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On lay mesh repair technique is a safe tension free repair for large incisional hernia (Prospective study)

Hussein Mjelee Kadhim Alkhalefa, Mohammed Jasim Hasan, Atheer Hasan Abdulsada Almaeni

Al-Diwanyh Teaching Hospital, Al-Diwanyh health directorate, Iraq

ABSTRACT:

Incisional hernia remains a frequent complication of abdominal surgeries with a reported incidence of (10-15)% Repair of large incisional 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.

Aim of this study: to evaluate the outcome of repair of large incisional hernia with the (on lay tension free) mesh technique.

Patients and Method:

A prospective study that includes a 70 patients who underwent mesh repair for large incisional hernia on lay tension free polypropylene mesh with two points fixation during the period from January2007 to December 2011 in Al-Diwanyh Teaching Hospital. Complications like; hematoma, seroma, Wound infection, intestinal obstruction and enterocutaneous fistula Were recorded, the Follow up period Range from 4 to 21 month. Recurrence rate with the period of fellow up was recorded.

Results**:**

Patients were included in the study 40 Females median age of 49.5 and 30 Males with median age of 51.5 year, 31 patients were overweight and had body mass index "BMI" equal to more than 30, twenty six patients made regular visits that extended up to 12 month, 22 patients made regular visits up to 6 months, 3 made regular visits up to 18 month , 3 patient was followed-up to 17 month ,while 8 patients made irregular visits up to 21 month due to causes other than the hernia , 8 patients lost from follow-up after 4 months.

The main postoperative complications were seroma formation 8 patients(11.7 %), wound haematoma 4 patient (5.7 %), wound infection3 patients (4.2 %),chronic wound sinuses one patient(1.4%) ,partial intestinal obstruction one patient(1.4%) No recurrence of hernia and no enterocutaneous fistula were reported during our follow-up period.

Conclusion**:** Tension free onlay mesh repair is a feasible operative procedure for repair of large incisional hernia with no significant major morbidity.

INTRODUCTION:

Incisional hernia (post-operative hernia) is the hernia that develop at site of previous incisions for other abdominal procedure. It usually starts as symptomless partial disruption of the deep facial layers during the early postoperative period (Williams et al., 2008) Any condition that affects wound healing and increase intra-abdominal pressure during the early post-operative period predisposes to the development of Incisional hernia (George et al., 1986).including wound infection, obesity , smoking ,poor surgical technique , malnutrition , steroid, jaundice, and anemia .

Incisional hernia develops in 10-15% of abdominal incisions(Mudge et al., 1985).about 100,000 Incisional hernia repair performed per year in USA (ZINNER MJ et al., 2007).the incidence may reach 23% in patients who develop postoperative wound infection(Bucknall et al., 1982).the incidence is higher in vertical incisions than other incisions(1,8).the incidence become less with smaller wound size (ZINNER MJ et al., 2007). Upper abdominal incisions are associated with higher incidence than lower abdominal incisions.

Most of Incisional hernia develops within 1st year postoperatively, but long term data shows that at least 1/3rd of Incisional hernia patients present within 5-10 years postoperatively (ZINNER MJ et al., 2007).

Predisposing factors related to incisional hernia

Technique of wound closure:

Suture material: absorbable sutures are associated with a higher incidence of I.H, while non absorbable suture associated with lower incidence of Incisional hernia, but associated with more wound pain and risk of sinus formation(Hodgson et al., 2000).Some studies show that slowly absorbable suture give similar result to non absorbable suture with less wound pain and sinus formation(ZINNER MJ et al., 2007).

Method of closure: clinical evidence show that there is no difference between continuous suture and interrupted suture in wound dehiscence, wound infection , pain regarding Incisional hernia (van 't, Riet M et al., 2002).the suture length should be at least 4 time the length of the wound.

Drainage: drainage through the incision associated with a high incidence of Incisional hernia (George et al., 1986).

Factors related to incision: midline and vertical incisions are associated with high incidence of Incisional hernia (Fassiadis et al., 2005). Incisional hernia has been described following paramedian, subcostal, grid iron, pfannenstiel incision, and laparoscopic port sites.

Reasons for initial operation: emergency operations show higher incidence (ZINNER MJ et al., 2007) of Incisional hernia Operations with peritonitis also show a higher incidence.postoperative wound infection consider one of the important factor in development of Incisional hernia (Bucknall et al., 1982).

Cough, vomiting and distension: these factors in early postoperative lead to wound disruption and development of Incisional hernia (Williams et al., 2008).

General condition of the patients: obesity is one of the major risk factor in the development of Incisional hernia (WILMORE DW et al., 2008).smoking ,malignancy , malnutrition ,diabetes mellitus, steroids ,and multiple pregnancy all are factors implicated in the development of Incisional hernia (Issamedin et al., 2008).

Increase age associated with a higher incidence of Incisional hernia (Yaser A R et al., 2004).

Types of hernias repair:

1-Suture repair:

-Simple suture repair: can be done for small defect (less than 4 cm in diameter) with strong viable surrounding tissue (WILMORE DW et al., 2008).

-Component separation technique: similar to simple suture repair ,but involved division of portion of anterior and posterior rectus sheath to gain adequate facial coverage (De Vries et al., 2003).

-Complex repair :MAYO AND KEEL ,Mayo similar to simple repair , but include overlapping of fascia on each other (double breast technique) .

2-MESH REPAIR : It can be used on rectus sheath (onlay), or under rectus muscle or posterior rectussheath and peritoneum (sub lay) or just between posterior abdominal wall and viscera (inlay). Inlay technique carried high risk of adhesion and enterocutaneous fistula. New type of mesh (pTFE) cause less adhesion and can be used intra abdominally.
Sublay is more difficult and only applicable in midline incisional hernia, and the mesh only separated from the bowel by peritoneum (Kingsnorth A et al., 2006). While onlay technique is simple and effective with short learning curve, with recurrence rate at 5 years follow up reach 15 % (Andersen LP A et al., 2009). Some studies show good result with sublay technique (De Vries et al., 2004). But the best method is still matter of debate (Kingsnorth A et al., 2006).
3-Laparoscopic Repair :
It's similar to inlay mesh repair, using large mesh fixed to posterior abdominal wall by transfascial suture or tacks, after reduction of the contents of the sac. The mesh should not induce adhesion (DeMaria et al., 2000) . Some studies show decrease recurrence rate with laparoscopic repair to less than 10% (Heniford et al., 2003) , and less complication rate (Olmi S et al., 2003) .

AIM OF STUDY:

Is to evaluate the outcome of large incisional hernia mesh repair with tension free onlay mesh repair .

PATIIENTS AND METHODS:

Patients Data sources from the private clinic and Al-Diwanya Teaching Hospital traditional file recording system were analyzed for all patients with large incision hernias mesh repair (ie; 10cm and more with tension free on lay procedure)for the period between January 2007 to December 2011 ; 88 patients have been found , proforma for each case is completed depending on the previously recorded informations , all operations were done as an elective procedure by the same Surgeon and by the same technique , 18 of them had follow-up of less than 2 months and excluded from the study ,the remaining 70 patients were included in this study had dependable follow-up (range from 4 - 21 month with median follow-up of 13 month).

Operative technique:

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 a onlay tension free , with 2 points of fixations, 1st point fixating mesh to the margin of the defect by continuous

prolene sutures , 2nd point fixating the periphery of mesh into exterior of anterior rectos sheath by interrupted sutures. 2 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 range 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 the discharge , then after 2weeks ; 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 70 patients, 40 Females and 30 Males with median age was 49.5 year for female and 51.5 year for male. 21 patients weighted more than their ideal body weight and had body mass index "BMI" equal to more than 30. six patients had controlled Diabetes mellitus, 35 patients had controlled hypertension and. 20 suffered from chronic obstructive air way disease. There were 21 smoker and stop smoking at least two weeks prior surgery as seen in table one.

Table (1). Patient sex and age distribution, and associated diseases.

PATIENT SEX	PATIENT NO.	MEDIAN AGE	BMI > 30	DM	HT	OBST.. AIR WAY DISEASE	SMOKER
FEMALE	40	49.5 YR	17	4	22	8	6
MALE	30	51.5 YR	14	2	13	12	15
TOTAL	70		31	6	35	20	21

Regarding the duration of follow-up, 26 patients made regular visits that extended up to 12 month, 22 made regular visits up to 6 months, 3 made regular visits up to 18 month, 3 patient was followed-up to 17 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.

The original operations were bowel related in 34 cases, gynecological in 13, hepatopancreaticobiliary in 17 patients, previous repair of paraumbalical hernia in 6 patients. (Table3).

Table(3): Cause of original operation.

Original operation	*Number*	*Percent*
bowel related	*34*	*48.5%*
Gynecological	*13*	*18.5%*
Hepatopancreaticobiliary	*17*	*24.3%*
Repair of paraumbalical hernia	*6*	*8.5%*

The previous incisions were long midline in 31cases, paramedian in 21, transverse in 18patients, table (4).

Table (4): Site of previous incisions

previous incisions	*Patients no.*	*%*
Long midline	31	44.2
paramedian	21	30
transverse	18	25.7
Total	70	100

Despite of the used of 2 drains ,Seroma formation was the commonest problem and occurred in 8 patients (11.7%), we noted that accumulation of serum occurred 3-17 days after operation. A wound haematoma developed in 4patients (5.7%), three patients (4.2%) developed Superficial wound infection, one patient (1.4%) developed chronic wound sinus. One patients developed partial intestinal obstruction, 3 patients developed chronic abdominal pain. Despite of antithrombotic prophylaxis 2 patients developed deep vein thrombosis and one developed non-fatal pulmonary embolism, these result shown in table 5.

There were no cases of enterocutanous fistula and no cases of recurrence of hernia in the available period of follow-up. There were no intra-operative or early postoperative mortality.

Table 5: Post-operative complications occurring in the 70 patients.

Complications	*Number (%)*
Seroma	8 (11.7)
wound haematoma	4 (5.7)
Superficial wound infection	3 (4.2)
Chronic abdominal pain	3 (4.2)
Chronic wound sinuses	1 (1.4)

deep vein thrombosis	2	(2.8)
non-fatal pulmonary embolism	1	(1.4)
partial intestinal obstruction	1	(1.4)

DISCUSSION:

Regarding postoperative seroma formation ; Usher (1962) reported; a 5.8% incidence of seroma formation after subaponeurotic mesh repair , Jacobs et al (1965) reported; a 45% seroma rate after subcutaneous position of the mesh and the extensive dissection involved, whether suction drains were used or not, Matapurkar et al (1991) reported ; no seroma formation because their mesh was incorporated into a peritoneal sandwich , Molloy et al (1991) onlay mesh repair reported; a 4% , Lewis et al (1984) onlay mesh repair report 6% , Langer and Christiansen (1985) compared their results using intraperitoneal mesh repair with onlay mesh repair and suggested that the use of intraperitoneal mesh gave a better repair with less seroma (3% Vs 11.6%) , Jacbus W.A. et al (1998) with prospective follow-up for 2.5 years(intraperitoneal mesh repair) reports;a 10% seromas, Steyerbery EW et al (2000) in their reterospective study with median follow-up for 21 month (intraperitoneal mesh repair) reported; a 11% seromas, Liakakos et al (1994) carried out a prospective comparison of intraperitoneal mesh against the use of onlay mesh and showed that a better repair with 3.9% seroma after intraperitoneal mesh at a mean of 7.6 years of follow-up, In a study by Leber et al ,reported; a 6.2% .

In a comparison our results report; a 11.7% incidence of seroma , this slight elevation in the incidence of seroma may be due to on lay procedure and large size of hernia which need extensive dissection in the subcutaneous plane and large size of mesh which leads to more reaction with the overlying tissues and relatively early removal of drains.

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% , Lewis et al (1984) reported; a 5.3% wound haematoma , Langer and Christiansen (1985) reported; 6.7% for onlay repair , Jacbus W.A. et al (1998) reported; 4.6% , Steyerbery EW et al (2000) reported; 5.7% , Liakakos et al (1994) reported; 2.8% , Leber et al reported; 4.8%. In comparison our results report; 5.7% wound haematoma , which was within range of the results of previous studies.

Regarding superficial wound infection, 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 Jacbus W.A. et al , 6% by Steyerbery EW et al , 3.9% by Liakakos et al and 3.2% by Leber et al.. In comparison our results report; a 4.2% superficial wound infection that are within the range of previous studies .

Regard wound sinuses (sinuses between mesh and skin) , Usher et al reported a ; 1.9% and 3.3% by Jacobs et al , 1.2% by Matapurkar et al , 3.1% by Molloy et al , 2.8% by Lewis et al , 3.5% by Langer et al , 2.5% by Jacbus W.A. et al , 2.5% by Steyerbery EW et al , no cases of wound sinuses by Liakakos et al , Leber et al reported; a 3.9% wound sinuses**.**

Regarding the incidence of partial small bowel obstruction, 2% reported by Usher et al , 1.1% by Jacobs et al , 1.8% by Matapurkar et al , 2.2% by Molloy et al , 3.2% by Lewis et al , 2% by Langer et al , 2.3% by Jacbus W.A. et al , 1.9% by Steyerbery EW et al , 1.9% by Liakakos et al , and 3.4 % by Leber et al .

In our study the only available mesh used at that time was polypropylene mesh, and despite that part of the mesh was in direct contact with the bowel the reported incidence of small intestinal obstruction was 1.4%,

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.

Lewis et al (after onlay mesh repair) reported incidence of (3.2%) that nearly similar to the result reported by Leber et al (3.4%) after inlay mesh repair , from that results we conclude that this complication not specifically related to the contact between mesh and bowel but might be also due to other causes that occur with any laparotomy.

Regarding recurrence of incision hernia, Jacobs et al (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.

On other hand; Loh et al (1992) in their literature review , suggested that the better results with intraperitoneal mesh, but due to inadequate length of follow-up they state that the risk of recurrence still under evaluation Previous studies have shown that 70-75% of recurrences develop within two years and 80-90% develop within 3 years(Hodgson NC et al 2000). Our available follow-up, therefore, is probably not long enough to record all possible hernia recurrence.

CONCLUSION AND RECOMMENDATIONS :

- 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.
- According to the available period of follow-up the incidence of enterocutanous 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.
- we advice a longer follow up period to be sure about further recurrence in future.

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