CASE REPORT

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A Rare Cause of Inguinal Hernia Recurrence: Herniation After Lumbar Spinal Surgery in Prone Position

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ABSTRACT Prone position is widely used for posterior approach in spine surgery. Patients operated in prone position are at risk for many serious complications such as perioperative visual loss, peripheral nerve damage, pressure ulcers, central nervous system lesions, venous air embolism and circulation interruption due to peripheral arterial compression. In addition, thoracoabdominal compression may lead to high airway pressures and result in severe increase of intraabdominal pressure in the prone position. In this report, we present a case of inguinal hernia recurrence after operation in a 58 year old male. The patient underwent lumbar spinal stenosis surgery in prone position and the hernia was noticed subsequently when the patient was reverted to supine position.

Keywords: Inguinal hernia recurrence; spinal surgery; prone position

It is difficult to find a surgical position that does not negatively affect cardio-pulmonary functions as well as facilitate the surgical approach. There are many serious surgical position related complications that may have catastrophic consequences for the patient.

Especially, prone position is frequently used in various surgeries including spinal surgery and requires a careful follow up during the operation. Thoracoabdominal compression in the prone position may result in severe increase of intraabdominal pressure.[1] The increase in intraabdominal pressures in patients who are placed in the prone position provides the basis for the development of many complications indirectly. High airway pressures may lead to perioperative hemodynamic instabilization that may be seen in patients with insufficient cardiac reserve and insufficient arterial blood pressure regulation.[2]

Theoretically, inguinal hernia may develop during surgery due to positive mechanical ventilation with increased airway pressure and increase of intraabdominal pressure in prone position. However, there is no reported case of inguinal hernia after a surgery in prone position in the literature. In this case report, we aimed to present an intraoperative inguinal herniation in a 58 year old male who underwent lumbar spinal surgery. The patient was operated in the prone position and inguinal hernia was noticed when the patient was placed in the supine position postoperatively.

Written informed consent was obtained from the patient for publication of this case report. During our case report we prepared, human rights were protected.

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The patient was 58 year old male scheduled for surgery by neurosurgery department for lumbar spinal stenosis. The patient was 173 cm and 84 kg, with a BMI of 28 kg m^{-2} without any systemic comorbid disease and with a normal airway examination. We evaluated the patient as Class I according to the American Society of Anesthesiologists risk assessment.

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After monitoring of electrocardiography, pulseoximetry and invasive arterial cannulation general anesthesia induction was performed using 2 mg kg^{-1} propofol, 1 µg kg^{-1} fentanyl and 0.6 mg kg^{-1} rocuronium. The patient was intubated with a 7.5 mm inner-diameter reinforced endotracheal tube at first attempt uneventfully. Three port central venous catheter was placed from the right internal jugular vein under ultrasound guidance. Bladder catheter was inserted and urine output was observed. Then, the patient was placed in the prone position, and the dorsal sides of both knees and feet were supported with soft gel pillows to prevent these regions from compression. Silicone-gel face pillow was placed under the head.

The operation started after appropriate surgical position was given and lasted for 2.5 hours. Totally 3500 mL of intravenous fluid was given and total bleeding was 400 mL.

When the patient was placed supine position after the surgery, a swelling of approximately 10x10 cm in width was detected in the right inguinal region. The possible reason was evaluated as urine extravasation. The patient was extubated uneventfully and was discharged to postoperative ward. The patient reported that he had undergone surgery for right inguinal hernia 5 years ago. Manual examination by a surgeon revealed a right inguinal herniation and the testis at left side could not be palpated in the scrotum. Superficial tissue ultrasonography showed mesenteric fatty tissue and intestinal loops within the hernia sac from a large defect in the right inguinal region. Scrotal color doppler ultrasonography revealed an inguinal canal in the left testis and a hydrocele-compatible image on the right. For the inguinal hernia, an elective surgery was recommended by general surgery department. Outpatient control was recommended for testis located in hydrocele and inguinal canal.

DISCUSSION

Prone position is usually preferred in spine surgery due to the ease of posterior approach to the spine. Despite the surgical advantages, many difficulties may be experienced in the operations performed in the prone position such as difficulty of airway management, high airway and intraabdominal pressures and exaggerated hemodynamic response. Patients to be operated in surgical prone position should be carefully observed in terms of position-related hemodynamic effects.

In particular, increased intraabdominal pressures pave the way for the development of different complications. In order to provide the most suitable position for spine surgery, more than one prone position is defined. In 2006, 51 adult patients undergoing lumbar spinal surgery were compared with different prone positions however, cardiac output and cardiac index decreased in all positions.[3] Some studies have shown that cardiac involvement is associated with reduced venous return due to vena cava compression.[4] Epidural and paravertebral venous blood pressure increases as a result of increased intra-abdominal pressure and vena cava compression; leading to an increase in intraoperative blood loss in spine surgery.[5] In addition, decreased renal perfusion and end organ damage may also develop.[6] All of these studies indicate the importance of careful preoperative evaluation and careful selection of patients who are planned to be operated in the prone position.

The incidence of abdominal wall hernias in all ages is 1.7%, while this rate is 4% over 45 years age. Inguinal hernias consist 75% of all abdominal wall hernias.[7] The recurrence rate after primary inguinal hernia repair is between 0.5% and 15% due to surgical and patient-based reasons.[7] Any condition that causes increased intra-abdominal pressure with congenital or acquired abdominal wall weakness promote for abdominal wall herniation. Previous abdominal surgery or abdominal wall injuries and infections, collagen tissue diseases, malnutrition, advanced age, smoking may result in weakness and herniation of the anterior abdominal wall. Improper surgical technique, size of herniation, obesity, wound infection, smoking, diabetes, chronic obstructive pulmonary disease, advanced age, steroid usage are some of the factors that increase the risk of recurrence. In our case, there were different risk factors for the development of inguinal herniation such as male gender, advanced age, and history of inguinal hernia operation. Increased intraabdominal pressure is another important factor for the development of ab-

dominal wall herniation which was possibly the primary reason of inguinal hernia recurrence in our case.[8] Positive mechanical ventilation may also increase intraabdominal pressures, which may be a cause associated with inguinal hernia. However, in our case, the development of inguinal hernia was mostly due to prone position. To our knowledge, our case appears to be the first reported inguinal hernia that after the surgery performed in prone position.

Abdominal wall herniations may be complicated and may not be noticed in procedures requiring prolonged prone position. The most feared complication in abdominal wall hernias is strangulation as a result of incarceration and has high mortality and morbidity for inguinal hernias as well as for all abdominal wall hernias.[9] A high rate of 15.4% of intestinal resection was indicated in patients who underwent emergency femoral and inguinal hernia operations.[10] In the study by Kurt et al, it was shown that prolonged incarceration for more than six hours increased the need for intestinal resection.[11] Due to the position, it was not possible to realize the stage of herniation during the operation in our case however, the most feared complication of incarceration did not occur. Recurrent herniation is associated with a high risk of incarceration and bowel resection may be necessary in patients with a history of recurrent abdominal wall hernia.

For this reason, in patients who will be operated in prone position, patients with a hernia history should be noted and kept in mind for anesthesia and position management. Scoliosis, spinal tumor resection and many other prolonged surgical procedures performed in the prone position may lead to increased risk of strangulation as a result of possible herniation. It is important that all patients to be operated in the prone position undergo a careful systemic examination. Examination forms should include a history of abdominal wall herniations and the status of herniation during the preoperative examination. In long-term operations, the hernia region in the patient's history can be examined at regular intervals. When the patient returns to the supine position at the end of the operation, the examination should be repeated. In case of a hernia, a consultation with general surgery department may be requested and an emergency hernia repair can be performed in the same session. While explaining perioperative complications to patients and their relatives, consent about hernia repair surgery and even bowel resection can be obtained. Such an approach may minimize the need for bowel resection by shortening the duration of diagnosis and treatment in possible incarcerated abdominal wall hernias.

In conclusion, our case demonstrated that inguinal hernia recurrence may be seen in prolonged operations; especially in prone position associated with increased intraabdominal pressures as a result of high airway pressures. It should be kept in mind that incarceration and strangulation may occur in patients with recurrent abdominal wall hernias. Preoperative careful systemic examination and repeated examination when the patient is reverted to supine position may prevent delays in the diagnosis and treatment in patients with a history of abdominal wall hernias.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Tayfun Aydın;* ***Design:*** *Tayfun Aydın, Onur Balaban;* ***Control/Supervision:*** *Onur Balaban;* ***Data Collection and/or Processing:*** *Ayşenur Acar Öztürk, Onur Balaban;* ***Analysis and/or Interpretation:*** *Tayfun Aydın;* ***Literature Review:*** *Ayşenur Acar Öztürk;* ***Writing the Article:*** *Ayşenur Acar Öztürk;* ***Critical Review:*** *Buse Kozlu;* ***References and Fundings:*** *Buse Kozlu.*

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