Bronchogenic Cyst in a Child
The use of a 5 mm stapler for thoracoscopic resection

S. Pavia F. Destro N. Cantone M. Maffi M. Lima

ABSTRACT
We report the case of a 4 year old patient affected by congenital bronchogenic cyst who underwent thoracoscopic surgery for cyst removal. A new 5 mm stapler device was used for the first time at our institution: its characteristics allowed us to safely perform the procedure with the advantages of using a 5 mm trocar.

Introduction
Over the past two decades minimally invasive techniques have been widely used in children thanks to instrumental and technological development. The advantages of minimally invasive surgery are well known and they are even more important in pediatric age. Unfortunately the widespread adoption of these techniques is limited by small spaces in which the surgeon is forced to operate, especially in children. For this reason there are many efforts in making new smaller devices that can be used also in infants or smaller children. We report our experience with the use of a new Stapler device that can be used through a 5 mm trocar sleeve.

Case Report
A 4 years old male came to our attention after the discovery of an upper right lobe radiolucent area on chest x-ray.

From the first months of life the child had presented recurrent upper airway inflammation. When he was 3 years old he performed chest x-rays for acute catarrhal inflammation showing a massive radiolucent rounded lesion with thickening of the right lung wall. It was therefore requested a CT scan of the chest that showed a huge cystic mass at the anterior segment of the upper right lobe, surrounded by a thin wall. In light of the radiological findings the boy was followed conservatively by clinical and radiological investigations. We decided for surgical removal of the mass due to the persistence of symptoms and the negativity of blood tests (total and specific IgE, serology, inflammatory markers).

Surgical technique

Figure 1 External view of the operative field
The surgical procedure was performed with thoracoscopic access. The patient was placed in left lateral decubitus. An endobronchial blocker was positioned in the right lung before surgery
to perform a single lung ventilation. Three 5 mm instruments were used: one for the 0° optic (in the 5th intercostal space over the anterior axillary line using the open Hasson technique) and two for the operating trocars that were positioned under direct vision (Fig. 1).

Pneumothorax was created with a pressure of 5 mm Hg and a flow of 1 L/min. A cystic lesion was identified in the upper right lung lobe. The cyst resection was performed by the MicroCutter XchangeTM 30 Stapler (Fig. 2). This stapler is a single 30 mm long patient device that delivers two double rows of stainless steel staples and it transects tissue between the rows.

Figure 2 Thoracoscopic view of the cyst resection (a); unplaced clips at the end of the “fire process” aren’t spread in the thorax but remain in the jaws of the instrument (yellow circle in b)

Once the procedure was over a chest tube was placed and it was removed in the first postoperative day. After the intervention, there were no complications and the patient was discharged on the fourth postoperative day. The boy is doing well eight months after surgery. Histological evaluation showed a bronchogenic cyst.

**Discussion and conclusions**

Endoscopic and minimally invasive techniques should have a preeminent collocation in pediatric surgery. In fact, they emphasize the role of the pediatric surgeon in such a way as to leave the smallest scar on the patient. Moreover minimally invasive surgery (MIS) has other advantages such as better functional results, reduced postoperative pain and fast recovery that means less social discomfort for children and lower health care costs [1-3]. The applicability of MIS in pediatric age has always been limited by the size of the instruments that should be adapted to narrow working chambers and to the peculiar anatomy. We think that 5 mm staplers may be useful devices for pediatric surgeon in many occasions. We used for the first time this stapler during a thoracoscopic procedure to remove a bronchogenic cyst of the upper right lobe. Bronchogenic cysts are congenital anomalies that arise from the abnormal budding process of the primitive intestine. They are usually unilocular cysts and independent for the trachea-bronchial tree. They may lead to recurrent pulmonary infections, as in our case, or be asymptomatic. Cystic malignant transformation is described in few cases. The treatment includes radical resection in order to avoid complications and recurrences [4-5].

Endosurgery was proved to be feasible and safe also in children, but successes are deeply connected with surgeon experience [3,6-11]. MIS has a steep learning curve as it is characterized by the loss of tactile sensation, a narrow and bidimensional field of view with a loss of depth perception. Moreover, movement possibility is scarce because instruments are forced into a fixed position.

Staplers partially avoid limited movements thanks to their flexible tip. The possibility to bend the tip requires bigger working chambers than those found in children, especially in thoracoscopic surgery. In our decades of experience, we think that the 5 mm stapler is applicable and useful also in thoracic resections in pediatric age. The stapler we used has a cross-sectional area six times smaller than conventional surgical staplers and articulates up to 80 degrees in each direction. The lower profile allows the use through 5 mm trocars improving aesthetical results compared to those obtained with bigger trocars.
The use of these instruments should not disregard anatomical knowledge and preoperative imaging evaluation. It is also important to know the features of the instruments in order to choose the most appropriate and to forecast its effect over the tissues.

Staplers are essential devices that can improve outcomes in minimally invasive procedures, reducing operative times and guaranteeing secure sealing. We believe that the small size and maneuverability of the 5 mm stapler offers surgeons a significant advantage.

References