SUBCUTANEOUS EMPHYSEMA AND HYPERCARBIA DURING DIAGNOSTIC GYNECOLOGIC LAPAROSCOPY: A CASE REPORT

DIAGNOSTIK JİNEKOLOJİK LAPAROSKOPİ SIRASINDA OLUŞAN SUBKUTANÖZ AMFİZEM ve HIPERKARBI: OLGU SUNUMU

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SUMMARY
Diagnostic and therapeutic laparoscopy is a relatively safe invasive procedure, but complications can occur, mainly related to Veress needle and trocar insertion. The rare occurrence of subcutaneous emphysema, as a consequence of pneumoperitoneum, following laparoscopy, is reported. The mechanism for the development of this complication and its management are discussed.

ÖZET
Diagnostik ve operatif laparoskopiler nispeten güvenli girişimler olmakla birlikte başlıca Veress iğnesi ve trokar yerleştirilmesine bağlı olarak komplikasyonlar görülebilir. Laparoskopide, pnömoperitonyum sırasında nadiren oluşan subkutanöz amfizem bildirilmiştir. Olgu sunumunda bu komplikasyonun gelişimi mekanizması ve yönetilmesi tartışılıdı.

INTRODUCTION
Laparoscopic procedures were first being performed in 1902 by Kelling and started to be used by surgeons after the study of Steptoe related to laparoscopic techniques in gynecology in 1967. Laparoscopy has become a widely used technique in France in 1987 and in USA in 1988 (1). Since 1970s laparoscopy is being used in diagnosis and treatment of variety of gynecologic cases. Technological developments provide usage of laparoscopic procedures not only gynecology, but also in thoracic and abdominal surgery (2, 3).

Minimalization of tissue trauma, providing a little incision scar, decreased morbidity and hospitalization period are the factors making laparoscopy more popular. However, laparoscopy is not without potential complications.

Several case reports exists in literature offering hypotheses on factors related to the risk of hypercarbia, subcutaneous emphysema, pneumothorax, and pneumomediastinum (4-8). Possible risk factors are related to surgical technique including preperitoneal insufflation (9-11) and improper trocar insertion with CO2 leakage into subcutaneous tissue (4,7).

CASE
A 32-year-old patient admitted to our hospital with primary infertility. She was 70 kg in weight and 167 cm in height. Diagnostic laparoscopy under general anesthesia was planned to this patient. Following induction with 4 mg/kg thiopental, 100 µg fentanyl, and 0.5 mg/kg atracurium endotracheal intubation was performed. Anesthesia was followed by 1-3% sevoflurane in 50% oxygen+nitrous oxide. Intraoperative monitorization was done by
pressure of carbon dioxide (PaCO₂) was 61 mmHg in the gynecologic operations minor complication incidence is 1-

affects the rate of the complications. In laparoscopic the experience of the surgeon performing the procedure types of laparoscopic procedures, but the education and incidence of laparoscopic complications are related to the education and meticulous adherence to proper technique are essential to prevent complications. Nevertheless, some complications, such as those associated with blind insertion of trocar, may be unavoidable. Veress needle is placed from a small subumbilical incision into peritoneal cavity. Extraperitoneal insufflation occurs when the Veress needle fails to enter the peritoneal cavity.

Carbon dioxide is generally used to provide pneumoperitoneum. The increase in arterial carbon dioxide pressure (PaCO₂) during laparoscopy primarily results from diffusion of CO₂ from the peritoneal cavity (14). Type of surgery, degree of dissection around diaphragm and in the retroperitoneal space might also be important (9). Patients’ risk factors like age and concurrent cardiopulmonary disease also affects the incidence of this complication (15, 16).

The incidence rates for subcutaneous emphysema during laparoscopy vary from 0.43% to 2.34% (17, 18). Wolf et al found 34 of 44 patients (77%) who had laparoscopic surgery to have subcutaneous emphysema on postoperative chest x-ray, nine of them with concomitant pneumomediastinum (9). Wolf et al also reported 34% of subcutaneous emphysema in urologic laparoscopic procedures (11). McAlister et al reported 56% subcutaneous emphysema in 27 patients who had laparoscopic cholecystectomy by performing computed tomographic scans (19).

Murdock et al found that risk factors for the development of subcutaneous emphysema were maximum end-tidal CO₂ of 50 mmHg or greater, older age, the use of six or more operative ports, and operative time over 200 minutes (20). Other authors have shown that there is a strong association between high positive end-tidal CO₂ and subcutaneous emphysema (9, 11).

Leakage of the insufflated gas into subcutaneous tissue is the most likely etiological factor in development of subcutaneous emphysema (20). There seems to be link between peritoneal insufflation and extensive retroperitoneal dissection with the development of subcutaneous emphysema and the resultant hypercarbia (6,9-11,21). Subcutaneous emphysema can be diagnosed by development of crepitation on the abdominal wall.

Both hemithorax were ventilated equally on auscultation, but crepitation was present in upper abdominal region on palpation. Subcutaneous emphysema was thought to be developed and the patient was brought to the horizontal position from trendelenburg position. Desufflation was performed and the operation was ended in 5 minutes. ETCO₂ decreased to 50 mmHg, PaCO₂ was 54 mmHg at the same time in arterial blood gas analysis. PIP decreased to 20 cmH₂O. Heart rate was 93 beats/min and blood pressure was 118/91 mmHg. After 10 minutes of manual respiration, decurarization was performed and 5 minutes later the patient was extubated. After all these procedures ended there was crepitation between upper abdominal region and the level of iliac crests. The patient was taken to postoperative unit and 4 hours later subcutaneous emphysema was regressed and PaCO₂ was 35 mmHg in blood gas analysis. The patient was discharged from the hospital after 24 hours without any problem.

**DISCUSSION**

Incidence of laparoscopic complications are related to the types of laparoscopic procedures, but the education and the experience of the surgeon performing the procedure affects the rate of the complications. In laparoscopic gynecologic operations minor complication incidence is 1-

4%, major complication incidence is 0.3-2.8%. Major complication rate seems to be decreased in spite of increased number of laparoscopic operations (12, 13).
Differences in airway pressures and increased end-tidal CO2 are the early findings of the extravasation of CO2. Increase of CO2 diffusion seen with subcutaneous emphysema causes hypercapnea and respiratory acidosis. In our case end-tidal CO2 increase is firstly recognized and we increase minute ventilation to compensate this. Since there was no regression both hemithorax were auscultated and found to be normal but crepitation at upper abdominal region was recognized and the surgery was ended by the development of subcutaneous emphysema. In most cases there is not any specific intervention for subcutaneous emphysema. It usually regresses after peritoneal desufflation (22, 23).

In conclusion, the authors emphasize the importance and the need of continuous monitoring to reduce perioperative morbidity and to avoid major complications in the course of laparoscopy.

REFERENCES

