Journal of Neonatal Surgery 2017; 6:78
Doi:10.21699/jns.v6i4.527

OPEN ACCESS

ORIGINAL ARTICLE

Thoracoscopic Esophageal Atresia Repair in Pakistan: Early Learning Curve

Ali Raza Brohi[1],* Naseem Mengal[1], Rafia Tabassum[2]

1 Department of Pediatric Surgery, Peoples University of Medical and Health Sciences Nawabshah, Sindh, Pakistan

2 Department of Anesthesiology, Peoples University of Medical and Health Sciences Nawabshah, Sindh, Pakistan

How to cite: Brohi AR, Mengal N, Tabassum R. Thoracoscopic esophageal atresia repair in Pakistan: early learning curve. J Neonatal Surg. 2017;6:78.

ABSTRACT

Background: Esophageal atresia is rare congenital anomaly, which is traditionally repaired by open thoracotomy. Thoracoscopic esophageal atresia repair has evolved as an effective and safe technique.

Material and Methods: This is a retrospective review of 11 cases of esophageal atresia (type C), between June 2015 to May 2016. The objective of study is to describe our initial learning curve of thoracoscopic esophageal atresia repair.

Results: Out of 11 patients, initial 4 underwent video assisted technique through single incision of 2 cm to visualize the exact video-scopic anatomy and to do few steps if possible. In last 7 cases, steps were completed with both ends mobilization and intracorporeally single layer interrupted stitching of esophagus. Complications encountered in 3 patients like esophageal leak in one managed conservatively, stenosis and reflux in one patient each.

Conclusion: Thoracoscopic esophageal atresia repair is challenging and demanding surgery. Every surgeon has a learning curve before successful thoracoscopic repair which requires skills and learning under supervision of experienced surgeons.

Key words: Thoracoscopic repair; Esophageal atresia; Learning curve; Developing country

INTRODUCTION

Esophageal atresia with or without fistula is rare congenital anomaly occurring in 1/3000-5000 of neonatal population [1] which is traditionally repaired by posterio-lateral thoracotomy and still a standard approach [2-4]. With advancement in minimal invasive pediatric procedures and availability of high definition technology, it becomes possible to perform technically demanding and complex procedures thoracoscopically [5]. The objective of study is to describe our experience of few basic steps of learning curve to make it possible for achievement of final thoracoscopic repair.

MATERIALS AND METHODS

This is retrospective study conducted from June 2015 to May 2016 at Peoples University of Medical and Health Sciences Nawabshah. Eleven (11) patients included for thoracoscopic esophageal atresia repair. Detailed pre-operative assessment done in all patients, full term with type C esophageal atresia weighing greater than 1.5 kg were selected. Neonates with major cardiac anomalies on echocardiography and having GIT anomalies were excluded. Preoperative assessment of gap between two atretic ends were roughly assessed by plain x-ray of cervical and thoracic spine in lateral view with large bore tube in situ in esophagus.

Correspondence*: Prof. Ali Raza Brohi, Professor and Chairman Pediatric Surgery, Peoples University Of Medical and Health Sciences, Nawabshah Sindh, Pakistan
E mail: Kidssurgeon@gmail.com
Submitted: 14-01-2017
Conflict of interest: None

Accepted: 25-09-2017
Source of Support: Nil

Data collected included newborn age, weight at the time of surgery, operative time, mechanical ventilation required, days of hospitalization, time to start first feed per/post-op complications. Informed written consent was obtained from parents for initial cases as well as other cases for thoracoscopic repair.

TECHNIQUE

Baby placed in modified prone position with right side elevated at 45 degree with tracheal intubation in all cases and no attempt was done for single lung ventilation. In first four cases single small incision of 2-3 cm like we do in VATS given below the tip of scapula at 5th intercostal space. A 5mm scope put from top of incision and two working 3mm instruments places directly from mid of incision, lung retraction done with 3mm fan retractor from bottom of incision. The aim of this technique was to see video-scopic view of internal anatomy and to assess difficulties while doing few video-assisted steps like azygos vein ligation and fistula handling. Rest of procedure was completed by open method.

In next 7 cases, three port technique was used consisted of camera port of 5mm just below tip of scapula, right port of 5mm in mid axillary line, two space above camera port, and the last 3mm port placed two space below in 6th or 7th intercostal space behind posterior axillary line (Fig.1). Lung collapse was achieved with CO2 insufflations with flow of 1lit/min and pressure kept between 5-8 mmHg. The first step in all cases was to deal azygos, which was accomplished by hook electrode easily after opening the pleural membrane. Next step was to ligate with fistula (Fig.1) which was done with 5mm of Grena plastic clips passed through right upper port (Fig.1). Next was to identity the upper pouch, which was mobilized by hook in right hand and grasper in left hand to pull pouch inferiorly to achieve adequate length (Fig.1). Once the good length is achieved, anastomosis of posterior layer of two ends was done intracorporeally by 5/0 non-absorbable suture in 2 cases, and Vicryl in rest of cases. After completing posterior layer, a trans-anastomotic tube was placed and anterior layer of anastomosis completed (Fig.1). Chest drain was placed in all cases.

RESULTS

Initial 4 cases underwent video assisted (Uniportal VATS) thoracoscopy, which were converted to open. Seven cases, were successfully done thoracoscopically. Mean age at the time of surgery was 3 days. Weight of patients at the time of surgery ranges between 2-3.5 kg. The initial cases had operative time between 120 to 150 minutes; in last two cases it was reduced to less than 120 minutes. Mechanical ventilation was required in 4 cases. Contrast swallow done in all case on day 5, but in 2 cases early contrast was done suspecting leak which confirmed it in one (healed conservatively). First feed was started on day 3 in 4 cases through nasogastric tube; in 5 cases feed started on day 5 after contrast swallow and in remaining two case feed started lately after 6 days as these were on mechanical ventilation. Postoperative complications encountered in 3 cases including one leak, one stricture and one case had reflux. Leak was managed conservatively, stricture improved on dilatation and gastro esophageal reflux is being managed medically. Hospital stay ranged from 8 days to 16 days. There was one mortality in our series that developed sepsis postoperatively.

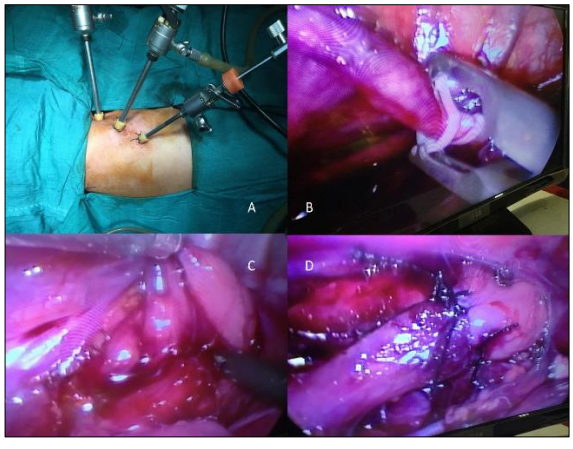

Figure 1: A) Port positions. B) ligation of fistula with plastic clip. C) upper pouch mobilization. D) completed anastomosis.

DISCUSSION

According to IPEG and EUPSA survey thoracoscopic esophageal repair is worldwide accepted procedure and being performed in more than 65 developed centers [6,7]. In few Asian countries and Middle East, thoracoscopic repair of esophageal atresia has been started but they are at initial learning stage [8-10]. In Pakistan, it is first ever attempt at thoracoscopic repair of esophageal atresia with tracheo-esophageal fistula.

In our study, the initial four cases have undergone a new technique like Uniportal VATS to learn the video-scopic anatomy and to attempt few steps keeping the safety of patient in mind. Regarding age, weight and associated anomalies our selection criteria was safe as we have excluded cases with low birth weight, prematurity and major cardiac association are absolute contraindication to thoracoscopic approach as Rothenberg et al also described in his study [12].

Azygos vein ligation or sparing is an option, in our study we dealt it with coagulating hook, but in few studies azygos sparing technique have been done claiming lesser edema at esophageal anastomotic site and prevention of recurrent fistula formation [8,9,13]. Fistula ligation can be done in different ways like suture ligation, titanium clips but we have done it with Grena 5mm plastic clips which is having secure locking mechanism in front and there is no statistical significant difference in all techniques [1,11,14].

The most difficult part of surgery is esophageal anastomosis, intracorporeally, which is technically demanding; the technique is same like in open repair, but the first stich is difficult one to apply because of distantly apart ends, we encountered the similar difficulties especially in long gap where we had to apply stay sutures before applying first intracorporeal stich [8,11]. The operative time is variable in our study which was more in initial cases because of technical difficulty and small working space, the same duration of operative time was seen in other studies with their initial learning curve experiences.

Although the number of patients in our series is small, the anastomotic leak and narrowing in our cases was seen in 10% each, but different comparative studies have found these complication are lesser in thoracoscopy group versus open group. Nevertheless, meta-analysis by Borruto et al showed no difference in open and thoracoscopic groups and the only advantage is to prevent major thoracotomy [15-17].

CONCLUSION

Thoracoscopic repair of esophageal atresia with TEF is feasible, but is technically challenging and demanding. Our current experience is on quite limited number of patients and there is considerable learning curve required till the perfection of procedure. Our initial learning curve based on video-scopic view of internal anatomy and preliminary handling of Azygous vein and fistula enabled us do successful thoracoscopic repair of esophageal atresia with tracheo-esophageal fistula.

REFERENCES

1. Rothenberg SS. Thoracoscopic repair of esophageal atresia and tracheo-esophageal fistula in neonates: evolution of a technique. J Laparoendosc Adv Surg Tech. 2012; 22:195-9.
2. Freeman NV, Waltden J. Shoulder deformity following right lateral thoracotomy for esophageal atresia. J Pediatr Surg. 1969; 4:627-36.
3. Durnign RP, Scoles PV, Fox OD. Scoliosis after thoracotomy in tracheoesophageal fistula patient. J Bone Joint Surg. 1980; 62:1156-8.
4. Chemp LL, Siewels RD, Futerll JW. Breast and pectoral maldevelopment after anterolateral and posteriolateral thoracotomies in children. Ann Thorac Surg 1986; 41: 492-7.
5. Lobe TE, Rothenberg SS, Wldschmidt J, Stroeder L, Thoracoscopic repair of esophageal atresia in an infant. Endosurg Innov Tech. 1999; 3:141-8.
6. Augusto Z, Simon E, Micheal E. International survey on the management of esophageal atresia. Eur J Pediatr Surg. 2014; 24:3-8.
7. Lal D, Miano G, Juang D. Current pattern of practice and technique in the repair of esophageal atresia and TEF: an IPEG survey. J Laparoendosc Adv Surg Tech. 2013; 23:635-8.
8. Masaya Y, Naoto Urusihara, Koji Fukumoto. Thoracoscopic versus open repair of esophageal atresia with tracheoesophageal fistula at a single institution. Pediatr Surg Int. 2014; 30:883-7.
9. Kanojia RP, Bhardwaj N, Dwivedi D, Kumar R, Joshi S, Samujh R, et al. Thoracoscopic repair of esophageal atresia with tracheoesophageal fistula: Basics of technique and its nuances. J Indian Assoc Pediatr Surg. 2016; 21:120-4.
10. Hassan ME, Al Ali K. First thoracoscopic repair of tracheoesophageal fistula in UAE: a case report and review of literature. Ann Pediatr Surg. 2014; 10:46-9.
11. Rothenberg SS. Thoracoscopic repair of esophageal atresia and tracheoesophageal fistula in neonates the current state of art. Pediatr Surg Int. 2014; 30:979-85.
12. Rothenberg SS. Thoracoscopic repair of esophageal atresia and tracheoesophageal fistula. Semin Pediatr Surg. 2005; 14:2-7.
13. vander Zee DC, Bax KN. Thoracoscopic treatment of esophageal atresia with distal fistula and of tracheomalacia. Semin Pediatric Surg. 2007; 16:224-30.
14. Holcomb GW, Rothenberg SS, Bax KM. Thoracoscopic repair of esophageal atresia and tracheoesophageal fistula, a multi institutional analysis. Ann Surg. 2005; 242:422-30.
15. Lugo B, Malhotra A, Gunner Y. Thoracoscopic versus open repair of esophageal atresia and tracheoesophageal fistula. J Laparoendosc Adv Surg Tech. 2008; 8:753-6.
16. AL Tokhais T, Zamakhasharay M, Aldekhail S. Thoracoscopic repair of tracheoesophageal fistula; a case control mathed study. J Pediatric Surg. 2008; 43:805-9.
17. Borrutu F, Impilizzeri P, Monatatto A. Thoracoscopic versus thoracotomy for esophageal atresia with tracheoesophageal fistula: review of literature and meta analysis. Eur J Pediatr Surg. 2012; 22:415-9.