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Research Article

Laparoscopic management of achalasia cardia

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ABSTRACT

Background: Primary idiopathic Achalasia is a quite rare disease. Achalasia Cardia is a motor disorder of the esophagus and lower esophageal sphincter. More specifically, it is a neuromuscular disorder characterized by degenerative changes of the myenteric plexus leading to a selective loss of inhibitory nerve endings. Irreversible disruption of peristaltic contractions and impaired relaxation of the lower esophageal sphincter in response to deglutition are the consequences of this damage. There is always a need to find out the best possible management options for this condition.
Methods: We studied 22 cases of Achalasia Cardia in a span of 2 years from November 2012 to November 2014. To confirm the diagnosis we subjected the patients to barium swallow, upper GI endoscopy and CT scanning. Esophageal Manometry and 24hr PH monitoring were not done, because of non-availability of it in our institute. Operative technique used was Laparoscopic Heller's Cardiomyotomy with Dor's 180 degree Partial Anterior Fundoplication.
Results: Following laparoscopic surgery there was significant improvement in preoperative symptoms like dysphagia (95.5%), regurgitation (95.5%), chest pain (90.90%) and epigastric pain (100%). After addition of anti-reflux procedure there was significant reduction in post-operative reflux without development of any dysphagia which has to be noted.
Conclusions: Laparoscopic Heller's Cardiomyotomy with Dor's Procedure is feasible, safe and better than open procedures. Laparoscopic Heller's Cardiomyotomy should be the management of choice in achalasia cardia in expert hands and proper setup.

Keywords: Cardiomyotomy, Laparoscopy, Achalasia, Fundoplication

INTRODUCTION

Heller performed first open cardiomyotomy in 1913.[1,2] Shimi et al was first to perform laparoscopic cardiomyotomy in 1991.[3] It has been suggested that the laparoscopic transabdominal route is associated with a low rate of failure, complications and high chance of success. The advent of minimally invasive surgery with a shorter hospital stay, reduced morbidity, and faster return to daily activity, makes laparoscopic cardiomyotomy more attractive.

In a laparoscopic and robotic era Dor or Toupet partial fundoplication as an antireflux procedure can further reduce postoperative heartburn rates by 80%, as well as the risk of esophagitis and peptic stricture. Although a Dor fundoplication is more commonly reported, the choice of Toupet versus Dor depends on surgeon preference.

Achalasia Cardia is a motor disorder of the esophagus and lower esophageal sphincter. More specifically, it a neuromuscular disorder characterized by degenerative changes of the myenteric plexus leading to a selective loss of inhibitory nerve endings. Irreversible disruption of

peristaltic contractions and impaired relaxation of the lower esophageal sphincter in response to deglutition are the consequences of this damage. Primary idiopathic achalasia is a quite rare disease, with an incidence of approximately 1/100,000/year and a prevalence rate of 10/100,000 with equal sex incidence and more common in age group of 25 to 40 years. Primary achalasia in children is part of the Allgrove's and Alport's syndromes, and is more frequent in Down's syndrome. Secondary achalasia shares clinical features with primary achalasia, but there is always an identifiable cause. Worldwide, the most common cause of secondary achalasia is protozoan infection by Trypanosoma cruzi, found in Central and South America. An autoimmune pathogenesis in achalasia has been sustained due to the description of antimyenteric neuron antibodies in a subset of patients. Diagnostic accuracy is provided only by esophageal manometric studies in over 96% of cases showing a typical pattern both in primary achalasia and pseudoachalasia.

The treatment of achalasia has traditionally relied on a surgical approach even though medical and non-surgical strategy may benefit in some patients. Surgical options available for treating patients with achalasia do not stop or reverse the underlying loss of nerve cell in the oesophagus.

Laparoscopic management of achalasia cardia provides the benefits of minimal invasive surgery to the patient. The purpose of the present study is to fortify this fact.

METHODS

Prospective interventional study was conducted at the Department of General Surgery, Indira Gandhi Govt. Medical College, Nagpur over a period of two years between Nov2012 to Nov2014. A total number of 22 patients were included in the present study. To confirm the diagnosis we subjected the patients to barium swallow, upper GI endoscopy and CT scanning. Esophageal Manometry and 24hr PH monitoring were not done, because of non-availability of it in our institute.

Inclusion criteria

1. All symptomatic and diagnosed patients of Achalasia cardia.
2. Patients fit for General anesthesia.
3. Within age group of 15-65 years.

Exclusion criteria

1. Patient who has undergone previous interventions for Achalasia Cardia like botulinum toxin injections, pneumodilatation, endoscopic stenting.
2. Patients unfit for General anesthesia
3. Non-consenting patients
4. Barium meal s/o mega oesophagus with diameter >8cm

Preoperative typical symptoms of Achalasia were graded according to the following scoring system.

Symptom grading according to scoring systems:

Dysphagia was graded on a 5 point symptom scoring scale from 0-4 according to symptom scoring of modified Mellow and Pinka's scale4

1. able to eat normal diet / no dysphagia
2. able to swallow some solid foods
3. able to swallow only semi solid foods
4. able to swallow liquids only
5. Unable to swallow anything / total dysphagia

Regurgitation symptom scoring was graded on a 4 point scoring system according to modified symptom scoring of DeMeester.[5]

1. None - 0 -No regurgitation
2. Minimal - 1 -Occasional episodes
3. Moderate - 2 -Predictable on position or standing
4. Severe - 3 -Episodes of pulmonary aspiration.

Heartburn was graded on a 4 point scoring system according to modified symptom scoring of DeMeester5.

1. None - 0 -No heartburn
2. Mild - 1 -occasional episodes
3. Moderate - 2 -Reason for medical visit
4. Severe - 3 -Interference with daily activities.

Operative technique

Patient was put in a semi lithotomy position in steep reverse Trendelenburg position approximately 30 degrees. Then after creating pneumoperitoneum a five-port access established

- ✓ 10mm telescope port 3cm to the left and above umbilicus.
- ✓ 5mm port Below and to the right of xiphoid process
- ✓ 5mm port 4cm to the right and above umbilicus
- ✓ 5mm port midway between xiphoid and umbilicus to the of linea Alba
- ✓ 5mm port at the lower edge of the sub costal region or self-retaining liver retractor
- ✓ Pneumoperitoneum created by veress needle technique.
- ✓ Pneumoperitoneum maintained at 14mm-16mm of Hg of CO2
- ✓ A 30-degree scope is placed through the supraumbilical port.
- ✓ The left lobe of the liver is retracted up by a blunt-tipped instrument inserted through the subxiphoid trocar or through self-retaining liver retractor.
- ✓ The stomach is retracted caudally through the left anterior axillary port.

- ✓ Gastro hepatic ligament divided, and the right cru is identified along with its peritoneal attachment near caudate lobe.
- ✓ The peritoneum is divided till the level of median arcuate ligament with harmonic scalpel.
- ✓ The left crus identified after lifting gastro esophageal junction
- ✓ Anterior vagus identified and preserved during the course of surgery.
- ✓ Posterior vagus running across the median ligament is preserved.
- ✓ Inferior phrenic artery preserved
- ✓ Phrenoesophagial ligament opened in anterior aspect and extended circumferentially.
- ✓ The esophagus is dissected from the inner surface of the left crus by sweeping motion of left hand grasper to avoid injury to vagus nerve.
- ✓ A retroesophagial window is created by alternate right and left handed instrument.
- ✓ After creating window sling is used for esophageal mobilization.
- ✓ The lower end of esophagus is mobilized from the mediastinum to obtain 3-5 cm of intraabdominal esophagus.
- ✓ Injury to the left pleura should be avoided.
- ✓ Clearance of the fat pad at the gastroesophegeal junction to adequately expose the GEJ. Stomach is retracted caudally by using blunt grasper through 5mm port in left subcostal region or through sling.
- ✓ The cardiomyotomy is extended about 4-6cm over the lower oesophagus from GEJ and about 1.5-2cm below towards stomach across the gastro esophageal junction. Landmark used to ensure adequate extension across the gastro esophageal junction were the appearance of gastric sub mucosal veins, the oblique sling fibers of stomach.
- ✓ Gastric myotomy is more difficult to perform as the mucosa and outer muscular layer are thinner and there are more bridging vessels than the oesophagus, which are highly prone to bleeding and perforation.
- ✓ Myotomy can be performed by stretching and tearing the circular muscle fibers with two laparoscopic graspers directed in opposite direction, creating a submuscular tunnel and using Achalasia scissors. Soft 52fr flexible boogie or intraoperative endoscope used to confirm the extent of cardiomyotomy and also to know any perforation.
- ✓ Fundus of stomach mobilized and plicated above gastro esophageal junction from left to right and sutured to muscle fibers of oesophagus and to left crus of diaphragm loosely with absorbable 2-0 vicryl to complete DOR'S 180degree partial anterior fundoplication.
- ✓ Pneumoperitoneum deflated and port site closed with non-absorbable sutures.

Figure 1: Port position with self-retaining liver retractor.

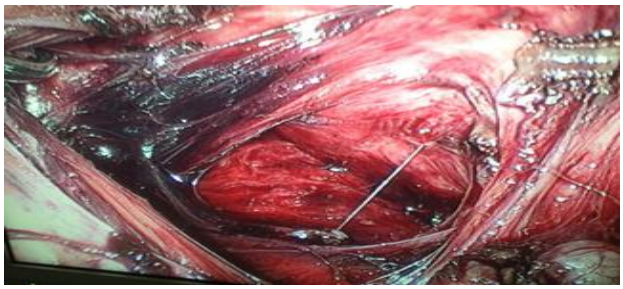

Figure 2: Mobilisation of esophagus with anterior vagus.

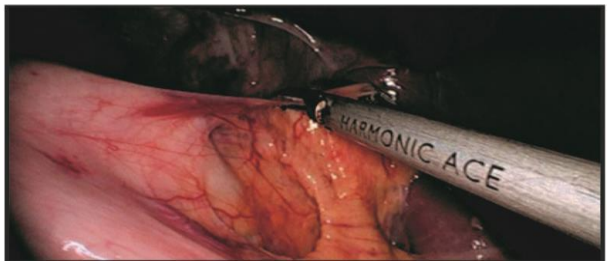

Figure 3: Division of gastrohepatic ligament.

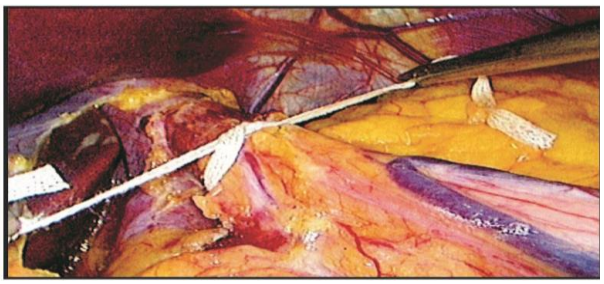

Figure 4: Mobilisation of esophagogastric junction with umbilical tape.

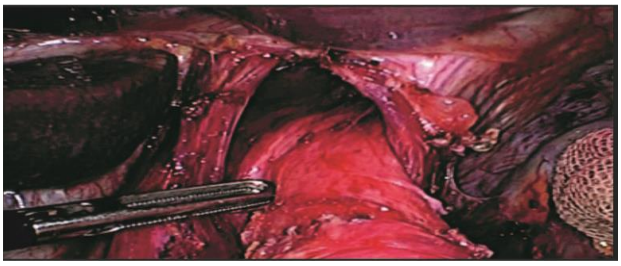

Figure 5: Oesophageal hiatal dissection.

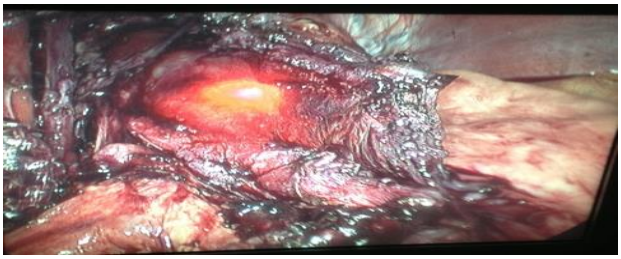

Figure 6: Intraop endoscopic glow confirming complete Myotomy.

Figure 7: Intraop endoscopic view of GE junction.

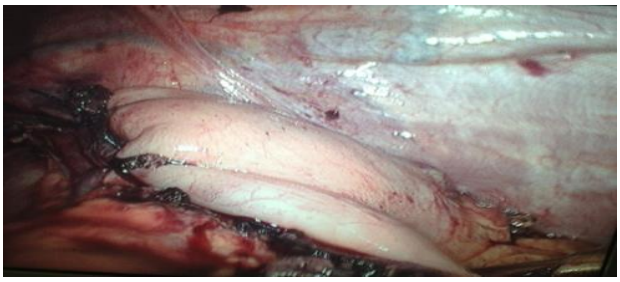

Figure 8: Anterior partial Dor's fundoplication.

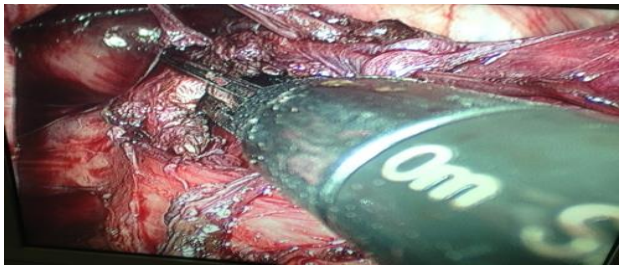

Figure 9: Myotomy done with achalasia scissor.

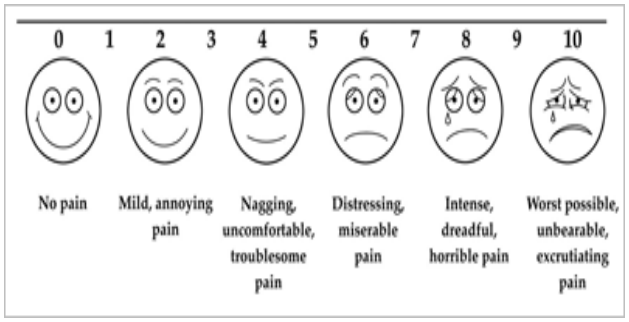

Figure 10: Post-operative pain recorded on VAS on postoperative day 1 and postoperative day 7.

RESULTS

In our study on laparoscopic Heller's myotomy it is found that disease is slightly more common in males 12 i.e. (55.55%), as compared to females 10 (45.45%) with male to female ratio is 1.2:1.

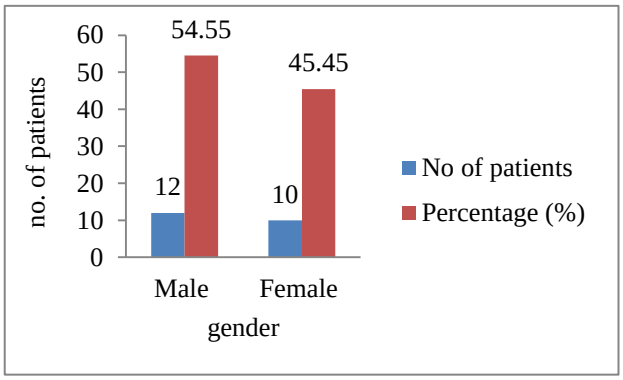

Figure 11: Gender wise distribution of patients of achalasia cardia.

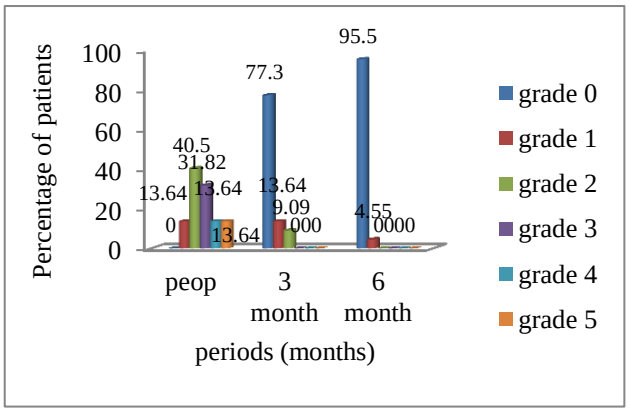

Figure 12: Dysphagia grading preoperatively, at 3 months and 6 months of post-operative in laparoscopic repaired patients of achalasia cardia.

In present study on laparoscopic Heller's myotomy, preoperatively maximum 9 (40.50%) patients had grade 2 dysphagia and 7 (31.82%) patients had grade 3 dysphagia and 3 (13.64%) patients each had grade 1 and 4 dysphagia. Dysphagia was most common presenting

symptom with all patients having dysphagia and no patients in grade 0 preoperatively. After 3 months postoperatively 17 patients were completely cured of dysphagia with grade 0, 3 patients had grade 1 dysphagia that preoperatively had higher grades of dysphagia and 2 patients had grade 2 dysphagia. After 6 months postoperatively only 1 patient had grade 1 transient dysphagia and all 21 (95.50%) had complete relief from dysphagia.

Preoperatively all 22 patients had regurgitation symptoms with maximum patients 13 (59.09%) had grade 2 regurgitation and 6 (27.28%) patients had grade 1 and 3 (13.64%) patients had grade 3 regurgitation. Following 3 months after surgery 20 patients were completely relieved of regurgitation with grade 0 and only 2 patients had grade 2 symptoms. After 6 months of follow up 21 patients had complete relief of regurgitation with only 1 patient having mild grade 1 symptoms.

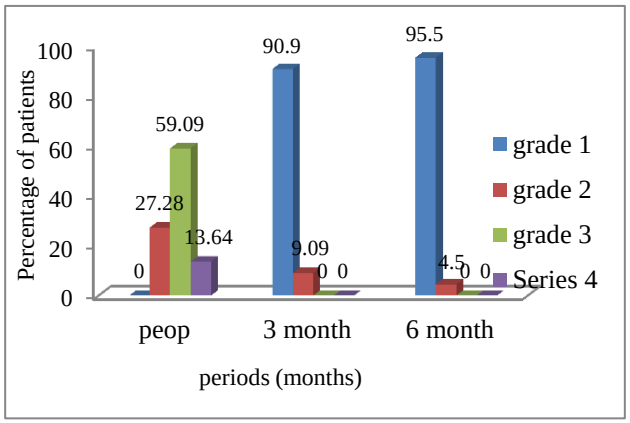

Figure 3: Regurgitation grades preoperatively, at 3 months and 6 months postoperative in laparoscopic repaired patients of achalasia cardia.

Preoperatively 6 (27.28%) didn't had heart burn and maximum 11 (50.00%) patients had grade 1 symptoms with 1 patient having grade 3 symptom. On postop follow up after 3 months 17 patients didn't had heart burn with grade 0 and 5 patients had mild grade 1 symptoms. Out of 5 patients with postop heart burn 3 patients who preoperatively had grade 2 and grade 3 symptoms were reduced to grade 1 and other 2 were newly developed heart burn cases postoperatively with symptoms of reflux esophagitis and upper GI scopy suggestive of grade A esophagitis. These patients were put on PPI's and followed up regularly. After 6 months of follow up only 1 patient had a mild symptom of heart burn that was again followed up further and was continued on PPI's.

In this study on laparoscopic Heller's myotomy for achalasia Cardia, out of 22 patients 12 (54.55%) patients had chest pain preoperatively. After 3 months post operatively there were 17 (77.30%) patients without chest pain and 5 (22.77%) patients still had chest pain in which 3 patients had reflux esophagitis on upper GI scopy and other 2 patients with normal endoscopy findings. These patients were put on PPI's and followed up further. After 6 months follow up only two had mild chest pain which was very occasional, once in 15 days.

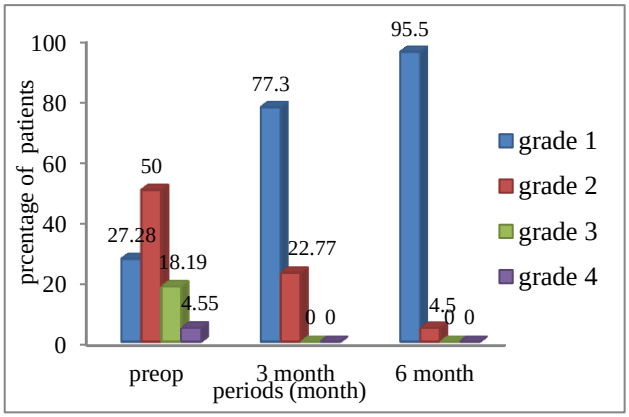

Figure 4: Heart burn grade preoperatively, at 3 month and 6 month post operatively in laparoscopic repaired patients of achalasia cardia.

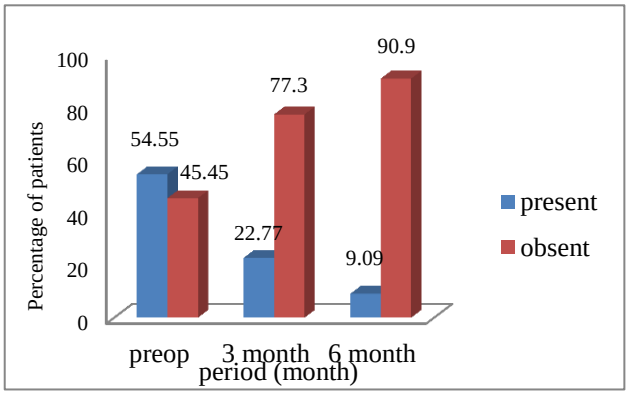

Figure 5: Chest pain preoperatively, at 3 months and 6 months of post-operative in laparoscopic Heller's myotomy patients of achalasia cardia.

In this study on laparoscopic Heller's myotomy for Achalasia Cardia, out of 22 patients, 12 (54.55%) patients had epigastric pain preoperatively. After 3 months post operatively there were 19 (86.40%) patients without epigastric pain and 3 (13.64%) patients still had epigastric pain in which they had reflux esophagitis on upper GI scopy. Patient with normal upper GI scopy had no epigastric pain. These patients were put on PPIs and followed up for 6 months when all 22 patients were completely relieved of epigastric pain.

Esophagitis was diagnosed preoperatively by doing upper GI scopy. Preoperatively achalasia patients have esophagitis secondary to stasis of food in dilated esophagus. 6 (27.28%) patients had grade an esophagitis and 3 (13.65%) patients had grade B oesophagitis. 13 (58.09%) patients didn't had any signs of esophagitis preoperatively. After 3 months postop 19 patients were free of oesophagitis on upper GI scopy. Postoperative oesophagitis was mainly due to reflux of gastric content

into oesophagus and 3 patients had mild grade- A signs on upper GI scopy. These patients were put on PPI's and dietary changes with reduced spicy foods and postural changes. After 6 months of follow up these symptoms were reduced and only 2 patients had esophagitis on upper GI scopy who were again managed conservatively and followed up further.

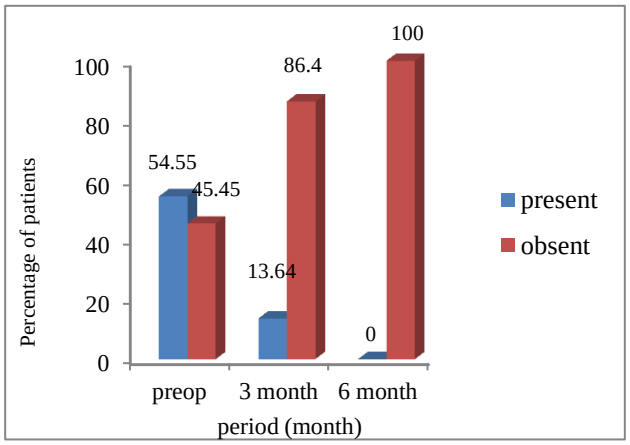

Figure 6: Epigastric pain preoperatively, at 3 months and 6 months follow up postoperatively in laparoscopic Heller's cardiomyotomy.

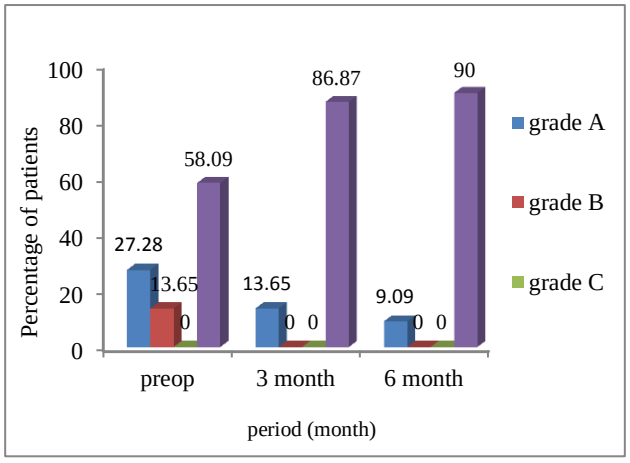

Figure 7: Esophagitis grading preoperatively, at 3 months and 6 months of post-operative in laparoscopic repaired patients of achalasia cardia.

In this study of Achalasia Cardia patients main symptoms were dysphagia and regurgitation present in all 22 patients. Next was heartburn in 16 patients and weight loss in 10 patients.

In this study on laparoscopic Heller's cardiomyotomy, mean blood loss was 34ml (20-60ml), no patient required Intraoperative blood transfusion.

In this study on laparoscopic Heller's cardiomyotomy for Achalasia Cardia, out of 22 patient 1 (4.55%) patient had Intraoperative complication of pneumothorax and other 4 had oesophageal mucosal perforation. All perforation where sutured intra-op using vicryl 2.0 and drain placed and pneumothorax patient was diagnosed postoperatively on day 1 when patient complained of dyspnea and chest X-ray was suggestive of pneumothorax. Intercostal drain inserted and removed on 4th post op day. Abdominal drain placed for perforation removed on 5th post op day in 3 patients and on 6th day in 1 patient after starting oral liquid and semisolid diet.

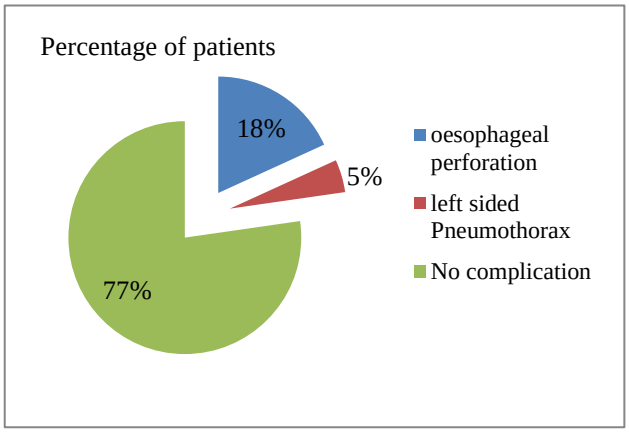

Figure 8: Frequency of intraoperative complications in laparoscopic repaired patients of achalasia cardia.

In this study on laparoscopic Heller's cardiomyotomy for achalasia Cardia, all patients were undergone laparoscopic repair and no conversion to open procedure. 11 patients i.e., 50% of patients who had uneventful surgical procedure without any intraop complications were discharged on day 3 with full oral diet. 1 patient who had pneumothorax postop ICD inserted on day 1and removed on day 4 and discharged on day 7. Out of 4 patients who had intraop oesophageal perforation, abdominal drain placed and in 3 patients (13.64%) of them, drain was removed on day 5 after starting oral diet on day 4 and was discharged on day 9, in 1 patient (4.55%) drain was removed on day 6 and was discharged on day 10. On an average mean hospital stay was 4.6 days (3 days -10 days) which was much less compared to open (thoracotomy or laparotomy) or thoracoscopic procedure.

In this study on laparoscopic Heller's Cardiomyotomy for Achalasia Cardia, 22 patients were undergone procedure; follow up was kept up to 6 months in all cases without complications. In our study initial 2 patients did not undergo DOR's anterior partial fundoplication and all other 20 cases underwent fundoplication. Out of this 2 cases, 1 patient developed Grade A reflux oesophagitis after 3months of follow up who was put on PPI's and followed up further. Other 1 patient was normal. In other 20 cases that underwent DOR's fundoplication, 2 cases developed Grade A reflux oesophagitis after 3 months of follow up who were again put on PPI's and followed up further. At the end of 6th month 3 patients who previously had reflux symptoms were relieved of their symptoms and 1 new patient had developed Grade A oesophagitis

who was again put on PPI's and was further followed up. It was found that post-operative complication was Grade A oesophagitis in only 4 patients (18.19%), who were medically treated and were relieved of symptoms on further follow up. No surgical intervention was required in any of the patients. Overall all patients who underwent this procedure had well to excellent outcome postoperatively on 6 months of follow up.

DISCUSSION

The greatest advantage of laparoscopic Heller's myotomy is that superior visibility of anatomic structure during procedure. Laparoscopic approach offers a safe and effective method for treating Achalasia cardia. Better relief of symptoms during long term follow up, it is much less traumatic, large incision is not required, blood loss is minimal and fluid shifts due to third spacing are negligible. There is faster recovery time, which is shown by early resumption of normal diet, shorter hospital stay, and quicker return to normal activity. Laparoscopic approach is feasible, safe with low morbidity, mortality and recurrence.

In present study of laparoscopic Heller's cardiomyotomy, disease incidence was found to be more in males 12 (54.55%) cases; females were 10 (45.45%). Mean age in our study was 36.80 years.

Gouda BP et al, in there study they had slightly more female than male with mean age group of 43 years.[6]

Carter JD et al had slightly more male patients as compared to female with average age incidence of 49 years.[7]

Zaninotto G et al had slightly higher female incidence than male with mean age of presentation was 41 years.[8]

Decker G et al, all these studies had mean age of disease presentation nearer to the present study.[9]

This shows that achalasia cardia is more common in adulthood with almost equal sex incidence in males and females.

All patients were evaluated for the preoperative symptoms, postoperatively on 3 months and 6 months. It was found that all symptoms were significantly improved post operatively.

Carter JT et al had studied 165 patients with achalasia who underwent laparoscopic myotomy.[7] It was found that at the end of 3 months 78% of patients had complete relief of dysphagia and at the end of 6 months it was found that 89% of patients were free from dysphagia.

Yamamura MS et al also had very significant 95% improvement in a study of 24 patients with 16.5 months mean follow up.[17]

Decker G et al studied 73 patients who had dysphasia and postoperative follow up for median 30 months there was 83% patients with complete relief of dysphagia.[9]

Finely RJ et al studied 98 patients with achalasia had relief of dysphagia in 96% of patients at the end of 15 months follow up.[14]

Table 1: Mean age of patients included in various studies.

Study	Mean age (years)
Kiss[10](1996)	45(13-72)
George Pechlivanides[11](2001)	47(18-74)
Kenneth W Sharp[12](2001)	48(13-80)
Giovanni Zaninotto[8](2002)	41(17-69)
Georges Decker[9](2002)	52(15-86)
Mark S yamamura[13](2000)	51(17-84)
Biswanth P gouda[6](2011)	43(18-72)
Jonathan T Carter[7](2011)	49(14-93)
Present study (2014)	37(15-65)

Table 2: Preoperative dysphagia improvement postoperatively in various studies.

Study	RESULTS
Giovanni Zaninotto[8](2001)	Significant improvement
Marius katilius[15](2001)	Significant improvement
George Peclivanides[11](2001)	Significant improvement
Richard J finely[14](2001)	Significant improvement
George Decker[9](2002)	Significant improvement
Mark S Yamamura[13](2000)	Significant improvement
Present study (2014)	Significant improvement

Carter JT et al studied 165 patients for mean 62 months and there was significant relief of heart burn postoperatively.[7]

Yamamura MS et al also had very significant improvement in heart burn in a study of 24 patients with 16.5 months mean follow up.[13]

Decker G et al studied 73 patients who had heart burn and postoperative follow up for median 30 months there was 88% patients with complete relief of heart burn and better gastro intestinal quality of life.[9]

Giovanni Zaninotto et al 113 patients who underwent laparoscopic Heller's cardiomyotomy and were followed up for 1, 6 and 12 months.[8] Only 3 patients had chest pain during swallowing on postop follow up showing significant improvement.

Decker G et al studied 73 patients with achalasia who had chest pain daily preop, only 5 (7%) patients had chest

pain once a week postop and 10 (14%) patients had occasional chest concluding to be a significant improvement.[9]

Yamamura MS et al also had very significant improvement in chest pain in a study of 24 patients with 16.5 months mean follow up.[13]

Table 3: Preoperative regurgitation improvement postoperatively in various studies.

Study	Result
George Decker[9](2002)	Significant Improvement
Mark S Yamamura[13](2000)	Significant Improvement
Jonathan T carter[7](2011)	Significant Improvement
Present study (2014)	Significant Improvement

Table 4: Preoperative heart burn improvement postoperatively in various studies.

Study	Result
Richard J Finely[14](2001)	Significant Improvement
Mark S Yamamura[13](2000)	Significant Improvement
Jonathan T carter[7](2011)	Significant Improvement
Present study (2014)	Significant Improvement

Table 5: Preoperative chest pain improvement postoperatively in various studies.

Study	Result
Giovanni Zaninotto[8](2002)	Significant Improvement
George Decker[9](2002)	Significant Improvement
Mark S Yamamura[13](2000)	Significant Improvement
Jonathan T carter[7](2011)	Significant Improvement
Present study (2014)	Significant Improvement

Table 6: Percentage of patients with reflux oesophagitis postoperatively in various studies.

Study	Percentage of patients with reflux postoperatively
Massimo P. Di Simone[16](1996)	13.65%
Anselmino[17](1997)	5.67%
George Peclivanides[11](2001)	10.86%
Present study (2014)	9.09%

In present study epigastric pain was not very common complaint which was present in only 12 patients out of 22 patients. At the end of 6 months all patients were relieved of epigastric pain with significant improvement in symptom.

Yamamura MS et al also had very significant improvement in epigastric pain in a study of 24 patients with 16.5 months mean follow up.[13]

Decker G et al studied 73 patients with achalasia who had epigastric pain daily preop, only 13 (19%) patients had epigastric pain after 30 months of mean follow up post operatively.[9]

Di Simone MP et al studied 129 patients in whom 22(17.05%) developed reflux oesophagitis post operatively which is comparable with present study of 13.65%.[16]

Anselmino at al found pathological reflux in only 2 (5.67%) patients out of 35 patients' studied.[17]

Peclivanides G at al had conducted study on 29 patients with achalasia who underwent laparoscopic Heller's myotomy out of which 3 (10.86%) developed reflux symptoms postoperatively which was comparable with present study.[11]

In present study there is overall significant improvement in all the pre-operative symptoms like dysphagia, regurgitation, heart burn, chest pain and epigastric pain. Post-operative gastro esophageal reflux appears to be the only long term complication in present study with 9.09% after 6 months of follow up which was treated medically with antacids and followed up till the end of study.

Oesophageal perforation was the most common complication of this procedure which was encountered in most of the other studies like Yamamura MS et al, Peclivanides G et al, Finely RJ et al, Decker G et al and Chuah S et al.[9,11,14,14,18]

In all the above studies including present study oesophageal perforation was sutured intraoperatively without any major complication.

In this study of laparoscopic Heller's cardiomyotomy for achalasia cardia, there was no mortality because of any Intraoperative complication and during hospital stay. In most of the studies no mortalities were found except for Gouda BP at all had 0.63% mortality due to splenic capsule tear and severe sepsis.[6]

In present study on laparoscopic Heller's cardiomyotomy for achalasia cardia, all patients were undergone laparoscopic repair and no conversion to open procedure. On an average mean hospital stay was 4.6 days (3 days-10 days) which was much less compared to open (thoracotomy or laparotomy) or thoracoscopic procedure.

Table 7: Intraoperative complication rates in various studies.

Study	Complication Details	Percentage (%)
Mark S Yamamura[13] (2000)	Oesophageal perforation	8.33%
George Peclivanides[11] (2001)	Oesophageal perforation	6.33%%
Richard J Finely[14](2001)	Oesophageal perforation -pneumothorax -subcutaneous emphysema	-9.00% -2.44% -3.01%
Kenneth W Sharp[12] (2001)	oesophageal perforation aspiration pneumonitis	-8.00% -1.00%
George Decker[9](2002)	oesophageal perforation gastric perforation splenic capsule tear lower lobe pneumonia paranoid delirium	-4.10% -1.40% -1.10% -1.10% -1.10%
Seng-kee chuah[18](2013)	Oesophageal perforation	-5-10%
Present study(2014)	Oesophageal perforation Left pneumothorax	-18.19% -4.50%

In this study of laparoscopic Heller's Cardiomyotomy for achalasia cardia, all patients' pain was recorded on visual analogue scale on postoperative day 1 and on post-operative day 7, it was found that on day 1 mean VAS score was 6 and on day 7 VAS score was 1, that means there was significant less pain or almost no pain on postoperative day 7 in patients of laparoscopic repair of achalasia cardia. It was an important reason for high satisfaction of patients on laparoscopic surgery than open thoracotomy or laparotomy.

Similar study was conducted by Katilius M et al and Sharp KW et al shown that there was significant difference in VAS score.[12,15]

None of the 22 patients had recurrence of dysphagia on follow up showing its significant improvement in symptoms. None of the patients required redo surgeries or other modalities of treatment for any of the complication.

In study of Di Simmone MP et al mild dysphagia relapsed within mean follow up of 12.4 months in 11 patients (8.52%) out of 129 patients undergoing the procedure. Main cause of this complication was incomplete myotomy. Out of this 6 patients underwent redo surgery. Severe reflux oesophagitis was found in 18 patients (13.95%) in a mean follow up of 73.8 months.

Katilius M et al had persistent dysphagia in 1 patient (4.55%) of 22 patients.[15] According to this study addition of anti-reflux procedure benefits from post-operative reflux.

Finley RJ et al, showed only 2 patients (3.50%) developed new heart burn and reflux oesophagitis post-surgery on regular follow up[14]

Sharp KW et al, showed that only mild degree of relax oesophagitis developed in 14 patients out of 100 patients who underwent laparoscopic Heller's myotomy.[12]

Zaninotto G et al, showed recurrence of dysphasia in 10% of patients with mean follow up of 8 months. With addition of antireflux procedure post-operative reflux symptoms were completely absent on follow up.[8]

Decker G et al, showed that 1 patient had left lower lobe pneumonia (inhalational anesthesia induced), and 1 patient had paranoid delirium.[9]

Table 8: Postoperative complication rates in various studies.

Study	Post-operative complication
Missimo P Di Simmone[16](1996)	-dysphagia relapse -severe reflux oesophagitis -heart burn
Marius Katilius[15](2001)	-Persistent dysphagia - reflux oesophagitis
Richard J Finley[14](2001)	-reflux oesophagitis
Kenneth W Sharp[12](2001)	-Mild reflux oesophagitis
Giovanni Zaninotto[8](2002)	-recurrent dysphagia -mild reflux oesophagitis
George Decker[9](2002)	- left lower lobe pneumonia - Paranoid delirium.
Seng-Kee Chuah[18](2013)	-Post operative reflux
Present study(2014)	-reflux oesophagitis

Farrokhi F showed major disadvantage of this procedure is possibility of significant GERD which was tackled by addition of anti-reflux procedure.[19]

In this study on laparoscopic Heller's cardiomyotomy for Achalasia cardia, 22 patients had undergone procedure, follow up was kept up to 6 month and patients were visited weekly for first 3 weeks in OPD. This study shows that mean days of resumption of normal daily routine activities was 13 days (10-20) days.

Similarly Sharp KW et al, Yamamura MS et al study shown that after laparoscopic Heller's cardiomyotomy for achalasia cardia resumption of daily routine activities was achieved on postoperative day 13.[12,13]

Similarly Katilius M et al study shown that after laparoscopic Heller's cardiomyotomy for achalasia cardia resumption of daily routine activities was achieved on postoperative day 9.[15]

CONCLUSION

This study on laparoscopic Heller's cardiomyotomy for achalasia cardia showed it is feasible and safe procedure and excellent patient satisfaction on follow up. This study of laparoscopic Heller's cardiomyotomy for achalasia cardia shows that Laparoscopic repair is technically challenging, some complications may occur like esophageal, perforation and pneumothorax. This study of laparoscopic Heller's cardiomyotomy for achalasia cardia shows that laparoscopic approach offers a minimally invasive approach for treating Achalasia cardia. This study of laparoscopic Heller's cardiomyotomy for achalasia cardia shows that the greatest advantage of this approach is that superior visibility of anatomical structure during procedure. This study of laparoscopic Heller's cardiomyotomy for achalasia cardia shows that Laparoscopic approach offers a safe and effective method for treating Achalasia cardia. It is much less traumatic, large incision is not required, blood loss is minimal and fluid shifts due to third spacing are negligible. This study on laparoscopic Heller's cardiomyotomy for achalasia cardia realizes that post myotomy there was chance of reflux of gastric content into oesophagus. So prevent that, this study insists to add antireflux procedure preferably Dor's anterior partial fundoplication, every time during laparoscopic Heller's cardiomyotomy. This study shows that there is faster recovery time, which shown by early resumption of normal diet, shorter hospital stay, and quicker return to normal activity. This study on laparoscopic Heller's cardiomyotomy for Achalasia cardia shown that patient's satisfaction has been high because pain experienced after laparoscopic surgery has been much less than would have resulted from thoracotomy and laparotomy incision.

Finally to conclude, Even though many advances have occurred in treatment of Achalasia cardia like self-expanding metallic stents, Per Oral Endoscopy assisted Myotomy (POEM), the benefits of these procedures are not satisfactory during long term follow up. So minimal invasive laparoscopic Heller's cardiomyotomy remains standard procedure for providing good long term symptomatic relief in patients with achalasia cardia.

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