



PEDIATRIC SURGERY Update 8

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Thoracoscopic Lung Biopsy

The first minimally invasive procedure reported using thoracoscopic techniques was a lung biopsy. Lung biopsy is generally utilized to provide answers for causes of interstitial lung disease in both the immunocompetent and immunocompromised child, lung residual masses after chemotherapy and evaluation of new suspicious nodules found in oncology patients. Interstitial lung disease is defined as diffuse interstitial findings on chest x-ray or CT scan. Interstitial disease may be bilateral or unilateral and may be more prominent in one lobe over another. Posterior pleural biopsies are performed with the patient almost prone and anterior lesions are performed with the patient almost supine. Thus, positioning takes advantage of gravity to allow the lung to fall away from the lesion when the lung is collapsed. Instead of single lung ventilation children can benefit from undergoing contralateral lung ventilation using ipsilateral bronchial blockers or Fogarty balloon catheters. Use of CO₂ insufflation creates a pneumothorax and further collapses the ipsilateral lung. Pressures of 4-6 mm should be utilized. The lung biopsy can be performed with endoloop or endoscopic staplers. Image-guided percutaneous needle biopsy is preferred for pulmonary nodules. Thoracoscopy reduces pain, shortens hospital stay and is more pleasing cosmetically.

References:

- 1- Rothenberg SS, Wagner JS, Chang JH, Fan LL: The safety and efficacy of thoracoscopic lung biopsy for diagnosis and treatment in infants and children. *J Pediatr Surg.* 31(1):100-3, 1996
- 2- Partrick DA, Bensard DD, Teitelbaum DH, Geiger JD, Strouse P, Harned RK: Successful thoracoscopic lung biopsy in children utilizing preoperative CT-guided localization. *J Pediatr Surg.* 37(7):970-3, 2002
- 3-Hayes-Jordan A, Connolly B, Temple M, Chait P, Weitzman S, Njere I, Langer JC, Kim P: Image-guided percutaneous approach is superior to the thoracoscopic approach in the diagnosis of pulmonary nodules in children. *J Pediatr Surg.* 38(5):745-8, 2003
- 4- Ponsky TA, Rothenberg SS: Thoracoscopic lung biopsy in infants and children with endoloops allows smaller trocar sites and discreet biopsies. *J Laparoendosc Adv Surg Tech A.* 18(1):120-2, 2008
- 5- Langenburg SE, Lelli JL: Minimally invasive surgery of the lung: lung biopsy, treatment of spontaneous pneumothorax, and pulmonary resection. *Semin Pediatr Surg* 17: 30-33, 2008
- 6- GIÄ3er S, Schwerk N, Reismann M, Metzelder ML, Nustede R, Ure BM, Gappa M: Thoracoscopic biopsy in children with diffuse parenchymal lung disease. *Pediatr Pulmonol.* 43(10):992-6, 2008

Thoracoscopic CDH Repair

Congenital diaphragmatic hernias (CDH) can be surgically managed using either laparoscopic or thoracoscopic minimally invasive technique. Either Bochdalek and Morgagni hernias have lent themselves to repair using these minimally invasive approach. The ideal child for thoracoscopic repair would be those that have delayed presentation beyond the neonatal period since the presence of pulmonary hypoplasia

and pulmonary hypertension is minimal or none. The child should be in stable cardiovascular and respiratory status before surgery. The procedure is performed under general anesthesia without single lung ventilation with an epidural thoracic catheter. Reduction of the hernia occurs using one optical trocar, two operating trocars and a pleural insufflation pressure of carbon dioxide between five and 8 mmHg. The hernia defect is repaired using non-absorbable interrupted sutures or mesh with absence of significant diaphragm. Conversion to open occur with difficulty in reducing the hernia toward the abdominal cavity, herniation of liver and intolerance of insufflation. Reduction of the defect is easier in babies that have a hernial sac. Without a sac the bowel is gently pushed down into the abdominal cavity. Using the laparoscopic approach the spleen and bowel are difficult to reduce into the peritoneal cavity and the working space is very restricted. The thoracoscopic technique causes minimal trauma, results in good respiratory function, excellent cosmetic results and promotes early recovery. End tidal CO₂ is significantly elevated during repair.

References:

- 1- Becmeur F, Jamali RR, Moog R, Keller L, Christmann D, Donato L, Kauffmann I, Schwaab C, Carrenard G, Sauvage P: Thoracoscopic treatment for delayed presentation of congenital diaphragmatic hernia in the infant. A report of three cases. *Surg Endosc.* 15(10):1163-6, 2001
- 2- Nguyen TL, Le AD: Thoracoscopic repair for congenital diaphragmatic hernia: lessons from 45 cases. *J Pediatr Surg.* 41(10):1713-5, 2006
- 3- Becmeur F, Reinberg O, Dimitriu C, Moog R, Philippe P: Thoracoscopic repair of congenital diaphragmatic hernia in children. *Semin Pediatr Surg.* 16(4):238-44, 2007
- 4- Guner YS, Chokshi N, Aranda A, Ochoa C, Qureshi FG, Nguyen NX, Grikscheit T, Ford HR, Stein JE, Shin CE: Thoracoscopic repair of neonatal diaphragmatic hernia. *J Laparoendosc Adv Surg Tech A.* 18(6):875-80, 2008
- 5- Cho SD, Krishnaswami S, Mckee JC, Zallen G, Silen ML, Bliss DW: Analysis of 29 consecutive thoracoscopic repairs of congenital diaphragmatic hernia in neonates compared to historical controls. *J Pediatr Surg.* 44(1):80-6, 2009
- 6- Gourlay DM, Cassidy LD, Sato TT, Lal DR, Arca MJ: Beyond feasibility: a comparison of newborns undergoing thoracoscopic and open repair of congenital diaphragmatic hernias. *J Pediatr Surg.* 44(9):1702-7, 2009
- 7- McHoney M, Giacomello L, Nah SA, De Coppi P, Kiely EM, Curry JI, Drake DP, Eaton S, Pierro A: Thoracoscopic repair of congenital diaphragmatic hernia: intraoperative ventilation and recurrence. *J Pediatr Surg.* 45(2):355-359, 2010

Anal Strictures

Anal stricture is a well known complication of anorectal surgery in children and adults. Causes of anal stricture includes anastomotic ischemia, anastomotic leak or dehiscence, and local infection. Anal stricture can occur after anorectal procedures for Hirschsprung's disease, Familial polyposis, inflammatory bowel disease, imperforate anus and anorectal tumors. Most surgeons will start postoperative dilatation two weeks after surgery. This is followed by a program of gradual dilatations until the area becomes pliable, soft and symptoms disappear. Some strictures are not amenable to dilatation and will need further surgery by anoplasty or repeated pull-through. Mitomycin C, an agent that inhibits RNA and protein synthesis has been shown to be effective in

the prevention of fibroblast proliferation that leads to scarring, has been utilized in esophageal, vaginal, laryngeal and urethral strictures with success. Mitomycin C application has recently been utilized in anal strictures as an adjunct to anorectal dilatations with success avoiding the need of further reconstructive surgery.

References:

- 1- Liberman H, Thorson AG: How I do it. Anal stenosis. Am J Surg. 179(4):325-9, 2000
- 2- Alexander F: Complications of ileal pouch anal anastomosis. Semin Pediatr Surg. 16(3):200-4, 2007
- 3- Daher P, Riachy E, Georges B, Georges D, Adib M: Topical application of mitomycin C in the treatment of esophageal and tracheobronchial stricture: a report of 2 cases. J Pediatr Surg. 42(9):E9-11, 2007
- 4- Heran MK, Baird R, Blair GK, Skarsgard ED: Topical mitomycin-C for recalcitrant esophageal strictures: a novel endoscopic/fluoroscopic technique for safe endoluminal delivery. J Pediatr Surg. 43(5):815-8, 2008
- 5- Lillehei CW, Leichtner A, Bousvaros A, Shamberger RC: Restorative proctocolectomy and ileal pouch-anal anastomosis in children. Dis Colon Rectum. 52(9):1645-9, 2009
- 6- Mueller CM, Beaunoyer M, St-Vil D: Topical mitomycin-C for the treatment of anal stricture. J Pediatr Surg. 45(1):241-4, 2010

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