



Original Article

Surgical Approaches for Common Bile Duct Calculi in Failed ERCP Patients: A Tertiary Care Experience

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ABSTRACT

Common bile duct stone (CBDS) can be caused either by primary or secondary bile duct stones. A common presentation of CBDS is the biliary colic and is between 5.2% to 12% of asymptomatic presentation. Liver function tests (LFTs) can be used to screen for CBDS. Serum bilirubin levels may be markedly elevated depending on whether the obstruction of the bile duct is complete or incomplete. Magnetic Resonance Cholangio-pancreatography (MRCP) has emerged as an accurate, noninvasive diagnostic modality for investigating the biliary ducts. ERCP used primarily in diagnosis & therapeutic modality. With sensitivity between 90% to 95% in detecting CBDS. We studied 40 patients with Common bile duct stone (CBDS), in Dr. VM GMC, Solapur during the period of January 2021 to August 2025, with abdominal pain is seen in 85% of the patients and jaundice in 70% of the patients. In this study serum bilirubin, alkaline phosphatase and SGPT were deranged. Endoscopic Sphincterotomy done in all 38 patients but only 4% patient recover completely. 25% of patients require two or more ERCP treatment. 23 Complications of ERCP include bleeding, duodenal perforation, cholangitis, pancreatitis, and bile duct injury. 24 With respect to complications surgical management as exploration of CBD + T tube or cholidocho-enterotomy has less morbidity, mortality and cost effective. The average postoperative hospital stay after surgical management of Common Bile Duct calculi was 13.85 days. 15% patient got surgical site wound infection and 2% mortality with surgical management of CBDS.

Keywords: Common Bile Duct Calculi, ERCP.

INTRODUCTION

CBDS can be caused either by primary or secondary bile duct stones. In the primary stones, bilirubin is dominant component and is associated with biliary stasis and infection. In secondary stones, cholesterol is dominant component. 1 A common presentation of CBDS is the biliary colic with associated symptoms such as nausea and vomiting. 2 symptomatic CBDS between 5.2% and 12%. 3 Other common symptoms include pale stools and dark-colored urine, serious complications of CBDS are cholangitis and gallstone pancreatitis which carries a mortality rate of 10–20% 4. 6 Liver function tests (LFTs) can be used to screen for CBDS. Elevated serum bilirubin and alkaline phosphatase typically reflect biliary obstruction, but these are neither highly sensitive nor specific for CBDS. 5 In a study by Anciaux et al., elevated serum gamma glutamyl transpeptidase (GGT) and alkaline phosphatase (ALP) were the most frequent abnormalities in laboratory values of patients with symptomatic CBDS. 6 Serum bilirubin levels may be markedly elevated depending on whether the obstruction of the bile duct is complete or incomplete. 2 USG is highly sensitive and non-invasive investigation of choice. It provides information regarding size of Common bile duct, size and number of stones in the common bile duct and stones in the gall bladder. 7 Conventional Computed Tomography (CT) has a sensitivity of 87% and a specificity of 97% for the diagnosis of CBD stones. 8 Magnetic Resonance Cholangiopancreatography (MRCP) has emerged as an accurate, noninvasive diagnostic modality for investigating the biliary ducts. 9 excellent overall sensitivity of 95% and a specificity of 97% for demonstrating CBDS. 10

ERCP used primarily in diagnosis & therapeutic modality with sensitivity between 90% to 95% in detecting CBD stones and a specificity of 92% to 98%. 10,11,12 ERCP is not possible in 3% to 10% of all patients. The ERCP exam has a morbidity rate of 15.9% and a mortality rate of 1%.¹³ Although the success rate for stone clearance in isolated ERCP treatment is up to 87% to 97%, up to 25% of patients require two or more ERCP treatment.²³ Complications of ERCP include bleeding, duodenal perforation, cholangitis, pancreatitis, and bile duct injury.¹⁴ The combination of an aminoglycoside with amoxicillin-clavulanic acid is primarily used as the first-line of treatment.¹⁵ one-stage management of symptomatic CBDS is associated with less morbidity and mortality (7% and 0.19%) than two-stage management (13.5% and 0.5%).¹⁶ Choledoco-enterostomy is the most commonly performed as a side-to-side choledocho-duodenostomy, usually in the setting of a dilated CBD with multiple stones.¹⁷

Aims & Objectives:

1. To evaluate the clinical presentation, diagnostic modalities, and surgical management outcomes in patients with common bile duct calculi following failed ERCP.
2. To compare the postoperative morbidity, mortality, and hospital stay associated with different surgical procedures performed for common bile duct stone management after unsuccessful ERCP.

MATERIAL & METHODS:

This prospective as well as retrospective study (January 2021 to August 2025) of 40 cases of surgically managed patients with Common Bile Duct calculi was conducted in full time surgical units in a tertiary care level teaching hospital.

Inclusion Criteria: Male and female patients with common bile duct stones, above 14 years of age. Patients diagnosed with common bile duct stones.

Exclusion Criteria: Patients below age of 14 years with common bile duct stones. Stone with malignancy. Diabetes Mellitus, uncontrolled hypertension. All patients were clinically examined. All patients were subjected to routine blood and radiological investigations.

Special investigations were carried out if necessary to confirm the diagnosis like MRCP and ERCP. Patients underwent the curative surgery. Postoperative complications were analyzed and morbidity and mortality was discussed.

ERCP equipment consists of- Fiberoptic flexible edoscope (Olympus JF 15-30); 12mm size, 3.8-4.2mm working channel. Catheter- 5F double lumen, short taper with lumen at least 0.035 inch. Guide wire- Length 400-480 cm, diameter- 0.035 inch. C-arm X-Ray facilities.

Operative Procedure-

Abdomen is opened through right subcostal, right paramedian, midline or rooftop incision. Common Bile Duct is identified and freed from adhesions. Duodenum is mobilised by Kochers maneuver. Stay sutures are taken and Common Bile Duct is opened along its longitudinal axis. Common Bile Duct exploration is done to see for the stone and irrigated with saline using a soft catheter. The duodenum should be mobilised well to ensure good apposition between choledochal and duodenal mucosa. Choledochoduodenal anastomosis is done in single layer with 4-0 silk or polyglycolic acid interrupted sutures. Suturing of posterior layer first and then anterior layer done. Test for any leakage through the anastomosis site is done. A 32 Fr drain is kept in the morrison's pouch and the wound is closed. Drain can be removed after 4-5 days. Antibiotics given at the time of the incision and continued postoperatively. The antibiotics used were Inj. Cefoperazone 1gm iv three times a day. T-tube cholangiogram study done on 10th postoperative day to see clearance of CBD.

OBSERVATIONS & RESULTS:

Incidence of Common Bile Duct calculi (Choledocholithiasis) is common in thirties and forties. The incidence is more common in females with the female as to male ratio of 1.2:1. Abdominal pain is the commonest presenting complaint followed by jaundice. Ultrasound abdomen and CT scan abdomen is also a very accurate and sensitive investigation for choledocholithiasis, ERCP is a sensitive diagnostic as well as therapeutic modality for Common Bile Duct calculi management. Endoscopic approach has gained much popularity over the recent years and is the initial approach towards the management of Common Bile Duct calculi.

Different types of can be offered to the patients depending on the a) Intraoperative findings, b) surgeons expertise associated with individual surgery, c) Facilities available at the institute. Surgical wound infection and bile leak from anastomotic site are the most common complications encountered. Other complications adding to morbidity and mortality are septicaemia, respiratory infection, renal failure etc. The average postoperative hospital stay after surgical exploration for Common Bile Duct calculi vary from 10- 16 days.

Table 1) Distribution of study group as per Symptomatology:

Symptom	No of Patients	Percentage
Pain in Abdomen	35	87.5%
Fever	23	57.5%
Jaundice	29	72.5%
Itching	21	52.5%
Chills with Rigors	15	37.5%
Clay coloured Stools	27	67.5%

Distribution of Study Group as per Symptomatology

Frequency and percentage distribution of symptoms among patients.

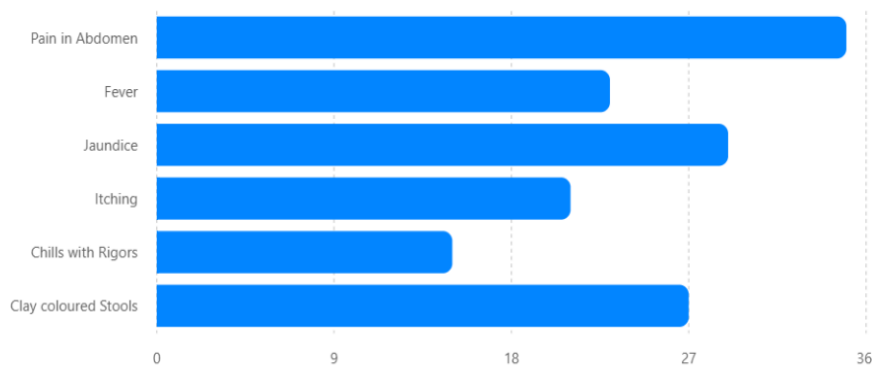


Chart no 1 – Distribution of study group as per Symptomatology:

Table 2) Preoperative ERCP-

Finding	No. of Patients	Percentage
Single Calculus	14	40
Multiple Calculi	24	60
Impacted Calculi	16	40
Stenting done	18	45
Sphincterotomy done	39	97.5
CBD cannulation not possible	3	7.5
CBD clearance achieved	5	12.5
F		

Table 3) Distribution Of cases as per the Surgeries performed-

Surgery	No. of Patients	Percentage
CBD Exploration + Choledochojejunostomy (Post Cholecystectomy Status)	3	7.5
CBD Exploration + T-Tube Drainage (Post Cholecystectomy Status)	4	10
Cholecystectomy + CBD Exploration + Choledochojejunostomy	12	30
Cholecystectomy + CBD Exploration + T-Tube Drainage	16	40
Cholecystectomy + CBD Exploration + Choledochoduodenostomy	3	7.5
Cholecystectomy + CBD Exploration + Hepaticojejunostomy	4	10

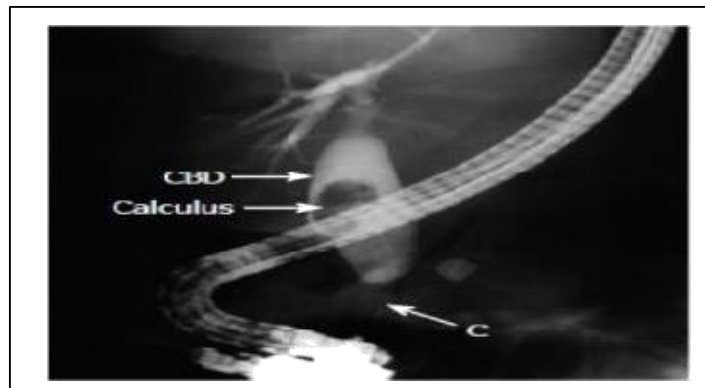


Photo 1 : ERCP image showing dilated CBD with calculus within it



Photo 2: Cholidocho-deudenostomy

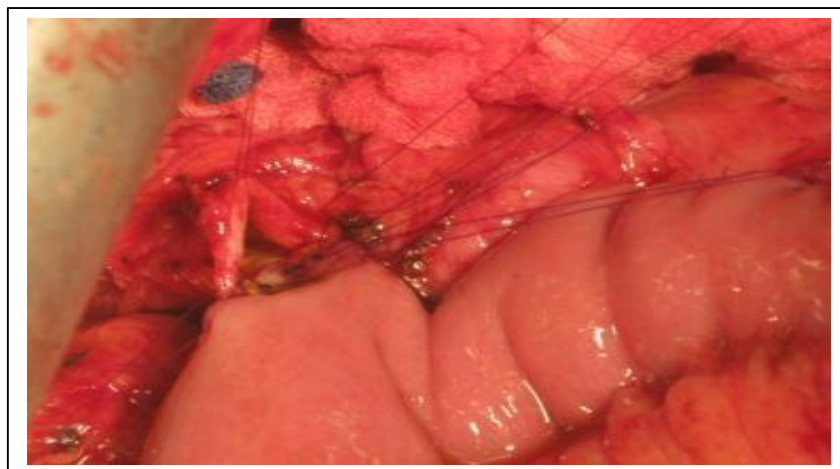


Photo 3: Surgery – Hepatico-jejunostomy

DISCUSSION:

Presence of calculi in the Common Bile Duct (Choledocholithiasis) causing obstructive jaundice is an important pathology, which is frequently encountered during routine practice to the general practitioners as a jaundice. Advances in biliary tract imaging have made increased and early recognition of the condition and the further treatment. A total of 40 patients with Common Bile Duct calculi who were managed surgically were included in this study. The highest incidence of Common Bile Duct calculi was in the age group of 31-40 years (30%) followed by 41-50 years (25%) age group. These findings are comparable to study conducted by Ahmed T, et al, reported that the mean age of the patient presenting with choledocholithiasis was about 45.88 years approximately.¹⁸ The female to male ratio in our study was 1.2:1. This finding is comparable with the study carried out by Zafar SN, et al, presented, female:male ratio of 1.38:1.¹⁹ 85% of the patients presented with the complaint of the pain in the abdomen, followed by Jaundice (72.5%). Hu KC, et al, reported that patients were more likely to develop symptoms such as biliary colic in the presence of CBD stones.³ Abellán Morcillo I, et al.,

mentioned that, Jaundice was the most frequent presentation.⁶ 55% of the patients were having fever. Complaints of clay coloured stools and itching were present in 67.5% and 52.5% of the patients respectively.

On clinical examination 33 patients were icteric. 16 patients had enlarged liver while 10 patients had palpable Gall Bladder. 18 patients had tenderness over right hypochondria region.⁸ 8 patients had pallor. All patients underwent the liver function tests including serum bilirubin, alkaline phosphatase, SGPT. In our study group serum bilirubin, alkaline phosphatase and SGPT were deranged in 90%, 80% and 75 % patients respectively. Hu KC, et al, presented that proportion of abnormal liver function tests were significantly greater in patients with having Common Bile Duct calculi than in those without CBD calculi.³

All patients in our study underwent ultrasonography of the abdomen. Five patients had already undergone cholecystectomy prior. Out of remaining 35 patients 18 patients had contracted Gall Bladder & 17 patients presented with distended gall Bladder. 25 patients out of 35 (71.42%) had Gall Stones on ultrasonography out of which 20 patients had multiple Gall Bladder calculi while 5 had single Gall Bladder calculus.³⁷ 37 patient had Common Bile Duct calculi on ultrasonography and Common Bile Duct was dilated in 92.5% of the patients. Karki S, et al, reported that ultrasonography had sensitivity of 100% and specificity of 89% in detecting choledocholithiasis. Ultrasonography acts as a valuable diagnostic imaging modality in detecting the causes of obstructive jaundice.⁸ To search for the cause of dilated CBD 3 patient underwent MRCP, and shown evidence of calculi without any other pathology in CBD. Endoscopic Retrograde Cholangiopancreatography (ERCP)- All 40 patients underwent ERCP. In two patients selective cannulation of Common Bile Duct was not possible. Out of remaining 38 patients, 14 patients had single calculus while 24 patients had multiple calculi.¹⁸ 18 patients underwent Common Bile Duct stenting. Horiuchi A, et al, shown that Biliary stenting proved to be a useful alternative therapy to stone clearance in the management of choledocholithiasis.¹¹ Endoscopic Sphincterotomy done in all 39 patients. Successful CBD clearance was achieved in 5 patients. Those patients who had successful stone retrieval on ERCP were followed up after 6 weeks for definitive management- Interval Cholecystectomy. Yasui T, et al, reported that, the 10-year cumulative incidence of overall biliary complications was significantly lower in cholecystectomized patients than in patients with gallbladder in situ.²⁰ Cuschieri, et al. also mentioned in their study that, the current management of patients with ductal calculi and gallstone disease consists of endoscopic stone extraction followed by cholecystectomy.²¹ After unsuccessful ERCP, 36 patients underwent surgical exploration. Koc B, Adas G, Karahan S mentioned in their study that, common bile duct exploration can be a savior for failed endoscopic bile duct stone extraction.¹³ Similarly Neri V, et al, reported that, patients who are not eligible for endoscopic approach, have been submitted to surgical therapy.²² Bergman S, et al, reported that, One-third of elderly patients will develop a recurrence following non-operative management of symptomatic biliary disease. These recurrences are associated with significant rates of emergency surgery and morbidity.¹⁴ Out of 36 patients 5 patients had already undergone cholecystectomy previously. 2 of them underwent Common Bile Duct exploration with Choledochojejunostomy while 4 underwent Common Bile Duct exploration followed by T-Tube drainage. Out of remaining 31 patients 12 patients underwent cholecystectomy with Common Bile Duct exploration with Choledochojejunostomy. 16 patients underwent Cholecystectomy with Common Bile Duct exploration followed by T-Tube drainage. Three patients underwent cholecystectomy with Common Bile Duct exploration with Choledochoduodenostomy. Four Out of the 40 patients with common bile duct calculi, 4 patients had successful stone retrieval on ERCP patient underwent cholecystectomy with Common Bile Duct exploration with Hepaticojejunostomy. DiFronzo LA, et al, stated that, most common operation performed was a Choledochojejunostomy; the remaining operations were either Choledochoduodenostomy Roux-en-Y Choledochojejunostomy, Hepaticoduodenostomy, or Roux-en-Y Hepaticojejunostomy.¹⁷

Five patients had postcholecystectomy status. Out of 35 patients 11 patients had contracted Gall Bladder while 24 patients had distended Gall Bladder. Calculi were present in 31 patients. Common Bile Duct was dilated in almost all patients.¹⁴ 14 patients had single calculus in the Common Bile Duct. While 19 patients had multiple calculi in the Common Bile Duct. 3 patients had shown no evidence of calculus In the Common Bile Duct. That may be because of preoperative ERCP and Common Bile Duct stenting with sphincterotomy. Intraoperatively all patients underwent cholangiogram study. Complete CBD clearance ensured intraoperatively. 18 patients who had undergone T-Tube drainage, all underwent post operative cholangiogram study around 14th post operative day. All patients had normal postoperative cholangiogram study.

The common post-operative complication found in our study group was wound infection in 15% of the patients. 10% patients had bile leak from anastomotic site and 10% patients had renal failure. 5% patients developed septicaemia. Respiratory infection, cardiological problems were some other post-operative complications developed in the patients. 2 patients developed T-Tube related complications. The average morbidity rate was 27.5%. Zafar SN, et al, reported that, most frequent complications following surgical intervention for Common Bile Duct calculi were wound infection (23%) and bile leak (10%).¹⁹

Post operative hospital stay- The average postoperative hospital stay after surgical management of Common Bile Duct calculi was 13.85 days. In patients who underwent Choledochojejunostomy and Choledochoduodenostomy the average post-operative hospital stay was short (12.45 and 10.5 days respectively) compared to the patients who underwent T- Tube

drainage (15.72 days). Patients who underwent Hepaticojejunostomy were discharged with an average postoperative hospital stay of 10 days. Shelat VG, et al, the mean length of stay after Common Bile Duct Exploration was 11.7 ± 7.3 days.²³ Out of the 40 patients with common bile duct calculi, 5 patients had successful stone retrieval on ERCP, and were discharged with average post-procedure hospital stay of 2.25 days. Those patients who had successful stone retrieval on ERCP were followed up after 6 weeks for definitive management- Interval Cholecystectomy. Three patients underwent laparoscopic cholecystectomy and one patient underwent laparoscopy converted open cholecystectomy and followed by endoscopic stent removal. Remaining 36 patients who were managed surgically were discharged with an average postoperative hospital stay of 13.85 days with normal liver function tests at the time of discharge. Two patients died during postoperative hospital stay. One of them developed wound infection, respiratory infection and died due to Myocardial Infarction. Second patient developed bile leak from anastomotic site, wound infection, renal failure and died subsequently due to septicemia.

CONCLUSION-

Surgical management remains an effective and reliable treatment option in patients with common bile duct calculi following failed ERCP. Common bile duct exploration with T-tube drainage and biliary enteric anastomosis provides satisfactory stone clearance with acceptable morbidity and mortality. ERCP continues to be the first-line diagnostic and therapeutic modality; however, surgical intervention becomes essential in difficult, impacted, or recurrent stones. Postoperative complications such as wound infection and bile leak were manageable in most cases. Selection of the appropriate surgical procedure should be based on CBD dilatation, stone burden, patient condition, and surgeon expertise to achieve better clinical outcomes and reduced hospital stay.

BIBLIOGRAPHY:

1. Madden JL. Common duct stones. Their origin and surgical management. *Surg Clin North Am.*; 53(5):1095–1113, Oct 1973.
2. G. R. Caddy and T. C. K. Tham, Symptoms, diagnosis and endoscopic management of common bile duct stones, *Best Practice & Research: Clinical Gastroenterology*, vol. 20(6). 1085–1101, 2006.
3. Hu KC, Wang HY, Chang WH, et al. Clinical presentations of patients from different age cohorts with biliary tract stone diseases. *J Gastroenterol Hepatol.*, 29 (8):1614-9, Aug 2014.
4. K. Uchiyama, H. Onishi, M. Tani, et al., “Long-term prognosis after treatment of patients with choledocholithiasis,” *Annals of Surgery*, vol. 238(1), 97–102, 2003.
5. M. L. Freitas, R. L. Bell, and A. J. Duffy, —Choledocholithiasis: evolving standards for diagnosis and management, *World Journal of Gastroenterology*, vol. 12,(20), 3162–3167, 2006
6. Abellán Morcillo I, Qu
7. rashi K, Abrisqueta Carrión J, Martínez Isla A. Laparoscopic common bile duct exploration. Lessons learned after 200 cases. *Cir Esp.*92(5):341-7. May2014
8. G, Morgenstern L. Laparoscopic management of common bile duct stones: a multi-institutional study. *Surg Endosc.* 8: 1168-1175. 1994
9. M. L. Freitas, R. L. Bell, and A. J. Duffy, “Choledocholithiasis: evolving standards for diagnosis and management,” *World Journal of Gastroenterology*, vol. 12, no. 20, pp. 3162–3167, 2006
10. A. H. Hallal, J. D. Amortegui, I. M. Jeroukhimov, et al., “Magnetic resonance cholangiopancreatography accurately detects common bile duct stones in resolving gallstone pancreatitis,” *Journal of the American College of Surgeons*, vol. 200 (6) 869–875, 2005.
11. Horiuchi A, Kajiyama M, Ichise Y, et al. Biliary stenting as alternative therapy to stone clearance in elderly patients with bile duct stones. *Acta Gastroenterol Belg*;77(3):297-301 Sep2014
12. “NIH state-of-the-science statement on endoscopic retrograde cholangiopancreatography (ERCP) for diagnosis and therapy,” *NIH Consensus and State-of-the-Science Statements*, vol. 19 (1), 1– 26, 2002.
13. Koc B, Adas G, Karahan S. Use of laparoscopic common bile duct exploration for failed endoscopic bile duct stone extractions. *Minerva Chir*;69(4):209-15 Aug 2014
14. C. K. Tai, C. N. Tang, J. P. Y. Ha, et a,“Laparoscopic exploration of common bile duct in difficult choledocholithiasis,” *Surgical Endoscopy*, vol. 18, no. 6, pp. 910–914, 2004
15. Broughman T, Sivak M, Herman R. The management of retained and recurrent bile duct stones. *Surgery*, 98(4): 746-51, 1985
16. Petelin J. The argument for contact laser laparoscopic cholecystectomy. *Clin Laser Monthly*, 71-1. 1990
17. DiFronzo LA, Egrari S, O'Connell TX. Safety and durability of single-layer, stentless, biliary- enteric anastomosis. *Am Surg.*, 64(10):917-20, Oct1998
18. Ahmed T, Alam MT, Ahmed SU, Jahan M. Role of intraoperative flexible Choledochoscopy in calculous biliary tract disease. *Mymensingh Med J.* 21(3):462-8, Jul- 2012.
19. Zafar SN, Khan MR, Raza R, et al. Early complications after biliary enteric anastomosis for benign diseases: a retrospective analysis. *BMC Surg.* 25;11:19, Aug-2011

20. Yasui T, Takahata S, Kono H, Is cholecystectomy necessary after endoscopic treatment of bile duct stones in patients older than 80 years of age? *J Gastroenterol.* 47(1):65-70,Jan-2012.
21. Cuschieri, et al. *Surgical Endoscopy-Ultrasound and Interventional Techniques* Volume-10,1130, 1996
22. Neri V, Ambrosi A, Fersini A, Tartaglia N, Lapolla F. Common bile duct lithiasis: therapeutic approach. *Ann Ital Chir.*84(4):405-10, Jul-Aug 2013.
23. Shelat VG, Chia VJ, Low J. Common bile duct exploration in an elderly asian population. *Int Surg.*, 100(2):261-7. Feb 2015