

# VIDEO ASSISTED THORACOSCOPY IN CHILDREN

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## ABSTRACT

*Objective* To determine the outcome of video-assisted thoracoscopic surgery (VATS) in terms of its efficacy, safety and usefulness in children.

*Study design* Case series

*Place & Duration of study* Department of Paediatric Surgery Unit B, National Institute of Child Health, Karachi, from May 2006 to December 2006.

*Patients and Methods* This study was carried out on patients who were admitted with various intra thoracic pathologies and had video assisted thoracoscopy.

*Results* Total of 13 patients underwent VATS. There were 6 patients of empyema thoracis who underwent thoracoscopic decortication and done successfully. There were four patients of hydatid disease among which three were converted into open thoracotomy. Two patients were of mediastinal mass and one of bronchopleural fistula. In these patients only biopsy was done which was conclusive in one patient, who was diagnosed as having ganglioneuroma. In other biopsy was inconclusive. Biopsy report was that of tuberculosis in patient with bronchopleural fistula.

*Conclusions* Video-assisted thoracoscopy is a safe and effective diagnostic and therapeutic procedure in children and this new approach has an important place in pediatric thoracic surgical practice. Thoracoscopic decortication can be treatment of choice for early empyema thoracis. As the learning curve progresses, more and more procedures can be done by VAT.

*Key words* Video-assisted thoracic surgery, VATS, Complications, Child.

## INTRODUCTION:

Video-assisted thoracic surgery involves performance of intra-thoracic procedures through several small thoracostomies without a thoracotomy.<sup>1</sup> Availability of fine ports, smaller fine endoscopic instruments and clips,

improvement in visual optics, controlled diathermy, single lung ventilation techniques and better intraoperative visualization and exposure of the pleural surface as compared with limited thoracotomy incision make this an alternative approach to intra thoracic pathologies. The advantages of thoracoscopy include decreased postoperative pain, lower postoperative narcotic requirement, shorter hospital stay, improved postoperative pulmonary function, decreased levels of circulating inflammatory cytokines postoperatively and improved cosmetic appearance.

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VATS is used for both diagnostic and therapeutic purposes which include biopsy and excision of pulmonary and mediastinal masses,<sup>2</sup> decortication of empyema,<sup>3,4</sup> pleurodesis and blebectomy for pneumothorax, repair of eventration of diaphragm,<sup>5</sup> lung resection, esophageal myotomy, evaluation of thoracic trauma, closure of patent ductus arteriosus<sup>6</sup> and repair of esophageal atresia and has been proven to be safe and effective in pediatric patients of all ages as results are comparable to open thoracotomy.

Disadvantages include inability to manually palpate the lung parenchyma, the potential of port site seeding with tumor cells and incomplete decortication<sup>7</sup> when treating empyema. But overall more advantages and its application to paediatric population, makes it an attractive alternative to open surgery. This study describes our initial experience of VATS in paediatric patients.

### **PATIENTS AND METHODS:**

This study was conducted over a period of eight months from May 2006 to December 2006, in the Department of Paediatric Surgery, Unit B at National Institute of Child Health Karachi. All patients were subjected to detailed history and clinical examination followed by relevant investigations which included blood complete picture, serum electrolytes, blood sugar and urea. Radiological investigations were also done which includes plain x-ray chest, ultrasound and CT scan chest if indicated. Data was entered in proforma. All consecutive patients between the ages of 1-12 years with various thoracic lesions requiring otherwise open surgery for diagnostic / therapeutic purposes, were included. Re-do surgeries and patients with large tumors >5cm were excluded if therapeutic resection was required.

In all patients with empyema thoracis, VATS was done, who showed minimal or no response to simple chest tube placement. Patients with hydatid disease lung were initially started on albendazole. Surgery was done after period of six weeks of medical treatment.

### **RESULTS:**

There were 13 patients in our study spanning over 8 months who had video assisted thoracoscopy. Out of 13 patients, there were 8(62%) males and 5 (38%) females with male: female ratio of 1.6: 1. Mean age was 7 year (ranging from 1.5 to 12 years). Mean weight in kilograms was 18 (ranging from 6 to 31). Empyema thoracis was the most common diagnosis that was observed in 6 (47%) followed by hydatid disease in 4 (31%), mediastinal mass in 2 (14%) and bronchopleural fistula in one (8%) patient. The common presenting symptoms were fever and cough which were present in more than two third of patients.

Mean duration of surgery among 13 patients was 101 minutes (ranging from 55 to 135 min). Duration of post operative chest tube insertion ranged from 1 to 10 days with a mean

of 5 days. Mean length of postoperative stay in ward was 7 days (ranging from 3 to 11days). Conversion to open thoracotomy was done in 3 (23%) patients. Complications included port site infection in 3 (23%), chest tube blockage in 2 (15%) and chest tube dislodgement in 1 (8%). Inconclusive biopsy resulted in 1 (8%) patient.

In patients with hydatid disease out of four, three patient needed conversion. In one patient it was due to anesthesia related problem as patient was not maintaining O<sub>2</sub> saturation and other two because of dense adhesion between lung, cyst and thoracic wall. In one patient complete cyst was removed and residual cavity was left as such. In immediate post operative residual cavity was present but after six weeks it significantly reduced in size and complete lung expansion achieved.

Two patients of mediastinal masses underwent thoracoscopic biopsy. The biopsy report in one patient showed ganglioneuroma and this patient had open thoracotomy and tumor was completely excised. In other case biopsy was inconclusive. One patient with diagnosis of bronchopleural fistula who underwent thoracoscopic biopsy, tuberculosis was the final diagnosis. This patient was put on anti tuberculous therapy and improved.

### **DISCUSSION:**

Video assisted thoracoscopy is a useful adjunct, the objective of which is the same as that of conventional thoracotomy but with less surgical trauma, less pain and morbidity, a speedier return to normal physical activities and less time in hospital and thus, potentially reduce healthcare costs. The assumption is made that if "minimally invasive" procedure can be performed with at least equal safety and efficacy as standard open operation, then it is the preferred mode of therapy.

Thoracoscopy has advanced significantly since the 1970s when Rodgers<sup>8</sup> et al introduced the technique for diagnosing intrathoracic pathology in children. As the technology improved, the indications for VATS increased including more technically demanding and complex procedures such as lobectomies, pneumonectomy and oesophageal atresia with tracheoesophageal fistula repair. Use of new technologic instruments for dissection and concurrent hemostasis such as the ultrasonic shears and Ligasure helped greatly by providing a dry operative field and allowing a safe resection.

In our 6 patients of empyema thoracis, thoracoscopy was able to achieve its goal and complete lung expansion was achieved. One patient who underwent VATS had incomplete decortication and as a result did not have complete lung expansion in the immediate postoperative period but this patient improved over the period of time after continuous chest physiotherapy and control of infection through medical treatment and has satisfactory lung expansion. None of the patients needed re-exploration.

Grewal<sup>9</sup> treated twenty-five children of empyema with VATS and the most common presenting symptoms of patients were fever and cough as noted also in our study. Kurt<sup>10</sup> mentioned in his study of 18 patients that hospital length of stay, number of chest tube days, narcotic use and number of radiographic procedures were all less in the patients who underwent primary video-assisted thoracoscopic surgery. Suchar<sup>11</sup> recommended early video assisted thoracoscopic decortication in children with advanced pneumonia with empyema, to avoid unnecessary lengthy hospitalization and prolonged intravenous antibiotic therapy. This is also noticed in our study that VATS is treatment of choice in early empyema.

In patients with hydatid disease we had high conversion rates to open thoracotomy that is 75%, which may be because of our lack of experience and also there were dense adhesions present between cyst cavity, lung and chest wall. But studies have shown high success rate in those patients who underwent thoracoscopic surgery for various cystic lesions.<sup>12</sup> Thoracoscopic procedures in children may be performed under intravenous sedation with regional anesthesia especially those procedures that can be performed rapidly and with little manipulation such as lung biopsy.<sup>13</sup>

In those patients who underwent thoracoscopic biopsy we had success rate of 50% and there was no significant morbidity in these cases. Studies have shown very good results in achieving the goals in those patients who either had therapeutic or diagnostic thoracoscopic biopsy. We had no mortality during this study as most of the cases were done on elective basis. Sandoval<sup>14</sup> had reported series of nine children with undiagnosed mediastinal masses who underwent video-assisted thoracoscopy. In all cases adequate tissue for diagnosis was obtained and there were no complications related to the operative procedure. As the learning curve progresses more complex procedures can be performed through VATS as mentioned in a study by Cano.<sup>15</sup> He had done lobectomy in six children without any serious complication. Evidence is gradually accumulating indicating that video-assisted thoracoscopic surgery is a feasible and perhaps better alternative for the treatment of tumors especially those in early stages.<sup>16</sup>

Two important limitations of thoracoscopic lung surgery are the loss of a three-dimensional operative view and the loss of the ability of the surgeon to use tactile sense. As surgeons continue to gain experience using video images they become more comfortable judging spatial relations on a two-dimensional image. In addition, continued improvement in optical technology and the possibility of three-dimensional images in the future will most likely eliminate this problem altogether. As the indication of therapeutic procedures that can be done by VATS is increasing, indirectly the cost of treatment will further come down due to wider availability and applicability.<sup>17</sup>

In the end we conclude that introduction of video assisted thoracoscopy has been of great benefit to children with various thoracic lesions and has achieved the clinical results which are comparable to open thoracotomy if proper attention is paid to technical details.

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