir. Daha önceden sağlıklı olan 26 yaşındaki kadın hasta sol tibia ve fibula kırığı ile Acil Servis'e müracaat etti. Obstetrik ultrason ile 8 haftalık gebelik tespit edildi. Kombine spinal-epidural anestezi kullanılarak %2 lidokain solusyonunun kademeli şekilde uygulanması ile anne ve gelişmekte olan fetüs için güvenli anestezi sağlandı. Bu vaka raporunda sol tibia ve fibula kırığı sebebi ile ameliyat geçiren ilk trimester gebeliği olan bir hastadaki anestezi yaklaşımı sunulmuştur. Eğer ilk trimesterde cerrahi müdahale kaçınılmaz ise anne ve bebek için en güvenli olan anestezi tercih edilmelidir.

Anahtar Kelimeler: Gebelik; anestezi; tibia kırıkları; cerrahi

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Approximately 0.5-2% of all pregnant women undergo non-obstetric surgery during gestation.[1] Operations during pregnancy may be related to pregnancy such as cerclage or unrelated to pregnancy such as cholecystectomy or trauma. The type of anesthetic technique is important in all trimesters of pregnancy due to the maternal and neonatal side effects. Especially, the organogenesis period (from 18 to 58 days after conception) has maximum sensitivity to teratogens and anesthetic agents.[2,3] Both anesthetic techniques and surgery in the first trimester can adversely affect fetal development during pregnancy and may cause premature birth, fetal abnor-

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malities, spontaneous abortion and lower birth weight.[4,5] We reported the case of a patient with 8 weeks of pregnancy who underwent successful fracture surgery under combined spinal-epidural anaesthesia.

CASE REPORT

Written informed consent was obtained from the patient for publication of this case report. A 26-year-old, previously healthy female was admitted to the Emergency Department with shaft fracture of the left tibia and fibula. Her Glasgow Coma Scale was 15. The patient was hemodynamically stable. Eight weeks of gestation was defined via obstetric ultrasound. Fetal heart rate was reactive and 150 beat.min^{-1}. Preoperative laboratory findings including hemoglobin, platelet counts and international normalized ratio were within normal limits. Prior to entering the operating room, intravenous (iv) administration of metoclopramide and a histamine 2 receptor antagonist were done against the risk of aspiration. Later, the patient was taken to the operating room and standard monitoring included non-invasive arterial pressure, electrocardiogram and pulse oximetry was established.

Her mean arterial pressure (MAP) was 110/70 mmHg, heart rate (HR) was 102 bpm and oxygen saturation was 93%. A combined spinal-epidural anesthesia in the sitting position was planned. Ringer Lactate solution (15 mL/kg/min) was infused as a bolus for 15 minutes. During the procedure, 2-3 L/min of O_2 with a face mask and 8 mL/kg/h of Ringer Lactate solution were administered. After skin infiltration with 2% lidocaine, 18G Tuohy needle (Set for combined-spinal and epidural anaesthesia, Braun®, Melsungen, Germany) was inserted through the L_{2-3} intervertebral space with loss of resistance technique. The needle was filled with saline and epidural space was localized when a clear loss-of-resistance of saline was detected. Later, spinal anesthesia was established with 1.5 mL 2% lidocaine through a 27-gauge pencil point needle using the needle-through-needle technique. Epidural catheter was then inserted 5 cm into the epidural space. Following the placement of an epidural catheter, the patient was placed in supine with left lateral tilt for prevention aortocaval compression. The adequacy of the block was assessed by loss of cold sensation (pin-prick test) to T_{10} bilaterally. But, sensory level reached the level of T_5 bilaterally in a 10-minute period in this presented case. To prevent the rise in the level of block, the upper part of the operating table was raised automatically, and then surgical procedure was initiated. Five mL boluses of 2% lidocaine were administered in a graded fashion (30 and 60 minutes of operation) through the epidural catheter as needed to achieve a sensory level of T_{10}.[6,7]

The operation proceeded comfortably without pain. Bradycardia (HR below 60 bpm) and hypotension (a decrease of >30% in MAP) were not observed during operation. The operation continued for 80 minutes without complication. Postoperative analgesia was provided with iv paracetamol 1g and followed by further doses on request. The epidural catheter was removed after 2 hours. Amoxicillin was administered for three days and she was discharged from hospital four days after surgery. Seven months later, spontaneous labour began at 39 gestation weeks. A healthy baby was delivered with a birth weight of 3500 g and Apgar scores of 9 and 10 at 1 and 5 minutes, respectively.

DISCUSSION

This case presents the anesthetic approach in a patient with first trimester pregnancy who was performed surgical correction due to left tibia and fibula fractures. Lidocaine was preferred as a local anesthetic drug in this case. Because, it was classified as a category B by the FDA in pregnancy. There is no controlled study in human pregnancies. But, doses up to 6.6 times the human dose have not been detected to be harm for fetus in pregnant rats.[8]

The researchers questioned the effects of anesthetic drugs on the fetus and pregnancy outcome. Exposure to surgery during the first 3 weeks of pregnancy may cause structural anomalies in the fetus, due to rapid tissue differentiation and incomplete embryogenesis.[9] So, researchers recommend that elective surgical procedures during the first trimester must be postponed to later periods.[3,4]

Additionally, no anesthetic agents could be proven as definite teratogen for the fetus.[10,11] Some studies have shown that the use of nitrous oxide as an inhalation anesthetic during early pregnancy increases incidence of spontaneous abortions and preterm births.[11,12] Sevoflurane, desflurane, propofol, etomidate and thiopental are not teratogen in clinically effective doses.[4,10] However, there is no well-controlled study in pregnant women. Jenkins et al. found that surgery in the second trimester results in the lowest rate of preterm birth compared to the first trimester.[5] In another study, the rate of major birth defects among women who underwent non-obstetric surgery in the first trimester was reported as 3.9%.[4]

A decrease in maternal blood flow may cause reduced placental perfusion and fetal hypoxia.[13,14] This situation may result in fetal death. That is why the preferred anesthetic technique during pregnancy should not cause longtime maternal hypotension. In this case, we preferred combined spinal-epidural anesthesia and administered lidocaine in graded fashion through the epidural catheter to achieve a sensory level of T_{10} bilaterally. We did not observe bradycardia and hypotension during operation. In this present case, surgical procedure was initiated after T_{10} sensory block was achieved. Similar to our case, appropriate sensorial block dermatome for lower extremity surgery was the level of T_{10} in Albayrak et al's study.[6] Also, Ozhan et al. allowed to surgery after T_{10} sensory block was achieved in cases undergoing ambulatory under-knee extremity surgery.[7] Because paracetamol is the safest analgesic for a developing fetus in early gestation, we preferred paracetamol for postoperative analgesia.[15] Pregnancy continued to term and a healthy baby was born.

As a conclusion, both surgery and anesthesia during early gestation may increase the risk of congenital anomalies and spontaneous abortion. If non-obstetric surgery is inevitable in the first trimester, the safest anesthesia for both the mother and the baby must be preferred. Normal maternal MAP should be maintained during surgery. In this case, using combined spinal-epidural anesthesia with 2% lidocaine in a graded fashion provided safe anaesthesia for the mother and developing fetus in a patient undergoing non-obstetric surgery.

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