LAPAROSCOPIC CHOLECYSTECTOMY IN SICKLE CELL DISEASE: IS IT A SAFE PROCEDURE?

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Abstract

The aim of this trial is to determine the safety of laparoscopic cholecystectomy for treatment of gall bladder stones in patients with sickle cell anemia (a controversial issue). Sixty patients from both sexes, between 19-35 years old with sickle cell anemia, all of them having gall bladder stones were included in this study in Endosurgery Center in Basrah General Hospital. The patients were divided into three groups, group one (19 patients) were selected for laparoscopic cholecystectomy on random preoperative background, the same thing was applied in group two (21 patients) whose patients were subjected to open cholecystectomy while patients in group three (20 patients) were selected for laparoscopic cholecystectomy on conditioned selection. Three mortalities and two serious morbidities were encountered in the group one and one mild morbidity seen in group two and no mortalities or morbidities in group three. Laparoscopic cholecystectomy in sickle cell patients is a debatable issue, an increasing controversy about serious perioperative and postoperative morbidity were mentioned. The procedure itself was accused and an entirely opposed results were emerged from different studies all are debatable. In this study we noticed the big influence of the risk factors, preparation of patients for surgery and the adherence to the principle anesthetic rules on the outcome after laparoscopic cholecystectomy in patients with sickle cell disease. This influence was limited in open procedure. The controversy in the different trials lies on whether the problem is confined to the disease itself or to the surgical method used for cholecystectomy or both. According to the results obtained from our study we believe that both the severity of the disease and the surgical procedure affecting the results, application of intra and post operative protocol (blood transfusion if Hb less than 9gm/dl, rehydration, oxygenation and respecting general anesthesia rules are mandatory for the safety of the patients.

Introduction

Sickle cell disease is due to the presence of an abnormal B-globine chain in HbA (Valine substituted for glutamic acid) resulting in reduced oxygen tension, increased blood viscosity, occlusion of small blood vessels and infarct in many organs. Pulmonary infarct can lead to acute chest syndrome, dehydration seems to predispose to sickle cell crisis and acute chest syndrome by increasing the viscosity of blood. Sickle cell anemia can only occur when two people who carry sickle cell trait have a child together. Gallstones are frequent complication in patients with haemoglobinopathies because of the repeated bouts of RBC haemolysis leading to an increase in bilirubin excretion and gall stone formation of pigment type. The incidence of gallstones with sickle cell disease increases due to the use of non invasive detection technique (ultrasound vs. cholecystogram) and the longer survival of these patients. The development of pigment gallstones in patients with sickle cell disease is age dependant with a
reported prevalence of 50% by the age of twenty two. Laparoscopic cholecystectomy in sickle cell patients is a debatable issue, an increasing controversy about serious perioperative and postoperative morbidities was mentioned, the procedure itself was accused and an entirely opposed results were emerged from different studies with no solid answers.

Methods
Sixty patients were included in the study, from both sexes, all of them having sickle cell disease and gall bladder stones. Age ranged between 19-35 years. The patients were divided into three groups, group one included nineteen patients, group two included twenty one patients, group three included twenty patients. The three groups were exposed to surgery for removal of their gallbladder (Table I): Patients in group one were selected for laparoscopic cholecystectomy on random preoperative bases, only blood transfusion was ordered when Hb level was less than 9 gram% and some anesthetic principles (increased oxygen concentration, increased tidal volume and decreased respiratory rate) were applied. The same things were applied for group two whose patients were subjected to open cholecystectomy, while patients in group three were selected for laparoscopic cholecystectomy on conditioned back ground (appreciation of the risk factors (Table II), perioperative hydration, good per operative oxygenation, prophylactic antibiotics, blood transfusion was ordered only when HB level less than 8 gram%).

Results
The patients in group one (treated by laparoscopic cholecystectomy after routine preoperative preparations) showed 3 mortalities and 2 morbidities, 15.789% mortality and 10.526% morbidity (total 26.315%). Average operation time was 46 minutes and average hospital stay was between 6 -8 days.

In group two (treated by open cholecystectomy after routine preoperative preparation), only one case of mild vasoocclusive crisis in form of musculoskeletal pain was reported (4.761%). Treatment was ordered and patient recovered. Average, operation time was 65 minutes and all patients discharged from hospital after 4-6 days. The post operative period for patients in group three (treated by laparoscopic cholecystectomy after conditioned selection) was smooth, neither morbidity nor mortality was recorded, average operation time was 42 minutes and all patients left hospital after 2-3 days, and in the next 2-3 weeks they reported to the outpatient department for follow up.

Discussion
In this study we noticed the big influence of the risk factors, preparation of patients for surgery and the sticking to the principle anesthetic rules on the outcome after laparoscopic cholecystectomy in patients with sickle cell disease. This influence was Limited in open method. The controversy in the different studies lies on wether the problem is confined to the disease itself or to the surgical procedure used for cholecystectomy or both. According to the results obtained from our study we believe that both the severity of the disease and the surgical procedure affecting the results. The experience of many centers in the evaluation of the laparoscopic cholecystectomy in patients with sickle cell disease were elusive and opposing each other. Application of intra and post operative protocol (blood transfusion if Hb less than 9g/dl, rehydration, oxygenation and respecting general anesthesia rules) are mandatory for the safety of the procedure. Pulmonary care and appropriate monitoring are also important.
Laparoscopy does not decrease the incidence of acute chest syndrome compared with open approach and predisposing factors were not significant in predicting postoperative acute chest syndrome. A study concluded that the procedure is safe in experienced hands with adequate preoperative preparation. Another study emphasized that sickle cell anemia patients undergoing cholecystectomy have a high perioperative morbidity specially if patients not transfused before surgery. Portal vein thrombosis following prolonged laparoscopic intervention in a patient with sickle cell disease had been reported. The mortality and morbidity increased in emergency and nonprepared patients. The incidence of acute chest syndrome (ACS) is more in laparoscopy than open method. In the absence of preoperative transfusion there is 50% chance of painful vasoocclusive crisis. The effect of pneumoperitoneum and intraperitoneal pressure on the operation outcome was also controversial; one study claimed the harmless effect of pneumoperitoneum even in patient with ASA 3,4. Another one explained the deleterious effect of pneumoperitoneum by inducing hypoxia and local tissue acidosis and the adverse effect of high CO2 pressure on the micro-circulation. The importance of blood transfusion in the prevention of serious postoperative complications was mentioned in different studies. The debate still existing about whether laparoscopy is safe or not for patients with sickle cell anemia.

**Conclusion**

Although the safety of the laparoscopic cholecystectomy in patients with sickle cell anemia is still a debatable issue we believe that it is a reliable and convenient procedure provided that the requirements are fulfilled (blood transfusion before surgery, perioperative hydration, good preoperative tissue oxygenation, prevention of infection and minimizing the risk factors).

**Table I: Three groups of patients with sickle cell disease exposed to cholecystectomy.**

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</thead>
<tbody>
<tr>
<td>One 19 patients</td>
<td>Lap.chole. with routine preop. preparation risk factors not appreciated</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>When Hb level less than 9 grams</td>
<td>No</td>
<td>3</td>
<td>15.8% ACS &amp; sever vaso Occlus. crises</td>
<td>6-8 days</td>
<td>46 min.</td>
</tr>
<tr>
<td>Two 21 patients</td>
<td>Open chole. with routine preop. preparation risk factors not appreciated</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Same like group one</td>
<td>No</td>
<td>Nil</td>
<td>1 4.7% mild vaso Occlus. crises</td>
<td>4-7 days</td>
<td>65 min.</td>
</tr>
<tr>
<td>Three 20 patients</td>
<td>Lap.chole. with conditioned preop. preparation &amp;minimum risk factors</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes if Hb level less than 8 grams</td>
<td>Yes</td>
<td>Nil</td>
<td>Nil</td>
<td>2-3 days</td>
<td>42 min.</td>
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Table II: The Risk factors

<table>
<thead>
<tr>
<th>Age</th>
<th>More than 30 years</th>
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<tr>
<td>ASA (American society of anesthesiologists) score</td>
<td>2,3,4</td>
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<tr>
<td>Past medical history</td>
<td>Systemic disease and smoking</td>
</tr>
<tr>
<td>Number of hospitalization and time of hospital stay in the past year</td>
<td>More than 5 admissions, more than 7 days</td>
</tr>
<tr>
<td>Transfusion history, reaction</td>
<td>More than 10</td>
</tr>
<tr>
<td>Preoperative hypoxia</td>
<td>O2 saturation less than 90%</td>
</tr>
<tr>
<td>Radiology</td>
<td>Abnormal chest radiology</td>
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<tr>
<td>Liver function test</td>
<td>SGPT more than 60U/L</td>
</tr>
<tr>
<td>Serum creatinine</td>
<td>More than 1.5 mg/dl</td>
</tr>
<tr>
<td>Anesthesia time</td>
<td>More than 2 Hours</td>
</tr>
<tr>
<td>Extended procedure</td>
<td>Incidental</td>
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<tr>
<td>Hospitalization time</td>
<td>More than 9 days (depend on ASA)</td>
</tr>
</tbody>
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References