

**Muscle Sparing vs. Non Muscle Sparing in Open Cholecystectomy:  
Does it offer an advantage?**

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## **Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 1**

### **Abstract**

**Objective:** To compare open cholecystectomy through a right subcostal incision (Kocher's incision) with muscle sparing and right subcostal incision (Kocher's incision) without muscle sparing in terms of post operative pain, duration of operation, length of hospital stay and morbidity

**Methods:** Prospective randomized clinical trial. Includes patients who underwent cholecystectomy from February 1, 2007 to August 31, 2007 who fulfill the inclusion criteria

**Results:** Open cholecystectomy with muscle sparing have significant advantages over open cholecystectomy without muscle sparing in terms of post operative pain and duration of operation.

**Conclusion:** Muscle sparing open Cholecystectomy is another option to offer to patients who elect to undergo open cholecystectomy with less pain and shorter hospital stay.

**Keywords:** cholecystectomy, muscle sparing

## **Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 2**

### **Introduction**

At Ospital ng Maynila Medical Center, a significant number of cholecystectomies are being performed. Cholecystectomies ranked 4<sup>th</sup> in the tally of operations for 2005 and 6<sup>th</sup> in 2006.

The lack of facilities and training in laparoscopic techniques has limited operative options to open cholecystectomies. Minimally invasive surgeries have yet to be introduced as part of the armamentarium of the residents.

Faced with the limited options in the performance of cholecystectomy, we are now faced with the dilemma of providing the most beneficial technique for open cholecystectomy in terms of post operative pain, duration of operation, length of hospital stay, and post operative morbidity.

To limit the scope of the study we can divide the operative techniques into two (2) general categories, (a) those considered as muscle sparing techniques and (b) those without muscle sparing.

When the right rectus muscle of the abdominal wall is not cut in order to provide exposure, the technique is classified as muscle sparing subcostal incision.

When the right rectus muscle of the abdominal wall is cut in order to provide exposure, the technique is classified as non muscle sparing subcosta; incision.

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Since the predominant incision employed is the right subcostal incision, we will be comparing the right subcostal incision with muscle sparing and the right subcostal incision without muscle sparing.

These different techniques can be compared in terms of post operative pain, duration of operation, length of hospital stay and post-operative morbidity.

Literature review yielded little regarding open cholecystectomy with muscle sparing, nor were there any articles comparing open cholecystectomy with muscle sparing versus open cholecystectomy without muscle sparing.

Other papers show a comparable morbidity rate for open versus laparoscopic cholecystectomy. With a significant number of laparoscopic cholecystectomies being converted to open cholecystectomy. (2)

A study by Assalia in 1993 proved that open cholecystectomy with small incision or mini cholecystectomy is better than conventional cholecystectomy in terms of analgesic requirement, hospital stay and return to normal activity.(3)(4)

Open cholecystectomy has its drawbacks and newer techniques promise to alleviate these drawbacks. The evidence of improvement in technique with the advent of mini cholecystectomy illustrates the fact that we can innovate or improve on open cholecystectomy without resorting to laparoscopy.

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### ***General Objective***

This objective of this study is to compare open cholecystectomy through a right subcostal incision (Kocher's incision) with muscle sparing and right subcostal incision (Kocher's incision) without muscle sparing.

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### ***Specific Objectives***

Comparison of the two (2) techniques in terms of:

- post operative pain
- operative time
- length of hospital stay
- post-operative morbidity

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### ***Methods***

This will be a prospective randomized clinical trial. Randomization will be thru the use of a table of random numbers. Patients will be informed of the ongoing study. Informed consent will be obtained.

There will be two (2) treatment arms:

- (1) Group A: open cholecystectomy through a right subcostal incision (Kocher's incision) with rectus muscle sparing and;
- (2) Group B: open cholecystectomy right subcostal incision (Kocher's incision) with rectus muscle transection.

This will be a single blinded study. The patients will not be informed of which part of the study they randomized into.

Operative techniques for both arms will be standardized. A prescribed operative technique will be made available (Appendix A, B). All residents performing cholecystectomies will be oriented and trained to do the prescribed technique during the duration of the study.

Follow up will be done on the first and second post-operative days and one week post operatively. A standardized follow up data sheet will be provided.

For data analysis, version thirteen of the software, Statistical Package for the Social Sciences (SPSS) was used. T-test was used to analyze the data collected for this study.

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### ***Outcome***

Results of the study will be based on the following outcome variables:

- a) post operative pain
- b) operative time
- c) length of hospital stay
- d) post-operative morbidity



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### **Inclusion Criteria**

All patients diagnosed with cholecystolithiasis from February 1, 2007 up to August 31, 2007 will be included in the study.

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### **Exclusion Criteria**

- Patients with acute cholecystitis
- Patients with choledocholithiasis
- Patients with signs of obstructive jaundice
- Patients with co-morbid conditions
- Morbidly obese patients

### **Results**

For the period of February 1, 2007 up to August 31, 2007, there were a total of 63 patients included in the study. The youngest patient was a nineteen years old female and the oldest was a seventy-nine year old female. Majority of the patients belong to the forty to forty-nine age group. There were nineteen male patients and forty-four female patients accrued for this study. (Table 1)

The mean age for this study is at 43.06. Median age is at forty-two years old. Overall, the age range of the study was sixty years. (Figure 1)

For both groups, the mean pain score at day 1 is 6.7. At the second day, the mean pain score is at 5.8. At one week post operatively, the mean pain score is at 1.8. (Table 2)

On the first post operative day, the range of the recorded pain scores was from five to eight. For Group A and Group B majority of the patients claimed to have a pain score of seven. (Table 3)

On the second post operative day, the range of the recorded pain scores was from four to seven. For Group A, an equal number of patients claimed to have pain scores of five and six. On the other hand, most Group B patients have a pain score of 6. (Table 4)

One week post operatively, the range of pain scores was from one to three. For Group A, most patients claimed to have a pain score of one while for Group B patients the predominant pain score was two. (Table 5)

Overall, the operating time ranged from as short as a thirty minute operation to as long as three hundred twenty minutes (five hours and thirty three

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minutes approximately). The average operating time for all the patients is at one hundred eight minutes. (Table 6) For Group A the average operating time is ninety four minutes. For Group B the average operating time is one hundred nineteen minutes. (Table 7)

The average length of hospital stay for all the patients is at four days. (Table 6) For Group A patients the mean is at 4.7 days while for Group B it is at 3.8 days. (Table 7)

Body Mass Index (BMI) on the average, was at  $22.9 \text{ kg/m}^2$  for the whole population. (Table 6) Separately the mean BMI for Group A is at  $22.77 \text{ kg/m}^2$  while for Group B it is at  $23.03 \text{ kg/m}^2$ . (Table 7)

There were no recorded morbidities for the duration of the study.

Using the student's t-test (Table 8), with the alpha error set at 0.05, we can see that pain on the first post-operative day is significantly lower (p-value = 0.00) for Group A compared to Group B. Pain on the second post-operative day was also significantly lower (p-value = 0.00) for Group A. One week post-operatively, the difference on the pain experienced by the patient was still significantly lower for Group A. (p-value=0.006)

The length of the operation was also statistically in favor of Group A. (p-value = 0.017). The difference in length of hospital stay was also statistically significant. We can see that it is significant for Group B. (p-value = 0.044)

Body Mass Index did not play a significant part in the operation for both Group A and B. (p-value = 0.806).

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Since the probability value is less than the set  $\alpha=0.05$ , we have enough evidence to conclude that the two treatment groups are significantly different from each other in terms of pain, length of operation and length of hospital stay. However there is no significant difference in terms of Body Mass Index.

### **Conclusion**

In this study, open cholecystectomy with muscle sparing has shown its advantage over open cholecystectomy without muscle sparing. Post operative pain has been significantly better for patients who underwent open cholecystectomy with muscle sparing. There was also significant difference in terms of operative time in favor of the same group.

Length of hospital stay was statistically in favor for those who underwent cholecystectomy without muscle sparing. The fact that there is no significant difference for patients in terms of Body Mass Index means that open cholecystectomy is a viable option for patients scheduled for open cholecystectomy.

### **References:**

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Tables



## Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 16

***Table 1. Age and Sex Distribution of Both groups.***

	Sex		Age						
	Male	Female	<19	20-29	30-39	40-49	50-59	60-69	>70
Group A	9	18	0	6	7	7	4	1	2
Group B	10	26	1	4	8	13	6	4	0
TOTAL	19	44	1	10	15	20	10	5	2

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**Table 2. Pain Scores.**

		<i>Pain on Day 1</i>	<i>Pain on Day 2</i>	<i>Pain on Week 1</i>
<i>N</i>	<i>Valid</i>	63	63	63
	<i>Missing</i>	1	1	1
<i>Mean</i>		6.7302	5.8413	1.8095
<i>Median</i>		7.0000	6.0000	2.0000
<i>Mode</i>		7.00	6.00	2.00
<i>Std. Deviation</i>		.78712	.80735	.73741
<i>Range</i>		3.00	3.00	2.00
<i>Minimum</i>		5.00	4.00	1.00
<i>Maximum</i>		8.00	7.00	3.00

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**Table 3. Pain score on day 1.**

		<i>Pain on Day 1</i>				<i>Total</i>
<i>Group</i>	<i>Group A</i>	<i>5.00</i>	<i>6.00</i>	<i>7.00</i>	<i>8.00</i>	
	<i>Group B</i>					
		5	10	12	0	27
		0	5	23	8	36
<i>Total</i>		5	15	35	8	63

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**Table 4. Pain score on day 2.**

		<i>Pain on Day 2</i>				<i>Total</i>
<i>Group</i>	<i>Group A</i>	<i>4.00</i>	<i>5.00</i>	<i>6.00</i>	<i>7.00</i>	
	<i>Group B</i>					
		3	12	12	0	27
		0	5	18	13	36
<i>Total</i>		3	17	30	13	63

## Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 20

**Table 5. Pain score on week 1.**

		<i>Pain on Week 1</i>			<i>Total</i>
<i>Group</i>	<i>Group A</i>	<i>1.00</i>	<i>2.00</i>	<i>3.00</i>	
	<i>Group B</i>				
		15	10	2	27
		9	17	10	36
<i>Total</i>		24	27	12	63

**Table 6. Overall Operating time, Length of hospital stay and Body Mass Index**

		<i>Duration of Operation</i>	<i>Length of Hospital Stay</i>	<i>Body Mass Index</i>
<b><i>N</i></b>	<b><i>Valid</i></b>	63	63	63
	<b><i>Missing</i></b>	1	1	1
<b><i>Mean</i></b>		108.5238	4.2222	22.9254
<b><i>Median</i></b>		105.0000	4.0000	23.1125
<b><i>Mode</i></b>		80.00	3.00	20.97
<b><i>Std. Deviation</i></b>		42.35596	1.65046	4.09263
<b><i>Range</i></b>		290.00	8.00	22.98
<b><i>Minimum</i></b>		30.00	1.00	9.27
<b><i>Maximum</i></b>		320.00	9.00	32.25

**Table 7. Operating time, Length of hospital stay and Body Mass Index (Groups A and B) with standard deviation**

		<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
<b>Body Mass Index</b>	<b>Group A</b>	27	22.7776	3.70284	.71261
	<b>Group B</b>	36	23.0362	4.41089	.73515
<b>Duration of Operation</b>	<b>Group A</b>	27	94.0000	32.13792	6.18495
	<b>Group B</b>	36	119.4167	46.10818	7.68470
<b>Length of Hospital Stay</b>	<b>Group A</b>	27	4.7037	1.87729	.36128
	<b>Group B</b>	36	3.8611	1.37639	.22940

**Table 8. T-test (Independent Samples Test)**

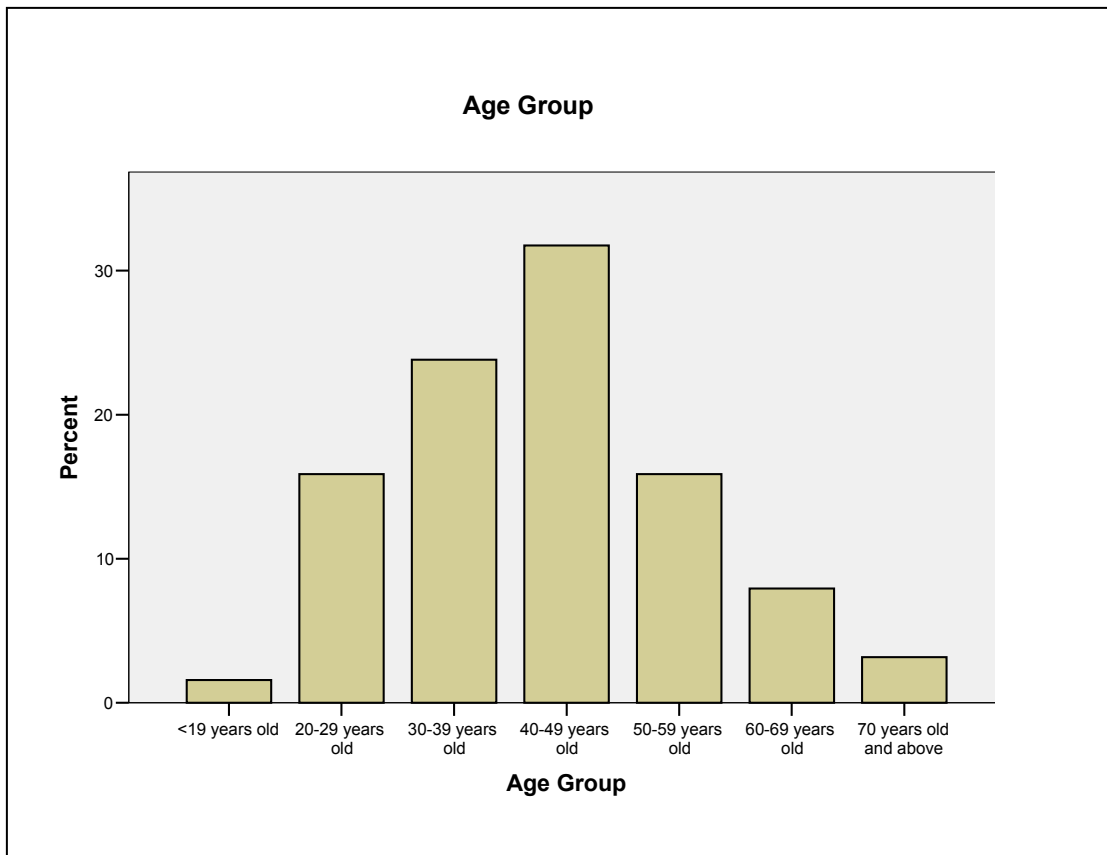
		<i>Levene's Test for Equality of Variances</i>		<i>t-test for Equality of Means</i>						
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2- tailed)</i>	<i>Mean Difference</i>	<i>Std. Error Difference</i>	<i>95% Confidence Interval of the Difference</i>	
									<i>Lower</i>	<i>Upper</i>
<b><i>Pain on Day 1</i></b>	<b><i>Equal variances assumed</i></b>	5.784	.019	-4.783	61	.000	-.82407	.17229	-1.16858	-.47957
	<b><i>Equal variances not assumed</i></b>			-4.625	48.182	.000	-.82407	.17819	-1.18231	-.46584
<b><i>Pain on Day 2</i></b>	<b><i>Equal variances assumed</i></b>	.121	.729	-5.133	61	.000	-.88889	.17317	-1.23516	-.54262
	<b><i>Equal variances not assumed</i></b>			-5.135	56.222	.000	-.88889	.17311	-1.23565	-.54213
<b><i>Pain on Week 1</i></b>	<b><i>Equal variances assumed</i></b>	.119	.731	-2.866	61	.006	-.50926	.17768	-.86456	-.15396
	<b><i>Equal variances not assumed</i></b>			-2.923	59.528	.005	-.50926	.17423	-.85784	-.16068
<b><i>Body Mass Index</i></b>	<b><i>Equal variances assumed</i></b>	1.438	.235	-.246	61	.806	-.25853	1.04992	-2.35797	1.84091
	<b><i>Equal variances not assumed</i></b>			-.253	60.166	.802	-.25853	1.02385	-2.30641	1.78935
<b><i>Duration of Operation</i></b>	<b><i>Equal variances assumed</i></b>	.433	.513	-2.450	61	.017	-25.41667	10.37283	-	-4.67492
	<b><i>Equal variances not assumed</i></b>			-2.577	60.728	.012	-25.41667	9.86449	46.15841 -	-5.68962
<b><i>Length of Hospital Stay</i></b>	<b><i>Equal variances assumed</i></b>	2.767	.101	2.057	61	.044	.84259	.40965	.02345	1.66174
	<b><i>Equal variances not assumed</i></b>			1.969	45.675	.055	.84259	.42796	45.14372 -.01901	1.70420



## Figures

## Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 1

**Figure 1. Age distribution.**



## **Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 2**

### **Appendices**

## **Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 3**

### **Appendix A Operative Technique for Group A**

- Patient supine under General Anesthesia
- Asepsis- Antisepsis techniques observed
- Sterile drapes placed
- Right Kocher incision done on the skin carried and down to the subcutaneous tissue
- Anterior rectus sheath cut and opened
- Rectus abdominis muscle dissected free from its tendinous insertions using electrocautery
- Rectus abdominis muscle retracted laterally
- Posterior rectus sheath cut; Peritoneum identified cut and entered
- Gallbladder identified
- Intra op findings noted;
- Gallbladder grasped with forceps and retracted laterally
- Common bile duct palpated for stones
- Pancreas palpated
- Sharp and blunt dissection on the peritoneum overlying the Calot's triangle done
- Cystic artery identified, clamped and suture ligated.
- Peritoneum overlying the fundus of the gallbladder cut
- Dissection of the gallbladder from the liver bed carried down to peritoneal reflection overlying the Calot's triangle
- Identify the common bile duct/cystic duct junction
- Cystic duct identified, clamped and suture ligated.
- Gallbladder removed
- HEMOSTASIS
- Layer by Layer closure
- Peritoneum and posterior rectus sheath closed with continuous interlocking using vicryl 0
- Anterior rectus sheath closed with continuous running sutures using vicryl 0
- Subcutaneous closed using chromic 3-0
- Skin closed with subcuticular sutures using vicryl 4-0
- Dry sterile dressing placed

## **Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 4**

### **Appendix B Operative Technique for Group B**

- Patient supine under General Anesthesia
- Asepsis- Antisepsis techniques observed
- Sterile drapes placed
- Right Kocher incision done on the skin carried and down to the subcutaneous tissue
- Anterior rectus sheath cut and opened Rectus abdominis muscle divided with electrocautery
- Posterior rectus sheath cut; Peritoneum identified cut and entered
- Gallbladder identified
- Intra op findings noted;
- Gallbladder grasped with forceps and retracted laterally
- Common bile duct palpated for stones
- Pancreas palpated
- Sharp and blunt dissection on the peritoneum overlying the Calot's triangle done
- Cystic artery identified, clamped and suture ligated.
- Peritoneum overlying the fundus of the gallbladder cut
- Dissection of the gallbladder from the liver bed carried down to peritoneal reflection overlying the Calot's triangle
- Identify the common bile duct/cystic duct junction
- Cystic duct identified, clamped and suture ligated.
- Gallbladder removed
- HEMOSTASIS
- Layer by Layer closure
- Peritoneum and posterior rectus sheath closed with continuous interlocking using vicryl 0
- Anterior rectus sheath closed with continuous running sutures using viryl o
- Subcutaneous opposed using chromic 3-0
- Skin closed with subcuticular sutures using vicryl 4-0
- Dry sterile dressing placed

## Cholecystectomy: Muscle Sparing vs. Muscle Cutting - 5

### Appendix C

#### Patient Data Form

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Hospital Number: \_\_\_\_\_

Preoperative Diagnosis: \_\_\_\_\_

Procedure Done: \_\_\_\_\_

Postoperative Diagnosis: \_\_\_\_\_

Date of Admission: \_\_\_\_\_

Date of Discharge: \_\_\_\_\_ Length of Hospital Stay \_\_\_\_\_ (days)

Date of Operation: \_\_\_\_\_

Length of Operation: \_\_\_\_\_ (hours) \_\_\_\_\_ (minutes)

Surgeon (Consultant/Resident): \_\_\_\_\_

Pain Score:

Day 1:            ←   0   1   2   3   4   5   6   7   8   9   10   →

Day 2:            ←   0   1   2   3   4   5   6   7   8   9   10   →

1 week:           ←   0   1   2   3   4   5   6   7   8   9   10   →

Morbidity:

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Remarks:

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