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COMPARISON OF THE QUALITY OF LIFE (QOL) FOLLOWING RECONSTRUCTIVE CONDUIT SURGERIES (INTERPOSITION COLOPLASTY VS. GASTRIC PULL UP) FOR PATIENTS WITH CORROSIVE STRICTURES OF THE OESOPHAGUS

Surgery

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ABSTRACT

Background:. The aim of the study is to analyze and compare the Quality of life (QoL)following the two different reconstructive surgeries viz. gastric pull up and interposition coloplasty undertaken for patients with corrosive injuries of the esophagus at the end of the first post operative month and year.

Patients and Methods: Between August 2008 and December 2015, 56 patients underwent reconstructive surgery for intractable strictures of oesophagus, of whom, 44 patients were amenable for regular followup. Of these patients , 32 underwent coloplasty and 12 underwent gastric pull up depending on concomitant caustic involvement of stomach . The patients filled two questionnaires including :1) Short form Health survey SF-36 to assess general quality of life2)and a specifically designed, previously unvalidated questionnaire which we believe addresses the quality of life in an appropriate social context.This is a checklist containing items reflective of patients general symptoms , reflux related symptoms, perceived weight gain after procedure , perceived body image after procedure and overall social and psychological well being.

Results: At one month duration, the mean of all scales in SF 36 are low reflective perhaps of the poor quality of life perceived by most patients and the subscales of the SF 36 Questionnaire are not different when compared between coloplasty and gastric pull up. At the one year period, however , the mean of patients undergoing coloplasty is significantly better ($p<0.05$) when compared to gastric pull up with respect to all subscales of the SF -36 .

On analysis of the special questionnaire at 1 month,,coloplasty patients performed better with regard to most physical symptoms . Also, coloplasty patients had significantly less social and mental impairment when compared to gastric pull up On analysis of the special questionnaire at 1 year, it was seen that coloplasty patients perform better on most questions relating to physical and reflux symptoms with better mental state, perceived weight gain. And body image . However, coloplasty patients had more self noticeable neck swelling and the frequent hold up of food was still statistically significant.

Conclusion: There is significantly better QOL reflected by both the questionnaires for coloplasty patients at the 1 year interval when compared to the gastric pull up patients ..Though there is a theoretical increased risk of leak in coloplasty patients, owing to the increased number of anastomosis when compared to gastric pull up , they can be done in experienced centres with minimal morbidity.

In India ,where concentrated acid injury causing corrosive stricture of the oesophagus with concomitant stomach involvement is very common than the West ,coloplasty may be the preferred reconstructive conduit surgery in the long term at centres of excellence if the short term morbidity of coloplasty can be tided over.

KEYWORDS:

quality of life; corrosive stricture oesophagus; colon interposition; gastric pull up

INTRODUCTION

In India, highly concentrated hydrochloric acid is used as a cheap toilet solvent. Due to easy access, low cost, and absence of safety packaging, it is most frequently swallowed in suicidal attempts[1]. Acid causes injury to the esophagus and stomach where as alkali is thought to cause more esophageal injury. It is postulated that the stratified squamous epithelium lining the oesophagus is resistant to acid injury than alkali. After corrosive injury, the esophagus heals by stricture formation which requires periodic dilation .

Undilatable intractable oesophageal strictures necessitate substitution by either stomach, colon or jejuneum as conduits. In this study, we aim to analyse the Health related Quality of life (HRQOL) as perceived by the patients who undergo primary reconstruction with gastric pull up or colonic interposition for intractable oesophageal strictures after corrosive acid ingestion .

PATIENTS AND METHODS

Patients who underwent reconstructive conduit procedures for undilatable refractory strictures of the oesophagus viz. Colonic interposition or gastric pull up participated in the study. In all patients who underwent primary conduit surgery in the DEPARTMENT OF SURGICAL GASTROENTEROLOGY, CENTER OF EXCELLENCE FOR UPPER Gl SURGERY, RAJIV GANDHI GOVT GENERAL HOSPITAL, CHENNAI-03 from August 2008 to December 2015.

All patients were contacted for review and asked to to fill two questionnaires in the local language after the first month and year of surgery with the assistance of primary care giver. The well validated SF-36 questionnaire[4] for the general quality of life and a new self designed, previously unvalidated corrosive injury specific questionnaire (annexure-1) which we believe addresses the specific effect of corrosive injury and reconstructive surgery in an appropriate cultural and social context. Patients younger than 18 years of age, not willing to consent, lost to follow up, those undergoing reoperation and those who had not completed the one year follow-up were excluded from the study.

Between August 2008 and December 2015, of the 56 patients underwent surgery for corrosive strictures of oesophagus, 44 patients were amenable for follow up. Of these patients, 32 underwent coloplasty and 12 underwent gastric pull up. Of the 12 patients not amenable for follow up in spite of our efforts , 8 patients(4- male, 4-female)underwent coloplasty and 4 patients (3- male, 1-female) underwent gastric pull up. 8 patients(6-coloplasty and 2-gastric pull

up) were not not willing for follow up at 1 year period due to logistic reasons, 4 patients(2-coloplasty,2-gastric pull up) had repeat caustic ingestion. For the sake of brevity and comprehension, patients undergoing high pharyngocolic anastomosis also were included In the coloplasty subgroup along with oesophageocolic anastomosis.

The highly validated **SF-36** [3], has been used in India to assess health outcomes in several diseased populations but this is the first time it is used to assess reconstructive conduit surgeries for corrosive strictures of the oesophagus.

The , newly designed, hithero unvalidated **corrosive injury specific QOL assessment tool** (annexure 1) ,which is a checklist in the vernacular language containing 21 items in total ,with 10 items reflective of patients general symptoms , 5 of reflux related symptoms, 2 suggestive of perceived weight and 4 of the patients overall social and psychological well being. A clear explanation was provided for all items in order to elicit a standardized response . All items were graded on a four point qualitative scale from 1-4 where a higher grade on any item implied a poorer quality of life.

Statistical Analysis

The statistical analyses were performed using Statistical Package for Social Sciences (SPSS), version 21 (SPSS Inc., Chicago, IL)..Scale-level validity and reliability were assessed by testing whether the SF-36 scale scores showed substantial variability and if their reliability estimated using the internal consistency method (Cronbach alpha coefficient) was acceptable, namely 0.70 or higher for group comparisons, (18). Data analysis was done using T test for parametric and Mann Whitney U test for non parametric data . The translation, cultural adaptation and validation of the SF-36 followed the International Quality of Life Assessment methodology. Statistical significance was set at $p < 0.05$.

RESULTS

Patients

Overall, out of the 44 patients who underwent conduit surgery, 32 underwent coloplasty, there were 17 males and 15 females and. in those who went for gastric pull up(n=12) there were 4 males and 8 females with female predilection (M:F::1:2). The average age of those who underwent surgery in both groups was 25 years (range-18—38) . (table1,2)

Table 1.patients included in the study and follow up

	Patients undergoing colon interposition (n=32)	Patients undergoing gastric pull up (n=12)	Total
Patients fulfilling criteria (overall)	40	16	56
(M/F)*	**(21/19)**	**(7/9)**	**(28/28)**
Patients in study	32	12	44
(M/F)	**(17/15)**	**(4/8)**	**(21/23)**
Patients lost to follow up	8	4	12
(M/F)	**(4/4)**	**(3/1)**	**(7/5)**

(M/F)*-MALE/FEMALE

Table 2. demographic data of patients undergoing reconstructive surgeries

	Patients undergoing colon interposition (n=32)	Patients undergoing gastric pull up (n=12)
Mean age (range) at time of survey [years	26 (18-38)	25.75 (19–38)
Male/female	17/15	4/8
Suicide intent (M/F)	**15/15**	**4/8**
- Family dispute	1/1	1/-
- Marital problems	3/1	1/5
- Financial woes	10/2	1/1
- Inability to achieve goals	0/1	1/1
-type of corrosive ingested		
*acid	5/15	4/8
*alkali		
Accidental (M/F)	2/-	-/-
*acid	1/-	-/-
*alkali	1/-	-/-

OUR PROTOCOL

All patients who have history of corrosive ingestion are followed over three weeks to three months for strictures to manifest. In the meantime, Enteral access to improve nutrition is performed by either feeding jejunostomy or nasogastric tube in most cases. Endoscopic dilation is instituted after six to eight weeks of injury when reepithelisation has taken place [5]

The need for oesophageal substitution surgery is based on need for excess dilation, inability to dilate to sufficient diameter[7]long extensive strictures, multiple strictures, failed dilation and patients with previous complications of dilation like perforation.

Most studies recommend the ideal time for oesophageal reconstruction of 6-12 months for complete scarring to occur .

The decision whether to use colon or stomach as replacement was dependent on factors including preoperative and intraoperative diagnosis of concomitant stomach injury, gastrocoele formation, foreshortening of the oesophagus and stomach due to acid ingestion, previous gastrectomy for acute necrosis, gastrostomy for enteral nutrition and high oesophageal stricture involvement necessitating anastomosis to the level of the pharynx where an adequate mobilisation of the stomach was improbable.

For patients who undergo colonic interposition, the distal colonic interposition anastomosis was to stomach (cologastric) or jejuneum (colojejuneal) when a gastric anastomosis was not possible .(table 3,4)

Table 3. Oesophageal stricture in patients for reconstructive oesophageal surgery.

	Patients undergoing colonic interposition (N=32)	Patients undergoing gastric pull up(N=12)
Type of oesophageal stricture		
long segment undilatable stricture	14	6
multiple strictures	13	4
dilation complications	5	1
failure to dilation	-	1

Table 4. rationale for coloplasty in patients undergoing coloplasty (n=32)

Stomach abnormalities	**12**
long segment antral stricture	6
distal diffuse stricture	3
deformed stomach due to diffuse injury	1
gastrocoele (retention of stomach contents due to complete antral and oesophageal stricture)	2
Foreshortened oesophagus and stomach	4
Previous gastrectomy for acute necrosis	3
Previous gastrostomy for enteral access	1
High oesophageal /hypo pharyngeal stricture limit	12

For patients in whom the stomach appeared normal, gastric pull up was done on a greater curvature tube based on the right gastroepiploic artery.

In our centre,the neo oesophagus (colon or stomach) is routinely brought out through the retrosternal route as there is extensive perioesophageal fibrosis which may not allow the removal of native oesophagus. When the stomach is not available due to stricture and fibrosis, right colon is used as a conduit based on middle colic or left colic vessels. The patients undergoing colonic interposition are subjected to colonoscopy and mesenteric angiography in instances when vascularity is doubtful SF -36 scores of coloplasty and gastric pull up were compared at 1 month and 1 year intervals with respect to their various scales At one month duration, the mean of all scales are well below average that reflective perhaps of the poor quality of life perceived by most patients. The subscales of the SF 36 Questionnaire are similar when compared between coloplasty and gastric pull up at one month interval. (table 5)

TABLE 5. Short Form-36 Health Survey (SF-36) Subscales Scores of the patients after reconstructive procedures for corrosive oesophageal stricture at 1month post op

SF -36 scales	Patients undergoing colon interposition	Patients undergoing gastric pull up	P value
General health	26.63(9.26)	25.69(7.37))	0.75
Physical functioning	27.28(8.63)	26.28(7.71)	0.73
Role (physical)	27.96(7.63)	26.47(6.0)	0.55
Bodily pain	29.86(8.94)	30.11(8.67)	0.93
Vitality	34.40(10.8)	31.8(9.05)	0.46
Social functioning	25.85(9.46)	26.01(10.1)	0.96
Role (emotional)	22.22(8.84)	20.48(6.98)	0.54
Mental health	22.67(12.6)	22.31(9.69)	0.93

Mean(SD) SD-standard deviation
* → clinically significant

At one year period, the mean of all scales are around average reflective of the quality of life perceived by most patients .However , the means of patients undergoing coloplasty are significantly better when compared to gastric pull up with respect to all scales in the questionnaire .(table 6)(fig1)

TABLE 6. Short Form-36 Health Survey (SF-36) Subscales Scores of the patients after reconstructive procedures for corrosive oesophageal stricture at 1 year follow up.

SF -36 scales	Patients undergoing colon interposition	Patients undergoing gastric pull up	P value
General health	57.93(6.5)	45.42(7.6)	< .001*
Physical functioning	52.40(4.52)	47.33(5.85)	0.003*
Role (physical)	50.49(4.47)	42.18(6.9)	< .001*
Bodily pain	55.07 (5.34)	45.23(7.48)	< .001*
Vitality	60.30(6.31)	51.36(8.35)	< .001*
Social functioning	50.6(4.7)	42.72(6.22)	< .001*
Role (emotional)	48.33(5.0)	38.76(8.13)	< .001*
Mental health	54.71(6.3)	41.5(9.69)	< .001*

Mean(SD) SD-standard deviation
* → clinically significant

Figure1- Qol using sf-36 at post operative year 1

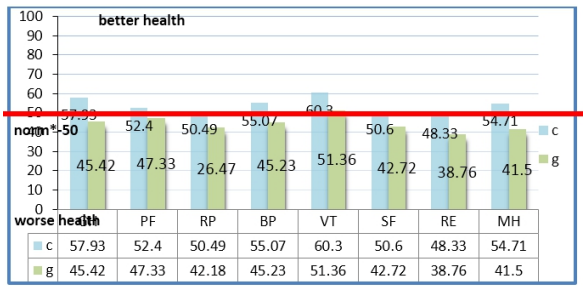

Fig 1.*Norm is taken at 50 for graphical representation only .

Our questionnaire 1 month

On analysis of the special questionnaire at 1 month, it was seen that coloplasty patients perform better on almost all questions relating to physical symptoms, reflux social and mental impairment. However, coloplasty patients had increased self noticeable neck swelling and frequent hold up of food which was significant. Interestingly, weight related symptoms like perceived body weight and body image, though better in coloplasty patients was not statistically significant. This may be due to the negative nitrogen balance and catabolism induced by surgical stress irrespective of the procedure performed .(table 7)

TABLE 7. Scores for patients undergoing colonic interposition when compared to gastric pull up at 1 post operative month.

	Type	1Not at all	2 A bit	3 - some what	4 - Very much	Mean symptom score (1–4)	P-value
Physical symptom related score (PRS)							
Dysphagia for solids(DS)	c	8	22	1	1	1.84	O.00*
	g	2	9	1	0	1.92	
Dysphagia for liquids(DL)	c	2	24	4	2	2.18	0.00*
	g	1	7	2	2	2.42	
Variations in posture(PV)	c	8	8	10	4	2.31	0.33
	g	1	9	1	1	2.17	
Swelling of scar site neck(SW)	c	2	8	10	12	2.16	0.00*
	g	1	2	5	4	1.25	
Abdominal pain(AP)	c	1	13	10	8	1.94	0.00*
	g	0	2	3	7	3.0	
Abdominal distention(AD)	c	3	12	8	9	1.97	0.00*
	g	1	1	4	6	2.75	
Prolonged eating(PE)	c	1	9	10	12	2.16	0.7
	g	1	3	6	1	2.42	
Hold up in the chest(HC)	c	6	8	10	8	1.72	0.00
	g	0	3	2	7	2.50	
Increased salivation(IS)	c	3	4	14	11	1.72	0.00
	g	0	1	7	4	2.42	
Diarrhoea(D)	c	3	4	10	15	2.22	0.2
	g	1	1	2	8	1.75	
Reflex symptom related score (RRS)							
Reflux of acid(RA)	c	7	6	11	8	2.19	0.00*
	g	0	2	3	7	3.5	
Nocturnal cough(NC)	c	8	8	10	6	1.97	0.00*
	g	1	4	4	3	3.5	
Disturbance in sleep(SD)	c	3	9	12	8	2.13	0.00*
	g	0	2	2	6	3.67	
FrequentChest infection(CI)	c	6	6	12	8	2.03	0.00*
	g	0	2	6	6	3.50	
Change In voice(CV)	c	4	4	11	12	1.94	0.00*
	g	0	1	3	8	3.67	
Weight symptom related score (WRS)							
Poor weight gain(BW)	c	0	7	12	13	1.09	0.27
	g	0	1	2	9	1.0	
Poor Body Image(BI)	c	0	8	10	14	1.00	0.19
	g	0	2	3	7	1.17	
Psychological symptom related score (PHSRS)							
Feeling of physical debilitation(PD)	c	4	28	6	15	2.5	0.46
	g	0	0	4	8	2.58	
Interference in family life(FI)	c	0	5	11	16	1.91	0.005
	g	0	0	5	7	2.50	
Difficulty in eating with others(DE)	c	1	4	11	16	2.56	0.714
	g	0	1	2	9	2.5	
Mental distress(MD)	c	0	2	11	19	3.353	0.003
	g	0	1	3	8	3.580	

c-coloplasty, g-gastric pull up

Our questionnaire -1 yr

On analysis of the special questionnaire at 1 yr , it was seen that coloplasty patients perform better on most questions relating to physical ,reflux related symptoms, mental well being and social interactions.. However ,Coloplasty patients had more self noticeable neck swelling and the frequent hold up of food was still statistically significant. **Interestingly, weight related symptoms like perceived body weight and body image were statistically significant and better in coloplasty patients when compared to pull up . (table -8)**

TABLE 8. Scores for patients undergoing colonic interposition when compared to gastric pull up at 1 post operative year

	Type	1-Not at all	2 A bit	3 -some what	4 -Very much	Mean symptom score (1–4)	P-value
Physical symptom related score (PRS)							
Dysphagia for solids(DS)	c	10	14	7	1	1.97	0.00*
	g	0	4	6	2	2.83	
Dysphagia for liquids(DL)	c	10	12	10	0	2	0.01*
	g	1	3	7	1	2.67	
Variations in posture(PV)	c	5	8	10	9	2.72	0.01*
	g	4	4	2	0	1.5	
Swelling of scar site neck(SW)	c	10	11	9	2	2.09	0.1
	g	4	6	2	0	1.83	
Abdominal pain(AP)	c	9	11	10	2	2.16	0.00*
	g	1	7	4	1	2.58	
Abdominal distention(AD)	c	10	12	10	0	2.0	0.00*
	g	8	3	1	0	1.41	
Prolonged eating(PE)	c	13	10	9	0	1.88	0.26
	g	6	4	2	0	1.67	
Hold up in the chest(HC)	c	14	10	7	1	1.84	0.00*
	g	0	6	6	0	2.5	
Increased salivation(IS)	c	7	18	7	0	2.0	0.00*
	g	0	4	7	1	2.75	
Diarrhoea(D)	c	8	14	10	0	2.07	0.04*
	g	0	2	7	3	3.92	
Reflex symptom related score (RRS)							
Reflux of acid(RA)	c	15	10	6	1	1.78	0.00*
	g	0	0	8	4	2.33	
Nocturnal cough(NC)	c	8	18	5	1	1.97	0.00*
	g	0	1	5	6	1.75	
Disturbance in sleep(SD)	c	11	11	10	0	1.97	0.00*
	g	1	2	2	7	3.25	
FrequentChest infection(CI)	c	13	11	7	1	1.88	0.00*
	g	0	0	6	6	3.5	
Change In voice(CV)	c	24	6	1	1	1.34	0.00*
	g	0	1	9	2	3.08	
Weight symptom related score (WRS)							
Poor weight gain(BW)	c	22	6	1	1	1.14	0.00*
	g	2	4	6	0	2.75	
Poor Body Image(BI)	c	20	6	6	0	1.56	0.00*
	g	1	3	5	3	2.83	
Psychological symptom related score (PHSRS)							
Feeling of physical debilitation(PD)	c	8	19	5	0	1.91	0.00*
	g	0	3	8	1	2.83	
Interference in family life(FI)	c	6	22	4	0	1.94	0.001*
	g	2	4	6	0	2.33	
Difficulty in eating with others(DE)	c	10	14	8	0	1.94	0.003*
	g	0	6	6	0	2.5	
Mental distress(MD)	c	0	29	3	0	2.07	0.00*
	g	0	6	6	0	2.5	

c-coloplasty, g-gastric pull up

Table 9 comparison of intraoperative and post operative variables in patients undergoing reconstruction For intractable oesophageal strictures

	Patients undergoing colonic interposition (N=32)	Patients undergoing gastric pull up(N=12)	P value
Mean operating time(min)	240	180	NS
Blood loss(ml)	220	200	NS
No. of anastomosis	3	1	-
Type of anastomosis(H/S)*	20/12	8/4	-
Post op leak	8	2.	-
Mean hospital stay(days)	14	12	-
Mean ICU stay(days)	1	nil	-
redundancy	nil	nil	-

In the coloplasty subgroup at 1 month and 1 year, the outcomes were similar in patients undergoing coloplasty using either the SF-36 or the disease specific questionnaire for either cologastric or colojejunal anastomosis.and for high pharyngeal anastomosis (n=12) or oesophageal anastomosis(n=20

DISCUSSION:

For effective management of corrosive acid injuries of the oesophagus and stomach, the patients can be divided into three groups based on involvement of oesophagus alone, involvement of oesophagus and stomach and isolated stomach involvement

Patients with oesophageal involvement only can be managed by oesophageal substitution with gastric pull up and those with both oesophageal and stomach involvement usually need a colonic interposition for a tension free, durable anastomosis.

Patients with isolated stomach involvement can be managed by endoscopy or surgery from truncal vagotomy with antrectomy to even a partial gastrctomy or total gastrectomy It is generally accepted that there is no ideal substitute for the esophagus, and that thebest oesophagus is the one's own [4]. Oesophageal substitution should be indicated only when all attempts to preserve its continuity fail [5].

Unless the oesophagus is resected at the time of the initial episode of ingestion, which is rare, the surgeon has the option of simply bypassing the strictured oesophagus with either colon or stomach and leaving the oesophagus in situ.

COLONIC INTERPOSITION VS GASTRIC PULL UP

Regarding the relative merits of colon interposition versus gastric pullup to replace a damaged oesophagus.Both have merits and demerits which must be factored in the type of replacement. The advantages for gastric pull up are the stomachs robust blood supply, close anatomical proximity, single anastomosis, less operative time involved , laparoscopic mobilisation and less anastomotic leak. The disadvantages include a long suture line, reflex related symptoms, loss of reservoir diameter mismatch and acid injury to stomach causing stenosis which may preclude its use. The gastric conduit may be done as a whole stomach conduit, greater curvature tube, reversed gastric tube and non reversed gastric tube. In our institution gastro intestinal continuity is preferably reconstructed by a narrow gastric tube based on the right gastro epiploic artery when there is no acid injury involving the stomach The merits for colonic pull up are its adequate

length, blood supply , good diameter match preservation of the gastric reservoir, acid resistance and decreased Barrets metaplasia risk in remnant oesophagus and possibility of isoperistaltic construction.The demerits include increased number of anastomosis and associated intrinsic pathology like colonic diverticula or compromised blood supply.

In caustic stricture there are even strong grounds for preferring colon interposition because the stomach has been damaged by the caustic agent and is scarred and foreshortened and not amenable to reach the proximal esophagus especially in high oesophageal stricture. As most of the patients who ingest corrosive acids with suicidal intent are quite young, unlike the mostly elderly patients undergoing colonic interposition for carcinoma oesophagus, the incidence of inherent colonic pathology like diverticulosis and inadequacy of blood supply is lower in this patient sub group at the time of reconstruction. Inspite of these disadvantages, the stomach is the conduit of choice if unaffected by acid injury. A prospective Indian study found that esophageal injury was seen in 87.8% of the patients, gastric injury in 85.4%, and duodenal injury in 34.1%. [6] reflecting the high incidence of concomitant stomach with oesophageal injuries with acid in indian patients Acid ingestion is associated with a higher stricture rate(33%) and mortality rate (18%)when compared to alkali [7]. Studies for reconstruction following oesophagectomies have shown that colon interposition is associated with a lower incidence of stricture than gastric pull-up[8].

Most of the work so far on the use of colonic interposition grafts for the oesophagus have been done in the setting of oesophagectomy for carcinoma oesophagus. A quality of life study for oesophageal replacement in oesophageal carcinoma involving 14 patients from Cense , Van Lanschot et al [9] state that patients after colon interposition by necessity have a poorer quality of life than patients after gastric tube reconstruction.

However it is to be noted that the indication for surgery and demographics of the patients in this study (69.9 yrs for colonic interposition vs 66.4 years for gastric pullup)are quite different from the patients in our study (26 years for colonic interposition vs 25.6 years for gastric pull up). Also the colonic interposition in this study is antiperistalic based on the middle colic artery and the the route is subcutaneous in 57% (8/14) with only 7%(1/14) following a retrosternal route. However, it is to be noted that all of our patients have isoperistaltic interposition and only in the retrosternal route. The authors also describe that subcutaneous interpositions score the lowest in Qol when compared to retrosternal or prevertebral routes.Also half these patients (7/14) patients had surgery for gastric tube complications before undergoing a colonic interposition implying the role of previous surgery which may negatively impact the QOL after coloplasty. Retrospective studies from DeMeester SR et al[10], Huttl TP et al [11], Kolh P etal [12] and Renzulli P et al [13] suggest that colon grafts in the setting of oesophageal carcinoma are not associated with more post operative complications and have comparable or even better functional outcome..Davis et al [14] compared 42 patients who underwent colon interposition with 959 patients who underwent whole stomach interposition after esophagectomy and concluded that colon interposition is a more complex procedure with increased short term morbidity and therefore should not be the operation of first choice As corrosive acid commonly affects the stomach, the use of the colon was the inevitable choice in most of our patients. Bassiouny et al [15] stated that isoperistaltic left colon based on left colic vessels with simultaneous oesophagectomy utilising the transhiatal approach is the best approach for paediatric patients Despite increased operative time and number of anstomosis when compared with gastric pull up, there is no significant difference in mortality rate when performed at an experienced centre. In our center(TABLE-9) even though mean operative time, blood loss, number of anastomosis, leak rate, mean hospital stay and intensive care stay is more with coloplasty patients, the quality of life is better with coloplasty patients. Bartels et al have found that gastric pull up is associated with significantly more cardiopulmonary complications[16]

Coloplasty has excellent outomes in the long term. In a long term study from Serbia of isoperistaltic mostly retrosternal left colonic interposition (75%) grafts due to alkali ingestion(50.9%), Knezevic[17]et al described combined lesions of the oesophagus and stomach in 28.9 % with high strictures involving the hypopharynx, orpoharynx or oesophageal ostium present in 24.11% patients.The outcomes were excellent with overall mortality rate of 4.16 % with improved mortality rates of 3.26% from 1985-2004. Most common cause of complications was cervical anastomotic leakage(9.23%)with transplant necrosis (2.38%) and abdominal anastomotic leakage (0.89%) Long term post operative complication rate was 13.99% with most common complications being cervical anastomotic stricture (4.46%) and colon redundancy (4.17%).. Also, colon grafts have an excellent functional outcome with good results in 81.75%, fair results in 13.68 % patients on long term follow up(1-30 years) Even our study revealed good outcomes for cooplasty patients in the short term (table 9)

RESULTS

*On analysis of the sf -36 questionnaire at 1 month, there is no significant differennce between coloplasty and gastric pull up patients.
*sf -36 questionnaire at 1 yr interval revealed coloplasty pts significantly surpassing gastric pull up pts in all scales revealing the supremacy of this procedure if the initial post operative course can be tided over.
*our self designed questionnaire at 1yr intervals revealed statistically better physical, reflux, weight, psychological scores for coloplasty patients than gastric pull up patients
*though operative variables like blood loss time taken and post operative ICU stay were the same, there is a increased theretical risk of leak owing to the increased number of anastomosis.

LIMITATIONS :

There are several limitations in this study. The sample size is small and the follow up is short term. The base line QOL before corrosive injury is unknown and there is no control group for comparing the QOL for patients undergoing reconstructive conduit surgeries of the oesophagus. There may be an inevitable preference to interposition coloplasty due to concomitant acid injury of the stomach. Further follow up of these patients is needed to discern complication rates and functional outcomes over the long term. The study may not be adequately powered to study intragroup differences eg.

High paharyngeal and oesophageal anastomosis in coloplasty sub group due to the low number of patients. Inspite of these limitations , this study is the first in medical literature to report on QOL outcomes for patients with corrosive injuries of the oesophagus and gives evidence for the successful use of interposition coloplasty in high volume centres in the setting of corrosive injuries.

CONCLUSION

In India, where corrosive stricture of the oesophagus are more common and occur in the younger population, coloplasty may be the preferred reconstructive conduit surgery owing to better outcomes at the 1 year interval. Our disease specific questionnaire performs well in relation to the well validated RAND SF -36 and augurs well for its supplementary use in asian socio economic cultural settings

Annexures

1. Self designed questionnaire for corrosive injury patients

Disease specific questionnaire for corrosive injury patients

Abbreviation	Explanation
C	Coloplasty
G	Gastric pull up
DISEASE SPECIFIC QUESTIONNAIRE	
Physical symptom related score (PRS)	
Dysphagia for solids(DS)	Dysphagia for solid. GRADE-1*
Dysphagia for liquids (DL)	Dysphagia for liquids. GRADE 3*
Variations in posture to aid swallowing (PV)	Variations in posture which facilitate swallowing in patientss with dysphgia
Swelling (SW) in the neck	Swelling of scar site in the neck especially during swallowing
Abdominal Pain (AP)	Abdominal pain- epigastric, lasting > 10 min, non radiating
Distension (AD)	Abdominal distention- a vague sense of fullness/bloating
Prolonged eating (PE)	Prolonged chewing when compared to meals before corrosive consumption
Hold up in chest(HC)	Hold up in the chest- subjective feeling of chest discomfort after swallowing food boluses.

Increased salivation (IS)	Increased salivation- increased drooling due to difficulty in swallowing
Diarrhoea(D)	Diarrhoea- associated with food intake, usually immediately after food consumption
Reflex symptom related score (RRS)	
Reflux acid (RA)	Reflux of acid content with bitter taste in mouth
Nocturnal cough (NC)	Productive cough at night
Sleep disturbance SD	Disturbance in sleep-periods of perceived interruptions in sleep and associated daytime somnolence
Chest infection(CI)	Frequent Chest infection- present with fever, productive cough
Change in voice (CV)	Change in voice-especially seen after waking from bed
Weight symptom related score (WRS)	
Poor weight gain (BW)	Increased feeling of loosening of body constricting apparel like belts, trousers, pyjamas
Poor body image(BI)	Body Image-unsatisfactory appearance compared to before surgery
Psychological symptom related score (PHSRS)	
Physical debilitation (PD)	Feeling of physical debilitation-limitation of physical activities considered normal before corrosive consumption
Interference in family life (FL)	Interference in family life- increased episodes of familial strife when compared to those before corrosive ingestion
d ifficulty in eating (DE)	Difficulty in eating with others-feeling of impaired social interaction with family during meal times.
Mental Distress (MD)	Mental distress-feeling of recent onset emotional labiality not seen before corrosive consumption

*- dysphagia based on Atkinson and Ferguson dysphagia score [18] where 1- difficulty with certain solids 2- soft diet only 3- liquids only 4- unable to swallow liquids / intravenous fluids needed

Based on the response, the mean symptom score is calculated for each item on the questionnaire

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