

Laparoscopic fundoplication for gastro-esophageal reflux disease and hiatus hernia: A short term outcome of first 8 cases.

Abstract

Background

Acute gastro-esophageal reflux disease is a common ailment in kashmiri population. Most of these patients are managed by gastroenterologist, physicians and surgeons in daily outpatient basis. Majority of them settle by medical management with the help of proton pump inhibitors, prokinetics and antacids. , laparoscopic Nissen's fundoplication (LNF) is currently the procedure of choice for the surgical management of GERD.

Aims and objectives

The aim of this study was to know the feasibility of laparoscopic fundoplication for hiatus hernia and acute gastro-esophageal disease in terms operative time, post operative pain, length of hospital stay, conversion rate and recurrence of symptoms.

Material and methods

The present prospective observational study was conducted in the Post-Graduate Department of General Surgery and minimal access surgery Government Medical College Srinagar from June 2013 to June 2017. The patients that were included in the study had symptomatic gastro-esophageal reflux (documented by endoscopy) with either persistent symptoms despite adequate and prolonged medical treatment, CT documented hiatus hernia and patients, who wanted to avoid long-term medical treatment. The duration of reflux symptoms ranged from 9 months to 30 years (median 6 years). Patients who were excluded from the study were those unfit for anesthesia. Informed consent was taken before surgery in the language, the patients understood.

Results

This study includes 8 patients, with median age of 40 years (range 20-70 years). In the study group, 5 were males and 3 were females. The mean operative time was 90 minutes (range 60 to 120 minutes). There were no major intra operative and post operative complications. The post operative pain was minimal as compared to open surgery. The median hospital stay was 3.5 days (range 3 -6 days). Two patients developed symptoms of bloating, early satiety, nausea and diarrhea. However these symptoms improved within weeks with a good response to appropriate medication. The median time until normal physical activity resumed was 2 weeks (range 3 days to 4 weeks). Median follow-up was 6 months (range 1-12 months).The overall short-term results in appropriately selected patients were excellent. The recurrence of symptoms was not observed in any patient within follow up of 6 months.

39 Conclusion

40 We conclude from our early series of 8 cases, that patients having long standing GERD not
41 responding to medical management who are at a threat to develop barrettes esophagus should be
42 given the benefit of laparoscopic fundoplication. However proper evaluation, patient's selection
43 is mandatory. The choice of fundoplication should be dictated by the surgeon's preference and
44 experience. Currently, the main indication for laparoscopic fundoplication is represented by PPI-
45 refractory GERD, provided that objective evidence of reflux as the cause of ongoing symptoms
46 has been obtained by impedance-pH monitoring.

47 **Keywords;** laparoscopy, hiatus hernia, reflux, fundoplication

48

49 Introduction

50 Gastroesophageal reflux disease (GERD) is currently defined as a condition that develops when
51 the reflux of gastric contents into the esophagus leads to troublesome symptoms and/or
52 complications [1,4]. The management of GERD is multi-disciplinary, often involving general
53 practitioners, gastroenterologists, surgeons and specialist nurses, all of whom should have an
54 awareness of the pros and cons of each management option. Barrett's esophagus is a condition in
55 which the stratified squamous esophageal epithelium is replaced by endoscopically detectable
56 columnar metaplasia [5,6]. It occurs in 2% of the general adult population and represents the
57 most dreaded complication of GERD because it predisposes to esophageal adenocarcinoma, the
58 fastest growing cause of cancer mortality. There is still debate about the working definition of
59 Barrett's esophagus [5,6]. According to the American Gastroenterological Association, Barrett's
60 esophagus is a change in the distal esophageal epithelium of any length that can be recognized as
61 columnar type mucosa at endoscopy and is confirmed to have intestinal metaplasia by biopsy of
62 the tubular esophagus [5]. According to the British Society of Gastroenterology, only 1 cm or
63 more of endoscopically visible columnar epithelium above the gastro-esophageal junction
64 dictates biopsy sampling, whereas the detection of intestinal metaplasia is not a prerequisite for
65 the definition of Barrett's esophagus but only for the necessity of endoscopic surveillance [6].
66 Although multiple variants of anti-reflux operations are described, laparoscopic Nissen's
67 fundoplication (LNF) is currently the procedure of choice for the surgical management of GERD
68 This is reiterated in the RCSE (Royal college of surgeons) guidance, which recommends
69 fundoplication for the surgical management of GERD. Since fundoplication was reported by
70 Nissen in 1956 [7,8], it has become the most common surgical procedure for gastro-esophageal
71 reflux disease, achieving long-term relief of reflux symptoms in 90% of patients [9-11], with low
72 morbidity rates (12-13%) and negligible mortality [12], to reduce the incidence of post-
73 fundoplication sequelae. The fundoplication offers the potential of reduced postoperative pain
74 and hence a shorter stay in hospital and reduced convalescent times compared with the open
75 approach.

76

77 **Aims and objectives**

78 The aim of this study was to know the feasibility of laparoscopic fundoplication for hiatus hernia
79 and acute gastroesophageal disease in terms of operative time, post operative pain, length of
80 hospital stay, conversion rate and recurrence of symptoms.

81

82 **Material and methods**

83 The present prospective observational study was conducted in the Post-Graduate Department of
84 General Surgery and minimal access surgery, Government Medical College Srinagar from June
85 2013 to June 2017. The approval from the ethics committee and a signed informed consent were
86 obtained from the patients. The patients that were included in the study were symptomatic
87 gastro-esophageal reflux (documented by endoscopy) with either persistent symptoms despite
88 adequate and prolonged medical treatment, CT documented and patients, who wanted to avoid
89 long-term medical treatment. The patients who were excluded from the study were those unfit for
90 anesthesia. The following data was collected prospectively: age, sex, operative time, intra-
91 operative and post operative complications, postoperative pain, hospital stay, conversion to open
92 and recurrence of symptoms. All the patients enrolled for the study were evaluated by detailed
93 history, thorough general physical examination, and focused systemic examination. Informed
94 consent was taken before surgery in the language, the patients understood. The patient was kept
95 fasting overnight. All patients received a prophylactic dose of injection ceftriaxone 1 g one hour
96 before surgery.

97 **Operative procedure**

98 **Position of patient**

99 After induction of general anesthesia and introduction of a bladder catheter, the patient was
100 placed in lithotomy, position, the table tilted 30° head up, and the surgeon standing between the
101 patient's legs with the first assistant to the patient's left and the second assistant to the patient's
102 right. We preferred camera man to stand on the left side of surgeon. We use only one monitor on
103 the side of the right shoulder of the patient. All procedures were completed by using 30 degree
104 telescope

105 **Port position**

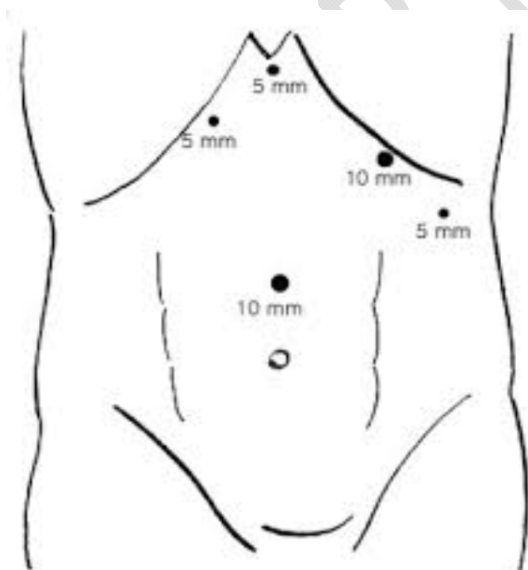
106 After placing an orogastric tube to deflate the stomach, Pneumo-peritoneum up to 15 mmHg was
107 achieved by a direct trocar technique. Five ports were used (Fig. 1). A 10 mm optical port for
108 the laparoscope was introduced just to the left of the midline, midway from the xiphisternum to
109 the umbilicus. Additional ports were placed under vision; 5 mm ports was placed in the mid-
110 clavicular line just below the right costal margin for a fan shaped retractor used for liver
111 retraction, two working ports were made on either side of the optical port, 10 mm working port
112 in the mid-clavicular line 5 cm away from the optical port on the left side of the abdomen, while
113 as 5 mm working port was placed on the right side of abdomen, 5 cm away from the optical port
114 in the mid-clavicular line and additional 5mm port was made in the anterior axillary line for
115 retraction of the stomach by the left assistant

116 **Surgical procedure**

117 Two of the assistants stand on the patient's right side; The camera man and the assistant who
118 retracts the liver. The assistant on the right side of the surgeon pulls the stomach down to expose
119 the gastro-esophageal junction. The first step is to incise the lesser omentum and pars flaccida
120 and proceed up towards the right side of gastro-esophageal junction. The phreno-esophageal

121 membrane is incised and the dissection is carried across the esophagus. The lesser omentum is
122 incised to expose the right crus of diaphragm. A plane is created between the right crus and
123 Para-esophageal tissue and deepened. The Para-esophageal fat is dissected from the esophagus
124 taking care not to damage the hepatic branches of vagus nerve, next to that dissection of
125 esophagus hiatus is done. The dissection of the hiatus is done to mobilize the lower esophagus
126 and making it free from all the structures. The dissection is also carried to the left of the
127 esophagus interiorly till the left crus is reached. A cleavage is developed between the esophageal
128 Wall and the left crus. Again the left Para-esophageal fat is dissected off the esophagus to expose
129 the whole of left crus. Next step is to complete the dissection of esophagus within the the
130 esophageal hiatus and to further extend the peri-esophageal dissection in the mediastinum in
131 order to mobilise enough length of it, thereby avoiding the upward retraction of gastro-
132 esophageal junction and fundoplication. At least 3- 4 cm tension free abdominal esophagus must
133 be present within the abdomen at the end of dissection. During the upper dissection of the
134 hiatus,a great care is taken not to damage the anterior vagus nerve. The mobilization of upper
135 part of the fundus of the stomach is the next step; this is achieved by dividing the gastro
136 esophageal adhesions and short gastric vessels until the upper part of fundus is liberated. The
137 dissection and division of these vessels is greatly facilitated by using harmonic scalpel.After the
138 dissection is completed, the reconstruction beginning by approximately the two pillars in order to
139 narrow the esophageal hiatus. The narrowing of the esophageal hiatus should be calibrated to a
140 size that allows the supple passage of a 10 mm scope along side of esophagus. The fundus is
141 passed behind the esophagus to initiate the fundoplication. The fundoplication is performed by
142 stitching the both sides of gastric fundus together in front of esophagus. To assess the tightness
143 of gastric wrap, a 5 mm grasper forcep is passed between fundal gastric wrap along side of
144 gastro-esophagus. Anchoring the fundoplication to the esophagus using an additional suture
145 completes the procedure. We also fixed the wrap with the right crus of diaphragm to avoid the
146 prolapse of fundal wrap. The drain was placed and secured in all cases. The ports were closed
147 and dressing applied. (Figure 1-14).

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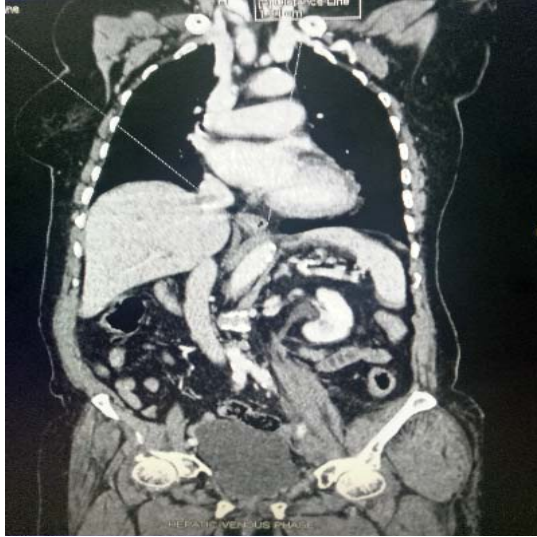


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150 Figure 1 Port position in Laparoscopic
151 Fundoplication

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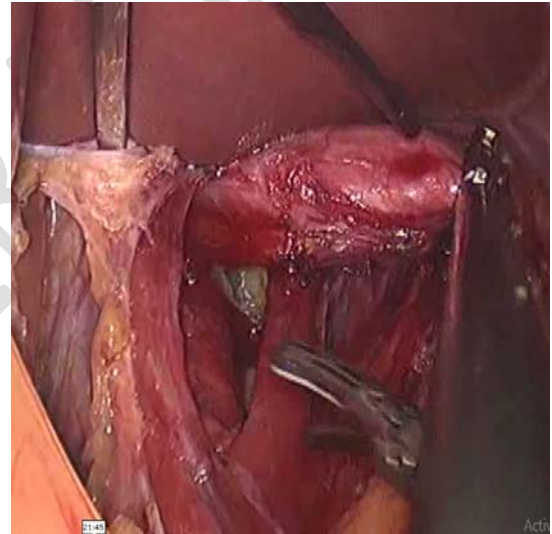


Figure 2 Post operative picture



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Fig. 3 Longitudinal section of CECT abdomen showing hiatus hernia

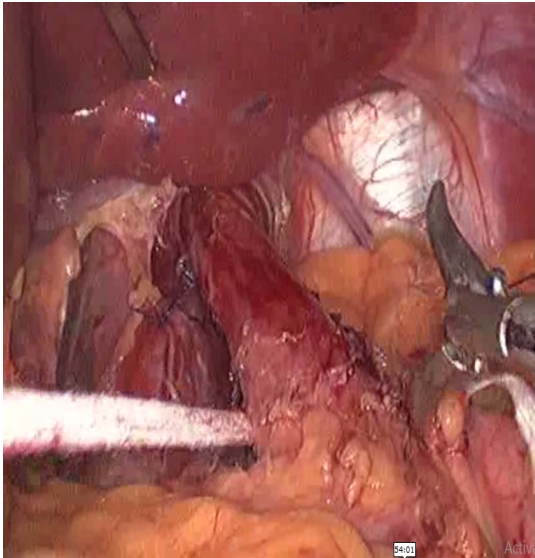


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Fig 4 Release of gastro hepatic ligament by Harmonic. This exposes the lesser sac distally and proximally from the hepatic branches of the vagal nerves which are left intact.

Fig. 5 the right crus is incised and the dissection is extended anteriorly, posteriorly on to the V- shaped commissure of the right crus. The mediastinum is opened widely which helps in localizing the left pillar and esophagus

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174
175 Fig 6 A ribbon gauze is passed in the window
176 behind the esophagus and placed around the
177 abdominal part of esophagus. This maneuver
178 allows the traction onto the esophagus and
179 gastroesophageal junction which helps in
180 opening dissection planes.

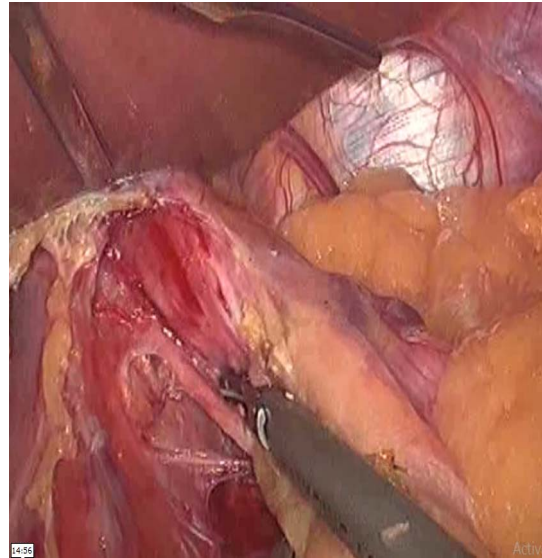


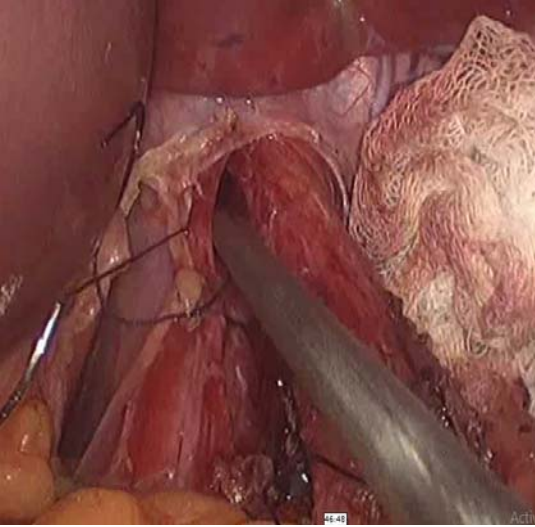
Fig 7 Vagus nerve on the posterior aspect
of esophagus. Continuously keeping in mind
the presence of both vagus nerves limits the
possibility of harming them



181
182 Fig 8 The greater omentum is dissected from
183 the stomach along the greater curvature. The
184 short gastric vessels are divided individually
185 using the harmonic scalpel. It is important to
186 mobilize the fundus completely away from
187 the diaphragm i.e until reaching the base of
188 the pillar posteriorly to avoid undue torsion on
189 the gastro-esophageal junction when
190 constructing the fundoplication.



Fig 9 The pillars are approximated from the
right of the esophagus with interrupted
nonabsorbable sutures. In order to narrow the
opening of esophageal hiatus.



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192 Fig 10 Narrowing of esophageal hiatus is access
193 -ed by passing grasper forcep alongside of
194 esophagus.
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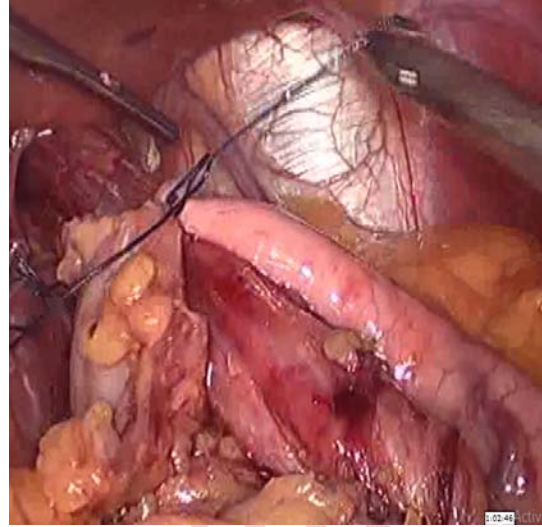
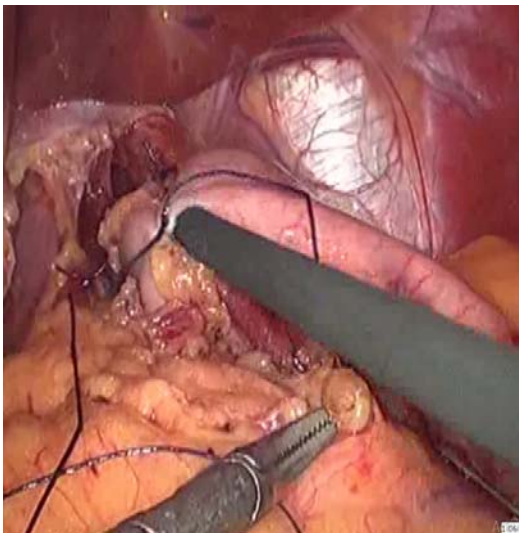


Fig 11 The fundoplication is performed by
stitching both sides of gastric fundus together
infront of esophagus



196
197 Fig 12 To access the tightness of gastric wrap
198 Grasper forcep is passed between fundal
199 gastric wrap and esophagus
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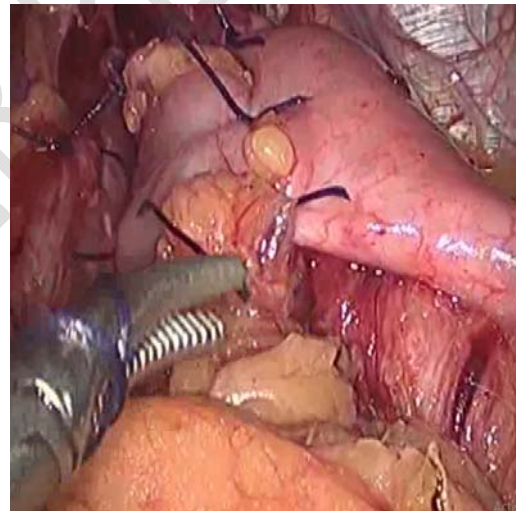
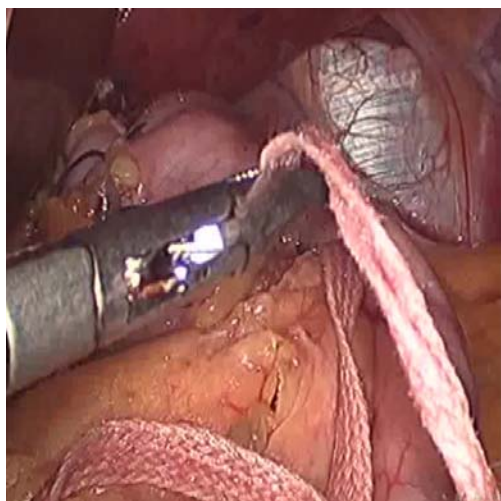


Fig 13 complete fundoplication



201
202 Fig 14 Removing the ribbon gauze. The
203 Floppy aspect of the fundoplication is again
204 Checked by passing grasper alongside of
205 esophagus
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Fig 15 Drain placed and secured

207 Postoperative care

208 To avoid forceful vomiting the first hours postoperatively as this may cause early disruption of
209 the sutures and intra-thoracic migration of the fundoplication an anti-emetics was administered.
210 A naso-gastric tube was routinely kept in place for 24 h after the surgery. Oral fluid intake was
211 started on the 1st postoperative day and soft solids on the 2nd day. Patients left hospital as soon
212 as they are well enough, continuing with a soft diet for the next 4 weeks. All patients were again
213 seen at the outpatient clinic at 1 week, 6 weeks and 6 month after the procedure. Further follow-
214 up was arranged on individual basis.

215 Results

216 This study includes 8 patients, with median age of 40 years (range 20-70 years). In the study
217 group 5 were males and 3 were females. The mean operative time was 90 minutes (range 60 to
218 120 minutes). There was no major intra operative and post operative complications (such as
219 bleeding, perforation of esophagus, injury to diaphragm, phrenic nerves and conversion to
220 open). The post operative pain was minimal as compared to open surgery. The median hospital
221 stay was 3.5 days (range 3 -6 days). Two patients developed symptoms of bloating, early satiety,
222 nausea and diarrhea. However these symptoms improved within weeks with a good response to
223 appropriate medication. The median time until normal physical activity was resumed was 2
224 weeks (range 3 days to 4 weeks). Median follow-up was 6 months (range 1-12 months). All
225 patients were currently free of reflux symptoms. Postoperative gastroscopy was performed in all
226 patients, revealing a satisfactory fundoplication on direct inspection and the absence of
227 oesophagitis in all patients. The overall short-term results in appropriately selected patients were
228 excellent. The recurrence of symptoms was not observed in any patient within follow up of 6
229 months.

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234 Table 1 shows variables and there results.

Variable	Results
Age (years)	40 (20-70)
Sex	Male=5, Female=3
Median weight(kgs)	70 (60-105)
Mean Operative time(minutes)	90 (60-120)
Post operative pain	Minimal
Intra and postoperative complication	
Bleeding	0
Esophageal perforation	0
Diaphragmatic injury	0
Vagal nerve injury	0
Conversion to open	0
Post operative fever	1
Port site infection	1
Mean hospital stay (Days)	3.5(3-6)
Recurrence of symptoms	0
Mean Follow up	6 (1-12 months)

235

236 Discussion

237 Acute gastro-esophageal reflux disease is a common ailment in kashmiri population. Most of
238 these patients are managed by gastroenterologist, physicians and surgeons in daily outpatient
239 basis. Majority of them settle by medical management with the help of proton pump inhibitors,
240 prokinetics and antacids [1,2,3]. There is an association of gall stones with esophageal reflux
241 disease and duodenum diverticulum (saint's triad). Gastro-esophageal reflux disease and gall
242 stone presentation share the common clinical scenario of symptoms. It is difficult to differentiate
243 the one entity from the other clinically. Unfortunately, there are only few places in our state,
244 where these patients would be evaluated in the true scientific spirit and helped on scientific
245 logical ground. Under this perspective most of these patients stay on a continued medical
246 management of PPIs even though they could be helped by surgical management called Nissen's
247 fundoplication. To detect acute gastro-esophageal disease, we need impedance PH monitoring,
248 esophageal manometry and establish imaging diagnosis of hiatus hernia, we require endoscopy
249 and CECT scan. The patients that were sent to us were highly suspicious of having acute gastro-
250 esophageal disease on clinical scoring systems and having a resistance to treatment by PPIs for
251 duration of more than two years. The patients having acute gastro-esophageal disease were with
252 the persistent symptoms of retrosternal burning pain, regurgitation of gastric aspirate, hoarseness
253 of voice and irritative cough [13, 14]. The patients with hiatus hernia were Nissen's
254 fundoplication were performed were diagnosed on clinical, radiological (barium meal study),
255 Endoscopy and CECT scan. Stein and De-Meester [15] have stated that the established principles
256 of anti-reflux surgery should not be jettisoned in order to perform a procedure laparoscopically.
257 They state that the 'construction of a loose 360° fundoplication' should be the goal. Dallemagne
258 et al [16] demonstrated the feasibility of this in their initial series of 12 patients. Geagea [17] and
259 Falk et al [18] all reported good initial results in preliminary series of 10 and 16 patients,

260 respectively. Five patients of our study group presented with a documented hiatus hernia on
261 endoscopy and CT scan. Four of them had sliding hiatus hernia and one had Para-esophageal
262 type. However the rest three patients were taken for surgery for acute gastro-esophageal disease
263 on their clinical presentation only, due to paucity of esophageal manometry and PH monitoring.
264 We could not document their reflux before taking them for surgery. Nevertheless, after a
265 threadbare discussion with the treating gastroenterologist, a unanimous consensus was generated
266 that Nissen's fundoplication will help these patients. It is agreed that the two entities may coexist
267 together, however it is also known that they are not related to each other. A small hiatus hernia
268 may have severe symptoms of gastro-esophageal disease and converse is also true. All these
269 patients were counselled in the preoperative setting about the nature of surgery, advantages,
270 disadvantages approach of surgery, conversion possibility and long term outcome. The risk of
271 barrettes esophagus in three of our patients who were resistant to medical management was
272 explained to them. A formal consent was obtained from the patients.
273 In our study, median age was 40 years (range 20-70years) and there are 5 male patients and 3
274 female patients and median weight was 70 kg (range 60-105 kg). There was a noticeable lack of
275 data on the demographic group in the study conducted previously. Mean operative time was 90
276 minutes (range 70-120), the operating time decreased with experience. The operating time was
277 comparable to the study conducted by David I Watson, with mean Operative time of 81 minutes
278 (range 45-154) minutes. Two patients developed symptoms of bloating, early satiety, nausea and
279 diarrhea. These symptoms improved within weeks and responded to appropriate medication.
280 The mean hospital stay was 3.5 days (range 3-6 days) and mean follow was 6 months (range
281 1month-1 year) this was comparable to study conducted by David I Watson with mean hospital
282 stay of 3 days (rang 3 -8 days) and follow up 5 months rang (1 month 1 year).
283 In our study the results demonstrated excellent symptomatic out come with shorter operative
284 time , hospital stay, early discharge and early return to normal physical activity and also cost
285 effective, as well as beneficial to patients by reducing the morbidity of surgery [19], with no
286 reduction in efficacy. One of our patients in this series developed postoperative fever which
287 responded to usual analgesics prescribed. One more patient developed port site infection which
288 settled within first 10 days of surgery performed. We didn't have any conversions to open
289 technique and we followed them for around 1 year.

290 Conclusion

291 We conclude from our early series of 8 cases, that patients having long standing GERD not
292 responding to medical management who are at a threat to develop barrettes esophagus should be
293 given the benefit of laparoscopic fundoplication. Patients having CT documented hiatus hernia
294 are also indications for laparoscopic fundoplication. Laparoscopy gives them all the benefits of
295 minimal access surgical procedure and avoids a big laparotomy on them. However proper
296 evaluation, patient's selection is mandatory. The choice of fundoplication should be dictated by
297 the surgeon's preference and experience. Currently, the main indication for laparoscopic

298 fundoplication is represented by PPI-refractory GERD, provided that objective evidence of
299 reflux as the cause of ongoing symptoms has been obtained by impedance-pH monitoring.

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UNDER PEER RL