Rev Port Pneumol. 2016;22(3):157–162

revista portuguesa de PNEUMOLOGIA portuguese journal of pulmonology

www.revportpneumol.org

ORIGINAL ARTICLE

Thoracoscopy in the management of pediatric empyemas☆

R. Lamas-Pinheiro[a,*,1], T. Henriques-Coelho[a,1], S. Fernandes[a,b], F. Correia[a,c], C. Ferraz[b], L. Guedes-Vaz[b], I. Azevedo[b], J. Estevão-Costa[a]

[a] *Pediatric Surgery Department, Hospital São João, Faculty of Medicine, Porto, Portugal*
[b] *Pediatric Department, Hospital São João, Faculty of Medicine, Porto, Portugal*
[c] *Pediatric Department, Centro Hospital do Alto Ave, Guimarães, Portugal*

Received 17 September 2015; accepted 11 December 2015
Available online 21 January 2016

KEYWORDS
Thoracoscopy;
Empyema;
Children;
Conversion;
Reintervention

Abstract
Introduction: Thoracoscopy is increasingly being used in the treatment of empyema. This study assesses feasibility, efficacy and safety in children.
Material and methods: Clinical files of patients who underwent primary thoracoscopy for empyema between 2006 and 2014 were reviewed. Demographic, clinical and surgical data were analyzed and a comparison between the period before (period1) and after (period2) the learning curve was performed.
Results: Ninety-one patients (53 males, 58%) were submitted to thoracoscopy at a median age of 4 years. There were 19 conversions to thoracotomy with a steady decrease of conversion rate until 2009 (period1) and no conversions thereafter (period2). There was no difference in any of the analyzed parameters between patients submitted to thoracoscopy alone and those requiring conversion in period1. Six cases (6.6%) needed redo-operation (five in period2) and thoracotomy was the elected approach in four. Necrotizing pneumonia was present in 60% of the reoperated cases; in other words, in period2 3 out of 9 cases with necrotizing pneumonia required reintervention ($p = 0.07$). Thoracotomy was avoided in sixty-eight (75%) patients (62% in period1 versus 92% in period2, $p = 0.001$).
Discussion and conclusions: Thoracoscopic approach for empyema is feasible and safe avoiding a significant number of thoracotomies after a short learning curve. An increase of reintervention

☆ This study results from the collaboration of two departments; therefore the limit of six authors was exceeded.

* Corresponding author.
E-mail address: rubenlms@hotmail.com (R. Lamas-Pinheiro).

[1] Both authors contributed equally to this manuscript.

http://dx.doi.org/10.1016/j.rppnen.2015.12.004

rate should be expected, but throracoscopy alone is effective in the great majority of the cases. Necrotizing pneumonia may be associated with a higher risk of reintervention, as it is a contra-indication to thoracoscopy and probably surgery.

Introduction

The incidence of empyema in children is increasing worldwide.[1,2] Empyema occurs in nearly 1 in 150 children hospitalized with pneumonia, affecting about 3.3 per 100 000 children.[3,4] In contrast to their adult counterparts, children with empyema usually have a normal underlying lung and suppuration within the pleural cavity is most commonly a complication of acute bacterial pneumonia. Prognosis is excellent when appropriate treatment is administered early. Therapeutic options in children include systemic antibiotics, thoracocentesis, chest drain, fibrinolytic agents, and several surgical techniques such as thoracoscopy, video-assisted thoracoscopic surgery (VATS), mini-thoracotomy, and standard thoracotomy with lung decortication. No consensus has been reached about the optimal therapeutic strategy for pediatric empyema. A systematic review of randomized controlled trials (RCT) included three small RCTs comparing the outcomes of fibrinolytics and VATS with discordant findings: one study suggested better outcomes with primary operative treatment, but the other two found no significant difference in the measured outcomes except for the lowest cost of fibrinolytics.[3,5] The most recent randomized multicenter clinical trial, concluded that drainage plus urokinase instillation is as effective as VATS as first-line treatment of septated empyema in children.[6]

Despite the enthusiasm around minimally invasive surgical approaches, conversion and reintervention during the thoracoscopic management of pediatric empyemas have not been profoundly studied as in adults literature.[7]

The aim of this work is to assess the feasibility, efficacy and safety of thoracoscopic approach in a series of pediatric empyema.

Materials and methods

Study design and patient selection

All pediatric patients (aged <18 years) admitted between January 2006 and December 2014 at Hospital São João in Porto, Portugal with empyema associated with community-acquired pneumonia were eligible. An empyema was defined as a loculated or septated effusion by imagiologic study or finding of pus or loculated effusion at the time of surgical intervention. Necrotizing pneumonia was defined as multiple small lucencies or cavities of non-enhancement on a contrast-enhanced chest computed tomography (CT). Patients submitted to non-operative treatment or primary thoracotomy were excluded; only patients who underwent primary thoracoscopic management were included in this study.

The following data were retrieved from the patient records: demography (age, sex, date of empyema diagnosis), clinical presentation (duration of preoperative fever, duration of preoperative empyema, pneumonia characteristics – such as necrotizing pneumonia, empyema location, intensive care unit (ICU) admission), preoperative investigations (analytical inflammatory markers, chest radiograph, chest ultrasound and chest computed tomography, the use of preoperative chest tube), antibiotic usage, operative details (duration of surgery, number of trocars used, intraoperative complications, conversion to open procedure) and outcomes (complications including hemorrhage, pneumatocele, bronchopleural fistula and postoperative need for mechanical ventilation, duration of postoperative fever, duration of postoperative chest tube, duration of hospital stay and mortality). Surgical delay was defined as the number of days from the diagnosis to thoracoscopic treatment.

The learning curve was defined as the period when conversion occurred (period1), the period thereafter was defined as period2.

Patients submitted to thoracoscopy alone were compared with those requiring conversion (during period1) regarding preoperative data, operative details and outcomes. Patients needing reoperation during period2 were analyzed in a search for possible predictors of reintervention.

Globally, patients with necrotizing pneumonia were compared with those without this diagnosis regarding the preoperative data, operative details and outcomes.

Surgical techniques

Patients were submitted to thoracoscopy using either two or three trocars; in case of conversion or reoperation the posterolateral thoracotomy approach was used. At the completion of the procedure one or two chest tubes were inserted under thoracoscopic visualization and removed when drainage was minimal. Patients were discharged after chest tube removal and completion of intravenous antibiotics.

Statistical methods

Statistical analysis was conducted using SPSS® software, version 22 and all reported *p* values are two-tailed, statistical