

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 guidance, which recommends fundoplication for the surgical
69 management of GERD. Since fundoplication was reported by Nissen in 1956 [7,8], it has become
70 the most common surgical procedure for gastro-esophageal reflux disease, achieving long-term
71 relief of reflux symptoms in 90% of patients [9-11], with low morbidity rates (12-13%) and
72 negligible mortality [12], to reduce the incidence of post-fundoplication sequelae. The
73 fundoplication offers the potential of reduced postoperative pain and hence a shorter stay in
74 hospital and reduced convalescent times compared with the open approach.

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76 Aims and objectives

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

80

81 Material and methods

82 The present prospective observational study was conducted in the Post-Graduate Department of
83 General Surgery and minimal access surgery, Government Medical College Srinagar from June
84 2013 to June 2017. A total of 8 patients were included in the study. The approval from the ethics
85 committee and a signed informed consent were obtained from the patients. The median age was
86 40 years (20-70), 5 were male, and the median weight of the adult patients was 70 kg (60-105).
87 The patients that were included in the study were symptomatic gastro-esophageal reflux
88 (documented by endoscopy) with either persistent symptoms despite adequate and prolonged
89 medical treatment, CT documented and patients, who wanted to avoid long-term medical
90 treatment. The duration of reflux symptoms ranged from 9 months to 30 years (median 6 years).
91 Patients who were excluded from the study were those unfit for anesthesia. The following data
92 was collected prospectively: age, sex, operative time, intra-operative and post operative
93 complications, postoperative pain, hospital stay, conversion to open and recurrence of symptoms.
94 All the patients enrolled for the study were evaluated by detailed history, thorough general
95 physical examination, and focused systemic examination. Informed consent was taken before
96 surgery in the language, the patients understood. The patient was kept fasting overnight. All
97 patients received a prophylactic dose of injection ceftriaxone 1 g one hour before surgery.

98 Operative procedure

99 Position of patient

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

106 Port position

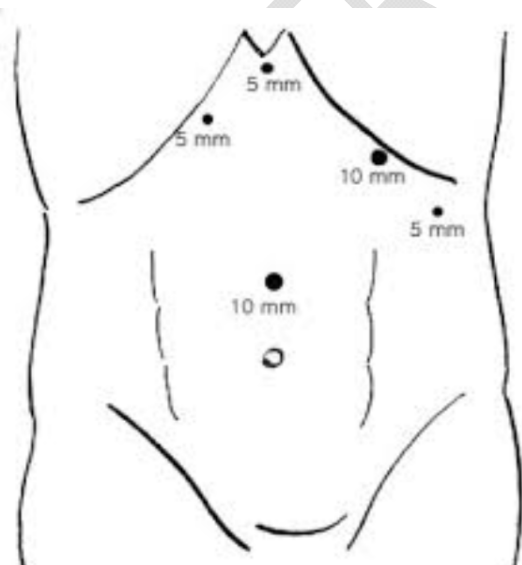
107 After placing an orogastric tube to deflate the stomach, Pneumo-peritoneum up to 15 mmHg was
108 achieved by a direct trocar technique. Five ports were used (Fig. 1). A 10 mm optical port for
109 the laparoscope was introduced just to the left of the midline, midway from the xiphisternum to
110 the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

117 Surgical procedure

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

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

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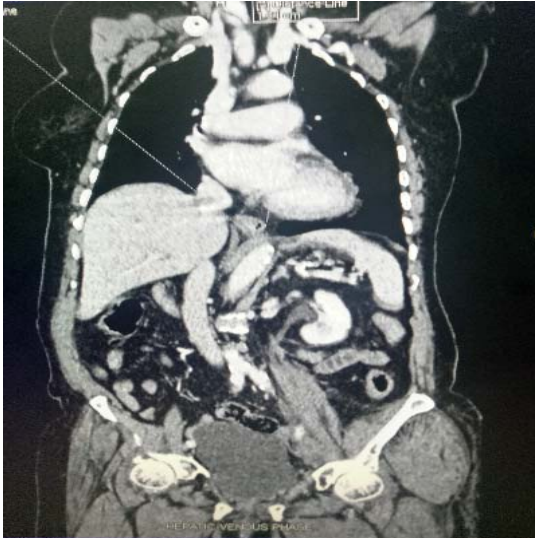
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151 Figure 1 Port position in Laparoscopic
152 Fundoplication



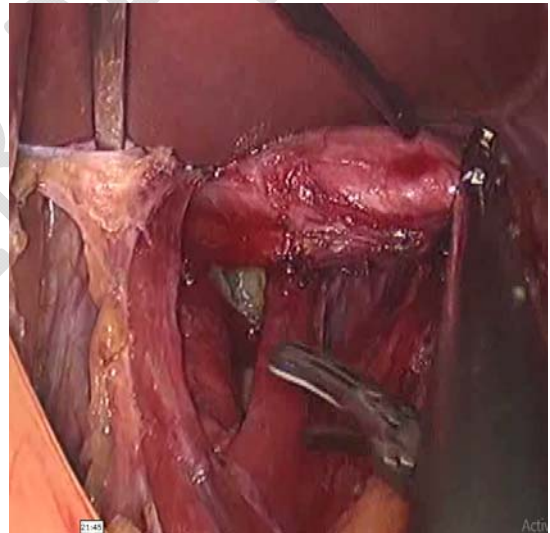
Figure 2 Post operative picture

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Fig. 3 Longitudinal section of CECT abdomen showing hiatus hernia

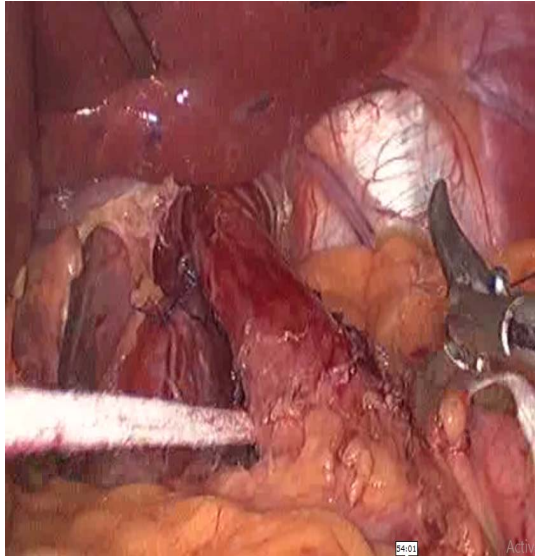


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Fig 4 Release of gastro hepatic ligament by Harmonic. This exposes the lesser sac distally and proximally from the hepatic branches of the vagal nerves which are left intact

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

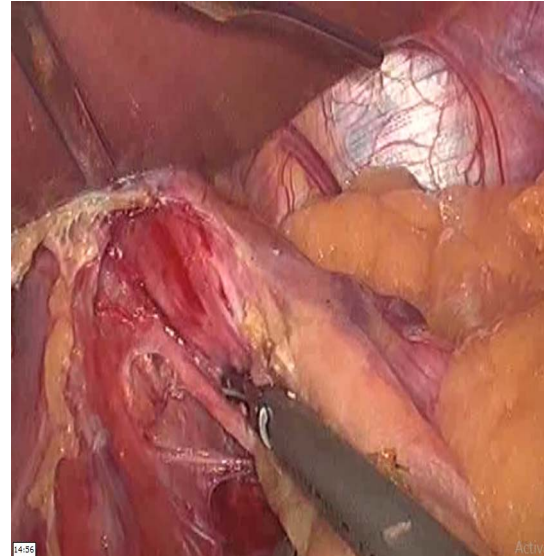
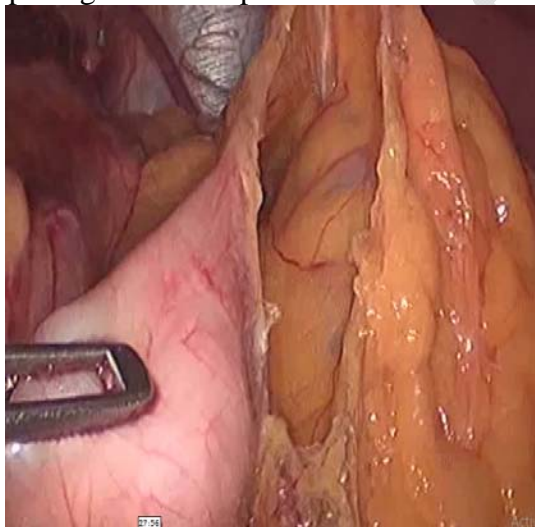


Fig 7 Vagus nerve on the posterior aspect
of esophagus. Continuously keeping in mind
the presence of both vagus nerves limits the
possibility of harming them

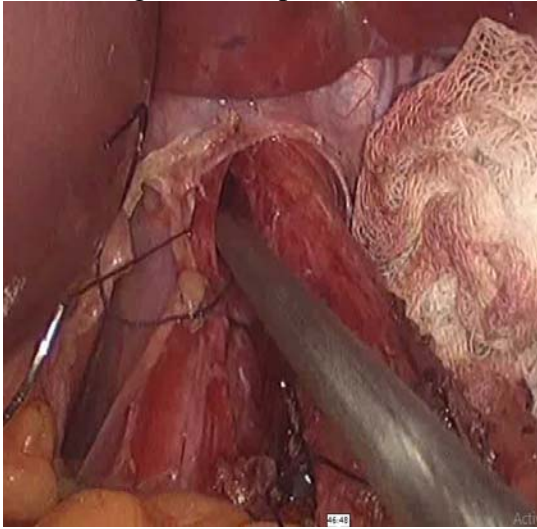


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183 Fig 8 The greater omentum is dissected from
184 the stomach along the greater curvature. The
185 short gastric vessels are divided individually
186 using the harmonic scalpel. It is important to
187 mobilize the fundus completely away from
188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



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.

191 constructing the fundoplication.



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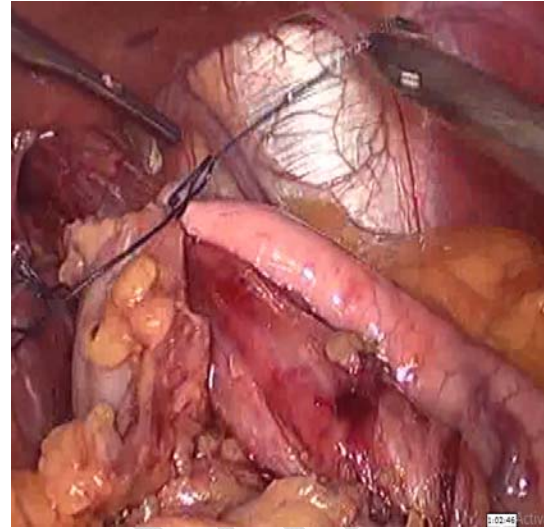
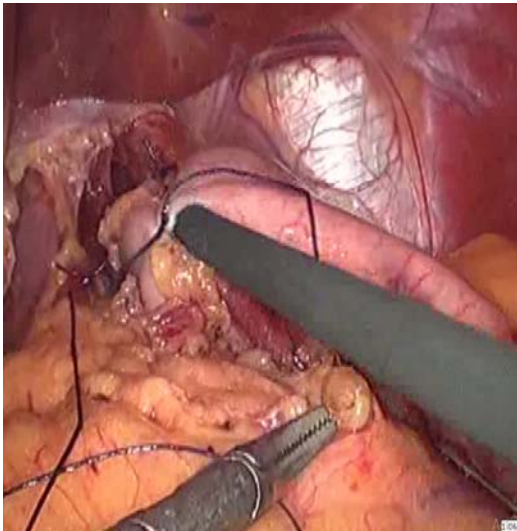


Fig 11 The fundoplication is performed by
stitching both sides of gastric fundus together
infront of esophagus



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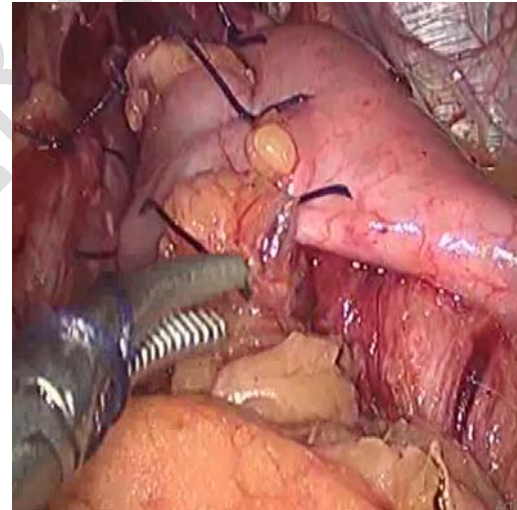
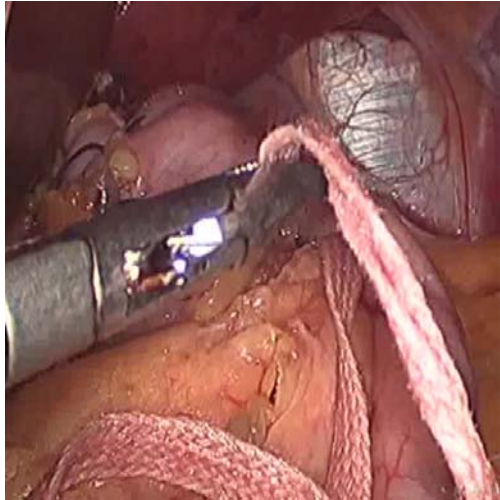


Fig 13 complete fundoplication



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

208 Postoperative care

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

216 Results

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

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235 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) |

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237 Discussion

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

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

291 Conclusion

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

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

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