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Needlescopic Cholecystectomy

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Abstract **From June 1996 to May 1997, thirty five cases of gallbladder dieases successfully underwent needlescopic cholecystectomy. There were 30 cases of cholelithiasis, 5 cases of acute calculous cholecystitis. Their ages ranged from 19 - 81 years. The mean operative time was 68.1 minutes (range 35 - 180 minutes). The mean hospital stay was 2.1 days. Patients were able to return to their normal activity in the average of 7.9 days. Only three cases of acute cholecystitis required pain medication on the first postoperative day. The surgical wounds of epigastric port and the two lateral ports were so small and hardly noticeable. Needlescopic cholecystectomy is another minimally invasive technique for laparoscopic cholecystectomy with much less scar and less tissue trauma.**

The first success in laparoscopic cholecystectomy was performed by a French surgeon, Dr. Phillipe Mouret, in 1987.[1,2] Since then, laparoscopic cholecystectomy has been worldwide accepted as the gold standard of treatment for symptomatic cholelithiasis even in acute cholecystitis,[1-7] because of reduced operative trauma, shorter recovery, diminished postoperative pain and shorter hospital stay. Today more than 80 per cent of patients with gallstone disease are treated laparoscopically.[8] The procedure has been shown to be safe and effective in experienced hands. Inspite of minimally invasive nature of the "classic" four-trocar technique of laparoscopic cholecystectomy, various techniques of laparoscopic cholecystectomy have been tried for the purpose of even less postoperative pain, less scar, as well as decreasing cost.

The three-trocar technique was introduced by Dr. Schwartzman in 1995 to minimize the risk of trocar site herniation, furthermore to improve the cosmetic result and to decrease the cost.[9,10]

The development of small size of instruments in the laparoscopic surgery has begun since 1995. The introduction of minilaparoscopy or the so-called "needlescopy" into surgery was first in the form of diagnostic procedure and adhesiolysis by gynaecologists.[11] The technique of needlescopic cholecystectomy was described by an American surgeon, Dr. Steve Eubanks, from Duke University Medical Centre in 1996. The objectives of this procedure are to gain the advantages of being least tissue trauma leading to least postoperative pain, minimal risk of trocar site hemiation, least scar as 14 gauge needle hole, shortest hospital stay and earliest recovery and reducing the cost of procedure.

Needlescopic cholecystectomy has not been performed in Thailand prior to this study. The objectives of this study are to discuss the operative procedures and to compare the benefits and results with other series in the literature.

Materials and Methods

Randomized prospective trial of 35 cases of needlescopic cholecystectomy were successfully performed during June 1996 - May 1997. There were 30 cases of cholelithiasis and 5 cases of acute calculous

cholecystitis. Their ages ranged from 19-81 years. All of the cases were diagnosed preoperatively by ultrasonography.

Operative technique

Preoperative work-up of the patients was not different from cases of conventional laparoscopic cholecystectomy. One gram of cefoxitin was given routinely at induction of anesthesia.

Position of the ports

The operation was performed under general anesthesia through 4 trocar-ports. The first 10 mm Hanson's trocar was inserted at the umbilicus as an open technique for introducing a 10 mm laparoscope, the endoclip applier and for removal of the gallbladder at the end of the procedure.

The two right subcostal ports using 2 mm. ports, as 14 gauge needle, were inserted at the right midclavicular and right anterior axillary line respectively for the 14 gauge grasping forceps.

The epigastric port using 3 mm port was inserted at 3 cm below the xiphoid process for working channel and introducing the 3 mm laparoscope during application of clips to the cystic duct and artery and for visualization of gallbladder during its extraction via the umbilical port.

Procedure

A 14 gauge grasper forceps was introduced through the right anterior axillary port. Its use is to grasp the fundus of the gallbladder and lifting it in a lateral direction with backward rolling to expose the subhepatic pouch. A second 14 gauge grasper forceps was inserted through the right midclavicular port to help grasping the neck of the gallbladder already lifted upwards and anteriorly (Figure 1A).

A 14 gauge monopolar scapel probe was intro-

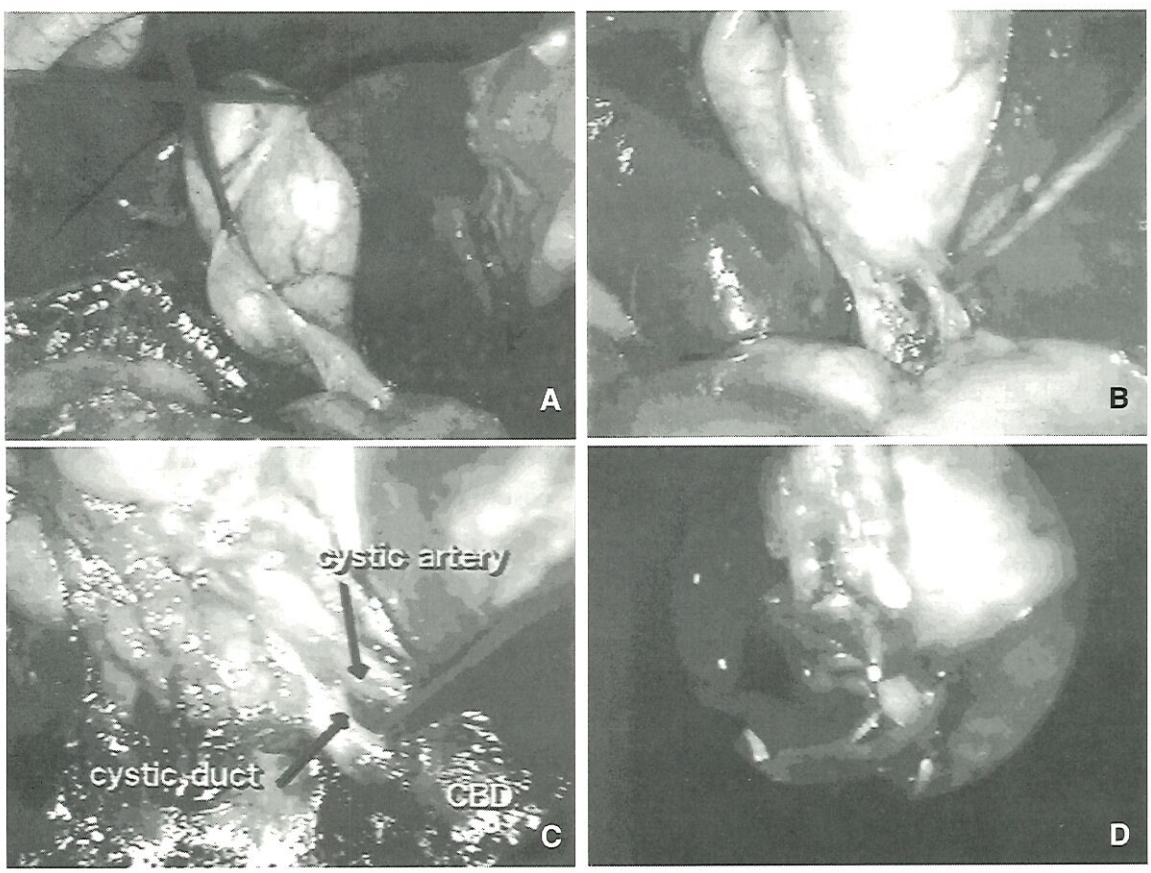

Fig. 2 A. The 14 gauge graspers are applied to the fundus and the neck of gallbladder.
B. Opening the superior and inferior leaf of the Calot's triangle.
C. Dissection of the cystic duct and artery.
D. Double clipping placed at proximal end of the cystic artery and duct.

duced through the 3 mm epigastric port. Dissection of the cystic duct and cystic artery started with an opening made through the visceral peritoneum along the Calot's triangle (Figure 1B). Further dissection to isolate these two important structures was carefully made with the use of an atraumatic grasper. They were individually doubly clipped and divided under direct vision through the laparoscope. Removal of the gallbladder from the gallbladder bed was achieved with the use of the monopolar scalpel probe. Bleeders in the gallbladder bed were coagulated and the gallbladder specimen was delivered via the 10 mm umbilical port under direct vision of the 3 mm laparoscope through the epigastric port.

Results

Out of 35 patients, 30 cases were operated for chronic cholecystitis and cholelithiasis. The other 5 cases were for acute cholecystitis. The mean operative time was 55 minutes (ranging 35-120 minutes) for the chronic cholecystitis and cholelithiasis. For acute cholecystitis the mean operative time was 129 minutes (ranging 90-180 minutes). The overall mean operative time was 68 minutes.

The overall mean hospital stay was 2.1 days. The mean hospital stay was 1.8 days in the chronic cholecystitis and cholelithiasis and 3.4 days for the acute cholecystitis (Table 2). The mean duration for returning to normal activity was 7.3 days for chronic cholecystitis and cholelithiasis, 11.6 days for acute cholecystitis and 7.97 days for the total 35 cases.

Table 1 Operative time.

	Cholelithiasis	Ac. Cholecystitis
Range	35-120 min.	90-180 min.
Mean (X)	55 min.	129 min.

Overall operative time = 68.1 min.

Table 2 The length of the hospital stay.

	Cholelithiasis	Ac. Cholecystitis
Range	1-3 d	2-5 d
Mean (X)	1.8 d	3.4 d

Overall hospital stay = 68.1 days.

All patients were able to take liquid diet in the evening of the day of operation and soft diet on the following day. Only three cases of the acute cholecystitis group required one injection of pain medication (100 mg Tramadol) on the first postoperative day. The surgical wounds were very small and the scars were hardly noticeable except the 10 mm umbilical wound. None of the 35 cases required conversion to open surgery and all recovered well without any postoperative complication.

Discussion

This initial experience demonstrated that needlescopic cholecystectomy holds the promise of minimal tissue trauma, lessen the risk of trocar site herniation and providing good cosmetic result. Several authors had reported no difference in the operative time, hospital stay and the duration of returning to normal activity (Table 3) which were also true in our series. In term of less postoperative pain and cost reduction, further comparative studies in a larger series of patient are needed.

Table 3 Time of returning to normal activity.

	Cholelithiasis	Ac. Cholecystitis
Range	7-10 d	10-14 d
Mean (X)	7.3 d	11.6 d

Overall = 7.97 days.

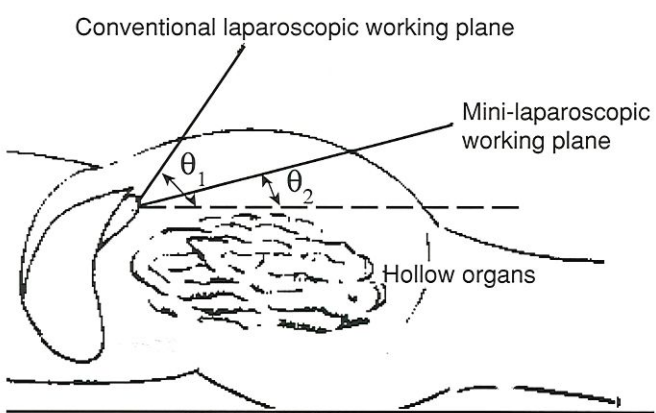

Fig. 4 During clipping and dividing cystic duct and artery, the working angle (θ_2) is smaller than the working angle (θ_1) in conventional laparoscopic cholecystectomy.

Table 4 Published series dealing with Standard LC, Mini-laparoscopic cholecystectomy.

Series	No. of patiente	Procedures	Mean operative time (minutes)	Mean hospital stay (days)	Return to normal activity (days)
Zucker et al.[3]	100	Standard LC	98 (range 35 to 168)	1	7
Bailey et al.[5]	375	Standard LC	-	1.3	7
Cuschieri et al.[2]	1236	Standard LC	50 (range 30 to 90)	3 (range 1 to 27)	11 (range 7 to 42)
Nathason et al.[1]	60	Standard LC	120 (range 65 to 210)	3 (range 1 to 9)	11 (range 6 to 30)
Slim et al.[9]	710	Three trocar technique	45 (range 17 to 180)	3.8 (range 3 to 7)	-
Jones et al.[12]	36	Standard LC	83 (range 39 to 158)	1 (range 1 to 4)	10 (range 3 to 14)
Yuan et al.[11]	14	Mini-Laparoscopic cholecystectomy	range 60.83 to 97.75	range 1.16 to 1.70	-
Davides et al.[13]	8	Micropuncture LC	80 (range 50 to 100)	1	-

The problem of needlescopic cholecystectomy is the small diameter instruments. They may be easily broken if not being carefully handled. The working angle during clipping and dividing the cystic duct and artery via the umbilical port is smaller and closer to the bowels as compared with the working angle in conventional laparoscopic operation (Figure 2). Therefore, it is important to carefully observe and avoid inadvertent hollow organ injury during this procedure.

The small diameter scope still can not provide satisfactory sharp image at the present time. We hope that further innovation and development of these small instruments and laparoscope would solve these problems in the very near future.

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