

Original Research Article

**“A COMPARATIVE STUDY BETWEEN FRENCH AND AMERICAN APPROACH TO LAPAROSCOPIC CHOLECYSTECTOMY”**

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**ABSTRACT:**

**Background:**The laparoscopic cholecystectomy is now unquestionably the “gold standard” for the surgical treatment of gallbladder diseases. Even some conditions that were once considered absolute contraindications to laparoscopic cholecystectomy, such as Mirizzi's syndrome and situs visceruminversus<sup>1-3</sup>, can now be treated with laparoscopy, limiting open surgery to a small number of cases, with mini laparotomic techniques used in some cases<sup>4</sup>.

**AIM:**To assess the efficacy of French and American methods of laparoscopic cholecystectomy and to find the better option in terms of surgeon's ergonomics and their satisfaction among French and American methods of laparoscopic cholecystectomy

**Material & Methods: Study Design:** A prospective comparative study. **Study area:** The study was done at surgery department, Subbaiah Institute of Medical Sciences, Shimoga.**Study Period:**June 2021 – Dec.2021. **Study population:** Patients attending outpatient and inpatient department of General surgery with gallbladder stones during the study period were included in the study.**Sample size:** 50 cases were included in our study.**Study tools and Data collection procedure:** Patients attending the outpatient and inpatient department of general surgery with gall bladder stones were included in the study. The individual participants were explained about the study and they were also assured that,their identity would be kept strictly confidential and they have the option to refuse participation in the study at any time. **Data analysis:**The data was entered in excel sheet and analyzed using SPSS (Version 20). Descriptive statistics with mean, standard deviation and proportions (%) were calculated for quantitative variables. To test the hypothesis Chi Square test and independent sample t tests were used. p value <0.05 was considered as statistically significant.

**Results:** In this current study the mean operative time for surgical procedure was recorded as 69.5±19.5 mins in American approach and 60.1±8.6mins in French approach, the difference between both the approaches was statistically significant for mean operative time (p value 0.0323).

**CONCLUSION:** Thus from this study, we infer that French approach is comparatively better than American approach both in terms of efficacy of the procedure and on ergonomic grounds of the surgeons.

**Key words:** laparoscopic cholecystectomy, French and American methods of laparoscopic cholecystectomy, ergonomic

## **INTRODUCTION:**

The laparoscopic cholecystectomy is now unquestionably the “gold standard” for the surgical treatment of gallbladder diseases. Even some conditions that were once considered absolute contraindications to laparoscopic cholecystectomy, such as Mirizzi's syndrome and situs viscerum inversus<sup>1-3</sup>, can now be treated with laparoscopy, limiting open surgery to a small number of cases, with mini laparotomic techniques used in some cases<sup>4</sup>.

The “French technique” and the “American technique” are two approaches to laparoscopic cholecystectomy that are widely used. Only the location of the ports and the surgeon's position (between the patient's legs in the “French” approach and on the left side in the “American” approach) differ between the two approaches. However, another thought is that “French” method causes less pulmonary function impairment but is associated with more postoperative pain.

The majority of them are focused on improving operating room working conditions and, as a result, increasing productivity. One of the most serious issues is the inadequacy of laparoscopic instrument handle designs<sup>5</sup>. Another major issue arises when performing surgery via a monitor, which is primarily due to the monitor's non-ergonomic positioning<sup>6</sup>.

The table height is frequently insufficient to accommodate the longer instruments used in video endoscopic surgery<sup>7</sup>. Furthermore, the video endoscopic surgery room is crowded with the equipment in use, leaving the team with a small working area. As a result, the surgical team's efficiency suffers, as well as their physical and mental health<sup>8</sup>. Despite this, open surgery operating rooms continue to be designed. Hence this study was conducted to assess the efficacy of French and American methods of laparoscopic cholecystectomy and also to find the impact of these two techniques on surgeon's ergonomics and their satisfaction.

**AIM:** To assess the efficacy of French and American methods of laparoscopic cholecystectomy and to find the better option in terms of surgeon's ergonomics and their satisfaction among French and American methods of laparoscopic cholecystectomy

## **Material & Methods:**

**Study Design:** A prospective comparative study.

**Study area:** The study was done at surgery department, Subbaiah Institute of Medical Sciences, Shimoga.

**Study Period:** June 2021 – Dec. 2021.

**Study population:** Patients attending outpatient and inpatient department of General surgery with gallbladder stones during the study period were included in the study.

**Sample size:** 50 cases were included in our study.

Based on literature, considering the proportion of surgeon's satisfaction as 50% and 75% for American and French techniques of laparoscopic cholecystectomy with power of 80% and level of significance of 5%, the calculated sample size was found to be 50. Hence a total

of fifty patients with gall bladder stones above the age of 18 years were included in the study and among them twenty five cases were assigned to American approach group and another twenty five cases were assigned to French approach group

**Sampling method:** Simple Random sampling method.

**Inclusion Criteria:** Cases with gall bladder stones, Cases aged more than 18

**Exclusion criteria:**

Cases with

- Common bile duct stones
- Recurrent cholecystitis
- Empyema
- Suspected gall bladder carcinoma were excluded from the study.

**Ethical consideration:** Institutional Ethical committee permission was taken prior to the commencement of the study.

**Study tools and Data collection procedure:**

Patients attending the outpatient and inpatient department of general surgery with gall bladder stones were included in the study. The individual participants were explained about the study and they were also assured that, their identity would be kept strictly confidential and they have the option to refuse participation in the study at any time.

Written informed consent was obtained from the study participants prior to the interview. Both the English and Telugu formats of the Informed consent are enclosed in Annexures. After taking the written informed consent, participants were allocated into two groups for surgery either to American approach group or French approach group. Both the groups were assessed for the demographic and clinical presentation by the principal investigator using a pre structured proforma. Following which the principal investigator assessed the detailed history of the participants and clinically examined the patients.

Based on the group allotted cases in American approach group for surgery were made in supine position with surgeon and first assistant standing to his left and the monitor placed on the right side of the patient whereas cases in French approach group were kept in lithotomy position and the surgeon stands between the patients legs and the first assistant stands to the left and the monitor to the right of the patient.

Outcome includes assessment of surgical indications, complications at the time of presentation, mean operative time, intra operative complications, mean pain score, post-operative complications, duration of Hospital stay, patients satisfaction and surgeons satisfaction and ease of handling the instruments. All the findings from both the groups were entered in the same proforma where clinical presentation was entered by the principal investigator.

**Data analysis:**

The data was entered in excel sheet and analyzed using SPSS (Version 20). Descriptive statistics with mean, standard deviation and proportions (%) were calculated for quantitative variables. To test the hypothesis Chi Square test and independent sample t tests were used. p value <0.05 was considered as statistically significant.

**Observations & Results:**

**Table 1: Age wise distribution of the study participants**

<b>Age group</b>	<b>American Approach N (%)</b>	<b>French Approach N (%)</b>	<b>Total</b>	<b>P value</b>
18-30 years	02 (04)	01(02)	03 (06)	0.8012
31-40 years	07 (14)	05(10)	12 (24)	
41-50 years	10 (20)	11(22)	21 (42)	
51-60 years	06 (12)	08(16)	14 (28)	
Total	25 (50)	25(50)	50(100)	

In this study 4%, 14%, 20% and 12% of the participants who under American approach for laparoscopic cholecystectomy were between the age group of 18- 30 years, 31-40 years, 41-50 years and 51-60 years respectively. Among participants inthe French approach 2%, 24%, 42% and 28% of the participants were between 18-30 years, 31-40 years, 41-50 years and 51-60 years respectively. There was no statistically significant association found for age group between American approach and French approach, the p value was found to be 0.8012.

**Table 2: Proportion of participants based on gender**

<b>Gender</b>	<b>American approach</b>	<b>French approach</b>	<b>Total</b>	<b>P value</b>
Male	11 (22)	12(24)	23 (46)	0.7766
Female	14 (28)	13(26)	27 (54)	
Total	25 (50)	25(50)	50(100)	

Among 46% of the male participants 22% of the participants were from American approach, 24% of the participants were from French approach. Among 54% of the female participants in the study 28% participants were from American approach and 26% participants belonged to French approach group. There was no statistical significant difference in gender distribution between both the groups (p value 0.7766).

**Table 3: Mode of Admission among the study participants**

<b>Mode of admission</b>	<b>American approach</b>	<b>French approach</b>	<b>Total</b>	<b>P value</b>
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Elective	18 (36)	16 (32)	34 (68)	0.5442
Emergency	07 (14)	09 (18)	16 (32)	
Total	25 (50)	25 (50)	50(100)	

In this current study 36% of the cases were taken for elective surgery while 14% of the cases were taken for emergency laparoscopy in American approach group. Likewise from the French approach group 32% of the cases were taken for elective surgery and 18% of the cases were taken for emergency laparoscopic surgery. The association between mode of admission and the approaches was statistically insignificant (p value = 0.5442).

**Table 4: Mean operative time among the study group participants**

Parameter	American approach	French approach	P value
Mean operative time (in minutes)	69.5±19.5	60.1±8.6	0.0323*

\*Significant

In this current study the mean operative time for surgical procedure was recorded as 69.5±19.5 mins in American approach and 60.1±8.6mins in French approach, the difference between both the approaches was statistically significant for mean operative time (p value 0.0323).

**Table 5: Specific Intra operative complications among the study participants**

Intra-operative complications	American approach	French approach	Total	P value
Present	07 (14)	01 (02)	08 (16)	0.0206*
Absent	18 (36)	24 (48)	42 (84)	
Total	25 (50)	25 (50)	50 (100)	

\*Significant

Intra-operative complications were recorded among 14% and 2% of the participants from American approach and French approach group respectively. Specific intra operative

complications were absent among 36% and 48% of the patients from American and French approach groups respectively. The difference between both the groups for specific intra operative complications was found to be statistically significant (p value 0.0206).

**Table 6: Patients satisfaction among the study participants in both the groups**

<b>Patients satisfaction</b>	<b>American approach</b>	<b>French approach</b>	<b>Total</b>	<b>P value</b>
Yes	19(38)	24 (48)	43 (86)	0.0415*
No	06(12)	01 (02)	07 (14)	
Total	25(50)	25 (50)	50(100)	

\*Significant

Based on patients satisfaction 38% participants were satisfied about the procedure done on them in American approach while 48% of the participants were satisfied about the surgical procedure done in the French approach group. The difference was found to be statistically significant for patient’s satisfaction between both the groups. (p value = 0.0415).

**Table 7: Difference between the approaches based on Surgeons symptoms**

<b>Symptoms among surgeons</b>	<b>American approach</b>	<b>French approach</b>	<b>Total</b>	<b>P value</b>
Yes	19(38)	09 (18)	28 (56)	0.0043*
No	06(12)	16 (32)	22 (44)	
Total	25(50)	25 (50)	50(100)	

\*Significant

Clinical Symptoms among the surgeons was noted in 38% and 18% of the doctors who operated on the study participants in American approach group and French approach group respectively. There was statistically significant difference found between the approaches based on surgeon’s symptoms. (p value =0.0043).

**Table 8: Ease of handling the instrument between both the groups**

<b>Ease of handling the instruments</b>	<b>American approach</b>	<b>French approach</b>	<b>Total</b>	<b>P value</b>
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Yes	15 (30)	23 (46)	38 (76)	0.008*
No	10 (20)	02 (04)	12 (24)	
Total	25 (50)	25 (50)	50 (100)	

\*Significant

In this current study ease of handling the instrument for surgeon was noted among 30% and 46% of the participants from American approach group and French approach group. The difference between the groups was statistically significant for easy handling of the surgical instrument, with p value of 0.008.

**Table 9: Surgeons satisfaction based on American approach and French approach**

Surgeons satisfaction	American approach	French approach	Total	P value
Yes	15 (30)	23 (46)	38 (76)	0.008*
No	10 (20)	02 (04)	12 (24)	
Total	25 (50)	25 (50)	50(100)	

\*Significant

Surgeon’s satisfaction was found to be 30% in American approach and 46% in French approach, the difference was found to be statistically significant with p value of 0.008

**DISCUSSION:**

In this study 4%, 14%, 20% and 12% of the participants who under American approach for laparoscopic cholecystectomy were between the age group of 18- 30 years, 31-40 years, 41-50 years and 51-60 years respectively. Among participants in the French approach 2%, 24%, 42% and 28% of the participants were between 18-30 years, 31-40 years, 41-50 years and 51-60 years respectively. There was no statistically significant association found for age group between American approach and French approach. Among 46% of the male participants 22% of the participants were from American approach, 24% of the participants were from French approach. Among 54% of the female participants in the study 28% participants were from American approach and 26% participants belonged to French approach group. There was no statistical significant difference in gender distribution between both the groups.

Larson GM et al<sup>9</sup> performed laparoscopic cholecystectomy among 1983 Americans and reported that 4.5% of cases required conversion from laparoscopic cholecystectomy to open cholecystectomy, in their study. They reported that there were 41 cases who developed complications during post-operative period and they stated that repeated surgeries were required for 18 cases. Ingraham AM et al<sup>10</sup> conducted a multicenteric study and included

65,511 cases. Among them 89.5% underwent laparoscopic cholecystectomy and 10.5% of cases underwent open cholecystectomy.

RulzTover J et al<sup>11</sup> conducted a study to assess the efficacy of French method for laparoscopic cholecystectomy with laparoscopic cholecystectomy using three midline ports. They reported that the mean operation time was  $70.1 \pm 19.2$  minutes in French method of laparoscopic cholecystectomy and  $65.9 \pm 17.0$  minutes in three midline port method of laparoscopic cholecystectomy. The mean difference in operating time in the French method and three midline port method of laparoscopic cholecystectomy was found to be statistically insignificant, in their study. The difference in proportion of cases with complications in the French method and three midline port method of laparoscopic cholecystectomy was found to be statistically insignificant, in their study.

Carlomagno N et al<sup>12</sup> performed a study among 140 cases those who underwent laparoscopic cholecystectomy and among them 70 cases underwent French technique and the rest 70 cases underwent American technique of laparoscopic cholecystectomy. They reported that the conversion rate from laparoscopic cholecystectomy to laparotomy, length of operative time and hospital stay among the cases those who underwent surgery by French technique and American technique were similar, in their study. Also they stated that morbidity rates were found to be comparatively higher in American technique group but it was found to be statistically insignificant and there were no deaths reported in both French technique and American technique groups, in their study.

However, Zamacona AR et al<sup>13</sup> performed a study to compare the American technique and French technique of laparoscopic cholecystectomy. They reported that French technique is found to consume less surgical time with reduced pain, length of stay, bleeding and a lower tendency towards conversion, in their study. Also they reported single lesion of bile duct in the French technique group. They concluded that French technique of laparoscopic cholecystectomy was found to be more beneficial compared to American technique of laparoscopic cholecystectomy. Neylan CJ et al<sup>14</sup> performed a study among the cases those who underwent laparoscopic cholecystectomy and among the cases those who underwent intended open cholecystectomy. They reported that 4% of the cases required conversion to open cholecystectomy from laparoscopic cholecystectomy, in their study.

In the study conducted by Hannan MJ et al<sup>15</sup> compared the alternative procedure so called bangle technique with the American and the French approaches of laparoscopic cholecystectomy. They reported that their technique was found to have a mean operating time of 36.25 minutes. Also they stated that 86% of the cases were discharged on the same day of surgery and the rest were discharged on the next day, in their study. There were 91.7% of cases, without any complications however bile leakage and excessive bleeding were reported among 6.7% and 1.4% of cases, respectively, in their study.

The findings of the present study were found to be consistent with the findings of the following studies. Berguer R et al<sup>16</sup> performed a study to assess the ergonomics of surgeon's by comparing the type of procedures performed by them like laparoscopic and open procedures. They reported that in the surgeons' head and back positions were found to be more often straight for the surgeons who perform laparoscopic procedures however for the surgeons who perform open procedure the neck position was found to be more often bent, in

their study. They also reported that the frequency of changes in back position per minute was found to be significantly reduced while performing laparoscopic procedures compared to open procedures.

Vereczkei A et al<sup>17</sup> performed a study among the laparoscopic surgeons and with respect to placement of monitors. They reported that measuring the typical postures of these phases the trunk and head are significantly more rotated and bent than in comfort positions, in their study. In another study, Omar AM et al<sup>18</sup> assessed the effects of gaze-down stance on the performance of a task with varying manipulative and perceptual demands. They reported that the overall, the gaze-down stance reduced time and errors, as compared with the gaze-up display. The difference in proportion of errors in gaze down stance and gaze up stance was found to be statistically significant, in their study.

In the study conducted by Kaya OI et al<sup>19</sup> reported that the surgeon's physical health related disorders were ranged from 32% to 72% owing to poor ergonomic conditions, in their study. Also they stated that their ergonomic status could affect the productivity of the surgical team and the safety and efficiency of the surgery.

In another study, Shahijani G et al<sup>20</sup> reported that the prevalence of musculoskeletal disorders among them as 98.9%, in their study. They also reported that the mean overall risk was  $7.27.2 \pm 0.75$  among the circulatory staffs and the same was reported as  $5.31 \pm 0.63$  among the scrub staffs, in their study. They concluded that the laparoscopic surgical technologists were American technique higher risk of physical health related disorders due to their job nature.

### **CONCLUSION:**

Mean operative time and proportion of cases with intra-operative complications were found to be significantly lower in the French approach group compared to the American approach group. Also notably, both patient's satisfaction and surgeon's satisfaction were found to be significantly high in the French approach group compared to the American approach group. Thus from this study, we infer that French approach is comparatively better than American approach both in terms of efficacy of the procedure and on ergonomic grounds of the surgeons.

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