





Injury of Abdominal Aorta During Laparoscopic Orchiectomy in a Pediatric Patient

Çocuk Hastada Laparoskopik Orşiektomi Sırasında Abdominal Aort Hasarı

 Gülsen KESKİN,^a
 Mine AKIN,^a
 Yeşim ŞENAYLI,^a
 Can İhsan ÖZTORUN^b

^aDepartment of Anesthesiology, Health Sciences University Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital,

^bDepartment of Pediatric Surgery, Ankara Yıldırım Beyazıt University Faculty of Medicine, Ankara

Received: 23.03.2018
 Received in revised form: 04.07.2018
 Accepted: 04.07.2018
 Available online: 28.09.2018

Correspondence:
 Can İhsan ÖZTORUN
 Ankara Yıldırım Beyazıt University
 Faculty of Medicine,
 Department of Pediatric Surgery, Ankara,
 TURKEY/TÜRKİYE
 drcan-oz@hotmail.com

ABSTRACT Injury to major vessels during laparoscopic procedures is an emergency intervention situation. Because it may result with death. During the laparoscopic (endoscopic) surgery of a 14-year-old boy child with the diagnosis of non-palpable testis, aortic injury occurred at the time of insertion of first trocar. Deteriorating of hemodynamic parameters perioperatively alarmed the surgical team and immediately open surgery was decided. Invasive monitoring and catheterization of internal jugular vein were performed. Adequate blood and blood product replacement were performed. Bleeding focus at the abdominal aorta was repaired through median laparotomy. The patient remained stable during postoperative period and was discharged with full recovery. In laparoscopic surgical interventions, it should be remembered that laparoscopic experience of the anesthesia team and close monitoring of hemodynamic parameters perioperatively could ease early recognition of complications, thereby decreasing morbidity and mortality rates.

Keywords: Child; anesthesia; laparoscopy; complications

ÖZET Laparoskopik işlemler sırasında ana damarların yaralanması acil girişim gerektiren durumlardır. Çünkü ölümlerle sonuçlanabilir. 14 yaşında, non-palpabl testis tanılı erkek çocuğun laparoskopik (endoskopik) cerrahisi sırasında, ilk trokar yerleştirilirken aort yaralanması meydana geldi. Hemodinamik parametrelerin kötüleşmesi cerrahi ekibi alarma geçirdi ve acil açık cerrahi kararı verildi. İnternal juguler vene kateterizasyon ve invaziv izlem yapıldı. Kan ve kan ürünleri takviyesi yapıldı. Median laparotomi ile, kanayan abdominal aort onarıldı. Operasyon süresince hasta stabil hale getirildi, şifa ile taburcu edildi. Laparoskopik cerrahi girişimler sırasında anestezi ekibinin de laparoskopik tecrübesinin olması ve hastanın hemodinamik parametrelerini yakından takip etmesi; komplikasyonların erken anlaşılmasını sağlayacağından, mortalite ve morbidite oranlarının düşmesine imkan verecektir.

Anahtar Kelimeler: Çocuk; anestezi; laparoskopi; komplikasyonlar

Injury to major vessels is the second leading cause of mortality due to laparoscopy (6.4-10.8%).¹ Pneumoperitoneum, position of the patient, prolonged surgical time, injury to the intestine or vessels and difficulties in predicting blood loss are common problems for the anesthesia management of the laparoscopic procedures.²

Therefore, beside the experience of surgical team, working with an anesthesia team that is experienced in laparoscopic surgeries is essential for lower morbidity and mortality rates.

CASE REPORT

A 14-year-old male patient weighing 70 kg with right non-palpable testis was consulted to anesthesia department for elective laparoscopic exploration and orchiectomy. Abdominal ultrasound (US) showed positioning of the right testis at the right lower quadrant of the abdomen. Past medical history indicated special education for autism. Upon normal physical and laboratory findings, the patient was accepted as ASA II, and written consent was obtained for general anesthesia. Prior to operating room, midazolam 0.1 mg kg⁻¹ iv (Zolamid®; Defarma, Turkey) was administered as pre-medication. In operating room, electrocardiogram, non-invasive blood pressure (BP), peripheral oxygen saturation (SpO₂), end-tidal CO₂ pressure (ETCO₂) monitoring were performed. For anesthesia induction, propofol 2 mg kg⁻¹ (Propofol 1% Fresenius®; Fresenius Kabi, Sweden), fentanyl 1 µg kg⁻¹ (Talinat®; Vem, Turkey) and rocuronium bromide 0.5 mg kg⁻¹ iv bolus (Esmeron®, Organon, Turkey) were administered.

Tramadol 1 mg kg⁻¹ iv (Tradolex®, Keymen Ilac, Ankara) was applied for pre-emptive analgesia. Maintenance of the anesthesia consisted of 2% sevoflurane within O₂-medical air (50-50%). Gastric drainage was provided by orogastric tube. Surgical team inserted the urinary catheter. The patient was draped in accordance with surgical sterilization principles.

A 10 mm pyramidal trocar was advanced to peritoneal cavity from umbilical area by open trocar entry technique. After pneumoperitoneum was established, the abdomen was penetrated by two 5 mm-trocars. Simultaneously, decrease more than 50% percentage in blood pressure was observed and this was reported to surgical team.

The case's input blood pressure was 110/70, while the follow-up values were 105/40 mmHg, 95/40 mmHg, 65/35 mmHg, 50/30 mmHg and heart rate (HR) was measured as 84 / min while the following values were measured as 96/min, 102/min, 112/min, 128/min, 152/min. Firstly, the maintenance fluid dose was increased to 20 ml / kg. At this

time, ETCO₂ value of the patient was 36 mmHg and SpO₂ value was 96%. Observation of accelerated blood accumulation in peritoneal cavity and hemodynamic deterioration led us to make the decision of emergent laparotomy. The abdomen was penetrated by median incision. The intestines and the mesentery were observed to be intact. The bleeding site was detected to be abdominal aorta at retroperitoneum. Bleeding was controlled by Satinsky clamp, and the aorta was repaired with 3/0 prolene suture. A surgeon was assigned to prepare blood products and transfer blood tests. An anesthesiologist and an anesthesia technician were called for assistance. Two-way central venous catheter of 7F was inserted into the right internal jugular vein. Invasive arterial pressure was monitored via radial artery cannulation. Arterial blood gases and complete blood count were ordered. Hemoglobin was 7.1 g dL⁻¹ and hematocrit was 21.4% (preoperative values were 12.5 g dL⁻¹ and 39.6%, respectively). Intraoperatively, 1500 cc 0.9% NaCl, 1000 cc Ringer lactate, 1000 cc colloidal solution, and 2 units of erythrocyte suspension were administered in total. After follow-up and treatment of 135 minutes at the operating table the case was stabilized hemodynamic and respiratory parameters with Hb 10.4 g/dL, Htc 32.7% values, the case was extubated and transferred to pediatric surgery intensive care unit. There was no decrease in postoperative Hb values and hemodynamic data was stable. On the third day of the surgery, oral feeding started with diet 1 and on the fourth day of the surgery drained. On the seventh day of the surgery oral feeding passed as diet 3. He was further followed at surgical intensive care for 10 days and discharged with full recovery on postoperative day 15.

DISCUSSION

Although vascular injury is not a frequent phenomenon in urological laparoscopic practice (1.6-4.6%), it is the most common reason for switching to open surgery and most commonly reported complication of the procedure.³

Vessel injuries were usually reported during first closed trocar entry or insertion of Veress needle.⁴ Some studies found open laparoscopic entry

technique safer than closed techniques in terms of vascular injuries.⁵

In our case, an open laparoscopic insertion technique was used, yet abdominal wall was not sufficiently lifted to insert pyramidal trocar, after which injury to abdominal aorta occurred.

It is essential in laparoscopic surgery to have adequate and necessary training and experience and to apply appropriate techniques for minimizing complication rates. Should complication occur, the most important factor to reduce mortality is early recognition.⁶ When sudden hypotension develops during laparoscopic procedure, CO₂ embolism, compression on inferior vena cava, or vascular injury should be suspected, immediately followed by informing the surgeon and cessation of CO₂ insufflation.⁶ Since hypotension occurred before initiating CO₂ insufflation in our patient, embolism and compression onto inferior vena cava were excluded, and the surgical team was alerted in favor of major vessel injury.

Nezhat et al. reported delayed cases of vascular injuries to have increased mortality.⁷ Due to limited visualization of laparoscopic images, clinically important intraoperative bleeding events may be missed. Therefore, hemodynamic follow-up and evaluation is very critical. Major vessel injury should be suspected in cases with suddenly deteriorating hemodynamics, and all teams and equipment should be immediately organized and ready for rapid administration of fluid and blood products.⁸ Sudden impairment in hemodynamics of our case was shared with surgical team, followed by rapid organization of another team to provide appropriate fluid and blood products as well as delivery of blood tests and access to central venous line.

Most important determinant of complications in laparoscopic surgery was reported to be surgeon's experience. While the complication rate of the surgeons with experience of <20 cases was shown to be 8.3% that of those having experiences

of >100 cases was 2.8%.⁹ In order to diminish complication rates in transperitoneal interventions, insertion of oro/nasogastric tube is recommended to decompress the stomach.

Vascular surgeons reported the most rapid and best approach for emergent laparotomy as the median laparotomy.¹⁰ In our case, sudden drop in arterial blood pressure and inspection of the paleness of the patient were alerting, which accelerated the switch to the laparotomy.

In conclusion, sudden deterioration of hemodynamic parameters during laparoscopic orchietomy should prompt for major vessel injury. Open surgery should be immediately performed for rapid bleeding control. In laparoscopic surgery, coordinating with the anesthesia team that has adequate experience of laparoscopy beside that of surgical team is essential for on time intervention to resolve complications. During laparoscopic surgery with less experienced surgeons, care and orientation of the anesthesia team reduce morbidity and mortality.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

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: Gülşen Keskin; **Design:** Mine Akın; **Supervision/Consultancy:** Yeşim Şenaylı; **Data Collection and/or Processing:** Can Ihsan Öztörün; **Analysis and/or Interpretation:** Gülşen Keskin; **Source Browsing:** Gülşen Keskin; **Writing of the Makalene:** Mine Akın; **Critical Review:** Yeşim Şenaylı.

REFERENCES

1. Bhojrul S, Vierra MA, Nezhat CR, Krummel TM, Way LW. Trocar injuries in laparoscopic surgery. *J Am Coll Surg* 2001;192(6):677-83.
2. Kaba A, Joris J. Anaesthesia for laparoscopic surgery. *Curr Anaesth Crit Care* 2001;12(3):159-65.
3. Thiel R, Adams JB, Schulam PG, Moore RG, Kavoussi LR. Venous dissection injuries during laparoscopic urological surgery. *J Urol* 1996;155(6):1874-6.
4. Nordestgaard AG, Bodily KC, Osborne RW Jr, Buttorff JD. Major vascular injuries during laparoscopic procedures. *Am J Surg* 1995;169(5):543-5.
5. Larobina M, Nottle P. Complete evidence regarding major vascular injuries during laparoscopic access. *Surg Laparosc Endosc Percutan Tech* 2005;15(3):119-23.
6. Öbek C. Complications and prevention of urological laparoscopy. *Urooncology Bulletin* 2005;2:3-8.
7. Nezhat C, Childers J, Nezhat F, Nezhat CH, Seidman DS. Major retroperitoneal vascular injury during laparoscopic surgery. *Hum Reprod* 1997;12(3):480-3.
8. Spinelli G, Vargas M, Aprea G, Cortese G, Servillo G. Pediatric anesthesia for minimally invasive surgery in pediatric urology. *Transl Pediatr* 2016;5(4):214-21.
9. Peters CA. Complications in pediatric urological laparoscopy: results of survey. *J Urol* 1996;155(3):1070-3.
10. Barbosa Barros M, Lozano FS, Queral L. Vascular injuries during gynecological laparoscopy--the vascular surgeon's advice. *Sao Paulo Med J* 2005;123(1):38-41.