

A STUDY OF ESOPHAGEAL STRICTURES AFTER SURGICAL REPAIR OF ESOPHAGEAL ATRESIA

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ABSTRACT

Objective: The aim of this study was to find out the prevalence of esophageal stricture (ES) following surgical repair of esophageal atresia.

Patients and Methods: This retrospective study was carried out in two referral hospital (Bahrami & Children Medical Centre) from April 1999 till March 2000. Data was collected from patient's file and follow up clinics. Seventy four patients with esophageal atresia were operated during this period. Twenty one patients who died and two patients with long gap esophageal atresia were excluded from the study. Hence fifty one patients were included in this study. End to end anastomosis was done in 45 and end to side anastomosis in 6 patients. Forty five patients had extrapleural thoracotomy while 6 patients had intrapleural thoracotomy. Single layer and double layer anastomosis were done in 36 and 25 patients respectively. Vicryl was used for repair in 47 babies and silk in 4 patients. Standard post operative care was provided to all patients.

Results: Of 51 patients who survived 28 (54.8%) were male 23 (45.2%) female. Anastomotic leak was seen in 10 (19.6%) babies. 26 patients (M=16, F=10) developed ES. 22 (43.1%) patients had radiologically proven gastro-esophageal reflux. Incidence of stricture formation was significantly higher in babies who developed anastomosis leak after repair ($p < 0.05$).

Conclusions: GER and leakage from the anastomosis site were significantly higher in the group A. The risk of stricture formation is a potential threat for up to a year in patients without G.E.R and up to 18 months in patients with GE Reflux. Leakage of anastomosis and GE Reflux play a major role in post operative strictures after esophageal atresia repair so treatment and prevention of these complications are very important.

KEY WORDS: Esophageal atresia, Anastomosis, Stricture.

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INTRODUCTION

Esophageal stricture (ES) is the most common complication after esophageal atresia repair; other include anastomotic leak, recurrent tracheo-esophageal fistulas, GE reflux and esophageal motility disturbances.¹ A recent study showed the 52% babies developed ES after repair.² Different factors such as ischemia at the anastomotic site, tension on the anastomosis,³ suture material,⁴ and GER play an important role in the development of complication.^{1,7} ES may remain asymptomatic or present with vomiting and dysphagia. Respiratory symptoms include stridor, dyspnoea and choking during feeds. Aspirations pneumonia and other pulmonary complications can precipitate the baby's condition. Diagnosis may be made by contrast studies and endoscopy.⁸

Repeated dilatation are necessary in nearly 40% of patients who develop ES.⁶ Patients who do not respond to the dilatation program or have long length of the stricture and in those complicated by GE Reflux, surgical intervention may be necessary. In case of GE reflux, funduplication may also be required.⁹⁻¹² Regular follow-up is essential for operated cases of esophageal atresia for early detection of complications.^{1,8} We conducted this study with a view to find out the prevalence of ES following surgical treatment of esophageal atresia.

PATIENTS AND METHODS

This retrospective study was carried out in Bahrami Children Hospital and Children Medical Centre from April 1999 to March 2000. Of 74 patients with OA who were operated 21 died, and two having type A esophageal were not included in this study. Hence fifty one patients with type C esophageal atresia were included in the study. At the time of operation surgical details such as layers of anastomosis, type of suture and thoracic exploration technique were recorded. After stabilization surgery was performed thorough right thoracotomy. Extrapleural approach was attempted in all patients but if pleura was opened it was converted to transpleural thoracotomy. Extrapleural thoracotomy was possible in 45 patients while six had intrapleural thoracotomy. Ligation of distal TE fistula and end to end anastomosis were done in 45 patients and end to side in 6 patients without division of distal fistula after ligation. Single layer and two layer anastomosis were done in

36 and 25 patients respectively. Polyglycolate (Vicryl) sutures were used in 47 and silk in 4 patients. Patients were divided in two groups. Patients who developed ES after surgery were placed in "Group A" while those who did not develop strictures were placed in group B. Patients were followed up for two years and data recorded in patient's files. Data was analyzed by SPSS software. Kolmogorov-Smirnov, Mann-Whitney, Gehan, and Chi-square tests were used for data analysis.

RESULTS

Gestational ages of patients were between 35-39 weeks with the mean of 37.1 weeks. Out of 51 patients, 26 patients (M=16, F=10) developed ES (Group A) and in 25 patients (M=12, F=13) stricture was not present (Group B). Ten patients in group A (38.46%) developed a leakage from anastomosis versus none in group B (P= 0.001). Seventeen patients (65.4%) in group A had GER versus 5 (20%) patients in group B (P=0.001). There was no significant difference between group A and B for the type of thoracotomy, anastomotic technique, and type of suture used (Table-I). 15 (57.7%) patients who developed ES presented between 0-6 months after surgery, 9 (34.9%) presented 6-12 months after surgery and 2 (7.7%) presented 12-18 months postoperatively. There was no new case of ES after 18 months. ES resolved after 1-3 dilatations in eleven patients (42.3%) whereas nine patients (34.6%) needed surgical revision. Fundoplication was done in six patients (23.1%) because of failure of medical therapy and non-responding anastomosis stricture with GER. There was no significant

Table-I: Comparison between Group A and Group B

	(Group A) With esophageal stricture	(Group B) Without esophageal stricture
Number	26(M = 16, F = 10)	25(M = 12, F = 13)
Leakage of anastomosis	No=16, Yes=10	No=25, Yes=0
GER	No=9, Yes=17	No=20, Yes=5
Type of anastomosis	End to end=24, end to side=2	End to end=21, end to side=4
String	Vicryl=23, Silk=3	Vicryl=24, Silk=1
Type of thoracotomy	Intrapleural=2, Extrapleural=24	Intrapleural=4, Extrapleural=21
Technique of anastomosis	One layer=19, Two layers=17	One layer=17, Two layers=18

difference between patients with GER and with out GER for possible time of stricture developing (Gehan test, $p=0.518$)

DISCUSSION

Esophageal stricture is a common complication of esophageal atresia repair. Anastomosis techniques, repair under tension, leakage of anastomosis and GE Reflux may cause stricture¹ after a successful repair. Out of fifty one patients in our study twenty six (51%) developed stricture as compared to 30-40% reported in other studies.^{5,6} In a recent study of 50 patients ES developed in 40% cases after EA repair, which was directly related to tension at anastomosis site and gap between the two segments($p=0.03$).³ Of the 26 patients who developed ES, 61.5% were male and 38.5% were female, but in patients without ES 48% were male and 52% were female. It had no statistical meaning ($\chi^2 = 43\%$, $p = 0.331$). We compared gestational age of patients with ES and those without it. Mann-Whitney test was used for this distribution (value=286.5, $p=0.447$) and it was not significant. Of 51 patients ten (19.5%) developed leakage of anastomosis, but in other studies it was 8%.² Tension at anastomosis site and technical problem were implicated for its causation. All patients with anastomotic leak developed stricture ($P= 0.001$, $\chi^2=11.961$). Some studies showed protective affect of pleural or pericardial flap against leakage.^{13,14} Use of silk string may also be considered responsible for causation of ES.¹⁻⁸ In patients without esophageal stricture (25 cases) silk was used in one (4%) and vicryl were used in twenty four (86%) patients. ($\chi^2=1.002$ $p = 0.32$). Recent studies showed least incidence of stricture formation after use of Polydioxanone sodium sutures in contrast with silk which had the highest incidence of stricture formation.⁴ In our study silk was used in few patients thus a conclusive decision can not be made on its possible side effects. Patients who developed ES 73.1% had a single layer anastomosis and 26.9% had two layer anastomosis compared with patients without stric-

ture (one layer=68%, two layer=32). This had no statistically significance ($p = 0.764$ - $\chi^2 = 0.158$). In a recent study anastomotic techniques were compared showing an improved survival with end to side anastomosis.¹⁵ It also showed that end to side anastomosis had less incidence of stricture formation and G.E Reflux.¹⁵ We did not find any direct correlation between type of suture used and anastomotic technique with subsequent stricture formation. In our study 7.5% patients with intrapleural thoracotomy and 92.3% with extra pleural thoracotomy developed stricture ($\chi^2=0.847$ - $p= 0.41$). Enguin SA et al mentioned that with extra pleural thoracotomy even after an anastomotic leak, 95% patients cured spontaneously, but may produce stricture.³ The reported incidence of GE Reflux is between 40-70%.^{3,6-11,12,16} The main reasons for GER are shortage of intra abdominal esophagus, stretch at anastomosis site, disturbance of esophageal motor function, manipulation during surgery, and esophageal motility problems.¹⁶⁻¹⁸ In our study 6(23.1%) patients who had GE Reflux and ES needed fundoplication. In some studies 45-75% of infants needed anti-reflux surgery, because medical treatment had failed or they had persistent anastomosis stricture, or distal ES.^{6,11,12} We also measured the probable time of ES formation after repair of EA. For compression Gehan static were used. (Gehan static = $0.4-7$ - $p=0.518$). Statistical review showed that GE reflux after 6 month was 0.64, after 12 months 0.66, and 1 after 18 month. This study shows that leakage of anastomosis and GE Reflux have a major role in post operative strictures after esophageal atresia repair so prompt treatment and prevention of these complications are very important.

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