Virtual Bronchoscopy – An emerging tool to diagnose 'H' type Tracheoesophageal Fistula (TEF)

Dr. Konark Thakkar[1], Dr. Rishabh Mohindru[2], Dr. Shweta Tyagi[3], Dr. Praveen Jhanwar[4]

[1]3rd year General Surgery Resident, Pacific Medical Collage and Hospital, Udaipur, Rajasthan.
[2]3rd year Radio-Diagnosis Resident, Pacific Medical Collage and Hospital, Udaipur, Rajasthan.
[3]3rd year Anesthesia Resident, Pacific Medical Collage and Hospital, Udaipur, Rajasthan.
[4]Paediatric Surgeon, Pacific Medical Collage and Hospital, Udaipur, Rajasthan.

INTRODUCTION

Most of the pediatric surgical conditions or major congenital malformations are diagnosed on spot or with simple radiological imaging just like Tracheoesophageal Fistula (TEF), e.g., Inability to pass NG tube with coiling of NG tube on chest X-ray. But a few of them are still challenging to diagnose, just like 'H' type TEF because of delayed presentation as well as absent classical symptoms. (1) And even in today's era where radiological accuracy has reached to a new level, this diagnosis is missed many times and only confirmed on table. Here we are reporting a case of 'H' type TEF, a 17 days old male child, whom we diagnosed on single attempt with virtual bronchoscopy.

CASE REPORT

A 22-day-old neonate presented to the Pediatric outdoors with complaints of cough and severe reflux post breastfeeding. She had been symptomatically treated for the same complaint at some private hospital for last 10 days but had persistent symptoms.Mother complained of coughing during feeding since last 20 days which was not associated with vomiting or abdominal distention. Patient's antenatal history was uneventful with birth weight of 2.9 kg . There was no history of neonatal jaundice or any NICU admission at birth .

Patient was referred to our hospital for non-resolution of symptoms. From above history and examination a communication between trachea and esophagus was suspected and CT and virtual bronchoscopy was performed which was suggestive of H-type trachea-esophageal fistula. Patient was planned for exploration and surgery was performed successfully, where the fistula was doubly ligated and transected with the cervical approach, Right side cervical approach was preferred as on CT the level of fistula was at T1-T2.Cervical excision was given. The fistula site was found exactly below the excision. On tracheal site prolene stay was taken and on esophageal side vicryl stay was taken. Fistula was divided, tracheal side closed with non absorbable suture (prolene 5-0). Local muscular flap was raised and placed between two suture line to avoid further adhesion. Esophageal site was closed with vicryl 5-0 over 7 no infant feeding tube. A glove drain was placed and removed on POD 4.

Baby was kept on NG feed till POD 8 then contrast study was performed and continuity was confirmed. NG removed and breast feeding started on POD8. Patient was discharged on POD 8 on spoon feed and breast feed.

DISCUSSION

As compared to type C and type A TEF, gross type E or type H TEF is a rare anomaly, only accounting for 4-5% of all congenital oesophageal malformations.[1,2]

Usually, diagnosis is missed in early neonatal period as there is absence of typical esophageal atresia. And before suspecting the diagnosis, these babies have had a history of hospitalization in view of aspiration pneumonia.[7,8]

Even in today's time, none of the tests used for diagnosis of H type TEF showed 100% sensitivity.[9,10] Multiple attempts of investigations especially contrast study (e.g., Barium esophagogram, Gastrograffin esophagogram, Methylene Blue dye test) makes the babies' lives more prone for complications.[3,4,5,6]

Availability of neonatal bronchoscope or esophagoscope and expertise in performing these in neonates is still restricted to few centres. All these factors make this rare condition more challenging to diagnose. But nowadays, Artificial Intelligence (AI) has become a great tool and is becoming the replacing invasive counter option of it. Many a times in the past, chest CT was used for diagnosing H type TEF, but only succeeded in 50% of cases. 3D reconstruction of CT imaging and virtual bronchoscopy make this investigation more fruitful in neonatal period as we did in our case.[11,12] An extra opening clearly visible in posterior wall of trachea and on over-imposed of two plane images along with virtual bronchoscopy show air filled fistula between oesophagus and trachea, which makes a confirmed diagnosis.

Virtual Bronchoscopy – An emerging tool to diagnose 'H' type Tracheoesophageal Fistula (TEF)

A flow chart made by Sampat K and Losty P.D. in their meta-analysis study 2021 showed various diagnostic methods used as primary investigation for H type oesophageal atresia e.g., Contrast esophagogram (n=245), contrast plus esophagoscopy (n=1), tracheo-bronchoscopy alone (n=6), tracheo-bronchoscopy with esophagoscopy (n=14), esophagoscopy alone (n=2), and high-resolution CT (n=6). (1)

Majority of patients underwent contrast study at many centres, but virtual bronchoscopy, being easily available at most of the tertiary centres, can easily replace these contrast studies and make the diagnosis more accurate.
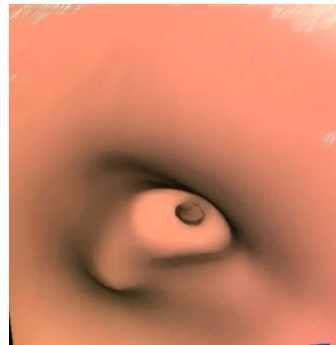
CONCLUSION

In the era of artificial intelligence (AI), virtual endoscopy is an emerging tool to diagnose H type TEF. We just need a strong clinical suspicion, an experienced surgeon, and a dedicated NICU team to take care of these babies after making the correct diagnosis.

REFERENCES

I. Keerthika Sampat1 · Paul D. Losty1,2 et al. Diagnostic and management strategies for congenital H-type tracheoesophageal fstula: a systematic review

II. Jeffrey Bank, MD1 , Rebecca Voaklander, MD1 , and Michael Sossenheimer, MD, PhD1 et al. H-type Tracheoesophageal Fistula: A Rare Cause of Cough and Dysphagia in Adults

III. Riazulhaq M, Elhassan E. et al. Early recognition of H-type tracheoesophageal fistula. APSP J Case Rep 2012; 3: 4

IV. Nq J, Antao B, Bartram J, Raqhavan A, Shawis R. et al. Diagnostic difficulties in the management of H-type tracheoesophageal fistula. Acta Radiol 2006;47:801-5.

V. Imperatori CJ. Congenital tracheo-esophageal fistula without atresia of the esophagus Arch Otolaryngol 1939;30:352.

VI. Karnak I, Senocak ME, Hicsonmez A, Buyukpamukcu N. The diagnosis and treatment of H-Type tracheoesophageal fistula. J Pediatr Surg 1997;32:1670-4.

VII. Genty, P. Attal, R. Nicollas et al., "Congenital tracheoesophageal fistula without esophageal atresia," International Journal of Pediatric Otorhinolaryngology, vol. 48, no. 3, pp. 231–238, 1999.

VIII. Murugappan Nachiappan , Ravikiran Thota , Srikanth Gadiyaram et al.

IX. Surgery Complicated by Self-Expandable Metallic Stents (SEMS) Tracheal Stent in a Congenital H type Tracheo-Esophageal Fistula

X. Huaying Li, MDa , Li Yan, MDb , Rong Ju, MDa∗, Biao Li, BMa et al.

Corresponding Author: Dr. Shweta Tyagi

Virtual Bronchoscopy – An emerging tool to diagnose 'H' type Tracheoesophageal Fistula (TEF)

XI. Detection of H-type bronchoesophageal fistula in a newborn A case report and literature review

XII. Gonz Lez Temprano N, Viguria S, Nchez N, Ayuso Gonz Lez L, et al. H-type tracheoesophageal fistula in neonates: different therapeutic approaches. Anales de Pediatr 2014;81:e50–1.

XIII. W.W. Lam, P.K.H. Tam, F.-L. Chan, K. Chan, W. Cheng et al. Esophageal atresia and tracheal stenosis: use of three-dimensional CT and virtual bronchoscopy-in neonates, infants, and children

XIV. Saleem Islam, Ellen Cavanaugh, Richard Honeke, Ronald B Hirschl, et al. Diagnosis of a proximal tracheoesophageal fistula using three-dimensional CT scan: a case report

Corresponding Author: Dr. Shweta Tyagi