COMPARISON OF OPERATIVE STRESS AFTER OPEN & LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT
Objective: To compare the operative stress after laparoscopic and open cholecystectomy by measuring blood sugar levels of the patients.
Design & Duration: Comparative case series from February to July 2007.
Setting: Department of Surgery, Unit D, Khyber Teaching Hospital, Peshawar.
Patients: A total of 50 patients, aged 20-60 years, including nine males and 41 females with uncomplicated gall stones who underwent open (n=25) and laparoscopic (n=25) cholecystectomy. Pregnant females and patients of other age groups, and those with hepatitis and other co-morbidities were excluded.
Methodology: The patients were randomly assigned to the open and laparoscopic groups. The blood samples of the patients were collected at 06 hours and then at 18 hours on the day of surgery, their blood sugar level estimated and the results tabulated and compared.
Results: The preoperative blood sugar level of the patients undergoing open cholecystectomy ranged between 57-93 mg/dl (mean 76.08±3.6) and the postoperative level from 75-143 mg/dl (mean 110.75±6.4); the percentage rise in blood sugar level being 43.5%. In case of laparoscopic cholecystectomy the preoperative blood sugar level ranged between 62-95 mg/dl (mean 78.9±6.4) and the postoperative level from 78-128 mg/dl (mean 97.78±12.8); the percentage rise in blood sugar level being 23.9%
Conclusion: Blood sugar levels were more in patients with open cholecystectomy than those who underwent laparoscopic cholecystectomy. Hence laparoscopic cholecystectomy results in less prominent stress response and metabolic interference as compared to open cholecystectomy.

KEY WORDS: Cholecystectomy, Laparoscopic Cholecystectomy, Operative Stress, Stress Hyperglycemia

INTRODUCTION
The superiority of laparoscopic cholecystectomy has justified its universal usage in recent years. There is little doubt that laparoscopic cholecystectomy has revolutionized the surgical management of cholelithiasis and has become the mainstay of management of uncomplicated gallstone disease. Laparoscopic cholecystectomy (LC) induces less surgical response when compared to open cholecystectomy (OC). All surgical traumas induce neurohormonal events which result in a postoperative rise in blood sugar levels. Bistrian showed that blood glucose level rises after surgery. However, there are few studies concerning the difference between laparoscopic and open cholecystectomy as regards to operative stress response especially by measuring blood sugar levels.

The objective of this study was to compare the postoperative stress response after open and laparoscopic cholecystectomy by measuring the blood sugar levels.

PATIENTS & METHODS
This comparative case series was carried out in the Dept. of Surgery (Unit D) at Khyber Teaching Hospital, Peshawar on 50 adult patients of either sex, aged 20-60 years, undergoing cholecystectomy. Patients of the

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other age groups, pregnant females, Hepatitis B and C positive patients, and those with other co-morbidities or who developed complications were excluded.

Patients were admitted a day before surgery and baseline investigations (Complete blood picture, Blood Sugar and Urea, Serum Electrolytes and Creatinine, Liver Function Tests, Hepatitis profile, ECG, X-ray Chest) carried out. These patients were kept nil by mouth from midnight on the day of surgery. They were given similar IV fluids, antibiotics and analgesics before and after surgery. The patients were randomly assigned to open and laparoscopic groups. Blood samples were collected from the patients at 06 hours and then at 18 hours on the day of surgery, and their blood sugar levels estimated.

RESULTS

Out of the total 50 patients, there were 41 females and nine males. Their age distribution, as shown in Table I & II, revealed that gall bladder disease is more common among females aged 40-50 years of age than males.

The preoperative blood sugar level of the patients undergoing open cholecystectomy ranged from 57-93 mg/dl with an overall mean of 76.08±3.6 mg/dl, while the postoperative levels ranged from 75-143 mg/dl with an overall mean of 110.75±6.4 (Table I).

In case of laparoscopic cholecystectomy the preoperative blood sugar levels ranged between 62-95 mg/dl with an overall mean of 78.9±6.4 mg/dl, while the postoperative blood sugar levels ranged between 78-128 mg/dl with an overall mean of 97.78±12.8 mg/dl (Table II). The patients who underwent OC showed a significant rise (45.5%) in blood sugar levels after surgery. The laparoscopic cholecystectomy patients, on the other hand, also revealed a rise (23.9%) in the blood sugar levels, which was not as high as that of OC.

The standard error between the two means of postoperative blood sugar levels in OC/LC is 2.86, while the actual difference between the two means is 12.97, which is quite significant. (the results are represented as 2 standard deviation with P=0.05). The standard error of deviation was 2.86 (Table III).

Table I. Blood Sugar Levels before and after Open Cholecystectomy

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number</th>
<th>Preop.</th>
<th>Blood Sugar Levels (mg/dl) Mean±SD</th>
<th>Postop.</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 years</td>
<td>1</td>
<td>74</td>
<td>78.3±09.5</td>
<td>109</td>
<td>--</td>
</tr>
<tr>
<td>31-40 years</td>
<td>4</td>
<td>67-90</td>
<td>76.5±12.9</td>
<td>75-143</td>
<td>107.6±18.5</td>
</tr>
<tr>
<td>41-50 years</td>
<td>13</td>
<td>57-98</td>
<td>75.6±08.4</td>
<td>96-126</td>
<td>111.4±13.4</td>
</tr>
<tr>
<td>51-60 years</td>
<td>7</td>
<td>67-93</td>
<td>76.2±03.6</td>
<td>75-143</td>
<td>110.8±06.4</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>57-93</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table II. Blood Sugar Levels before and after Laparoscopic Cholecystectomy

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Number</th>
<th>Pre op.</th>
<th>Blood Sugar Levels (mg/dl) Mean±SD</th>
<th>Post op.</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30 yrs</td>
<td>3</td>
<td>70-95</td>
<td>81.6±12.7</td>
<td>89-115</td>
<td>102±13</td>
</tr>
<tr>
<td>31-40 yrs</td>
<td>4</td>
<td>70-85</td>
<td>76.25±7.5</td>
<td>78-96</td>
<td>88.25±7.5</td>
</tr>
<tr>
<td>41-50 yrs</td>
<td>9</td>
<td>62-95</td>
<td>75.4±11.9</td>
<td>89-128</td>
<td>100.6±12.8</td>
</tr>
<tr>
<td>51-60 yrs</td>
<td>9</td>
<td>66-95</td>
<td>82.4±9.9</td>
<td>83-124</td>
<td>100.3±14.2</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>62-95</td>
<td>78.9±6.4</td>
<td>78-128</td>
<td>97.78±12.8</td>
</tr>
</tbody>
</table>
DISCUSSION

The superiority of laparoscopic cholecystectomy (LC) has justified its universal usage in recent years. It induces less surgical response as compared to open cholecystectomy (OC). The purpose of this study was to establish the fact that laparoscopic cholecystectomy is less traumatic and induces less surgical trauma than open cholecystectomy. In this study blood sugar level was taken as the indicator of surgical stress, based upon the finding of the Bistrian study that blood sugar level rises after surgery.

The patients were randomly assigned to either undergo the open (mean age 44.52±9.18 years) or the laparoscopic cholecystectomy (mean age 42.52±11 years). The blood sugar level of the patients was also represented as age wise groups. The results were documented as mean ± 2SD (p=0.05) which showed that there was a significant rise (45.5%) in the blood sugar levels after open cholecystectomy as compared to laparoscopic cholecystectomy (23.9%).

Luo et al also carried out a comparative study to measure operative stress response and energy metabolism after laparoscopic and open cholecystectomy. They measured insulin levels (besides other factors) before and then on the 1st and 3rd day after surgery. They found a marked decrease in insulin levels from the baseline in open cholecystectomy group on 3rd postoperative day, while the intergroup difference was not significant on either the 1st or 3rd postoperative day whereas in our study there was a significant rise in the blood sugar level after open cholecystectomy on the 1st post-operative day as compared to laparoscopic cholecystectomy.

Engin et al in their study on 32 cases discovered that the blood cortisol, glucagon and glucose levels increased significantly after open and minimally invasive surgery. This postoperative rise in glucagon and cortisol values was significantly higher in the open than the laparoscopic procedure. However, in patients who underwent open surgery, the increase in glucose concentrations was not significantly higher in the postoperative period. In our study the standard error between the two means of post operative blood sugar levels in open and laparoscopic cholecystectomy was 2.86, while the actual difference between the two means is 12.97, which is more than the double of SE between the two means and is quite significant.

CONCLUSION

The results of this study clearly show that blood sugar levels were more in patients after open cholecystectomy than those who underwent laparoscopic cholecystectomy. Since a rise in the blood sugar level represents the degree of postoperative stress, hence laparoscopic cholecystectomy results in a lesser stress response and metabolic interference as compared to open surgery.

RECOMMENDATIONS

Laparoscopic cholecystectomy results in minimal trauma and less prominent stress response than open cholecystectomy. Hence laparoscopic cholecystectomy is the operation of choice for non-complicated gall stones and should preferably be used where the facilities are available.

REFERENCES


