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Experience with Livaditis circular myotomy in management of long gap TEF

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ABSTRACT

Background: Management of long gap oesophageal atresia with tracheoesophageal fistula (OA TEF) is challenging. Various intra-operative and pre-operative manures have been described to tackle this challenge. We reviewed our experiences with livaditis circular myotomy. The aim of this study was to evaluate long-term outcomes in cases of long gap OA TEF managed primarily with livaditis circular myotomy. **Materials and Methods:** This is a cross-sectional study including cases of long gap oesophagus managed by livaditis circular myotomy between January 1998 and October 2012. Their case records were evaluated for operative and post-operative data. The anthropometric data of these cases were collected. All these cases were subjected to barium swallow and manometry. Those cases with other associated neurological anomalies, multiple congenital anomalies, parents refusing consent for the study, less than 6 months of follow up or incomplete data were excluded from the study. **Results:** Out of the total of 109 patients of OA TEF managed, long gaps OA TEF were 37. Out of the 37 cases, 13 were managed by primary repair with livaditis circular myotomy. Of these 13 cases, 11 formed the study group. Mean age at evaluation was 36 ± 9 months. Mean age at primary surgery was 3 ± 2.5 days of life. Minor leak in the immediate post-operative period was present in 2/11 cases. Manometry was done in all the cases and revealed motility disorder in the form of un-coordinated contraction in 4/11 cases. Remaining 7/11 cases were normal. **Conclusion:** Livaditis circular myotomy is a viable option in the management of long gap OA TEF with good comparable long-term results.

Key words: Ba swallow, livaditis circular myotomy, long Gap OA TEF, manometry, motility disorders

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INTRODUCTION

Congenital anomalies of the oesophagus are known and their management for a paediatric surgeon is challenging if the gap between the two pouches is long. Times along various intra-operative and pre-operative manures have been described to tackle this challenge. Upper pouch mobilisation and myotomies have been described in the management of the same. We reviewed our experiences with livaditis circular myotomies and their long-term outcomes.

The aim of this study was to evaluate long-term outcomes in cases of long gap oesophageal atresia with tracheoesophageal fistula (OA TEF) managed primarily with livaditis circular myotomies.

MATERIALS AND METHODS

This is cross-sectional study in which records of cases of long gap oesophagus managed by livaditis circular myotomies between January 1998 and October 2012 were reviewed. Long gap OA TEF was defined as gap between upper and lower pouch of more than 3 cm or inability to anastomose the two pouches after mobilisation of the upper pouch and lower pouch. The distance between the two pouches was measured intra-operatively using standard scale in the state of relaxation of upper and lower pouch and also after the mobilisation of the upper and lower pouches. Circular myotomy was done in cases of inability to achieve primary repair after adequate mobilisation of the upper pouch. Their case records were evaluated for operative and post-operative data. Those attending the outpatient department (OPD) were interviewed and those lost to follow-up were mailed and called back. The anthropometric data of these cases were collected. All these cases were subjected to barium swallow to check the presence of stricture and manometry to evaluate any functional disorder. Barium swallow was done using thin barium in 1:1

dilution. Significant stricture was considered if there was significant narrowing and hold up of barium. Manometry was done using apparatus of Albyn medical system over a wet swallow and pressure tracings recorded in centimetre of water. Those cases with other associated neurological anomalies, multiple congenital anomalies, parents refusing consent for study, less than 6 months of follow up or incomplete data were excluded from the study.

RESULTS

There were 37 cases of long gap OA TEF out of the total of 109 cases managed during the period. Of the 37 cases, 13 (35.13%) were managed by primary repair with livaditis circular myotomy while the remaining were diverted for staged repair. Of these 13 cases, 1 (7.69%) died within 6 months of surgery due to severe diarrhoea and delayed presentation to a health centre. Out of the surviving 12, 11 could be called and enrolled in the study because parents of one child expressed inability to come back for evaluation. Thus a total of 11 cases formed the study group. Out of these 11 cases, 6 were males and 5 were females with a male to female ratio of 6:5. Mean age at evaluation was 36 ± 9 months. Mean age at primary surgery was 3 ± 1.5 days of life. Minor leak in the immediate post-operative period was present in 2/11 cases and both cases were managed conservatively. Out of these two cases, one required oesophageal dilatation in the immediate post-operative period and had anastomotic stricture on current evaluation with barium swallow but did not have any complains of dysphagia. Demographic profile and the intra-operative findings were as shown in Table 1. Barium swallow done in these cases revealed stricture in 1/11 cases as shown in Figure 1. Manometry was done in all the cases and revealed motility disorder in the form of un-coordinated contraction in 4/11 cases as shown in Figure 2. One of these four cases has minor out pouching on the posterior wall in the form of diverticula. None of these four cases were, however, symptomatic for motility disorder and the findings were purely incidental detected during this study. Remaining 7/11 cases were developmentally normal with no dysphagia on swallowing and with normal growth and development.

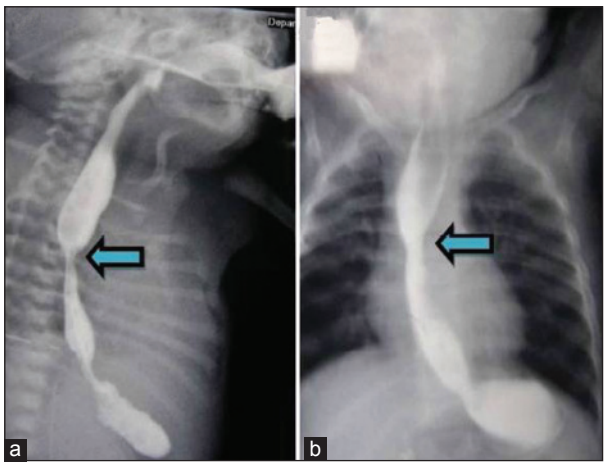

Figure 1: (a) Dye study in the immediate post-operative period, note the anastomotic site marked as arrow (b): Dye study 12 months after the surgery, note the improvement of local narrowing marked as arrow

DISCUSSION

The first description of this purely surgical condition was given by Dr. William Durston in 1670.[1] Eerland was credited with the first successful repair of OA almost 50 years ago.[2] Over the decades the survival rate has increased by leaps and bound. But despite advances in the management and significant improvement in the outcome of OA patients for the past few decades, the management of long gap oesophageal atresia (LGOA) remains controversial.[3,4] Controversy exists not only

Table 1: Shows demographic profile and intra-operative findings of cases

Age at surgery (days)	Age at enrolment in study (months)	Sex M/F	Gap length (cm)	Complication	Motility disorder
2	27	M	3.0	–	–
3.5	30	M	3.2	–	+
4.2	45	F	3.0	Leak	+
1.5	42	M	3.3	–	–
3.5	37	F	3.1	–	–
5.5	38	F	3.2	–	–
4.1	36	F	3.0	–	–
2.2	45	M	3.5	Leak	+
3.4	31	M	3.3	–	+
1.8	34	F	3.1	–	–
5.3	40	M	3.0	–	–

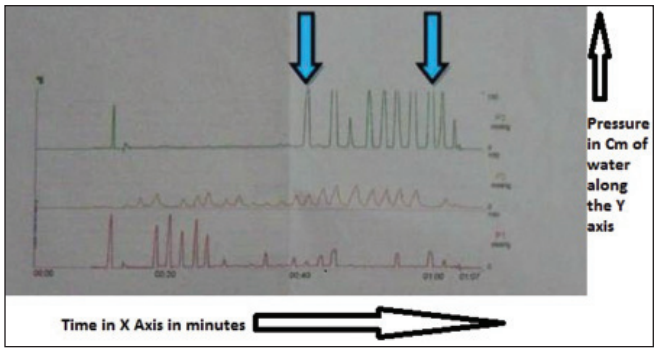

Figure 2: Shows un-coordinated contractions in oesophageal manometry in few cases (X-axis shows time in minute while Pressure in cm of water has been shown in the Y-axis; Note the point of wet bolus (Blue arrow) is showing contraction in all the three points)

in defining the LGOA but also in management, with description of multiple procedures and techniques by various authors.[5-8] Most surgeons agree that the diagnosis of LGOA may preclude immediate primary repair, but the diagnostic criteria of LGOA differ among different surgeons. Currently, there are no uniformly accepted criteria that define LGOA. Some authors divided the anomaly into short and long gap with 2 cm as the cut-off point, whereas others classified it into short, intermediate and long with 1 and 2.5-3 cm as the cut-off points.[8-10] Although these classifications have been proposed, their clinical significance has not been substantiated because of a lack of uniformity of methods used to measure gap length. Most reports did not indicate whether the gap was measured before or after dissection and if the gap was measured under tension. Variation on the methods of determining gap length contributes to the confusion and debates about how long is long.[11] Various innovative techniques have been designed to narrow the long gap before attempting the primary anastomosis, of which external traction technique described by Foker *et al*. is reported to expedite approximation of the pouches, allowing for early primary repair.[12,13] Apart from pre-operative techniques, many intra-operative procedures have been described in literature to confront the menace of LGOA. Livaditis was the first surgeon to describe the circular myotomy of the upper part of oesophagus to gain the extra length in 1973. This procedure is based on the blood supply of the upper pouch from the inferior thyroid artery.[14,15] Circular myotomy reduces the tension by 50% and provide additional length of 0.5 cm. Multiple other similar methods were described with modification such as use of balloon catheters inflation in upper pouch.[16-19] Kimura *et al*. modified the original procedure by giving spiral incision instead of circular thus avoiding pseudodiverticulum formation and leak.[20,21] Reported complication rate in cases of OA varies from 4% to 36% and as expected these complications are more with LGOA.[22] Reported complications specific to livaditis myotomy in the management of these cases are anastomotic leak, oesophageal dysmotility, oesophageal stricture, dysphagia and life threatening respiratory obstruction.[23-26] Tannuri *et al*., in their experimental study on 60 dogs, concluded that the circular myotomy does not decrease the possibility of anastomotic leak in addition to promoting deleterious changes in anastomotic healing.[27] In our study group, anastomotic leak was seen in 2 (18.1%) cases. Both the leak was contained minor leak and was managed conservatively. One (0.9%) case developed oesophageal stricture requiring oesophageal dilatation. Overall success rate was 63.3% (7 cases). Motility disorder was seen in 4 (36.6%) cases. There was 1 (0.9%) mortality, un-related to the primary disease. Our belief in the opinion that native oesophagus is better than any other replacement that can be constructed prompted us to use this approach in LGOA cases.[28] Our primary goal in each case of OA TEF is to do primary anastomosis, whenever possible, just to preserve the native oesophagus. Our series highlighted the effectiveness of circular myotomy in cases of LGOA, a fruitful procedure forgotten by new generation paediatric surgeons.

CONCLUSION

Livaditis circular myotomy is a viable option in the management of long gap OA TEF with good comparable long-term results.

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