

# Congenital tracheo esophageal fistula repair, a modified technique of anastomosis using pleural flap

## Abstract

**Purpose:** Tracheo esophageal fistula repair are usually complicated by the development of anastomotic leaks and strictures. The technique of anastomosis has long been a matter of debate. The most common method has been transverse circular esophageal anastomosis. We aim to bring down the frequency of early complications associated with conventional technique of esophageal repair by introduction of a modified repair method.

**Methods:** Twenty patients of congenital tracheo esophageal fistula underwent modified oblique esophago esophageal anastomosis with pleural patch. The patients were followed up for immediate complications of anastomotic leaks and strictures. Results: Contrast esophagogram showed no incidence of anastomotic leak and strictures in all the twenty patients.

**Conclusion:** The oblique esophageal anastomosis with pleural patch serves as a wide bore anastomosis compared to the classical circular anastomosis, hence explaining the reduced incidence of decreased leaks and strictures associated with this method.

Volume 6 Issue 1 - 2017

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**Received:** October 14, 2016 | **Published:** January 24, 2017

## Introduction

Congenital tracheo esophageal fistula is a not so rare neonatal surgical emergency. Immediate thoracotomy with ligation of the fistula and end to end esophageal anastomosis is the management of choice.<sup>1,2</sup> Even following a proper anastomosis, the condition is often complicated by anastomotic leaks and strictures.<sup>3</sup> These complications mandate either re exploration or a gastrostomy as a life saving maneuver.<sup>3-5</sup> Various factors have been implicated in diminishing the complications rate. The type of anastomosis to be done has been a subject of debate.<sup>1,2,6,7</sup> Classically a transverse circular anastomosis has been the teaching with proper mobilization of both the upper and lower esophageal pouches.<sup>7,8</sup> We have attempted to modify the technique of anastomosis to reduce the complication rate, thereby reducing patient morbidities.

## Materials and methods

Twenty neonates presenting with an antenatal or postnatal diagnosis of congenital tracheo esophageal fistula to the pediatric surgical emergency of SMS medical college Jaipur were selected. The patients underwent surgical repair under similar conditions. The birth weight and mean gestational age were not significantly different. The same surgical team operated all patients. The patients underwent right posterolateral extrapleural thoracotomy. After proper exposure, the fistula was identified and ligated using non absorbable suture. Both the upper and lower pouches underwent adequate mobilization. The upper pouch was opened by an oblique incision using scissors. The lower pouch was carefully held using stay sutures and a longitudinal incision made over the lateral border. The incision will be posterior if viewed in the supine position. An interrupted single layered anastomosis using absorbable suture material was completed. A rectangular portion of pleura adjacent to the anastomosis was excised keeping it attached to the mother tissue (not a free flap) and carefully sutured as a patch over the anastomosed segment of the esophagus. The incision was closed in layers following insertion of an intercostal water seal drain. The incidence of complications following this procedure was analysed. The patients were followed up with a contrast esophagogram study on the eighth and sixteenth day following surgery. The complications

of anastomotic leaks, anastomotic narrowing with strictures and recurrence of fistula were studied.

## Results

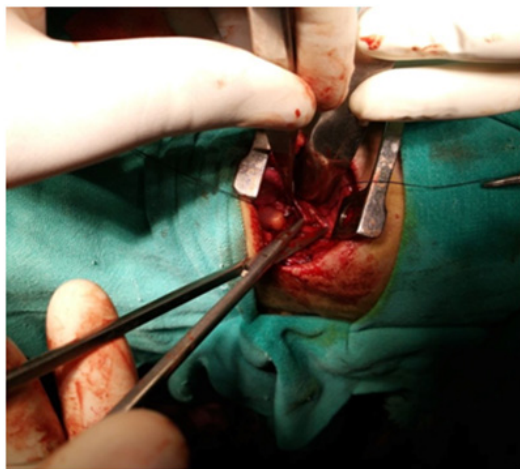
All the patients of this study were operated under similar conditions. The mean birth weight was 2.1Kg and mean gestational age was 34.2months. The same surgical team operated all the cases. Fourteen boys and six girls were operated on the first day of life. The mean operating time was 90.5minutes. All the patients were kept nil per mouth post operatively for a period of at least seven days. Total parenteral nutrition was given. A contrast esophagogram was performed on the eighth day. There was no leak or stricture detected in the contrast study. No recurrence of the fistula was identified. It is interesting that the same results were obtained for all the twenty patients. The caliber of the anastomosis as visible in the contrast study was also wide. Following this, the patients underwent repeat contrast esophagogram on the sixteenth day post surgery. This study also did not document any anastomotic leak, stricture or recurrence of fistulous tract.

## Discussion

Tracheo esophageal fistula repair has been a relatively common performed neonatal surgery. However the morbidities following the surgery has acted as a deterrent in the long-term follow up of these patients. The complication rates vary from 18 to 50% in various studies.<sup>9,10</sup> The chief complications include a narrow anastomosis, anastomotic strictures, leaks and recurrent fistula formation. Different factors were responsible for these poor outcomes.<sup>9,11,12</sup> The general condition of the patient, the amount of gap between the segments, the kind of fistula, the nature of suture materials used and the type of anastomosis performed have been implicated.<sup>10,13</sup>

The nature of anastomosis has been controversial and different approaches have been suggested in literature.<sup>2,8,9,14</sup> The earliest teaching still used in the majority of centers worldwide has been a circular anastomosis in a single transverse plane.<sup>10,15-17</sup> This creates a watertight anastomosis but all the sutures are in a single plane. This

narrows down the caliber and makes the anastomosis more prone to strictures. Different other methods have been reported to make the anastomosis large, non-tense and unrestricted to a single plane.



**Figure 1** Operative photograph showing lateral incision of the lower esophageal pouch.

Sulamaa et al gave the earliest description of such a technique describing an end to side anastomosis.<sup>18,19</sup> Sharma et al. gave a method of suturing the upper pouch to the anti spatulated end of the lower pouch in 1994. This was followed by circular myotomy which created a large anastomosis.<sup>8</sup> Melek et al gave a plus shaped incision over the upper pouch creating a zigzag anastomosis.<sup>2,9,10</sup> The suture lines were in different planes giving better results. Singh et al reported suturing an upper flap pouch to the spatulated end of the lower pouch.<sup>9</sup> The basic idea of all the above methods was to avoid anastomotic site narrowing.<sup>9,20,21</sup>



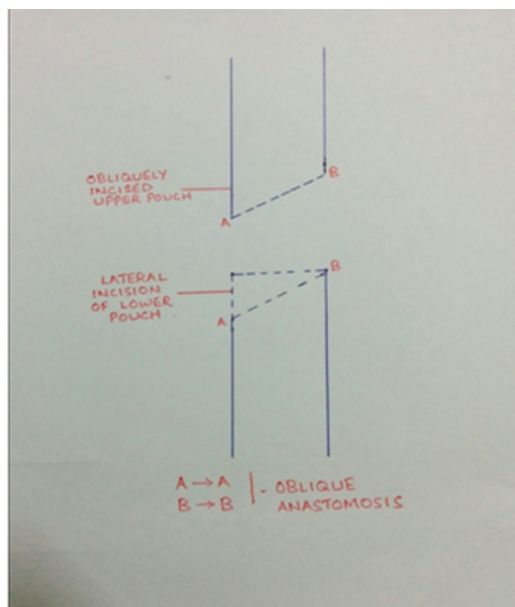
**Figure 2** Operative photograph showing completed oblique esophageal anastomosis.

Our procedure avoids any tissue loss by giving an oblique incision on the upper pouch and incising the lateral aspect of the lower pouch (Figure 1). A proper single layer anastomosis following this incision ensures that the suture line lies in a different plane (Figure 2). This creates a less tension, widened suture line that is believed to lessen the complication rates. The plane of the sutures tied lies in different planes and does not create pressure effect to cause any stenosis as happens if the sutures lie in same plane. Further, the use of a rectangular part

of pleura as a patch over the site of anastomosis adds to the strength and supposedly prevents ischemia (Figure 3). The pleural flap has earlier been noted in case reports, but no particular study has been carried out. The beneficial effect of pleural flap is believed to occur in the same way as an omental patch following bowel anastomosis. This novel alteration in the technique serves as a strong buttress preventing anastomotic leaks. The procedure is also simple and involves incision of a small rectangular part of pleura and suturing it to the anastomosis site (Figure 4). As seen in our study, there were no reports of anastomotic leaks, strictures or fistula recurrence in the early and delayed contrast esophagograms obtained.



**Figure 3** Operative photograph showing rectangular pleural flap before placement.



**Figure 4** Schematic representation of the procedure of anastomosis.

In conclusion, we describe a technique of anastomosis that is safe, effective and better for reducing complications and thereby morbidities in operated tracheo esophageal fistula patients. In patients where the gap between the two segments is not too long, the current procedure should prove better than the conventional circular anastomosis technique.

## Acknowledgments

None.

## Conflicts of interest

Author declares there are no conflicts of interest.

## Funding

None.

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