

## OUTCOME OF LARGE INCISIONAL HERNIA REPAIR WITH POLYPROPYLENE MESH

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### Abstract

Incision hernia remains a frequent complication of abdominal surgeries with a reported incidence of (2-20%). Repair of large incision hernia is a difficult surgical problem with short and long term complications, severity of these complications are related in part to the type of operative technique adopted.

The aim of this study is to evaluate the outcome of repair of large incision hernia with the (onlay tension free) mesh technique.

This is a retrospective study includes 46 patients who underwent mesh repair for large incision hernia during the period from January 1997 to December 2004. The operations were done by the same surgeon and by the same procedure (i.e; onlay tension free polypropylene mesh with two points fixation). Data regarding relevant patients with big ventral incision hernia with (onlay-mesh repair) in Basrah teaching hospital and private hospital were revised. The presenting condition, hernia description, associated systemic and local factors, procedure of repair and follow up duration were all taken in consideration. Possible complications like; hematoma, seroma, wound infection, intestinal obstruction and enterocutaneous fistula were recorded and discussed once they occurred. The follow up period ranged from 4 to 21 months.

Forty six patients were included in the study: 20 females and 26 males with median age of 50.5 year (range 35-68 year). Eleven patients (23.91%) were overweight and had body mass index "BMI" equal to more than 30, four patients (8.69%) had controlled diabetes mellitus, five (10.86%) had controlled hypertension and two (4.34%) suffered from chronic obstructive air way disease, there were eleven smokers (23.91%). Sixteen patients made regular visits that extended up to 12 months, 12 patients made regular visits up to 6 months, one made regular visits up to 18 month mainly due to partial intestinal obstruction., one patient was followed-up to 17 month because of multiple wound sinuses while 8 patients made irregular visits up to 21 month due to causes other than the hernia, eight patients lost from follow-up after 4 months. The original operation was bowel related in 18 cases, gynecological in twelve, hepatopancreatobiliary in 10, repair of paraumbilical hernia in six patients. The old incisions were long midline in 23 cases, paramedian in 17 and transverse in six patients. The main postoperative complications were seroma formation (13.04 %), wound haematoma (6.52 %), wound infection (4.34 %). no recurrence of hernia and no enterocutaneous fistula were reported during our follow-up period.

In conclusion, tension free onlay mesh repair is a feasible operative procedure for repair of large incision hernia with no significant major morbidity.

### Introduction

Incision hernia remains a frequent complication of abdominal surgery with a reported incidence of 2 to 20%<sup>1-3</sup>. In the United States, 4 to 5 million

laparotomies are performed annually<sup>4,5</sup>, which means that at around 400,000 to 500,000 incision hernias can be expected to develop each year. Approximately

200,000 Incision hernia repairs are performed per year<sup>6,7</sup>. The incidence depends on a number of factors which are either general like old age, obesity, associated systemic disease or local factors like bowel surgery, suture material, chest infection, abdominal distension and wound infection, Ninety percent of incision hernias occur within 3 years of operation<sup>8</sup>.

When morbidity is added to the vast numbers and the tremendous costs associated with incision hernia repair it becomes clear that the efficacy of incision hernia repair is of major importance. Unfortunately results of incision hernia repair are disappointing<sup>9</sup>. Suture repair of incision hernia results in recurrence rates of 12% to 54%<sup>10-11</sup>, while mesh repair results in recurrence rates of 2 to 36%<sup>12,13</sup>, and because most studies only provide short term follow-up, these recurrence rates may even be underestimated<sup>14,15</sup>.

In addition to the high recurrence rates, incision hernia repair may give rise to serious complications, like entero-cutaneous fistula and bowel obstruction, causing deterioration rather than improvement of the patient's situation<sup>16,17</sup>.

Numerous methods of repair have been described includes; primary repair in one or two layers, Mayo-type overlap, use of fascia (local or flaps) with suture darns and the use of fascia with synthetic mesh (polypropylene or marled, stainless steel, mersilene or expanded polytetrafluoroethylene mesh)<sup>9-11</sup>. Many operative techniques with prosthetic materials have been described on the basis of the anatomic positioning of the prosthesis (subcutaneous, sub-aponeurotic, preperitoneal and intra-peritoneal)<sup>11,12</sup>.

The types and severity of complications associated with incision hernia mesh repair are related in part to the type of operative technique<sup>13,14</sup>. The subcutaneous technique is associated with

high incidence of wound seromas, infections and recurrence rate<sup>14,16</sup>.

Subaponeurotic and preperitoneal approaches are associated with a low rate of short and long term complications and are considered the best methods for repair<sup>17-19</sup>.

The intraperitoneal approach is associated with a very low rate of general complications and recurrence due to deep placement of mesh and no need for dissection in the planes of deep layers of the abdominal wall<sup>20,21</sup> but there is fear of the serious complications that are enterocutaneous fistula and intestinal obstruction, where the mesh come in contact with the bowel, every effort should made to prevent this direct contact by using peritoneum or omentum to separate bowel from mesh<sup>22,23</sup>.

A recent report by Jacobus W.A. et al showed that the incidence of these complications was very low<sup>24</sup>. Steyerbery EW et al., on the other hand reported no such complications in their series (Intraperitoneal polypropylene mesh)<sup>25</sup>.

In case of huge incision hernia with longstanding adhesions between bowel and the hernial sac, (where the sac is excised completely and the abdominal wall defect can not be closed without tension or there is no sufficient peritoneum or omentum to separate the bowel from mesh), the mesh completes the abdominal wall defect and comes in direct contact with the bowel, here it is preferable to choose a mesh type with minimal tendency to react with the bowel like expanded polytetrafluoroethylene mesh<sup>26</sup>.

This study aimed to evaluate the outcome of large incisional hernia mesh repair with tension free onlay procedure, where the hernial defect can not be closed because of tension and there were no sufficient peritoneum or omentum to separate the bowel from polypropylene mesh.

## Patients and method

Patients data sources from the private clinic and Basrah Teaching Hospital traditional file recording system were analysed for all patients with large incision hernias mesh repair (ie; 10cm and more with tension free onlay procedure) for the period between January 1997 to December 2004; Fifty-eight patients have been found, proforma for each case is completed depending on the previously recorded information, all operations were done as an elective procedure by the same surgeon and by the same technique, 12 of them had follow-up of less than 2 months and excluded from the study ,the remaining 46 patients were included in this study had dependable follow-up (ranged from 4-21 month with median follow-up of 12 month).

### Operative technique:

All patients received anti-thrombotic prophylaxis in the form of subcutaneous heparin (5000 iu bid/subcutaneously) that was started twelve hours before operation and continued until discharge from hospital. All patients received prophylactic antibiotic (Ampiclox 50 mg/kg i n 3 divided doses ,first dose started at the time of induction of anesthesia and then at six hours interval, cephalosporine used instead of ampiclox in cases of allergy to penicillin), All operations were performed under general anesthesia. After skin preparation and draping the cutaneous scar was excised and the hernia sac dissected to expose the fascial defect.

The sac was opened and the contents of hernia reduced after release of adhesions. In all cases the hernial sac was excised completely due to longstanding adhesions between bowel and the hernial sac and the abdominal wall defect can not be closed without tension and there was no sufficient peritoneum or omentum to separate the bowel from mesh. Mesh dimensions are calculated so that it exceeds the defect

dimension by about 4cm all around margins. Technique is an onlay tension free, with 2 points of fixations, 1<sup>st</sup> point fixing mesh to the margin of the defect by continuous prolene sutures, 2<sup>nd</sup> point fixating the periphery of mesh into exterior of anterior rectus sheath by interrupted sutures, (fig.1). Two large size suction drains put in the subcutaneous space and removed within 24-72hrs or when less than 30 ml of fluid in the 2 suction drains after 24 hours.

The hospital stay was ranged from 4–12 day. On discharge the follow-up instructions for each patient included instructions to visit the out-patient or private clinic regularly. First visit was after 3 days from discharge, then after 2 weeks; monthly for 2 months; every 2 months for 6 months; every 6 months for 2 years and scheduled up to 5 years.

## Results

The total studied number was 46 patients, 20 females and 26 males with median age was 49.5 year for female (range 37-62 year) and 51.5 year for male (range 35-68 year). Eleven patients (23.91%) weighed more than their ideal body weight and had body mass index "BMI" equal to more than 30.

Four patients (8.69%) had controlled diabetes mellitus, five (10.86%) had controlled hypertension. Two (4.34%) suffered from chronic obstructive air way disease. There were eleven smokers (23.91%) and stopped smoking at least two weeks prior to surgery (Table I).

Regarding the duration of follow-up, sixteen patients made regular visits that extended up to 12 month, 12 made regular visits up to 6 months, One made regular visits up to 18 month mainly due to partial intestinal obstruction, one patient was followed-up to 17 month because of multiple wound sinuses while 8 patients made irregular visits up to 21 month either due to causes other than the

hernia, 8 patients lost from follow-up after 4 months, (Table II).

The original operations were bowel related in 18 cases, gynecological in 12, hepatopancreaticobiliary in 10 patients, previous repair of paraumbilical hernia in 6 patients. (Table III).

The previous incisions were long midline in 23 cases, paramedian in 17, transverse in 6 patients (Table IV).

There were no intraoperative complications. The postoperative complications are shown in (Table V and Chart 1).

Despite of the use of 2 drains, seroma formation was the commonest problem and occurred in six patients (13.043%), we noted that accumulation of serum occurred 3-17 days after operation and this complication was easily managed by multiple aspirations and usually subsided within 1 week (only three of them requiring repeated aspirations and one requiring stitches removal and draining of seroma).

A wound haematoma developed in three (6.52%) treated by partial removal of stitches and evacuation under aseptic technique after admission to hospital, two (4.34%) developed superficial wound infection resolved by antibiotic and draining of pus if present, one patient (2.17%) developed chronic deep multiple wound sinuses, end with re-exploration of the wound and excision of sinus tract with the part of mesh that attached after 3 months of conservative treatment without response and after that followed for another 14 months without recurrence of problem.

One patient developed partial intestinal obstruction resolved conservatively after three admissions to hospital over a period of 9 months and followed for another 9 months without recurrence of the problem, 2 patients developed chronic abdominal pain treated with simple analgesia or antispasmodic after exclusion of other pathologies and usually resolved after 6-8 months.

Despite of antithrombotic prophylaxis one patient developed deep vein thrombosis and one developed non-fatal pulmonary embolism those patients were followed by a physician.

Table V showed that the increasing incidence was only in the simple complications like seroma, haematoma, while the incidence of serious complications like enterocutaneous fistula and intestinal obstruction are absent or rare.

## Discussion

As a review to the frequency of complications in the previous studies and as a comparison with the results of our study (Table VI).

Regarding postoperative seroma formation (Chart 2); Usher (1962) reported a 5.8% incidence of seroma formation after subaponeurotic mesh repair, Matapurkar et al (1991) reported no seroma formation because their mesh was incorporated into a peritoneal sandwich, Molloy et al (1991) and Lewis et al reported a 4-6% seroma after onlay mesh repair report.<sup>27-34,36,37</sup>

In a comparison to our result, the incidence of seroma was 13.04%. This slight elevation may be due to onlay procedure and large size of hernia which need extensive dissection in the subcutaneous plane and to the large size of mesh which leads to more reaction with the overlying tissues. Regarding wound haematoma, Usher (1962) reported a 2.1%, Jacobs et al (1965) reported a 8%, Matapurkar et al (1991) reported 1.6%, Molloy et al (1991) reported a 3.6%, Langer and Christiansen (1985) reported 6.7% for onlay repair.<sup>27-34,36,37</sup>

Our result report 6.52% wound haematoma, which was within range of the results of previous studies (Chart 3). Regarding superficial wound infection (Chart 4); 3.5% superficial wound infection reported by Usher et al, 6.2% by Jacobs et al, 2.4% by Matapurkar et

al, 5.4% Molloy et al, 3.5% by Lewis et al, 5.3% by Langer and Christiansen (1985) for onlay repair, 5% by Jacobus W.A. et al, 6% by Steyerbery EW et al, 3.9% by Liakakos et al and 3.2% by Leber et al<sup>27-37</sup>. Our result report a 4.34% superficial wound infection that was within the range of previous studies (Chart 4).

Chart 5 showed wound sinuses (sinuses between mesh and skin) in different studies(0-3.9)<sup>7-37</sup>. Which was similar to our study(2.17%).

The incidence of partial small bowel obstruction was relatively low in our study if compared with other studies(Chart 6)<sup>27-37</sup>. This relatively low rate may be due to that only a relatively small part of mesh come in contact with the bowel and relatively short period of follow-up.

Regarding recurrence of hernia (Chart 7); Jacobs et al (1965) reported a 2.7% recurrence of hernia and 2.9% by Molloy et al, 1.3% by Lewis et al, 1.2% by Langer et al, the other previous studies and our study reported no recurrences within the available period of follow-up. Previous studies have shown that 70-75% of recurrences develop within two years and 80-90% develop within 3 years<sup>2-4</sup>.

Our available follow-up therefore is probably not long enough to record all possible hernia recurrence.

Regarding the incidence of enterocutaneous fistula (Chart 8); Liakakos et al (1994) reported a 1.4%

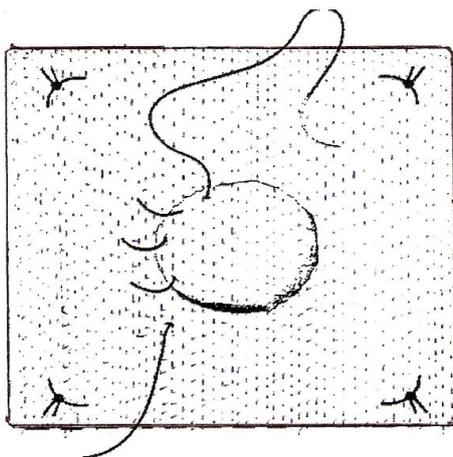
after intraperitoneal mesh repair. Other previous studies and our study reported no enterocutaneous fistula within the available period of follow-up<sup>27-37</sup>.

Enterocutaneous fistula is the more serious complication of inlay mesh repair of incision hernia, it occurs due to erosion of the bowel by the mesh. Previous studies show that this complication occurs within (1-6 weeks) postoperatively<sup>27-37</sup>.

So that the follow-up of our study was long enough to predict that this complication is rare, and when there were no other choices, we can put the mesh with direct contact with bowel without so much fear.

## Conclusion

1. Tension free onlay mesh repair is a feasible operative procedure for repair of large incisional hernia, We found it Safe with no significant major morbidity or recurrence.
2. According to the available period of follow-up the incidence of enterocutaneous fistulae and intestinal obstruction are very rare, and when there were no other choices we can put the mesh in contact with the bowel Without so much fear.
3. We advise a longer follow up period to be sure about further recurrences in future.

**Fig. 1 : Tension free onlay mesh repair with 2 points fixation.****Table I: Patient sex and age distribution, and associated diseases**

| Patient sex | Patient No. | Median Age | BMI $\geq 30$ | %     | D M | %    | Hyper-tension | %     | Obst.. Air way Disease | %    | Smoker | %     |
|-------------|-------------|------------|---------------|-------|-----|------|---------------|-------|------------------------|------|--------|-------|
| Female      | 20          | 49.5 yr    | 7             | 15.21 | 2   | 4.34 | 2             | 4.34  | 2                      | 4.34 | 2      | 4.34  |
| Male        | 26          | 51.5 yr    | 4             | 8.69  | 2   | 4.34 | 3             | 6.52  | 0                      | 0    | 9      | 19.56 |
| Total       | 46          |            | 11            | 23.91 | 4   | 8.69 | 5             | 10.86 | 2                      | 4.34 | 11     | 23.91 |

**Table II: Number of patients and duration of follow-up.**

| Number of patients | Duration of follow –up (months). |
|--------------------|----------------------------------|
| 16 ( 34.78%)       | 12                               |
| 12 ( 26.08%)       | 6                                |
| 8(17.39%)          | 4                                |
| 1(2.17%)           | 18                               |
| 1(2.17%)           | 17                               |
| 8(17.39%)          | 21                               |
| Median follow-up   | 12                               |

**Table III: Cause of original operation**

| Original operation             | Number of patients |
|--------------------------------|--------------------|
| Bowel related                  | 18 (39%)           |
| Gynecological                  | 12 (26% )          |
| Hepatopancreaticobiliary       | 10 (21.7%)         |
| Repair of paraumbalical hernia | 6 (13%)            |

**Table IV: Site of previous incisions**

| Previous incisions | Patients no. | %      |
|--------------------|--------------|--------|
| Long midline       | 23           | 50%    |
| Paramedian         | 17           | 36.95% |
| Transverse         | 6            | 13%    |
| Total              | 46           | 100    |

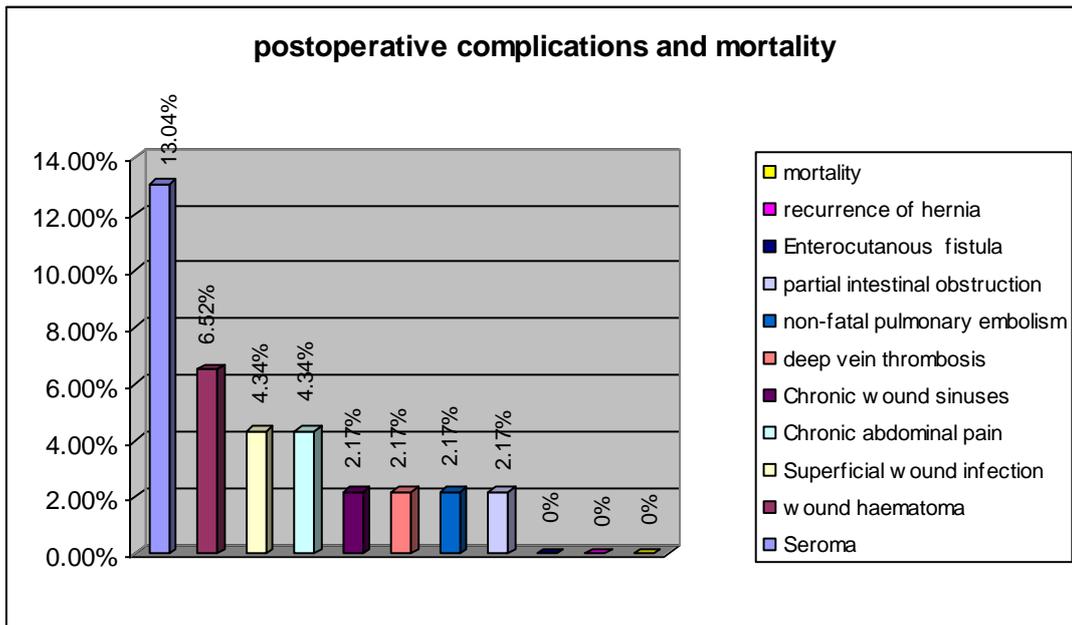
**Table V: Post-operative complications occurring in the 46 patients.**

| Complications                  | Number ( % ) |
|--------------------------------|--------------|
| Seroma                         | 6 (13.043% ) |
| Wound haematoma                | 3 (6.52% )   |
| Superficial wound infection    | 2 (4.34% )   |
| Chronic abdominal pain         | 2 (4.34% )   |
| Chronic wound sinuses          | 1 (2.17% )   |
| Deep vein thrombosis           | 1 (2.17% )   |
| Non-fatal pulmonary embolism   | 1 (2.17% )   |
| Partial intestinal obstruction | 1 (2.17% )   |
| Enterocutaneous fistula        | 0 (0 )       |
| Recurrence of hernia           | 0 (0 )       |
| Mortality                      | 0 (0 )       |

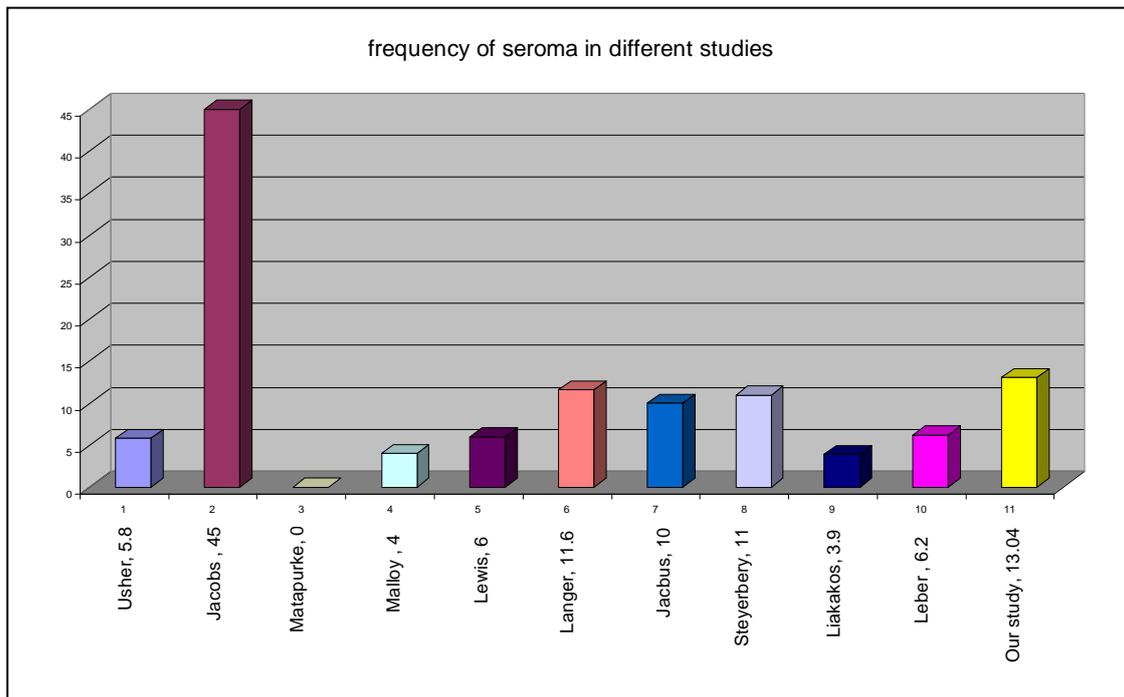
**Table VI: Frequency of complications in different studies.**

| complications                  | Frequency in individual studies (( % of patients )) |                                    |   |                             |                            |   |                                |                                  |                             |                   |           |       |
|--------------------------------|---|------------------------------------|---|-----------------------------|----------------------------|---|--------------------------------|----------------------------------|-----------------------------|-------------------|-----------|-------|
|                                | Usher ((1962)) subaponeurotic                       | Jacobs et al ((1965)) subcutaneous | Matapurker et al ((1991)) preperitoneal | Malloy et al ((1991)) onlay | Lewis et al ((1984)) onlay | Langer and Christiansen ((1985)) comparisim | Jacobs W.A. et al (1998) inlay | Steyerbery EW et al (2000) inlay | Liakakos et al (1994) inlay | Leber et al inlay | Our study |       |
| Seroma                         | 5.8   | 45                                 | 0                                       | 4                           | 6                          | 3   | 11.6                           | 10                               | 11                          | 3.9               | 6.2       | 13.04 |
| Wound haematoma                | 2.1   | 8                                  | 1.6                                     | 3.6                         | 5.3                        | 1.4   | 6.7                            | 4.6                              | 5.7                         | 2.8               | 4.8       | 6.52  |
| Superficial wound infection    | 3.5   | 6.2                                | 2.4                                     | 5.4                         | 3.5                        | 4.2   | 5.3                            | 5                                | 6                           | 3.9               | 3.2       | 4.34  |
| Wound sinuses                  | 1.9   | 3.3                                | 1.2                                     | 3.1                         | 2.8                        | 2.6   | 3.5                            | 2.5                              | 2.5                         | 0                 | 3.9       | 2.17  |
| Partial intestinal obstruction | 2   | 1.1                                | 1.8                                     | 2.2                         | 3.2                        | 2.9   | 2                              | 2.3                              | 1.9                         | 1.9               | 3.4       | 2.17  |
| Recurrence of hernia           | 0   | 2.7                                | 0                                       | 2.9                         | 1.3                        | 0   | 1.2                            | 0                                | 0                           | 0                 | 3.4       | 0     |
| Enterocutaneous fistula        | 0   | 0                                  | 0                                       | 0                           | 0                          | 0   | 0                              | 0                                | 0                           | 1.4               | 1.5       | 0     |

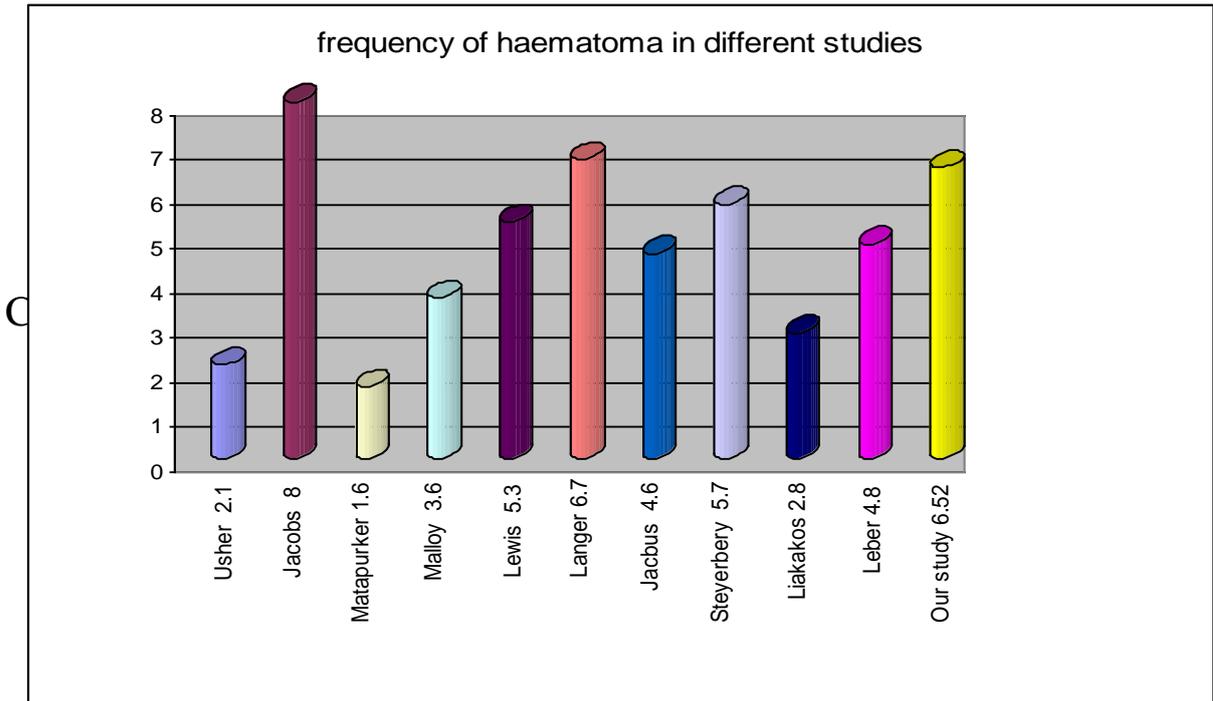
**Chart 1: Postoperative complications and mortality.**



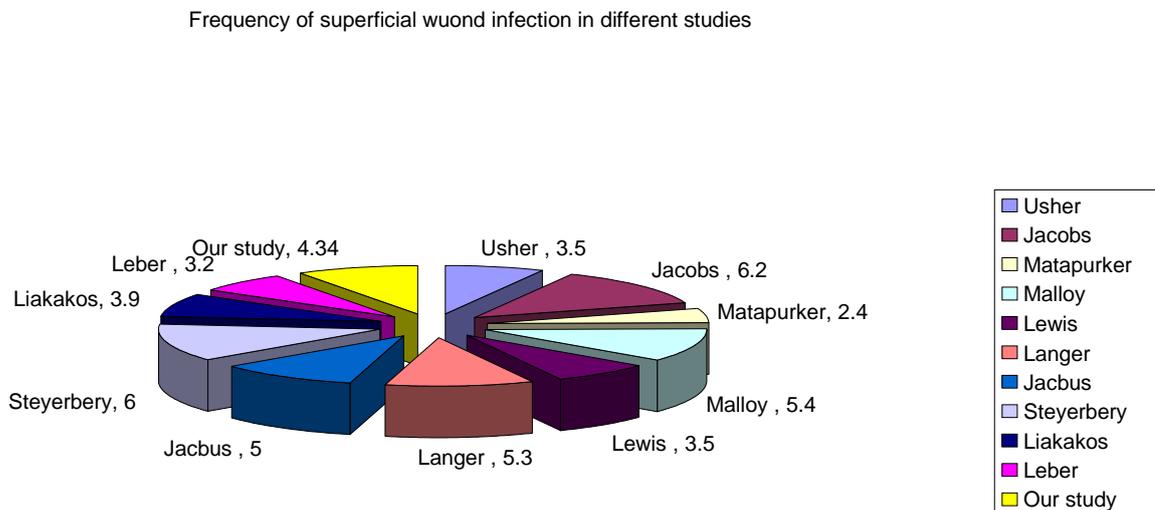
**Chart 2: Incidence of seroma in different studies.**



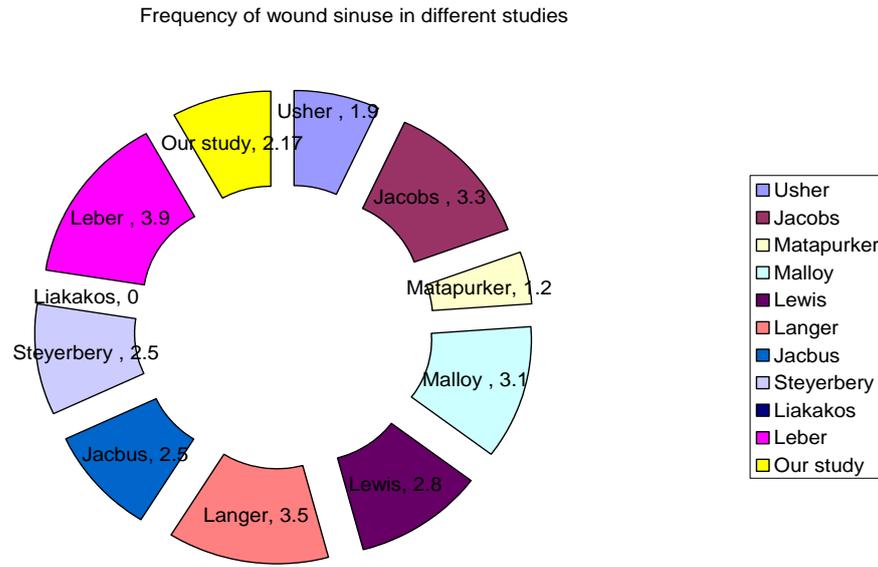
**Chart 3: Incidence of wound haematoma in different studies.**



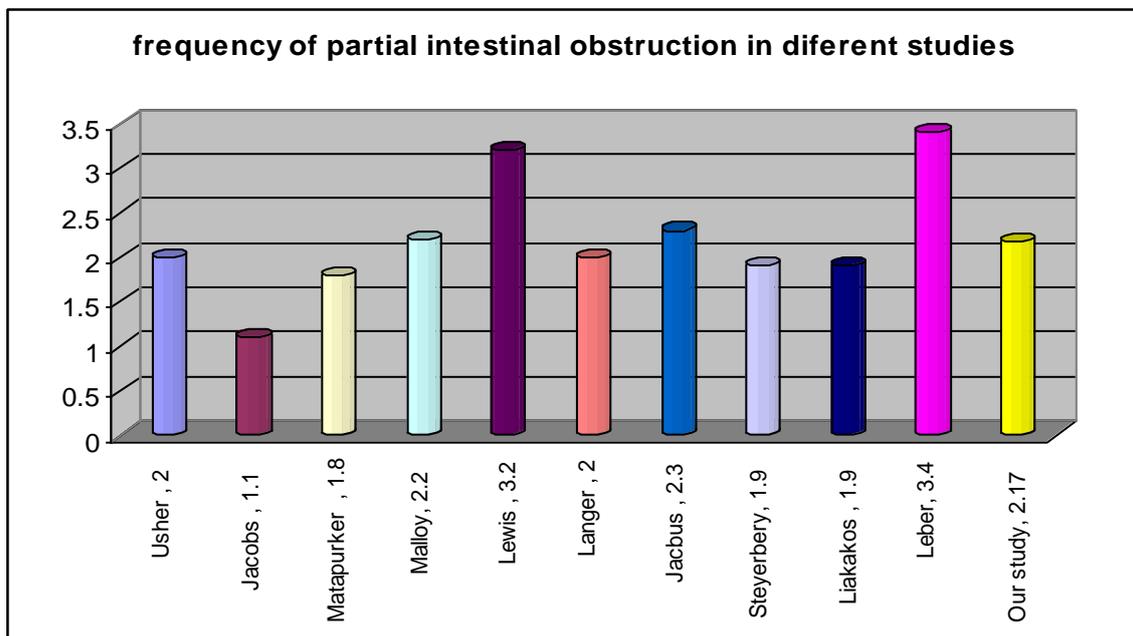
**Chart 4: incidence of superficial wound infection in different studies.**



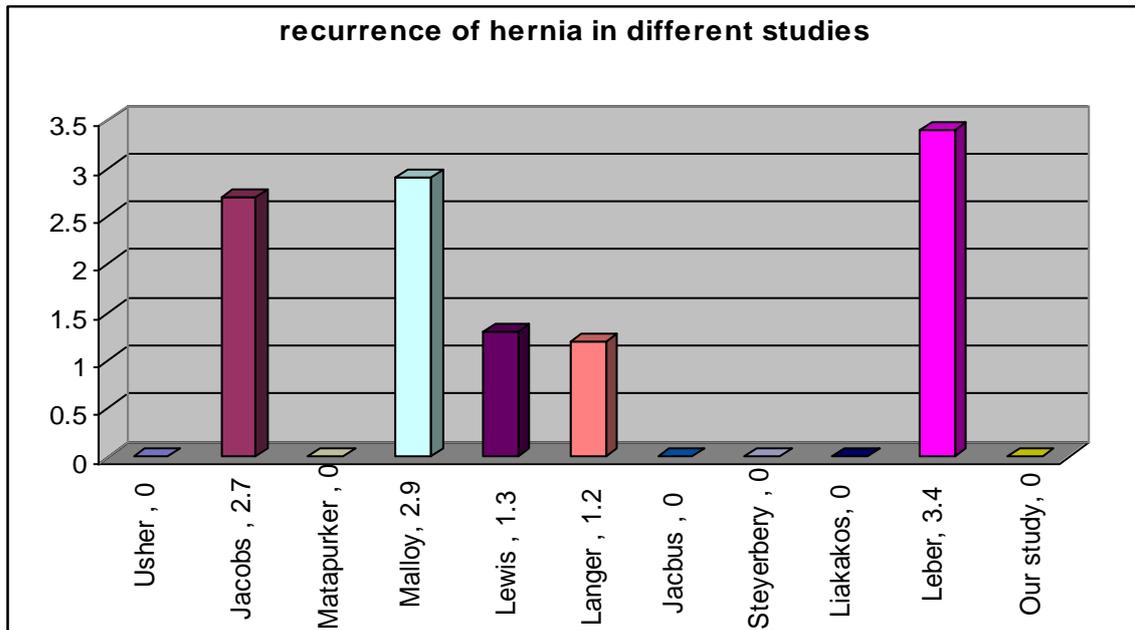
**Chart 5: Incidence of wound sinuses in different studies**



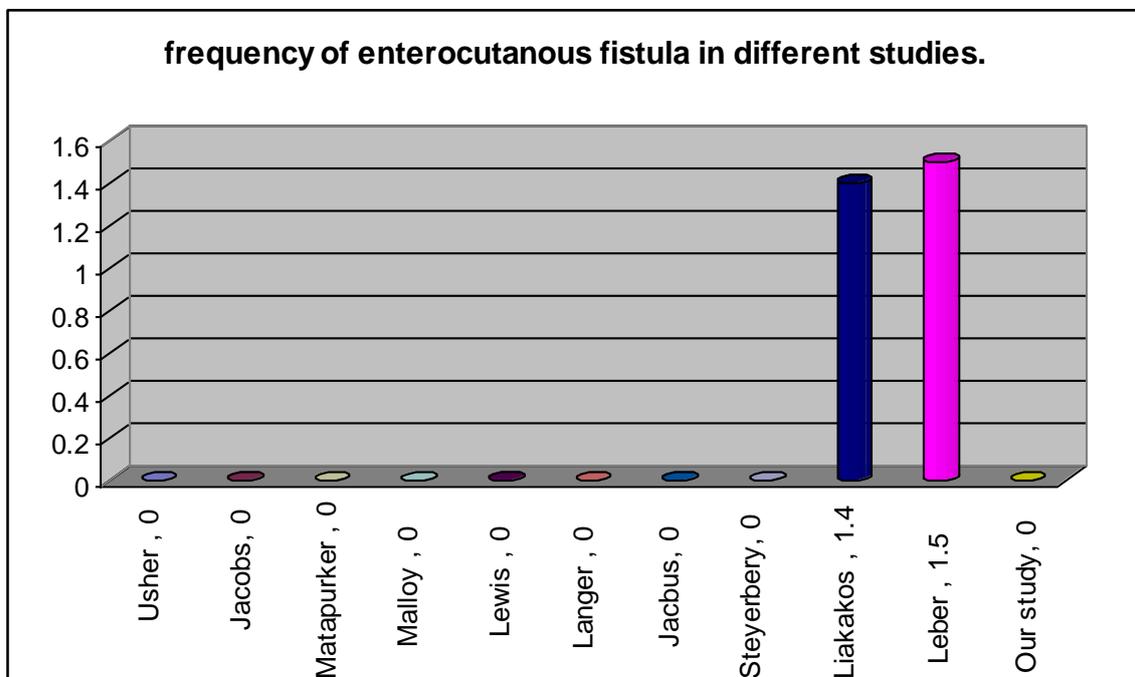
**Chart 6: Incidence of partial small intestinal obstruction in different studies.**



**Chart 7: Incidence of recurrent hernia in different studies.**



**Chart 8: Incidence of enterocutaneous fistula in different studies**



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