CASE REPORT

Conservative approach for the management of bilateral pneumothorax and pneumomediastinum after laparoscopic totally extraperitoneal inguinal hernia repair

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Abstract

Laparoscopic totally extraperitoneal inguinal hernia repair is considered a common and safe procedure. Here, we present the case of a 31-year-old male with right indirect inguinal hernia and no medical history. The patient underwent laparoscopic totally extraperitoneal inguinal hernia repair and the operation was completed successfully. During extubation, subcutaneous emphysema was noted at the neck, chest, and above the nipples. Tracheal injury was excluded by the anaesthesiologists and otorhinolaryngologists. On arterial blood gas, the patient's oxygen saturation was 95% with nasal oxygen support. The patient was followed-up closely in the general surgery inpatient clinic. Computed tomography was performed, on which bilateral pneumothorax and pneumomediastinum were noted. Conservative management was planned and the patient was discharged on the fourth postoperative day. Laparoscopic totally extraperitoneal inguinal hernia repair is considered a routinely applied safe procedure, however, appropriate care should be taken to avoid possible complications.

Keywords: Laparoscopy, Inguinal Hernia, Pneumothorax, Pneumomediastinum.

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Introduction

Inguinal hernias account for 75% of abdominal wall hernias, with a lifetime risk of 27% in men and 3% in women.[1] Inguinal hernia repair is one of the most common operations in general surgery. Laparoscopic totally extraperitoneal inguinal hernia repair is a well-described, routinely used technique for inguinal hernia repair, especially preferred in obese patients, bilateral inguinal hernia and recurrent inguinal hernia.[2,3] This technique is mostly preferred by the surgeons and patients due to its advantages for pain management, early recovery, and smaller incisions.[4] Its complication rate is similar to open repair techniques; however, unusual complications can be seen as this technique is applied more frequently.[5] Koliakos et al reviewed the literature and observed that only 15 cases of pneumothorax during laparoscopic inguinal hernia repair have been reported until 2021. Pneumomediastinum/pneumothorax may result in life-threatening complications when undetected and the treatment can vary depending on the causes and severity of the pneumothorax.[6] In this article, rare complications such as pneumomediastinum, pneumothorax and subcutaneous emphysema and their conservative treatment were reported.

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Case Report

A thirty-one-year-old male was admitted to the general surgery inpatient unit of Istanbul Provincial Directorate of Health Sisli Hamidiye Etfal Training and Research Hospital for laparoscopic totally extraperitoneal right inguinal hernia repair in October 2020. The patient's height was 170cm and weight was 68 kg (BMI was 23,5 kg/m^2). He had no previous surgical or medical history and was classified as class I according to the American Society of Anaesthesiologists' Physical Condition Classification System.[7] The patient had been smoking a pack per day for the last 10 years. He was suffering from right sided indirect inguinal hernia with no findings of strangulation and incarceration.

There was no problem in intubating the patient and optimal ventilation values were maintained during the operation. Two peripheral venous catheters were placed before and during the surgery. Three-port technique for hernia repair was planned and balloon trocar was inserted from the incision 1 cm below from the umbilicus. Without opening the peritoneum, right extraperitoneal space was dissected by using balloon trocar. During the inflation of the balloon, dissection was observed by a laparoscopic camera and the dissection was completed uneventfully. The balloon was extracted and insufflation of carbondioxide was started. The operation was conducted in a carbondioxide pressure of 12 mmHg. Two dissection ports were placed and dissection of hernial sac was

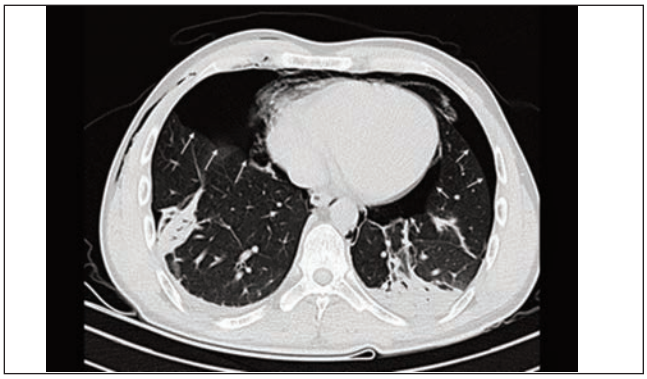

Figure-1a: Postoperative imaging study shows bilateral pneumothorax (Arrows show lung parenchyma).

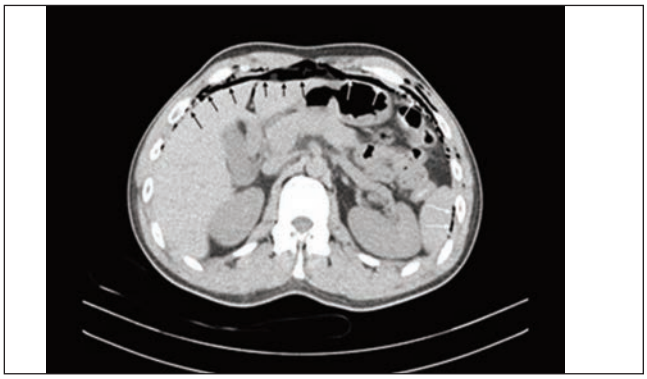

Figure-1b: Postoperative imaging study shows free air inside of peritoneum (Arrows show free air images).

initiated. During manipulation, there was no visible breach of peritoneum. 15 cm x 15 cm polypropylene mesh were placed and tucked properly. The operation took 55 minutes and there were no complications during surgery.

At the end of the operation, during extubation, subcutaneous emphysema was noted on the patient's neck, chest, and above the nipples. After extubation, oxygen saturation at room air was 90% and nasal oxygen support was started. Vital signs were stable. When the patient was assessed by the anaesthesiologist, lung sounds were noted to have decreased bilaterally.

The patient was also further assessed for vocal cord, larynx and trachea by ear, nose and throat specialists with endoscopy but there was no sign of injury. Due to suspicion of pneumothorax, after increasing the patient's oxygen saturation to 95% with nasal oxygen, he was taken for computed tomography imaging of the thorax, abdomen and neck.

Generalised subcutaneous emphysema at the neck and anterior thorax wall, pneumomediastinum and bilateral pneumothorax were detected at the computed tomography imaging (Figure 1a and 1b). In addition to these findings, free air in the preperitoneal cavity was

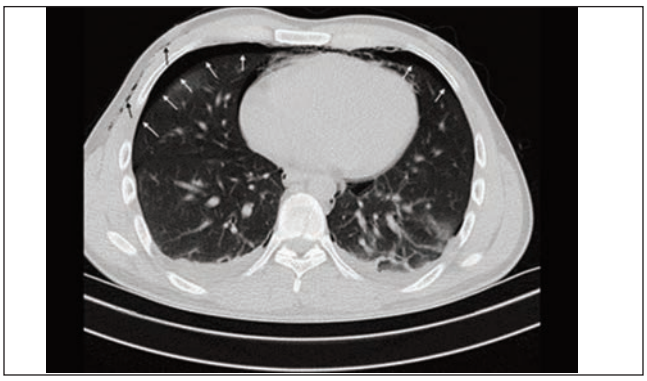

Figure-2: An image of resolved pneumothorax at the third day after surgery (White arrows show lung parenchyma; black arrows show subcutaneous emphysema).

observed at the abdominal images. There was no air at the retroperitoneal space. There was no sign of injury at the trachea in imaging studies.

Meanwhile, the patient was consulted by the thoracic surgeons. Since the patient was haemodynamically stable, he was monitored closely in the general surgery unit without any additional surgical intervention. Oxygen saturation levels in peripheral blood were no lower than 90% in room air and with nasal oxygen support oxygen saturation levels in peripheral blood were more than 95%. Subcutaneous emphysema was resolved and the general condition of the patient was good, with no signs of respiratory distress during follow-up.

On the third day after surgery, to evaluate the patient with control imaging study, the patient underwent computed tomography imaging for neck and thorax (Figure 2). In this study, subcutaneous emphysema and bilateral pneumothorax had resolved as compared to the first imaging study. The patient's clinical status and imaging studies were evaluated, and he was discharged on post-operative day three. At the follow-up visits, there were no remarkable signs or symptoms of pneumothorax, pneumomediastinum, and subcutaneous emphysema.

Discussion

Subcutaneous emphysema, pneumothorax and pneumomediastinum are not common complications of laparoscopic totally extraperitoneal inguinal hernia repair. These complications are rare and their aetiology and management are still a matter of debate.[4,5]

Potential tracks for insufflated gas to thoracic cavity from the abdomen are pleuroperitoneal hiatus (throughout oesophageal and aortic hiatus), congenital diaphragmatic defects, injured falciform ligament during insertion of trocars, retroperitoneal pathway, and anterior gaps of diaphragm.[8] In addition, pneumothorax during laparoscopic surgery may be due to non-surgical causes;

especially in bullous lung disease.[9]

Even though no breach of parietal peritoneum was observed in our case, a possibility for an unseen breach may still exist. Free abdominal gas images in computed tomography scan proves this possibility. The most common track for gas passage is anterior gaps of diaphragm which is created between diaphragmatic attachments to the sternum, xiphoid, and ribs.

In a previous report, two cases were presented with pneumothorax after totally extraperitoneal inguinal hernia repair.[10] Authors mentioned increased length of procedure and high insufflation pressure as two risk factors for pneumothorax in totally extraperitoneal inguinal hernia repair. Insufflation of the preperitoneal space with carbon dioxide at a pressure of 10 mmHg for 90 minutes does not cause any significant changes in haemodynamics and blood gas levels.[11] However, increased intra-abdominal insufflation pressure, especially from 10 mmHg to 15mmHg, may cause subcutaneous emphysema with hypercarbia due to the limited capacity of the preperitoneal space.[12] In our case, length of the procedure was shorter but insufflation pressure was still higher than the authors' recommendation (>10mmHg). 12 mmHg carbon dioxide pressure is an important factor in the occurrence of this complication. Increased carbon dioxide pressure and peritoneal breaches may be the possible causes of pneumothorax in this operation. Shorter operation length, lower insufflation pressures, and careful dissection of extraperitoneal space are the main steps to ensure the safety of this technique. Conservative management of pneumothorax was preferred in this case when the patient's status was assessed. In literature, several case reports mentioned the placement of chest tube in patients having pneumothorax during laparoscopic totally extraperitoneal hernia repair.[2,3,5] The patient's status during operation, vital signs, oxygen saturation levels, and extension of pneumothorax must be evaluated before making any decision for management. Tracheal injury and tear of previously existing bulla must be excluded before deciding to opt for conservative management of pneumothorax.[13]

Conclusion

Laparoscopic totally extraperitoneal inguinal hernia repair is considered a routinely applied safe procedure; however, appropriate care should be taken to avoid possible complications. Close monitoring, low insufflation pressure, shorter surgery time, and careful dissection are the main steps of a safe operation. Management strategies must be determined with multidisciplinary team and conservative approach can be safely applied in case of a stable patient and high oxygen saturation in arterial blood.

Declarations: Authors declare no competing interests. An informed consent was taken from the patient for publishing his case.

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Conflict of Interest: None.

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