

Pleural Effusions Complicating Upper Abdominal Surgical Pathologies in Children*

Çocuklarda Üst Abdominal Cerrahi Patolojilerin Komplikasyonu Olarak Gelişen Plevral Efüzyonlar*

Cüneyt Günşar¹, Alparslan Aşçı², Aydın Şencan¹, Ömer Yılmaz¹, Erol Mir¹

¹Celal Bayar University, Faculty of Medicine, Department of Pediatric Surgery, Manisa

²Van State Hospital, Pediatric Surgery Clinic, Van

Abstract

Intractable pleural effusions can occur during the courses of serious intraabdominal surgical pathologies. Information about the pathogenesis, presentation and management of this pulmonary complication is limited in the literature particularly for the childhood period. In this study we aimed to present our experience on management of three adolescent patients with pleural effusions which developed after upper abdominal surgical pathologies. According to the data collected from our patients, presence of peritoneal fluid, fever higher than 38°C and adolescent age can be risk factors for development of pleural effusions. If intractable fluid collections resist to multiple thoracentesis then tube thoracostomy may be needed for the treatment.

Keywords: Pleural effusion; upper abdominal surgery; pulmonary complications; laparotomy; children; adolescent

Özet

Ciddi intrabdominal cerrahi patolojilerin seyrinde inatçı plevral efüzyonlar gelişebilir. Özellikle çocukluk çağı açısından bakıldığında literatürde bu tip pulmoner komplikasyonların patogenezi ve klinik seyri ile ilgili çok fazla bilgi bulunmamaktadır. Bu çalışmada üst abdominal cerrahi patolojiler sonrasında plevral efüzyon gelişen üç adolesan hastanın klinik özellikleri sunulmuştur. Hastalarımızdan elde ettiğimiz verilere göre adolesan yaş, periton içi sıvı varlığı ve 38°C üzeri yüksek ateş plevral efüzyon gelişimi açısından risk faktörü olabilir. Plevra içinde inatçı sıvı koleksiyonları aralıklı torasentezlere yanıt vermez ise tedavi için tüp torakostomi gerekebilir.

Anahtar kelimeler: Plevral efüzyon; üst abdomen cerrahisi; pulmoner komplikasyonlar; laparotomi; çocuk; adolesan

Introduction

Pleural effusion (PE) is a complication which may develop during the courses of abdominal surgical pathologies (1,2). There are only few studies on this subject enclosing childhood period (3,4). We aimed to define the clinical characteristics of our patients with PE that developed during the treatment period of their primary upper abdominal surgical pathologies.

Case Reports:

Three patients with PE in association with upper abdominal surgical pathologies in the years 2006-2010 were retrospectively evaluated. The following information was collected: age, sex, the type of upper abdominal surgical pathology, association of atelectasis, other complications, localization, and beginning time of PE, pleural fluid characteristics, cultures, radiological investigations and treatment of effusions. The patients' data are summarized in the table (Table 1).

The first patient was a 16 years old adolescent girl who was operated on for small bowel intussusception due to a Peutz Jeghers type of solitary polyp as the leading

Correspondence to/İletişim: Cüneyt Günşar, Celal Bayar Üniversitesi Tıp Fakültesi, Uncubozköy Kampüsü 45030 Manisa.
Tel: +90 532 4319808 cuneyt.gunsar@bayar.edu.tr

*This case report was presented as a poster at the 28th National Pediatric Surgery Congress between 29 September-3 October 2009 in Malatya/Turkey.

*Bu olgu sunumu 29 Eylül- 3 Ekim 2009 tarihlerinde Malatya'da gerçekleştirilen 26. Ulusal Çocuk Cerrahisi Kongresinde poster olarak sunulmuştur.

point. At the operation, after manual reduction of the invaginated segment, we performed resection of the 15 cm of small bowel segment containing the large solitary polyp and end to end anastomosis. Postoperatively, she needed 80 days of critical care for systemic inflammatory response syndrome and enterocutaneous fistula. She had retractable, hemorrhagic type of PE in association with increased peritoneal fluid. Multiple thoracentesis did not solve the problem and she recovered after 12 days of treatment with tube thoracostomy which was placed on the 16th day of PE (Figure 1a,b).

The second patient was a 16 years old boy who was referred from another hospital with the complaints of abdominal pain and vomiting starting one day before the admission. When the patient was asked, he told a suspicious trauma history in the form of falling from height. Abdominal ultrasonography showed a laceration at the posterior side of the spleen and a subcapsular hematoma located anterolaterally. On the 14th day of his follow up he had high fever and respiratory distress. Ultrasonography, direct graphy and computerized tomography investigations of thorax showed right intrapleural fluid accumulation and atelectasis. History, respiratory symptoms and physical findings did not indicate thoracic injury and instead of direct thoracic trauma he was thought to have prolonged PE with atelectasis at the opposite side of the abdominal injury. He was treated with tube thoracostomy after a trial of thoracentesis.

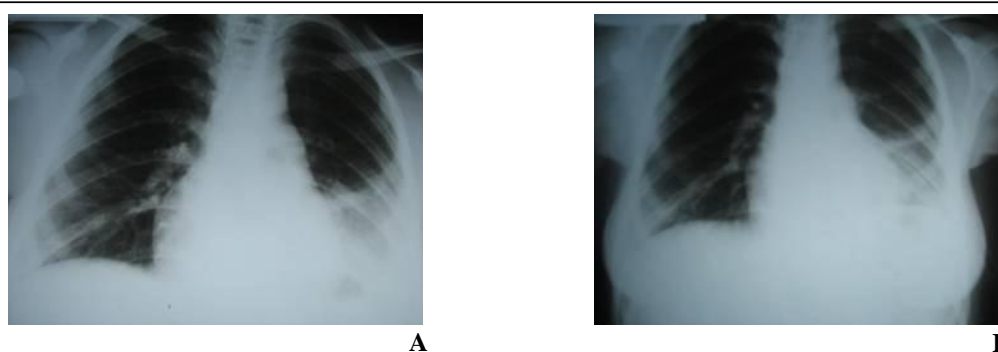


Figure 1. Thoracic X-rays of the first case: 1A: Immediate postoperative appearance of pleural effusion. 1B: Postoperative 16th day after tube thoracostomy.

Table 1. Clinical presentation of the patients with pleural effusion.

Clinical characteristics	Case 1	Case 2	Case 3
Age-sex	16-Female	16-Male	14-Female
Primary abdominal pathology	Small bowel intussusception due to a polyp	Traumatic spleen injury	Laparoscopic splenectomy for chronic ITP [#]
Beginning day of pleural effusion	7 th	19 th ?	3 rd
Other complications	SIRS*+Enterocutaneous fistula+hypoproteinemia	None	Subdiaphragmatic abscess-percutaneous drainage
High fever (> 38° C)	(+)	(+)	(+)
Associated atelectasia	Lower lobes of both lungs	Right total	Left basal
Physical findings	Decreased pulmonary sounds at left hemithorax (Decreased O ₂ saturation)	Totally decreased pulmonary sounds at right hemithorax and decreased sounds at the left side	Decreased pulmonary sounds at left hemithorax
Intraperitoneal fluid	(+)	(+)	(+)
Localisation of pleural effusion	Left	Right	Left
Fluid characteristics	Transudate	Transudate	Exudate
Bacterial Fluid culture	No growth	No growth	No growth
Radiological diagnosis	Plain radiography and Ultrasonography	Plain radiography, Ultrasonography and CT scan	Plain radiography, Ultrasonography and CT scan
Chemotherapy	Ampicillin+ sulbactam, Amikacin, Ornidazole	Ceftriaxone	Ampicillin-sulbactam
Interventional Treatment	Thoracentesis (4 times) + Tube thoracostomy (16 th day-stayed 12 days)	Thoracentesis (200 ml – only once) + Tube thoracostomy (33 rd day-stayed 17 days)	Thoracentesis (160 ml – only once)

In the third patient (14 years old female), pleural effusion developed after laparoscopic splenectomy for chronic idiopathic thrombocytopenic purpura. After the operation, left subdiaphragmatic abscess complicated the clinical condition and it was drained under the guidance of ultrasonography. The fluid accumulation was treated by thoracentesis and puncture of the pleural fluid (Figure 2).

Discussion

Pulmonary complications after laparotomies are rather well known and investigated clinical conditions particularly for the adult patients. PE, which is described as any significant collection of fluid within the pleural space, is a subtype of pulmonary complications and different rates (10-60 %) had been reported for the adult series in the literature (1,2).

These studies mentioned pneumonia and pneumonitis, atelectasis, bronchiectasy, pulmonary embolism and acute respiratory failure following pneumonia as primary pulmonary complications which effect hospitalization duration, morbidity and mortality. Factors predisposing pulmonary complications in adults can be classified as follows (1,2,5):

a) Operational factors: Elective or urgent upper abdominal surgery, the localization of abdominal incision (upper and/or lower quadrants), extended duration of operation (longer than 270 minutes) and multiple surgical procedures.

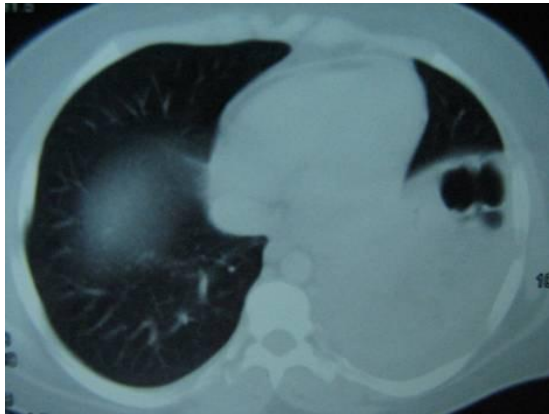


Figure 2. Computerized Tomography section showing fluid collection and atelectasis on the 3rd postoperative day of the third case.

b) Postoperative reasons: Hospitalization more than 24 hours in the critical care unit, postoperative nasogastric intubation, ventilator dependence more than 24 hours, inadequate-ventilation, inappropriate pain relief and pulmonary toilet.

c) Other reasons: Presence of respiratory symptoms before the operation, male gender, malnutrition, smoking and abnormal body mass index.

In their reference article in 1976, Light and George reported that the incidence of PE was higher under these circumstances; i) Following upper abdominal surgery, ii) In patients with postoperative atelectasis, iii) The side on which the surgery was performed iv) In patients with free abdominal fluid (6). The authors mentioned that these types of effusions were small and generally resolved spontaneously (6).

PE is a well known pulmonary complication in childhood. This complication is frequently found in association with childhood blunt spleen and liver injuries (3,4). PE and atelectasia were reported as the most frequent complications with a ratio of 17% in a pediatric series including 86 patients with blunt abdominal trauma (4). PE was also presented as a complication in children with advanced stage spleen injuries (7). These studies emphasized PE as a minor complication which generally did not effect morbidity (4,7). But, on the other hand, Gorenstein et al. (8), reported a series of 27 patients (age range 2-16 years) with blunt splenic trauma and bronchopulmonary involvement occurring in 44% of the patients presented as hemopneumothorax in the early and PE during the later periods of the disease process grading this complication with higher degree of importance. They mentioned that pleuro-pulmonary involvement was the result of direct chest trauma in only some of the patients with blunt splenic trauma and they advised monitoring of body temperature and follow up by repeated chest X-rays if PE was suspected (8). They suggested that conservative treatment of blunt splenic injury might predispose to development of delayed pleuro-pulmonary

complications as it was the case in our second patient (8). Detection of following clinical signs led us to diagnose PE in our patients; high body temperature (Over 38°C), presence of decreased respiratory sounds, auscultation and radiological findings on plain chest X rays and computerized tomography. Recovery periods were eventfull in all of the patients. In adult series PE was reported after splenic injuries and also as a frequent complication in patients with splenic abscess (9-11). Development of PE following laparoscopic splenectomy was reported in a limited number of pediatric cases. (12,13). Subdiaphragmatic abscess and PE complications following laparoscopic splenectomy can increase morbidity and need adjunct interventions such as drainage of abscess and thoracentesis as in our third patient (14,15). In general, pulmonary complications following upper abdominal surgery in the childhood period has been reported as a rare complication. Surgical pathologies of the pancreas, amoebic abscess of liver, and hepatic lobectomies could be given as the examples causing pulmonary complications (16-18). The pathogenesis and clinical course of pleural fluid accumulation during upper surgical pathologies is not a clearly defined phenomenon. Like in adult patients, we can speculate that the pleural fluid collections may originate from the peritoneal cavity passing directly through pores in the diaphragm or from the irritation of the diaphragm (6).

In conclusion, refractory pleural effusions developing during the course of serious intraabdominal surgical pathologies may increase morbidity. Associated lung atelectasis can also cause problems. Presence of free intraperitoneal fluid and adolescent age may also be risk factors for development of PE. Tube thoracostomy may be needed for the treatment of PE. Children who have had serious operations and/or possibility of longer periods of hospitalisation can benefit from spirometry and lung physiotherapy exercises. Our patients are not uniform, and presenting symptoms of the cases were not specific to PE. For instance, it is not easy to differentiate the source of fever, if it is connected to the primary pathology or by the PE itself. Related criteria should be supported and can be clearly defined with larger series of pediatric patients.

References

1. Serejo LG, da Silva Junior FP, Bastos JP, de Bruin GS, Mota RM, de Bruin PF. Risk factors for pulmonary complications after emergency abdominal surgery. *Respir Med* 2007;101:808-13.
2. Mathew JT, D'Souza GA, Kilpadi AB. Respiratory complications in postoperative patients. *J Assoc Physicians India* 1999;47:1086-8.
3. Yang JC, Sharp SW, Ostlie DJ, Holcomb GW 3rd, St Peter SD. Natural history of non-operative management for grade 4 and 5 liver and spleen injuries in children. *J Pediatr Surg* 2008;43:2264-7.
4. Yoo SY, Lim KS, Kang SJ, Kim CS. Pitfalls of non-operative management of blunt abdominal trauma in children in Korea. *J Pediatr Surg* 1996;31:263-6.
5. Fisher JC, Moulton SL. Nonoperative management and delayed hemorrhage after pediatric liver injury: new issues to consider. *J Pediatr Surg* 2004;39:619-22.

6. Light RW, George RB. Incidence and significance of pleural effusion after abdominal surgery. *Chest* 1976;69:621-5.
7. Steiner Z, Iuchtman M, Litmanovitch, Breitgand A. Low morbidity profile of spleen mesh wrapping in children. *Eur J Pediatr Surg* 2008;18:150-2.
8. Gorenstein A, Witzling M, Haftel LT, Mandelberg A, Serour F. Pleuro-pulmonary involvement in children with blunt splenic trauma. *J Paediatr Child Health* 2003;39:282-5.
9. Stephen WJ Jr, Roy PD, Smith PM, Stephen WJ Sr. Nonoperative management of blunt splenic trauma in adults. *Can J Surg* 1991;34:27-9.
10. Green BT. Splenic abscess: report of six cases and review of the literature. *Am Surg* 2001;67:80-5.
11. Jang TN, Fung CP. Treatment of pyogenic splenic abscess. *J Formos Med Assoc* 1995;94:309-12.
12. Fitzgerald PG, Langer JC, Cameron BH, Park AE, Marcaccio MJ, Walton JM, et al. Pediatric laparoscopic splenectomy using the lateral approach. *Surg Endosc* 1996;10:859-61.
13. Hery G, Becmeur F, Mefat L, Kalfa D, Lutz P, Lutz L, et al. Laparoscopic partial splenectomy: indications and results of a multicenter retrospective study. *Surg Endosc* 2008;22:45-9.
14. Corcione F, Esposito C, Cuccurullo D, Settembre A, Miranda L, Capasso P, et al. Technical standardization of laparoscopic splenectomy: experience with 105 cases. *Surg Endosc* 2002;16:972-4.
15. Casaccia M, Torelli P, Squarcia S, Sormani MP, Savelli A, Troilo B, et al. Laparoscopic splenectomy for hematologic diseases: a preliminary analysis performed on the Italian Registry of Laparoscopic Surgery of the Spleen (IRLSS). *Surg Endosc* 2006;20:1214-20.
16. Rabinovich A, Rescorla FJ, Howard TJ, Grosfeld J, Lillemoie KD. Pancreatic disorders in children: Relationship of postoperative morbidity and the indication for surgery. *Am Surg* 2006;72:641-3.
17. Saleem M. Anaerobic liver abscess-A cause of acute respiratory distress in infant: A case report. *J Med Case Reports* 2009;3:46.
18. Ekinçi S, Karak I, Tanyel FC, Senocak ME, Kutluk T, Buyukpamukcu M, et al. Hepatic lobectomies in children: experience of a center in the light of changing management of malignant liver tumors. *Pediatr Surg Int* 2006;22:228-32.