RESULTS

This work included 50 patients with chronic calcular cholecystitis prepared for operative intervention , however , choledocholithiasis was suspected from the history , laboratory investigations and confirmed by ultrasound or E.R.C.P. Among those patients 29 were females (58%) and 21 were males (42%) . The female to male ratio is 1.4:1 . The sex distribution of patients is shown in table (4) and fig. (26) .

Table (4) sex distribution of all patients :

Females	Males	Total
No.	No.	No.
29	21	50

The ages of patients varied from 22 to 70 years with a mean age of 45.46 . Choledocholithiasis was suspected by the history and the main associated symptoms are demonstrated in table (5) and fig.(27) .

The family history of cholelithiasis in the patients studied was found in 18 patients (36%) . Contraceptive pills were taken at the time of the study by 2 females only (6.9 % of the 29 females) . While the history of contraceptive pills taken was found in 10 females (34.5% of all females). Past history results are shown in table (6) and fig.(28) including medical and surgical past history.

Table (5) Symptoms suggesting choledocholithiasis :

Symptoms	Number
Colicky pain	22
Fever	14
Jaundice	12
Pruritis	10
Pale stools	9
Dark urine	12
Back pain	4

Table (6) Past history results :

Item	*Number*
Viral hepatitis	7
Schistosomiasis	18
Typhoid fever	4
Parasitic infestations	20
Abdominal operations	5
Other operations	9
Gall stone pancreatitis	4

From the history , examination and investigations , the following associated diseases were found :

- Cardiovascular diseases in 16 patients (32%).

- Chest diseases in 5 patients (10%).
- Renal diseases with creatinine over 3 mg/dl. in 4 patients (8%).

Liver cirrhosis (with no ascites or marked portal hypertension) in 6 patients (12%). The associated diseases are listed in table (7) and fig. (29) .

Table (7) Associated diseases in all patients :

Associated disease	*No.*
Cardiovascular	16
Rheumatic heart disease	5
Hypertension	9
Coronary artery disease	2
Chest diseases	5
Renal diseases	4
Diabetes mellitus	14
Liver cirrhosis	6

The important associated findings upon physical examination are shown in table (8) and fig. (30) . The results of laboratory investigations are shown in table (9) .

Table (8) Important abdominal findings on physical examination:

Signs	No.
Hepatomegaly	9
Right hypochondriac tenderness	12
Operative scars	5
Scratch marks	5
Jaundice	12

Table (9) Laboratory investigations :

Item	*Mean*	*S.D*
Hemoglobin	11.14 mg/dl	1.35
White cell count	9623 /m.m^3	3115
Fasting blood sugar	121.34 mg/dl	37.56
Postprandial B. sugar	211.45 mg/dl	98.76
Serum creatinine	1.36 mg%	1.04
Total bilirubin	3.46 mg/dl	1.34
Direct bilirubin	2.15 mg/dl	1.87
Alkaline phosphatase	19.8 K.A unites	5.84
ALT (SGPT)	60.34 mg/dl	39.56
AST (SGOT)	74.13 mg/dl	34.89
Albumin	3.38 gm/dl	0.67
Prothrombine time	13.65 sec.	1.05
Clotting time	5.87 min.	1.43

Ultrasonography was of aid in denoting the condition of the common bile duct (diameter & patency) also giving a clue about the obstructing agent in cases with calcular obstructive jaundice and eliminating cases of malignant obstruction . Dilated intrahepatic bile ducts and common bile duct were seen by ultrasonography in 13 patients (26%) .

Ultrasonography also helped to demonstrate the presence of stones in the G.B , the condition of the wall of the G.B with pericholecystic adhesions and the presence of bilharzial liver fibrosis . These manifestations are demonstrated in table (10) and fig. (31) . Thus ultrasonography was suggesting the presence of stones in the common bile duct in 21 patients (42%) but was only sure in 15 cases , 12 of those patients had had obstructive jaundice .

Table (10) Ultrasonographic findings in all patients :

Ultrasonographic Findings	*No.*	*%*
Dilated C.B.D	13	26
Dilated I.H.B.D	11	22
Collector G.B	50	100
Visualising stones C.B.D	15	30
Suggesting Stones C.B.D.	21	42
Severe inflammation of G.B	7	14
Bilharzial liver	18	36

Diagnostic E.R.C.P. was done in all the patients included in this study. Dilatation of common bile duct and intrahepatic bile ducts was confirmed by E.R.C.P following ultrasound . No abnormalities of the pancreatograms were observed . The stones of common bile duct were seen as filling defects . Difficult cannulation was encountered in 18 patients (36%) , 10 of them due to juxta-papillary diverticula (J.P.D) (20%) and the remaining 8 patients (16%) due to swollen papilla secondary to impacted stones as shown in table (11) and fig. (32) , the precut papillotomy technique was used in 4 of these patients .

Table (11) E.R.C.P findings in all patients :

E.R.C.P findings	No.
Dilated C.B.D	13
Dilated IHBD	11
Stones common bile duct	30
JPD	10
Impacted stones	8
Fasciola worm	1

E.R.C.P was superior than ultrasound in detecting stones in the common bile duct as 30 patients (60%) showed filling defects indicating the presence of stones compared to 15 patients (30%) visualised by ultrasound and 21 patients only (42%) were suggested to have stones , also, one extra-case (2%) no abnormality in the common bile duct was

found by ultrasound apart from mild dilatation , however , E.R.C.P demonstrated filling defect , after sphincterotomy & dormia basket extraction it was found to be a fasciola worm .

Classification of patients according to the risk factors present into groups was as follows in table (12) & fig.(33) :

- Group A : Clinical jaundice .
- Group B : Gall stone pancreatitis .
- Group C : Elevated liver function tests (normal duct size) .
- Group D : Stones seen in C.B.D by ultrasound .
- Group E : Elevated liver function tests & dilated C.B.D by U/S .

Table (12) : Illustration of C.B.D stones according to group by risk factors .

GROUP	*No.*	*C.B.D stones*
Group A	12	11
Group B	4	2
Group C	48	28
Group D	15	15
Group E	13	12

From table (12) it is evident that there are certain factors (The indicators of choledocholithiasis) , the percent of actual finding of stones on E.R.C.P in every item is high . Also , Using E.R.C.P. as a reference , ultrasound duct dilatation and elevated serum alkaline

phosphatase showed sensitivity in the detection of C.B.D stones of 44.2% in case of ultrasonography and 64.5% in case of alkaline phosphatase , while specificity was 98.2% for ultrasound and 93.1% for alkaline phosphatase , additional laboratory tests were irrelevant .

Therapeutic E.R.C.P was done for all the patients when duct pathology was present (32 patients 64%) . Sphincterotomy has been achieved in all the patients (100%) with positive cholangiograms . Subsequent stone extraction was feasible in 26 patients (86.6 %) , Three of them required mechanical lithotripsy (10%) . The one patient with a fasciola worm , duct clearance was achieved via basket extraction . Duct clearance failed in the remaining 4 patients (13.3%) preoperatively and one extra-case of failure was discovered after laparoscopic cholecystectomy making the overall failure of endoscopic stone extraction (16.7%) , These cases were converted to the traditional open surgery . In two of the successfully managed patients , a stent was inserted in the C.B.D. for two weeks then stone extraction was achieved on a second attempt . The results of therapeutic E.R.C.P are shown in table (13) , fig.(34 & 35) .

Table (13) The results of therapeutic E.R.C.P. :

Therapeutic E.R.C.P	*No.*	*%*
[illegible]	32	64
[illegible]	4	8
[illegible]	20	66.6 *
[illegible]	3	10 *
[illegible]	3	10 *
[illegible]	2	4
[illegible]	25	83.3 *
[illegible]	5	16.7 *
[illegible]	1	2

* Percent to all cases of stones C.B.D. (30 cases) .

Complications occured after endoscopic sphincterotomy in 8 cases out of 32 cases (25%) as follows :

Pancreatitis: In two patients (6.25%) , one of them was a 57 years old female , hypertensive, diabetic as shown in table (14) . The other was a 59 years old hypertensive male. Cannulation of the papilla was difficult with repeated trials of opacification of the CBD , classical clinical picture of pancreatitis occurred with elevated serum pancreatic amylase to 698 & 795 Somogi units/dl in both cases respectively .

Management was by nasogastric suction , i.v fluids , calcium with continuation of the antibiotics used in case preparation . The symptoms

and signs improved within 5 days and oral feeding was resumed within one week in both cases . Serum enzymes returned to normal and the elective laparoscopic cholecystectomy was done three weeks after E.S .

Cholangitis: occurred in three patients (9.4%) :

One female 51 years old who was obese and diabetic , at the time of sphincterotomy she was jaundiced . The symptoms of cholangitis increased at the night of the procedure , antibiotic was changed into cephtriaxone (Rocephin) 1 gm/24 hours (I .V) + Gentamycine 80 mg/8 hours (I.M) . Analgesics, antipyretics , I.V fluids and nasogastric suction were used . Amelioration of the condition occurred on the fifth day and laparoscopic cholecystectomy was done three weeks later .

The other two cases were a 47 years old male & 53 years old female with no risk factors apart from elevated serum alkaline phosphatase and mild pyrexia in the male patient . Symptoms were much less than the previous case , management was exactly the same .

Bleeding: Occurred in three patients (9.4%) :

Mild bleeding occurred in a male , 59 years old , diabetic with elevated serum creatinine 2.8 mg/dl . The bleeding was controlled endoscopically by epinephrine injection , as no stones were found on E.R.C.P , laparoscopic cholecystectomy was successfully continued after one week.

Moderate bleeding also occurred in a 48 years old , jaundiced , morbidly obese, hypertensive female . Trial of endoscopic control of bleeding was not completely sufficient , nasogastric tube and I.V fluids

with somatostatin infusion helped to control bleeding within one day , however , this patient was candidate for open surgery for stone extraction one day later .

The last patient was a 66 years old male, hypertensive and diabetic with total serum bilirubin 22 mg/dl . Massive bleeding occurred on sphincterotomy , all measures failed to stop bleeding , progressive hypotension urged immediate laparotomy that was successful in control of bleeding and removal of C.B.D stones through duodenotomy and choledochotomy with T-tube insertion afterwards .

Table (14) Endoscopic sphincterotomy complications :

Complication	No.	%	Risk factors	Time since E.S	Open surgery
Pancreatitis	2	6.25*	Hypertension, diabetes	Three weeks	Non
Cholangitis	3	9.4*	Obesity,diabetes, jaundice,pyrexia	Three weeks	Non
Bleeding	3	9.4*	Diabetes,hypert-ension,jaundice, obesity,	One week	Two

*Percent to all cases of endoscopic sphincterotomy (32 cases).

Statistical analysis of this group of patients revealed :

- The age range of patients with complications was 47-66 with a mean of 55 years .
- 6 patients (75%) were above 50 years .
- Female to male ratio was 1:1.
- The time between the first sphincterotomy session and surgery ranged from 1/6 to 22 days with a mean of 9.77 days .
- The interval from the first E.S to laparoscopic cholecystectomy in uncomplicated cases ranged from ½ to 14 days with a mean of 5.6 days .
- The interval from the first E.S to surgery in general in all cases ranged from 1/6 to 22 days with a mean of 6.8 days .

Failure of the procedure (Endoscopic clearance of bile duct stones) occurred in 5 cases with reversion to open surgery (16.7% of all cases of choledocholithiasis) :

- A 65 years old hypertensive , male who was jaundiced on the initial sphincterotomy , although two sessions , one week apart , and stent insertion was done to him (after failure of dormia basket & balloon extraction) . The patient was subjected to open cholecystectomy and choledochoduodenostomy 22 days after the first session of endoscopic sphincterotomy .
- A diabetic , jaundiced female ,55 years old , who had big primary stone in the C.B.D (earthy brown stone) and huge ductal dilatation . Attempt of stone extraction was done after endoscopic

sphincterotomy , dormia basket and mechanical lithotripsy in one session , no other attempt of endoscopic intervention was done and she was subjected to cholecystectomy and choledochoduodenostomy after one day .

- The other two cases were those who had bleeding after endoscopic sphincterotomy and open surgery was the treatment of choice as was described .
- A 56 years old hypertensive female who had multiple small stones gall bladder on ultrasonography and seemingly no C.B.D stones on E.R.C.P. , on performing laparoscopic cholecystectomy , slight dilatation of the cystic duct was noted , however , there were no facilities for intra-operative cholangiography in this case , afterwards , the patient was still complaining of dyspepsia and repetition of laboratory investigations showed persistent elevation of serum alkaline phosphatase and check E.R.C.P. revealed C.B.D. stone that was difficult to extract by dormia basket or by balloon , so open surgery (choledochotomy and choledochoduodenostomy) was performed later on .

The only case with suspected C.B.D stones , due to elevated serum alkaline phosphatase and mild elevation of serum total bilirubin (4.5 mg/dl) with slight dilatation of the C.B.D on ultrasonography , was a 47 years old male in whom endoscopic sphincterotomy and dormia basket extraction of the filling defect present on E.R.C.P revealed a fasciola worm that was successfully extracted and laparoscopic cholecystectomy

was performed two days later . Afterwards, the patient received medical treatment for fasciola and all parameters (biochemical and ultrasound) turned to normal within one month . Comparison of complicated and uncomplicated cases is present in tables (15 & 16) .

Table (15): Comparison between the mean values of complicated and uncomplicated patients to E.S :

Item	*Complicated*	*Uncomplicated*	*P-Value*
Age	55 ± 10.5	45.46±11.4	*<0.05*
Sex: F/M	1.5/1	1.4/1	*>0.05*
Time between E.S & surgery	9.8 ± 1.7	5.6 ± 1.2	<0.05

Table (16) : Interval between first E.S to surgery :

Item	*Range (days)*	*Mean (days)*
All patients	0.16 – 22	6.7
Complicated cases	0.16 – 22	9.8
Uncomplicated cases	0.5 – 14	5.6

Laparoscopic cholecystectomy was attempted in all cases (apart from the four cases in whom open surgery was done) , so in 46 patients operative difficulties were encountered in 15 patients (32.6%) in the form of difficult insufflation in two (4.3%) , difficult dissection in five

(10.8%) , difficult control of bleeding from the gall bladder bed in two (4.3%) , spilled stones in three (6.5%) and difficult extraction of the gall bladder through the laparoscopic ports in three (6.5%) . These difficulties are shown in table (17) & fig.(36) . A drain was inserted in the hepatorenal pouch in 16 patients (39% out of 41 successful cases) .

Table (17): Difficulties encountered during L.C. :

OPERATIVE DIFFICULTY	**NO.**
Difficult insufflation	2
Difficult dissection or unclear anatomy	5
Difficult control of bleeding (G.B. bed)	2
Spilled stones	3
Difficult extraction of the G.B.	3
Total	15

However , only five patients required conversion to open surgery out of all patients with difficult laparoscopic cholecystectomies . Three patients for severe chronic inflammation of the gall bladder with adhesions to surroundings , one patient was empyema of the gall bladder with difficult dissection and the last patient for difficult control of bleeding from the gall bladder bed . Table (18) & fig. (37) illustrate reasons for conversion to open surgery .

Table (18) : Reasons for conversion of L.C to open surgery :

REASONS FOR CONVERSION	NO.
Unclear anatomy with adhesions.	3
Empyema of the G.B.	1
Bleeding from the G.B bed.	1
Total	5

Table (19): The success and failure of laparoscopic cholecystectomy:

CASES	NO.
Successful L.C	41
Failed L.C	5

Table (19) & fig. (38) demonstrate success and failure of laparoscopic cholecystectomy while fig.(39) demonstrates those of ERCP . Post laparoscopic cholecystectomy operative complications included wound infection in 5 patients (out of 41 cases) (12.2%) , atelectasis and pneumonia 2 patients (4.9%) , urinary retention 1 patient (2.4%) , prolonged ileus in 1 patient (2.4%) , myocardial infarction in 1 patient (2.4%), deep vein thrombosis in 2 patients (4.9%) and retained C.B.D stones in only one patient (2.4%) . Table (20) & fig.(40) illustrate these complications .

Table (20) : Post L.C operative complications :

POSTOPERATIVE COMPLICATIONS	NO.
Wound infection	5
Atelectasis & pneumonia	2
Urinary retention	1
Prolonged ileus	1
Deep vein thrombosis	2
Myocardial infarction	1
Retained C.B.D stone	1

Among those patients one was thought to have retained stone C.B.D on performing intra-operative laparoscopic cholangiogram (through cystic duct cannulation) as a small filling defect was present in the lower third of the C.B.D , fig.(41) . However , postoperative E.R.C.P revealed that it was only gas bubble and no residual stones were found , fig.(42) . However, one patient with persistent elevation of the liver enzymes post-operative E.R.C.P. revealed retained stone C.B.D and again failure of the E.R.C.P. in clearing the duct urged open surgery in which choledochotomy and choledochoduodenostomy was performed .

Thus , successful management of suspected choledocholithiasis by E.RC.P.and laparoscopic cholecystectomy without the need for open surgery was possible in 40 patients out of 50 patients included in the study as shown in table(21) .

Table (21): Evaluation of E.R.C.P. & L.C in all patients:

ITEM	NO.	%
All patients involved	50	100
Total success	40	80
Total failure	10	20
Failed stone extraction	5	10
Failed L.C.	5	10

Analysis of the preoperative diagnostic variables of patients to compare the data of the forty successfully managed cases with those who needed open surgery revealed :

The five cases who failed stone extraction on performing E.R.C.P. , as was previously noted , were due to bleeding in two cases, technical difficulties in another two and one with missed stone that was discovered postoperatively . Comparison of the diagnostic variables with the other 45 patients is demonstrated in table (22) .

Similarly, analysis of the cases that failed laparoscopic cholecystectomy (5 cases) in comparison with successful laparoscopic cholecystectomies (41 cases) is demonstrated in table (23) . It was also noted that there was no mortality either to E.R.C.P. or to laparoscopic cholecystectomy in the entire series .

Table (22): Comparison of the diagnostic variables of the failed E.R.C.P. patients (5) with the other patients (45).

VARIABLES	FAILED E.R.C.P.	SUCCESS E.R.C.P	COMPARISON	
			P-VALUE	SIGNIFICANCE
Mean age	54.4±11.4	44.3±12.7	0.03	Sig.
Sex (Males)	2(40%)	19(42.2%)	0.14	Insig.
Fever	4(80%)	10(22.2%)	0.02	Sig.
Diabetic cases	2(40%)	12(26.6%)	0.3	Insig.
Total S. bilirubin	7.3±5.8	1.8±3.4	0.02	Sig.
WBCs. Count	9675	8736	0.14	Insig.
Schistosomiasis	3(60%)	15(33.3%)	0.17	Insig.
Hypertension	4(80%)	5(11.1%)	0.04	Sig.

As regards the laproscopic cholecystectomy , mean operative time was 58.7 ± 31.3 minutes , a drain was inserted in 16 patients (39%) , parentral fluids were given for a mean of 9.7 ±8.4 hours after which oral fluids were tolerated , postoperative pain was controlled by using only non-steroidal anti-inflammatory injections (NSAIDs.) in association with local anaesthetics injected in the abdominal wall sometimes , This combination failed in only two patients so pethidine was given . Antibiotics were given parentrally in the first post-operative day then orally afterwards for a mean of 3.4 ± 2.7 days . Post-operative

ambulation started after 6.8 ± 2.4 hours . Post-operative hospital stay was 1.8 ± 1.4 days . These observations are demonstrated in table (24) .

Table (23):Comparison of the diagnostic variables in failed and successful laparoscopic cholecystectomies :

VARIABLES	FAILED L.C.	SUCCESS L.C.	COMPARISON	
			P-VALUE	Significance
Mean age	53.4±9.7	43.6±8.9	0.03	Sig.
Sex (males)	2(40%)	17(41.4%)	0.63	Insig.
Obesity	3(60%)	10(24.4%)	0.02	Sig.
Fever	4(80%)	6(14.6%)	0.02	Sig.
Diabetes	2 (40%)	10(24.4%)	0.15	Insig.
Total S. bilirubin	6.8±3.8*	1.9±4.6*	0.01	Sig.
W.B.C.s	7975	6974	0.35	Insig.
Shistosomiasis	3(60%)	12(29.2%)	0.04	Sig.
Hypertension	2(40%)	3(7.3%)	0.02	Sig.

* Before E.R.C.P.

The follow up period of this study ranged from 3-23 months with a mean of 13.5 months , during this period laboratory liver function tests and ultrasonography were repeated for all patients . The patients who

Table (24): Operative & Post-operative observations as regards L.C:

Observation	Value
Mean operative time	58.7 ± 31.3 min.
Post-operative bleeding	16 cases (39 %)
I.V. fluids	9.7 ± 8.4 hours
Analgesics	2 cases (4.9 %)
Antibiotics	3.4 ± 2.7 days
Post-operative oral intake	6.8 ± 2.4 hours
Hospital stay	1.8 ± 1.4 days

were converted for open surgery were also subjected to the same post-operative evaluation , all of them were doing well apart from two patients were still complaining of fatty dyspepsia .

The patients after laparoscopic cholecystectomy , only three of them had mild symptoms (7.3%) in the form of fatty dyspepsia that occurred only after heavy or fatty diet , they were all easily treated by diet control . only one patient had severe symptoms that was proven to have missed stone , and as previously detailed was candidate for open surgery . The rest of the patients were symptom free till the end of the study .

The difference between the laboratory liver function tests and ultrasonography before and after performing E.R.C.P. and laparoscopic cholecystectomy , demonstrated improvement in all the parameters indicating the benefit of patients from this technique as illustrated in tables (25 & 26) .

Table (25) : Comparison between ultrasonography findings before and after the study :

ITEM	BEFORE STUDY		AFTER* STUDY		COMPARISON	
	No.	%	No.	%	P-value	Significance
Dilated IHBD	11	22	0	0	0.01	Sig.
Dilated C.B.D	13	26	1	2.4	0.02	Sig.
Suggest stones C.B.D	21	51.2	1	2.4	0.01	Sig.
Sure stones C.B.D	15	36.6	0	0	0.01	Sig.

* 41 patients .

Table (26) : Comparison of liver function tests before and after study .

ITEM	BEFORE STUDY	AFTER* STUDY	COMPARISON	
			P-VALUE	SIGNIFICANT
Total bilirubin	3.45	0.8	0.02	Sig.
Direct bilirubin	2.15	0.5	0.03	Sig.
Alkaline Phosphatase	19.8	11.7	0.04	Sig.
ALT (SGPT)	60.34	38.9	0.04	Sig.
AST (SGOT)	74.13	41.8	0.04	Sig.

* 41 patients .

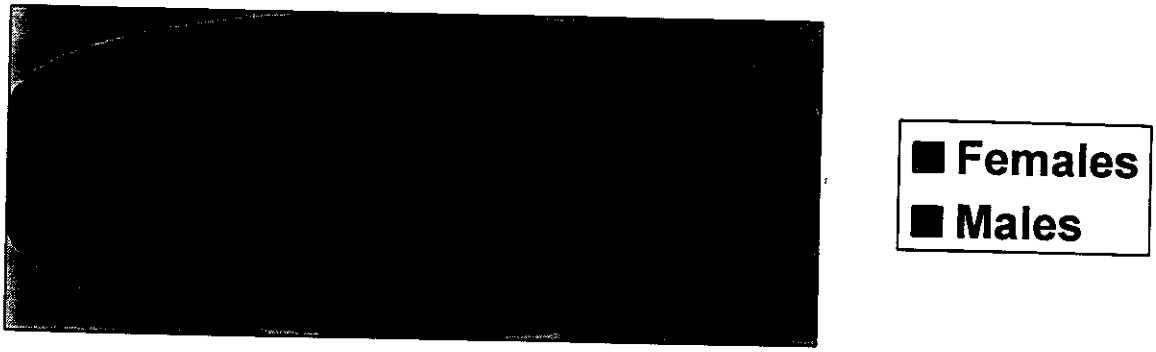

Fig. (26) : Sex distribution for all patients .

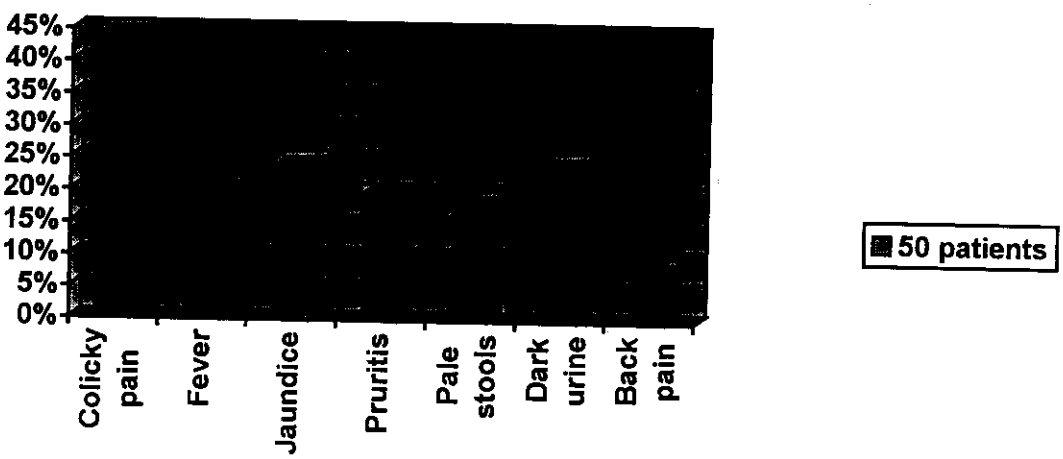

Fig.(27) : Percentile of symptoms suggesting choledocholithiasis .

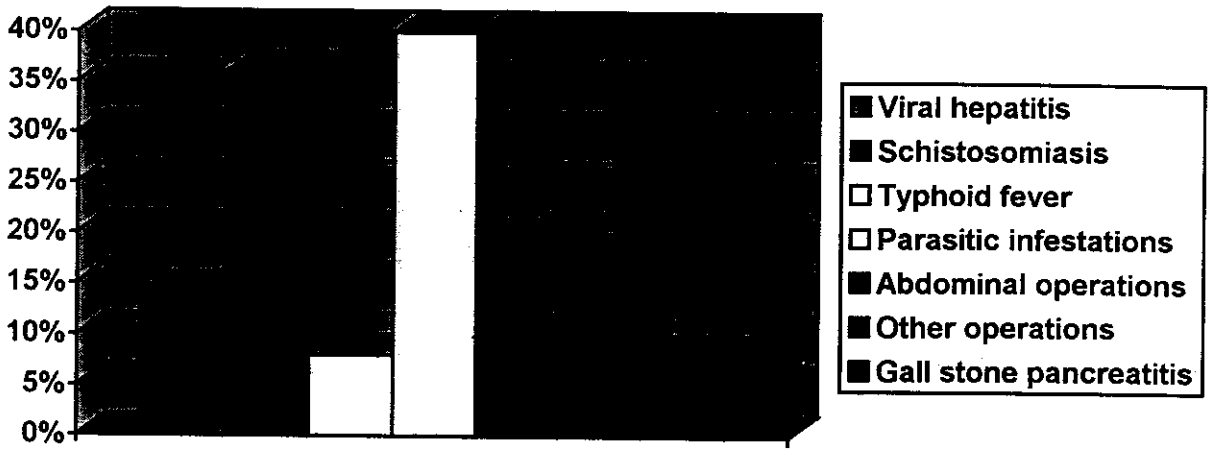

Fig. (28) : Past history results .

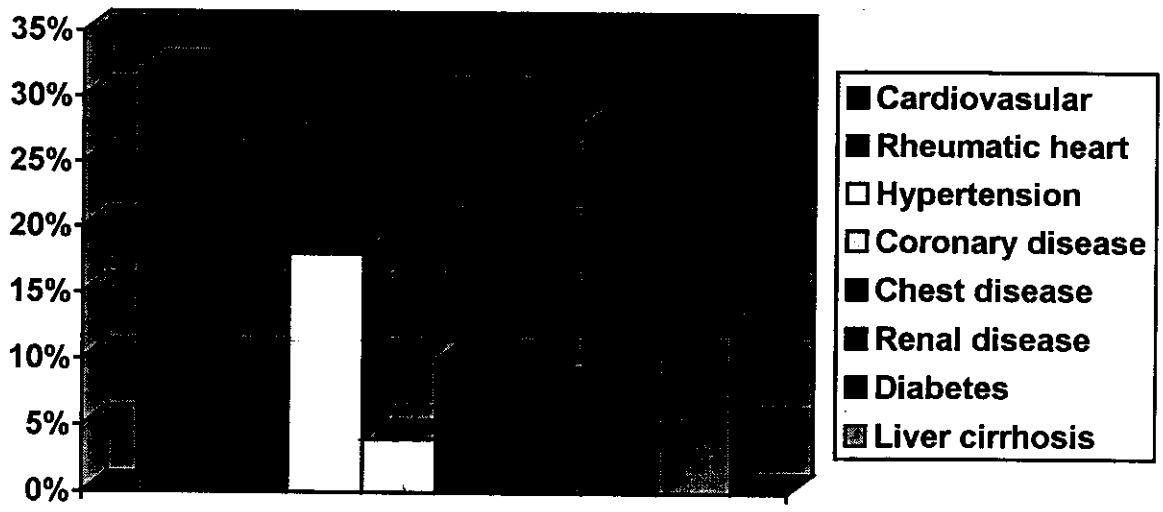

Fig. (29) : Associated diseases for all patients .

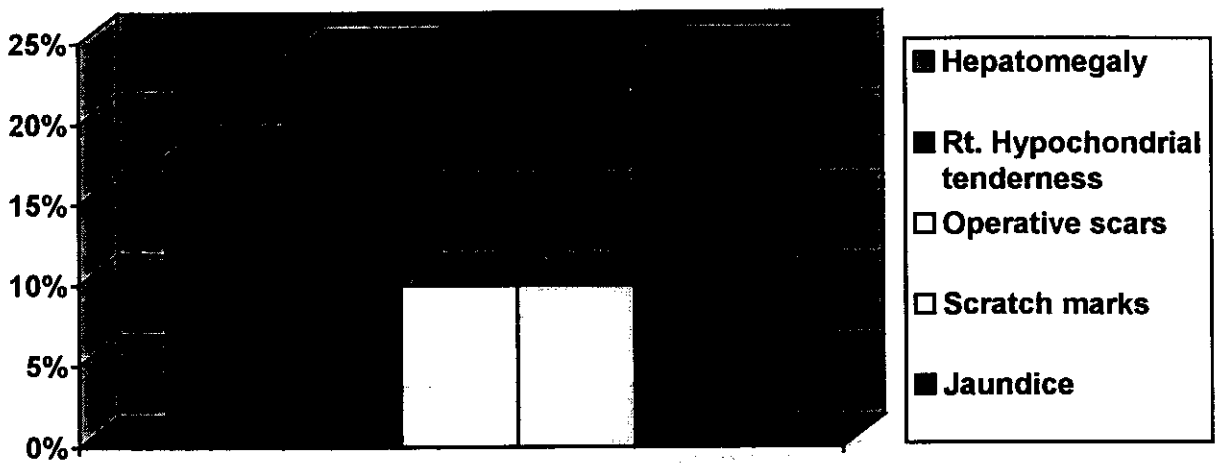

Fig.(30) : Abdominal findings .

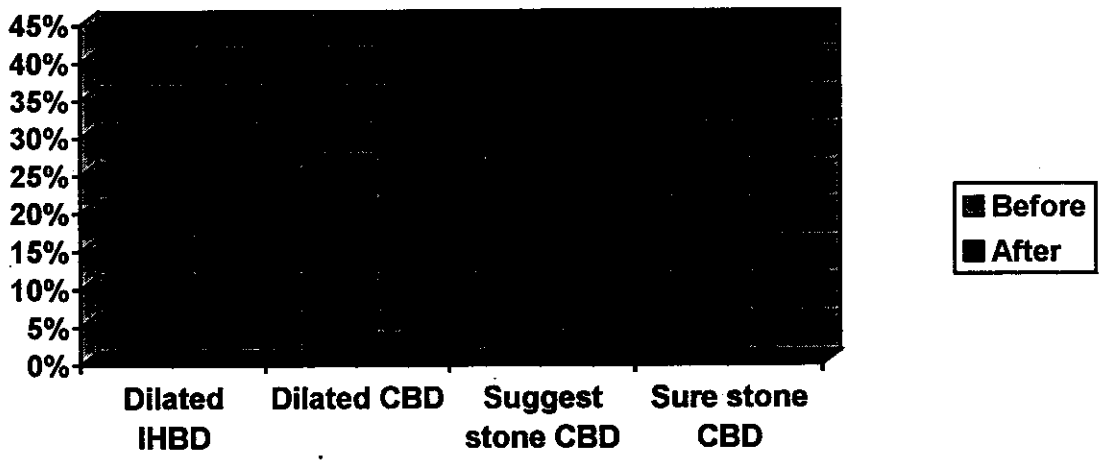

Fig.(31) : Comparison of ultrasonography findings before & after the study .

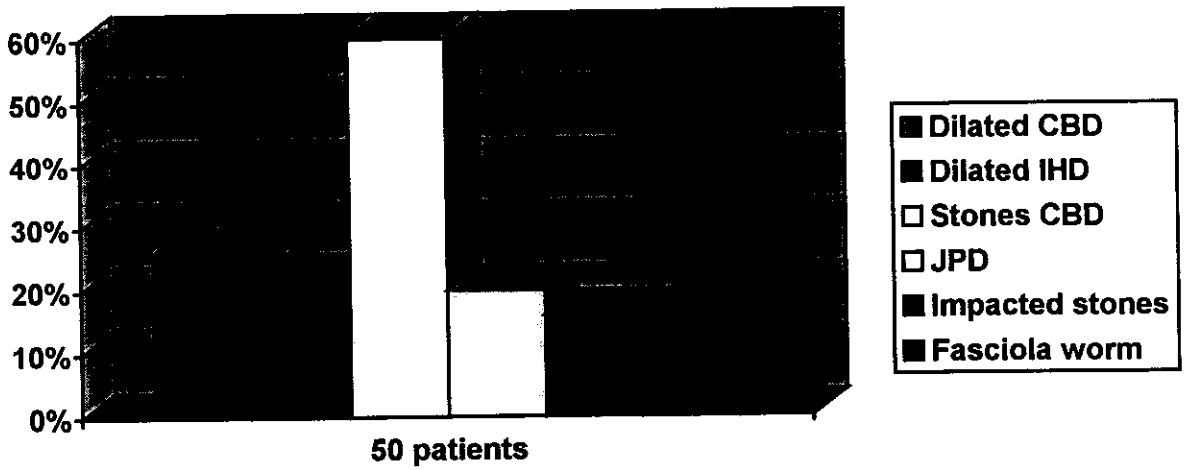

Fig.(32) : ERCP findings in all patients .

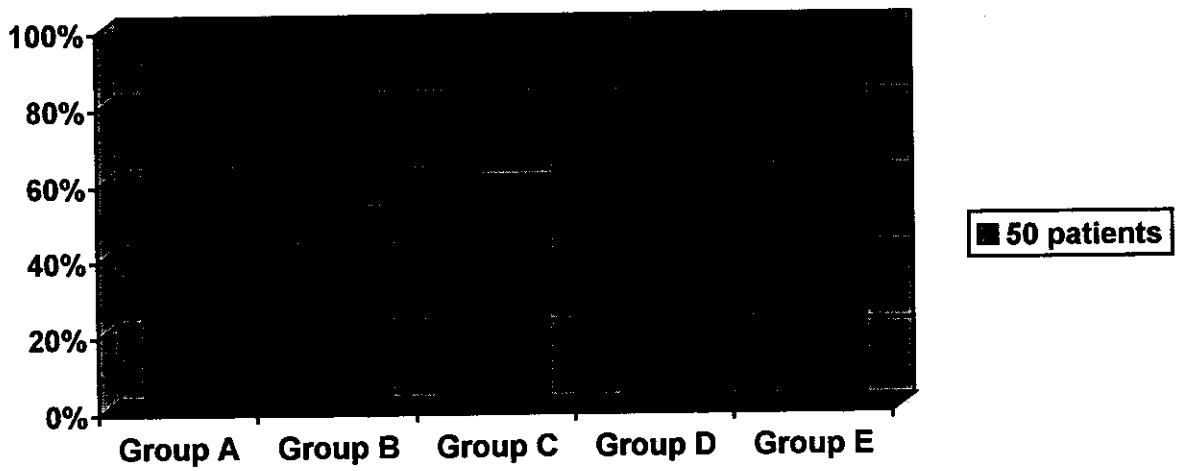

Fig.(33) : Illustration of common bile duct stones according to group by risk factors .

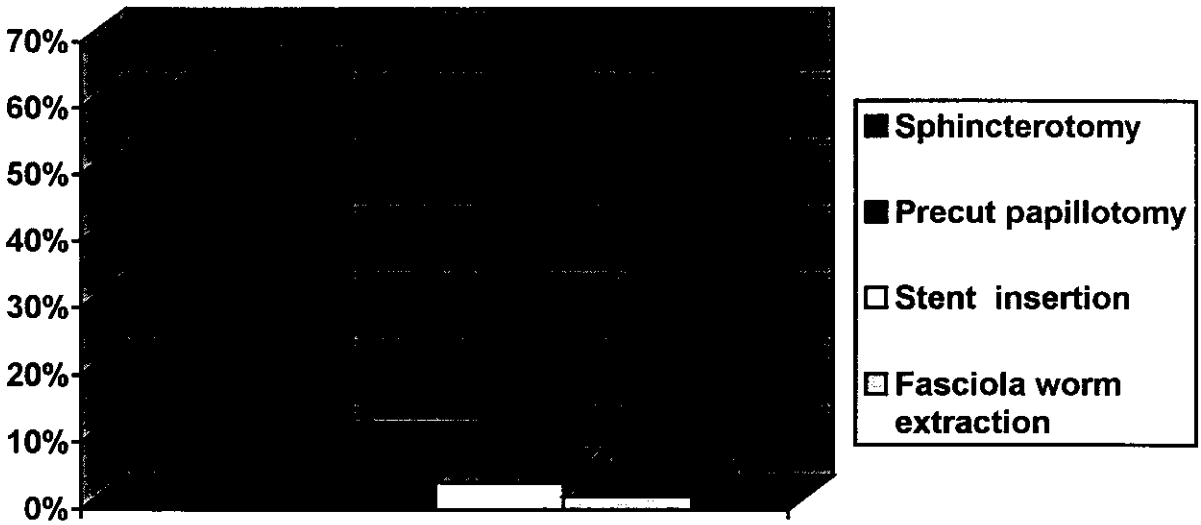

Fig.(34) : Percent of ERCP manipulations to all patients .

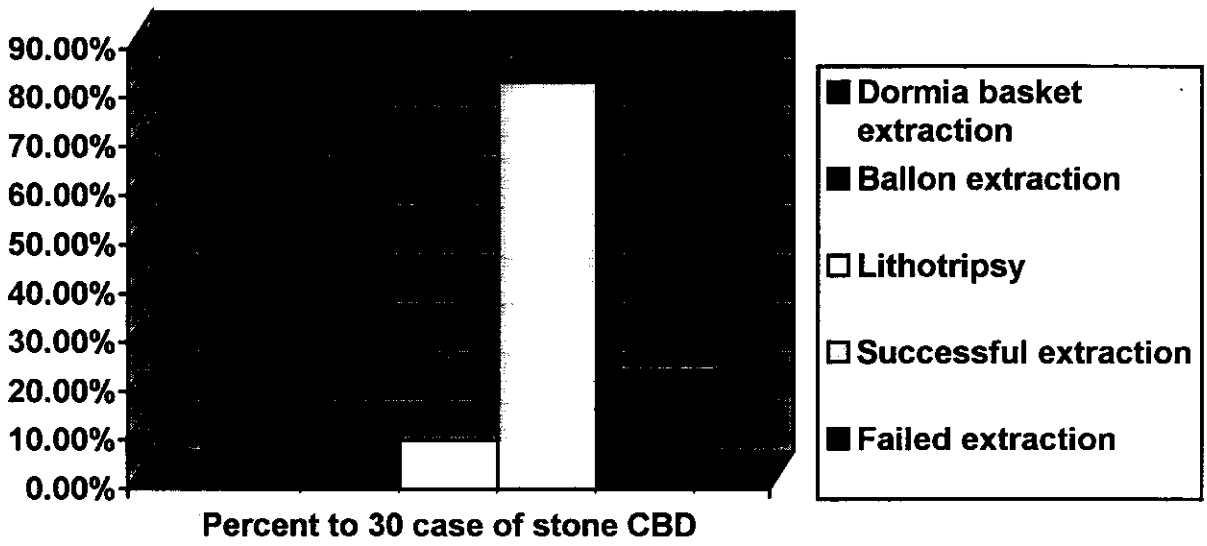

Fig.(35) : ERCP therapy for stones common bile duct (Total of 30 cases)

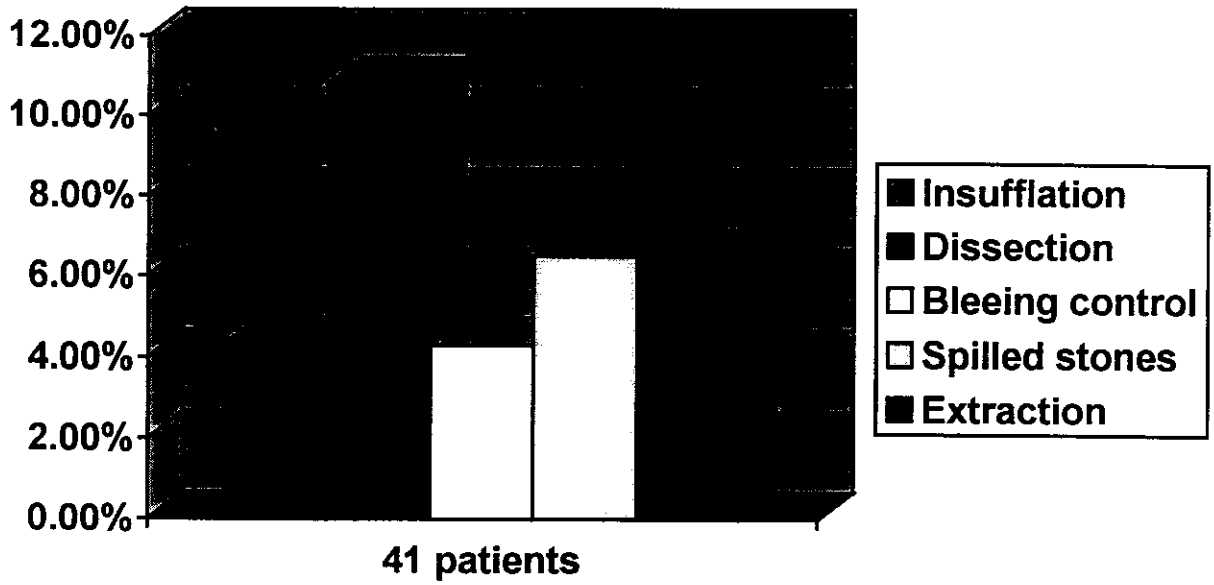

Fig.(36) : Difficulties during laparoscopic cholecystectomy .

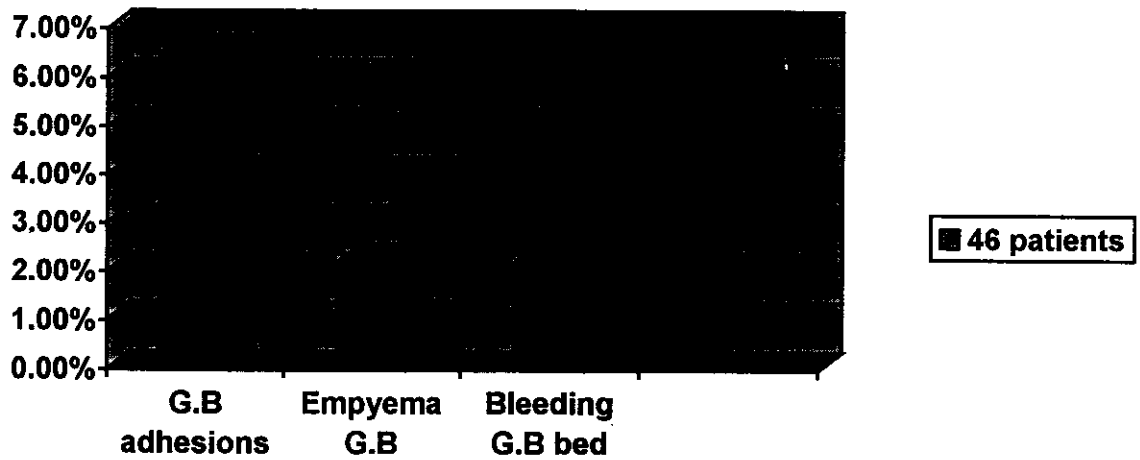

Fig.(37) : Reasons for conversion of laparoscopic cholecystectomy to open surgery .

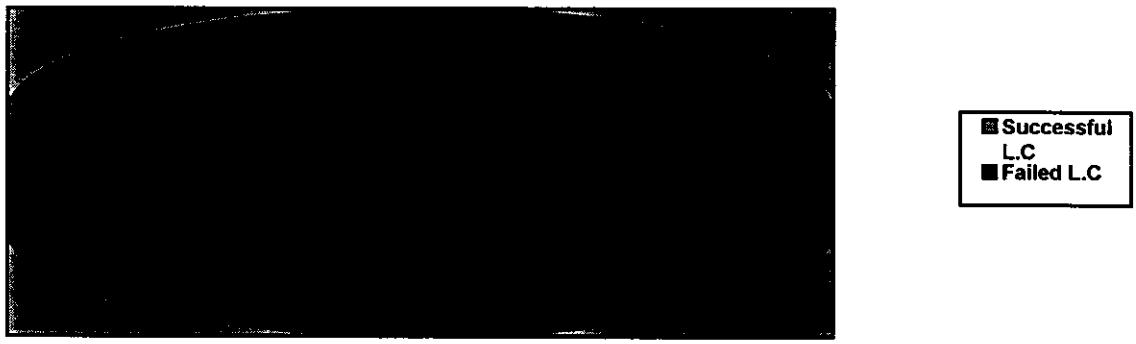

Fig. (38) : Success & failure of laparoscopic cholecystectomy .

Fig.(39) : Success & failure of duct clearance by E.R.C.P.