DOI: 10.14260/jemds/2014/2400

ORIGINAL ARTICLE

OUTCOME FOLLOWING OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY

Anmol N[1], Lakshminarayan G[2], T. M. Manohar[3], Avadhani Geeta K[4], Abinash Hazarika[5]

HOW TO CITE THIS ARTICLE:
Anmol N, Lakshminarayan G, T. M. Manohar, Avadhani Geeta K, Abinash Hazarika. "Outcome Following open and Laparoscopic Cholecystectomy". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 15, April 14; Page: 4061-4071, DOI: 10.14260/jemds/2014/2400

ABSTRACT: Laparoscopic cholecystectomy has rapidly become established as the popular alternative to open cholecystectomy, but it should have a safety profile similar to or better than that of open procedure. The aim of this study was to compare conventional cholecystectomy and laparoscopic cholecystectomy with respect to duration of procedure, complications, postoperative pain, analgesic requirement, antibiotic requirement, resumption of normal diet and period of hospital stay.50 patients with symptoms and signs of acute acalculous/calculous cholecystitis, selected randomly, were included in this study. Clinical profile, investigations, treatments, outcomes were analyzed. The highest age incidence was in the 5th decade, more common in females. Pain in the RUQ of abdomen was the most common symptom. Ultrasonography showed gallbladder stones in almost all patients. The duration of LC (120min) was more than for OC (90min). The conversion rate of LC to OC was 8%. Post- operative morbidity was more in case of LC. The antibiotic and analgesic requirements were less in LC group. The resumption of normal diet was 2 days earlier in LC compared to OC group, and the hospital stay was 4 days less in LC group. The result showed the incidence of acute calculous/acalculous cholecystitis more in females, 5th decade, presented more commonly with pain abdomen. Ultrasonography was the most common investigation. Laparoscopic cholecystectomy reduces the number of antibiotic and analgesic requirement, hospital days, pain disability, wound infection, and with better cosmesis, except for the prolonged operative time, which can be minimized in due course of time as the learning curve progresses.

KEYWORDS: Acute calculous/acalculous cholecystitis, Ultrasonography, Open cholecystectomy, Laparoscopic cholecystectomy

INTRODUCTION:

- Gastro-intestinal surgery has undergone a revolution in the recent years by the introduction of laparoscopic techniques.
- Acute acalculous/calculous cholecystitis, which continues to be one of the most common digestive disorders encountered, was traditionally being dealt by conventional (open) cholecystectomy. With the introduction of laparoscopic cholecystectomy, the surgical community witnessed a revolution in post-operative recovery of the patient.
- Laparoscopic cholecystectomy (LC) is safe and easy, which can be performed with much ease and safety because of the better magnification.
- LC has shown clear benefits in terms of shortened hospital stay, less morbidity, a quicker return to work and with cosmetic advantage.
- Some surgeons have suggested that the rates of serious complications, particularly bile duct injury might be significantly higher in laparoscopic procedure.
- The high costs of the laparoscopic equipment and the specialized training that is mandatory for mastery of the technique, the procedure inherently carries hazards and risks.

DOI: 10.14260/jemds/2014/2400

- Could laparoscopic cholecystectomy establish itself as a safe and cost effective alternative to the open method?
- In our study, we have planned an attempt to compare the advantages and drawbacks of both the procedures.

OBJECTIVES: The aim of this study is to compare conventional cholecystectomy and laparoscopic cholecystectomy with respect to:

1. Duration of the procedure.
2. Post- operative recovery.
3. Analgesic requirement.
4. Complications encountered.
5. Period of hospitalization.
6. Patient satisfaction.

METHODOLOGY: The study subjects were patients, admitted with diagnosis of acute acalculous/calculous cholelcystitis, who subsequently underwent cholecystectomy at Adichunchnagiri institute of medical sciences, BG nagara, between November 2010 and April 2012.

All the patients were selected randomly, and as per the proforma, all the patients were interviewed for detailed clinical history and examined. They were then subjected to routine blood, urine and other investigations and an abdominal ultrasound was performed in all cases.

INCLUSION CRITERIA: Patients with acute calculous/acalculous cholecystitis, proven by USG with at least one attack of upper abdominal pain and considered fit for elective cholecystectomy were included in the study.

EXCLUSION CRITERIA: The patients with following conditions were excluded from the study:

- History or investigations suggesting CBD stones.
- History of prior abdominal surgery.
- Patient's age above 70 years.
- Patients of coagulopathy and those on Anti-Coagulant therapy.

METHOD OF COLLECTION OF DATA: A written informed consent was taken from all patients before their inclusion in the study. The study was approved by the ethical committee of the hospital.

Patients were randomly allocated to the two study groups using simple lots (25 in each group). Patients in one group underwent laparoscopic cholecystectomy while those in the other group underwent open cholecystectomy.

All the patients were kept nil by mouth overnight, prior to surgery and were given a dose of prophylactic antibiotic. All the patients were asked to evacuate bladder prior to surgery and a nasogastric tube was passed if thought to be necessary. All the surgeries were performed under general anesthesia, by the surgical team, consisting of consultants and residents.

Intra operative findings and post-operative data were all recorded and analyzed, using simple statistical tests like Chi square test and Z-test, to compare the results.

DOI: 10.14260/jemds/2014/2400

RESULTS:

DURATION OF SURGERY:

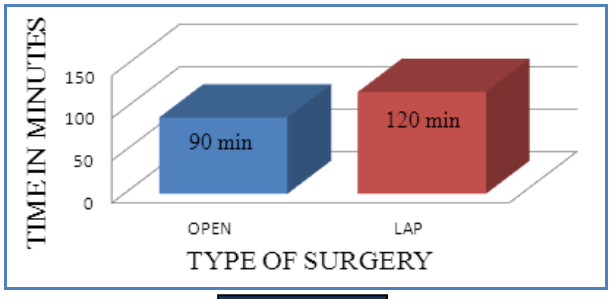
	Open cholecystectomy	Laparoscopic cholecystectomy
60 – 90 min	9	0
90 – 120 min	11	8
120 – 150 min	5	14
> 150 min	0	3

TABLE 1

Minimum time for open method: 70 min
Maximum time for open method: 130 min
Average time for open method: 90 min

Minimum time for laparoscopic method: 105 min
Maximum time for laparoscopic method: 170 min
Average time for laparoscopic method: 120 min

DURATION OF SURGERY:



Graph 1

Average operating time for Open –90 min
Average operating Time for Lap–120 min

COMPLICATIONS:

INTRA OPERATIVE COMPLICATIONS:

Complications	Open	Laparoscopic
Bleeding	1	2
Bile duct injury	Nil	Nil
Bowel injury	Nil	Nil
Others	Nil	Nil

TABLE 2A

DOI: 10.14260/jemds/2014/2400

POST OPERATIVE COMPLICATIONS:

Complications	Open	Laparoscopic
Bleeding	Nil	Nil
Bile leak through drain	Nil	3
Wound infection	2	Nil
Jaundice	Nil	Nil
Post cholecystectomy syndrome	Nil	2
Pulmonary complications	Nil	Nil

TABLE 2B

INTRA OPERATIVE COMPLICATIONS:

Complications	Open (n = 25)	(%)	Lap (n = 25)	(%)
Bleeding	1	4	2	8
Bile duct injury	0	0	0	0
Bowel injury	0	0	0	0
Others	0	0	0	0
Total	**1**	**4%**	**2**	**8%**

TABLE 2C

POST OPERATIVE COMPLICATIONS:

Complications	Open(n=25)	(%)	Lap (n=25)	(%)
Bleeding	0	0	0	0
Bile leak through drain	0	0	3	12
Wound infection	2	8	0	0
Jaundice	0	0	0	0
Post cholecystectomy syndrome	0	0	2	8
Pulmonary complications	0	0	0	0
Total	**2**	**8%**	**5**	**20%**

TABLE 2D

CHI – SQUARE TEST:

Complications[n=50]	Open cholecystectomy	Lap cholecystectomy	Total
Intra operative	1	2	3
Post- operative	2	5	7
Total	3 [6%]	7 [14%]	10
P = 0.023significance between the variables		Chi-dist = 0.7822	

TABLE 2E

DOI: 10.14260/jemds/2014/2400

DURATION OF ANTIBIOTICS GIVEN:

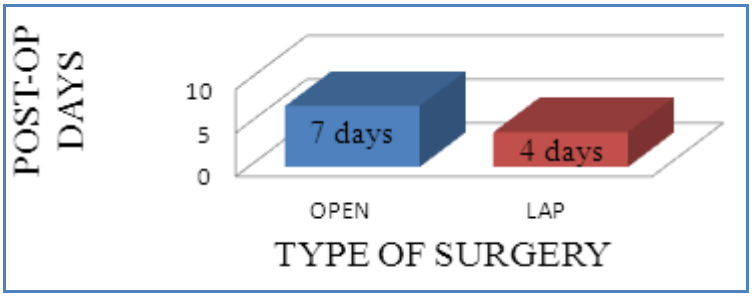
	Open cholecystectomy	Lap cholecystectomy
< 4 days	0	19
4 – 6 days	8	4
>6 days	17	2

TABLE 3

Minimum days of antibiotic for open method: 5 days
Maximum days of antibiotic for open method: 10 days
Average days of antibiotic for open method: 7 days

Minimum days of antibiotic for lap method: 3 days
Maximum days of antibiotic for lap method: 7 days
Average days of antibiotic for lap method: 4 days

DURATION OF ANTIBIOTICS GIVEN:



Graph 2

Average Post op antibiotics given for Open Method– 7 Days
Average Post op antibiotics given for Lap Method– 4 Days

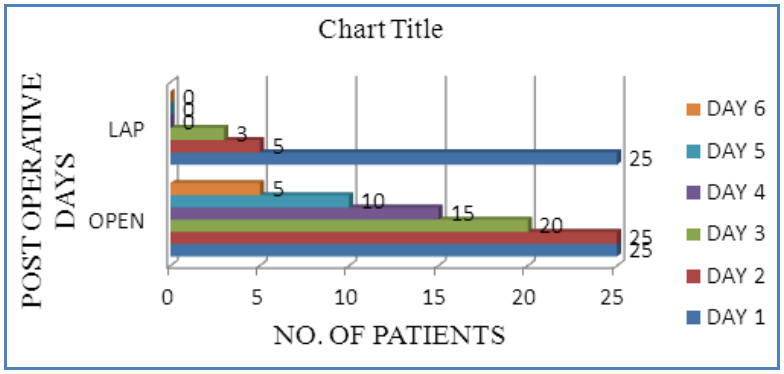
POST OPERATIVE PAIN: Number of patients in whom analgesics required:

Post Operative Day	Open cholecystectomy	Lap cholecystectomy
1	25	25
11	25	5
111	20	3
1V	15	-
V	10	-
V1	5	-

TABLE 4

DOI: 10.14260/jemds/2014/2400

POST OPERATIVE PAIN:



Graph 3

Maximum days of analgesic for open method: 6 days
Maximum days of analgesic for lap method: 3 days

RESUMPTION OF NORMAL DIET:

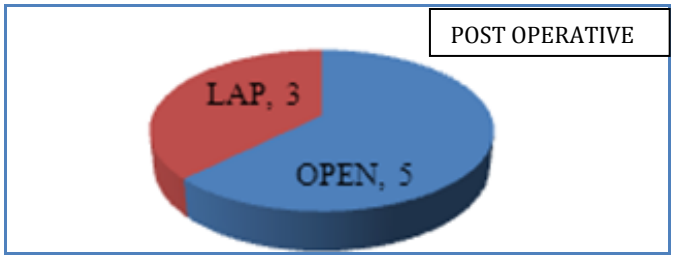
	Open cholecystectomy	Lap cholecystectomy
< 3 days	0	19
3 – 4 days	10	4
> 4 days	15	2

TABLE 5

Minimum resumption of normal diet for open: 3 days
Maximum resumption of normal diet for open: 7 days
Average resumption of normal diet for open: 5 days

Minimum resumption of normal diet for lap: 2 days
Maximum resumption of normal diet for lap: 5 days
Average resumption of normal diet for lap: 3 days

RESUMPTION OF NORMAL DIET:



Graph 4

Average Post op resumption of normal diet for Open–5 Days
Average Post op resumption of normal diet for Lap–3 Days

DOI: 10.14260/jemds/2014/2400

HOSPITAL STAY:

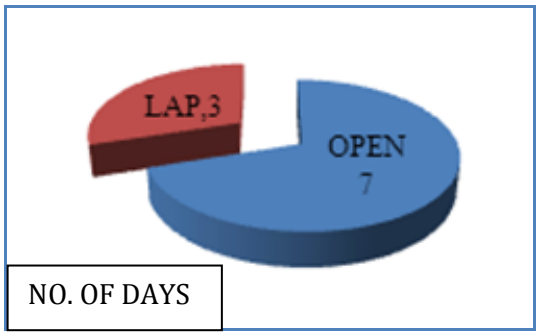
	Open cholecystectomy	Lap cholecystectomy
< 3 days	0	20
3 – 5 days	7	3
> 5 days	18	2

TABLE 6

Minimum post-op hospital stay for open: 4 days
Maximum post-op hospital stay for open: 10 days
Average post-op hospital stay for open: 7 days

Minimum post-op hospital stay for lap: 2 days
Maximum post-op hospital stay for lap: 7 days
Average post-op hospital stay for lap: 3 days

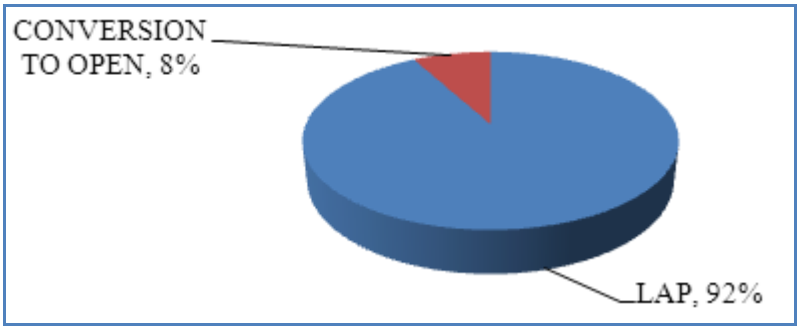
HOSPITAL STAY:



Graph 5

Average Post op hospital stay for open – 10 Days
Average Post op hospital stay for open – 5 Days

CONVERSION RATE: Conversion rate: Lap to Open [n = 25]



Graph 6

Conversion rate: 8 %

DOI: 10.14260/jemds/2014/2400

CONVERSION TO OPEN METHOD: Procedure was converted to open method in two cases out of 25 patients due to the following reasons:

1. In one case there were plenty of thick adhesions between gallbladder and surrounding structures.
2. In another case there was excessive fat in the calot's triangle and cystic pedicle could not be identified.

Clinical details of patients subjected to laparoscopic or conventional cholecystectomy:

Variables	Lap cholecystectomy (n = 25)	Open cholecystectomy (n = 25)
Age (years)	42.76 +/- 12.09	39.12 +/- 13.79
Sex ratio (M/F) nos.	7/ 18	11/ 14
Duration of surgery (min)	120 +/- 10.80	90 +/- 13.84
Analgesic requirement (days)	3.12 +/- 0.33	6.08 +/- 0.40
Antibiotic requirement (days)	4.28 +/- 0.46	7.40 +/- 1.58
Complications (%) [N=50]	14 %	6 %
Resumption of normal diet (days)	3.16 +/- 0.85	5.24 +/- 1.23
Post-operative hospital stay (days)	3.04 +/- 1.34	7.76 +/- 1.23

TABLE 7

Values are mean +/- S.D

$P < 0.005$

STATISTICAL ANALYSIS:

- The data are reported as the mean +/- SD or the median (25^{th}to75^{th}percentiles), depending on their distribution.
- The differences in quantitative variables between groups were assessed by means of the unpaired t test or the Mann-Whitney test.
- The chi-square test was used to assess differences in categoric variables between groups.
- Values of $P< 0.005$ were considered to be significant.
- All statistical analyses were performed using the SAS software.

DISCUSSION: A study of 25 open cholecystectomy patients of which 18 female and 7 male patients were compared with that of 25 cases of laparoscopic cholecystectomy of which 14 female and 11 male patients.

Duration of Procedure: In this study, the laparoscopic procedure was found to be associated with a longer operating time than open procedure (Median of 120 minutes for laparoscopic method against 90 minutes for open method). The more time required in LC was due to intra-operative gas leak, difficult adhesions, slippage of clips and delivery of gall bladder through the port site.

This is comparable with that of studies of Trondsen[1]and Porte.[2] Trondsendid a prospective randomized study to compare LC with OC (35 patients each). The results were that, LC took twice as long as OC (100 min v/s 50 min, $p<0.01$). Porte compared the results of 100 LC and 100 OC for cholelithiasis in elective surgery in a prospective age and sex matched cohort study and found that

median operating time for LC [75, (40-180min)] was significantly longer than for OC [55, (20-155min); p<0.001]. As experience is gained, the operating time is decreased. This "learning curve" represents adapting to operating in the 2-D screen, becoming familiar with the instrumentation and becoming accustomed to the technique. The surgeon gets trained in dealing with challenging cases in the course of his/ her learning curve.

Analgesia Requirement: Use of minimally invasive techniques in elective surgeries is associated with a reduced inflammatory stress response with improved pulmonary function and less hypoxia.[3,4] The VAS was significantly less for LC group (median 2days) compared to (median 4days) for OC group; p<0.005. Kum[5]also found a mean VAS score of 3.8 v/s 7.7 between LC and OC. There was more pain and more analgesics were required in patients in the OC group, especially when the patient developed wound infection.

The pain duration (median 2days for LC and median 4days for OC patients) and the duration of analgesics used (median 2days for LC and median 4days for OC patients) also were significantly less in LC group patients. This was due to the lesser incision size in LC. Other studies have also shown similar results.[6- 11]

Complications Encountered: In this study, there were no major complications and had several minor ones. There was no peri-operative mortality and no CBD injury. The complications observed were bile leak (OC-0, LC-3), blood loss (OC-1, LC-2), wound infection (OC-2, LC-0) and post cholecystectomy syndrome (OC-0, LC-2) which were found to be comparable in both the groups.

Bile leak through drain tube in LC group was because of injury to the gall bladder bed in the liver during dissection. All the three patients were treated conservatively, drains were kept for a period of 2 days and the leak subsided. The main reason for blood loss in LC group was the slippage of the clip applied to the cystic artery and from the gall bladder bed.

There was no wound infection in LC group. 2 patients of OC group had wound infection, requiring regular dressing of the wounds, and the wounds healed over a period of 10 days. Wound infections were more commonly seen in the open group compared to laparoscopic group.

Harris[12] in his study found similar results, Bile leak (LC-2%, OC-1%), bleeding requiring transfusion (LC-1%, OC-2%) and wound infection rate (LC-0%, OC-1%). Other studies also reported similar results.[6, 2]

The conversion from laparoscopic procedure to open procedure was necessary in 2 patients out of 25. One patient required conversion due to difficult dissection in view of thick adhesions and the other due to excessive fat in calot's triangle. Conversion rate was 8%. Conversion rate was also found to be higher in acute cases in other studies (0-45%).[13, 14, 15]

Post-operative recovery and Period of Hospitalization: The two most beneficial aspects of LC are the short hospital stay and the rapid recovery.[16] In this study, the median duration of hospital stay was 3days for LC group and 7days for OC group. The difference was found to be statistically significant (p<0.005). Hospital stay was more in OC group due to increased pain, wound infection, injectable antibiotics used and less mobilization due to pain. Porte[2], Trondsen[1]and Lujan[14] also found similar results. This was also confirmed in various other series.[6, 7, 17, 15, 11, 18]

The minimum resumption of normal diet for open method was 3 days compared to 2 days for laparoscopic method. The maximum resumption of normal diet for open method was 7 days due to

wound infection, compared to 5 days for laparoscopic method following conversion. The mean resumption of normal diet for open method was 5 days compared to 3 days for laparoscopic method, suggesting the LC group returning to normal life earlier.

Patient Satisfaction: The OC group had larger wounds, which healed by primary intention with a big single scar. The LC group had port incisions of <1.5cm, wound healed by primary intention without much visible scar. Thus the cosmesis is the greatest advantage after laparoscopic cholecystectomy compared to open cholecystectomy.

CONCLUSION: In our study the laparoscopic cholecystectomy surpasses the open cholecystectomy by the following:

1. Post-operative recovery with quicker ambulance, better compliance and rapid return to normal activity with rapid resumption of normal diet.
2. Shorter duration of analgesic requirements.
3. Decreased wound infection.
4. Shorter post-operative hospital stay.
5. Best cosmesis with patient satisfaction.

The disadvantages in the laparoscopic procedure are the prolonged operative time, and the complications which can be minimized in due course of time as the learning curve progresses.

We have also found that the conversion to open cholecystectomy should be done in proper time without any hesitation in case of complications that could not be managed by laparoscopic surgery and conversion in such case reflects sound judgment and should not be considered as a complication.

REFERENCES:

1. Trondsen E, Riertsen O, Anderson OK, Kjaersgaard P. Laparoscopic and open cholecystectomy: A prospective randomized study. Eur J Surg 1993 Apr; 159(4): 217-21.
2. Porte RJ, De Vries BC. Laparoscopic versus open cholecystectomy: a prospective matched-cohort study. HPB Surg 1996; 9(2): 71-5.
3. Williams MD, Sulentich SM, Murr PC. Laparoscopic cholecystectomy produces less post-operative restriction of pulmonary function than open cholecystectomy. Surg Endosc 1993 Nov-Dec; 7(6): 489-92.
4. Farrow HC, Fletcher DR, Jones RM. The morbidity of surgical access: a study of open versus laparoscopic cholecystectomy. Aust NZJ Surg 1993 Dec; 63(12): 952-4.
5. Kum CK, Wong CW, Goh PM, Ti TK. Comparative study of pain level and analgesic requirement after laparoscopic and open cholecystectomy. Surg Laparosc Endosc 1994 Apr; 4(2): 139-41.
6. Hardy KJ, Miller H, Fletcher DR, Jones RM, Shulkes A, McNeil JJ. An evaluation of laparoscopic versus open cholecystectomy. Med J Aug 1994 Jan 17; 160(2): 58-62.
7. Chan HS, Ha XF, Ooi PJ, Mack P. A prospective comparative study between conventional and laparoscopic cholecystectomy. Singapore Med J 1995Aug; 36(4): 406-9.
8. Buanes T, Mjaland O. Complications in laparoscopic and open cholecystectomy: a prospective comparative trial. Surg Laparosc Endosc 1996 Aug; 6(4): 266-72.
9. de Pouvourville G, Reibet-Reinhat N, Fendrick M, Houry S, Testas P, Huguier M. A prospective comparison of costs and morbidity of laparoscopic versus open cholecystectomy. Hepatogastroenterology 1997 Jan-Feb; 44(13): 35-9.

DOI: 10.14260/jemds/2014/2400

10. Hendolin HI, Paakonen ME, Alhava EM, Tarvainen R, Kempinen T, Lahtinen P. Laparoscopic or open cholecystectomy: a prospective randomized trial to compare postoperative pain, pulmonary function and stress response. Eur J Surg 2000 May; 166(5): 394-9.
11. Schietroma M, Carlei F, Liakos C, Rossi M, Carloni A, Enang GN et al. Laparoscopic versus open cholecystectomy: An analysis of clinical and financial aspects. Panminerva Med 2001 Dec; 43(4): 239-42.
12. Harris BC. Retrospective comparison of outcome of 100 consecutive open cholecystectomies and 100 consecutive laparoscopic cholecystectomies. South Med J 1993 Sep; 86(9): 993-6.
13. Eldar S, Sabo E, Nash E, Abrahamson J, Matter I. Laparoscopic versus open cholecystectomy in acute cholecystitis. SurgLaparosc Endosc 1997 Oct; 7(5): 407-14.
14. Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Garcia-Ayllon J. Laparoscopic versus open cholecystectomy in the treatment of acute cholecystitis: a prospective study. Arch Surg 1998 Feb; 133(2): 173-5.
15. Koperna T, Kisser M, Schulz F. Laparoscopic versus open treatment of patients with acute cholecystitis. Hepatogastroenterology 1999 Mar-Apr; 46(26): 753-7.
16. Attwood SE, Hill AD, Mealy K, Stephens RB. A prospective comparison of laparoscopic cholecystectomy versus open cholecystectomy. Ann R Coll Surg Engl 1992 Nov; 74(6): 397-400.
17. al Hadi FH, Chiedozi LC, Salem MM, George TV, Desouky M, Pasha SM. Comparison of laparoscopic and open cholecystectomy at Prince Abdulrahman Al Sudairy Hospital; Saudi Arabia. East Afr Med J 1998 Sep; 75(9): 536-9.
18. Capizzi FD, Fogli L, Brulatti M, Boschi S, Di Domenico M, Papa V et al. Conversion rate in Laparoscopic cholecystectomy: evolution from 1993 and current state. J Laparoendosc Adv Surg Tech A 2003 Apr; 13(2): 89-91.

AUTHORS:

1. Anmol N.
2. Lakshiminarayan G.
3. T. M. Manohar
4. AvadhaniGeeta K.
5. Abinash Hazarika

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of General Surgery, RGUHS, Bangalore.
2. Professor and Guide, Department of General Surgery, RGUHS, Bangalore.
3. Professor and Medical Superintendent, Department of General Surgery, RGUHS, Bangalore.
4. Professor and Unit Chief, Department of General Surgery, RGUHS, Bangalore.
5. Associate Professor, Department of General Surgery, RGUHS, Bangalore.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Anmol N,
Assistant Professor,
Department of General Surgery,
AIMS, B. G. Nagara,
Mandya - 571448.
E-mail: anmolhsn@yahoo.co.in

Date of Submission: 18/02/2014.
Date of Peer Review: 19/02/2014.
Date of Acceptance: 22/03/2014.
Date of Publishing: 14/04/2014.