An Evaluation of the Efficacy of Thorascopic Lung Biopsies in Pediatric Patients.

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Abstract

Background: Thorascopic lung biopsies (TLBxs) is readily available in most pediatric centers. The procedure has proven safer than open thoracic biopsy, but TLBx’s impact on treatment is less well-defined. The aim of this study was to determine the current frequency at which TLBxs changes clinical treatment.

Methods: Consecutive TLBxs performed on patients at Phoenix Children’s Hospital between January 2006 and May 2011 were retrospectively reviewed. Data collection included demographic and disease-related data, such as imaging results and tissue pathology.

Results: Thirty patients (mean age 9 years ± 6 years, 33% female) underwent 32 thorascopic biopsies (78% immunocompromised; 72% diffuse lung disease). The only complication was persistent air leak (6%). Conversion to thoracotomy occurred in 19% of procedures (all immunocompromised patients). The biopsies resulted in meaningful treatment changes in 37% of cases. The TLBxs remain highly effective at providing information which guides therapy. Complications are infrequent, but conversion to open biopsy was necessary in a significant number of immunocompromised patients.

Background: Thorascopic lung biopsy was first used in children by Rogers and his colleagues in the 1970’s. Since this first application, there have been advancements in optical equipment and anesthetic techniques. Thorascopic equipment has also been adapted for use in children. These reasons have lead to a greatly increased application of thorascopic lung biopsy in the pediatric population. Currently, the procedure is utilized at the physician’s discretion children for the diagnosis of various diseases including interstitial lung disease and lung tumors.1,4,8

With the increased availability of thorascopic lung biopsy, there has been significant research into the safety of the procedures. Several studies have shown that thorascopic lung biopsies pose a minimum risk.1,4 There is also research showing that thorascopic lung biopsy are effective in providing adequate tissue sample for histological diagnosis.2,7 Initial research by Rothenberg and colleagues, as well as research by Gluer and colleagues, suggest that thorascopic lung biopsies meaningfully impact the treatment protocol in pediatric patients.1,4 The aim of this study is to assess the current impact of TLBxs changes on therapy in the pediatric population and to determine if TLBxs continues to play a role in guiding therapy.

Methods

A retrospective study of consecutive TLBxs was conducted in children who had undergone thorascopic surgery at Phoenix Children’s Hospital between January 2006 and May 2011. The study sample excluded patients that underwent a thorascopic procedure other than TLBxs, such as multiaccessial mass biopsies, blebectomies, and fístula repair. Demographic data (age, gender, and race) as well as clinical data (indications for biopsy, radiology results, pathology, complications from procedure, and follow-up information) were collected and reviewed. Data were summarized using descriptive statistics, with Fisher’s exact test for comparisons when necessary. Statistical significance was set at alpha of 0.05, with two-sided alternative hypotheses. Analysis was performed using SPSS Statistics (Chicago, Illinois).

Results and Discussion

This study reviewed 32 thorascopic lung biopsies that were performed in 30 pediatric patients (33% female, ages ranging from 5 months to 16 years) at Phoenix Children’s Hospital from January 2006 to May 2011. All but one (97% of biopsies) provided diagnostically usable lung tissue, confirming the effectiveness of thorascopic lung biopsy to provide adequate samples for tissue diagnosis. More importantly, all of the 31 adequate lung biopsies providing a diagnosis lead to a change in treatment. The impact was seen in all groups (100% of focal disease, 96% in diffuse disease, 100% in immunocomproment patients, and 96% in immunocompromised patients). Thus, TLBxs appear to play an important role in treatment in pediatric patients regardless of extent of pulmonary disease or immune system status.

For those patients that underwent biopsy, complications were infrequent. The only major complication encountered was persistent air leak in 6% of cases. The difference in persistent air leak in diffuse disease versus focal disease (9% versus 0%, p=0.51) and immunocompromised patients versus those with normal immune function (14% versus 4%, p=0.35) did not reach statistical significance, but sample sizes were relatively small for these subgroups. The slight increased risk of persistent air leak in diffuse disease likely reflects the widespread damage of lung parenchyma making the lung parenchyma less likely to compress solidly or hold staples in its diseased state. Thus, while TLBxs in patients with diffuse disease may carry a slightly higher risk of complication, the overall risk remains low.

The majority of TLBxs were converted to thoracotomies. While not statistically significant, conversion was more common in focal (33%) compared to diffuse (13%) disease (p=0.16), and among immunocompromised (24%) versus immunocompetent (0%) patients (p=0.20). Conversion to thoracotomy in immunocompromised patients appears to have been due to difficulty with focal target lesion. For these patients undergoing a minimally invasive procedure, thoracotomy may represent a significant setback in terms of pain and length of stay. The availability of image-guidance may provide an opportunity to decrease conversion in patients with focal disease.

Conclusions

As currently applied, the vast majority of TLBxs at our center are done for immunocompromised patients. Thorascopic lung biopsy offers adequate tissue samples, meaningfully alters treatment plans, and can be done with a low risk of complications in both focal and diffuse disease. The most common complication is persistent air leak, but need for reoperation is uncommon in immunocompromised patients with focal lesions due to difficulty locating the target lesion does not appear to be uncommon and may represent an opportunity to improve care.

References


Table 1: Indications for thorascopic lung biopsies

Table 2: Incidence of complications and conversions in thorascopic lung biopsies

Table 3: Diagnosis from thorascopic lung biopsies

Table 4: Outcomes of thorascopic lung biopsies

Table 5: Outcomes of thorascopic lung biopsies in different patient groups