Incisional hernia repair by abdominal wall component and onlay mesh fixation: Review Article

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Abstract:

An incisional hernia is a common complication following laparotomy and is the most common indication for reoperation. However, the optimal repair approach remains a matter of debate. We will investigate the incidence of postoperative surgical site occurrence between component separation and onlay mesh hernioplasty in the treatment of midline incisional hernias, which helps avoid unwanted complications and associated morbidities.

Keywords: Incisional hernia, onlay mesh, IH.

Introduction:

Mesh onlay repair: the mesh-onlay "sublay" repair was as described by **Wantz in (1991) (1)**. Incision of the posterior rectus fascia was performed close to the linea alba and a pocket was then created posterior to the rectus abdominis muscle and anterior to the posterior rectus fascia and the peritoneum. The peritoneum and the posterior rectus fascia were closed with a running absorbable suture to form a barrier between the implanted mesh and the abdominal contents **(2)**.

The mesh was placed underneath the rectus muscle through its full width overlapping above and below the margins of the fascial defect by 4–6 cm. The mesh was then fixed by using a non-absorbable suture through the abdominal wall. A Closed suction drain was then placed anterior to the mesh. The anterior rectus fascia, linea alba, and scar tissue were then approximated in the midline to cover the mesh and to isolate it from the subcutaneous tissue. The subcutaneous tissue was sutured and the skin was then closed **(2).**

PCS with TAR was performed as prescribed by (**3)**. An incision was then made in the posterior rectus sheath within 0.5cm of its medial border through the entire length of the rectus muscle and it was then dissected from the muscle to develop a retromuscular plane. The posterior rectus sheath was incised, approximately 0.5–1 cm medial to the neurovascular bundle to the rectus abdominis muscle and linea semilunaris and the transversus abdominis muscle was transected along its whole length. Once divided, the muscle was retracted anteriorly to develop the ocular retromuscular plane. The same

procedure was performed for the contralateral side. The posterior rectus sheath was reapproximated in the midline with all holes in the posterior layer closed **(2)**.

The mesh was then placed in a diamond configuration and fixed immediately above the pubic ramus and around the xiphoid process. On each side, full-thickness trans-fascial sutures were placed at three cardinal points under physiological tension. The linea alba was reconstructed by suturing the anterior rectus sheath along the midline. A closed suction drain was then placed anterior to the mesh. The subcutaneous tissue was closed in layers and the skin was stapled or sutured **(2).**

Complications of contemporary onlay incisional hernia repair:

- Surgical site infection (SSI) is one of the most common surgical site occurrences complicating open ventral hernia repair and is the most significant predictor of hernia recurrence **(4)**.
- Hematomas following open ventral hernia repair can occur from transection of myofascial barriers and bleeding from cut edges of muscles, and can also occur in the space created by raising large lipocutaneous flaps. Damage to perforator vessels or epigastric vessels can cause ischemic complications or necrosis **(5).**
- Seromas can occur as a consequence of the extent of tissue mobilization, dissection and local inflammatory reactions to mesh and suture material **(5).**
- Wound dehiscence involves separation of skin edges in the absence of surgical site infection. Contributing factors include poor blood supply to the skin edges, poor suturing technique or damage to suture material and radial tension on the wound cause it **(5).**
- Recurrence: the patient-related factors considered important in relation to recurrence following hernia repair are extremity of age, large hernia defect >6 cm, no prophylactic antibiotic cover **(5).**

Prevention of Incisional Hernia

Measures taken to reduce the incidence of IH include:

- Preoperative control of the major risk factors for IH and administration of appropriate antibiotics for all patients undergoing emergency or elective surgery where there is a risk of contamination and in high-risk patients are well known to reduce postoperative complications, including IH **(6, 7).**
- Reducing the operative time, gentle manipulation of tissues, and avoidance of intraoperative contamination reduces the incidence of IH **(8).**
- Interventions or procedures used to prevent IH in high-risk patients **(table 1)**, selection of a slowly absorbable or non-absorbable monofilament suture material, and increasing the ratio of SL to WL >4 significantly reduced the incidence of IH **(8).**
- Post-operative pain control and prevention of respiratory complications

are achieved by respiratory training and early mobilization (**7**).

- The cumulative rate of recurrence of IH was reduced by using a mesh for repairing IH **(9)**.
- The introduction of the minimally invasive surgery in the sixties of the last century contributed in the reduction of the incidence of IH **(10; 11)**.
- The injection of transforming growth factor beta 2 into the abdominal wall increases the production of collagen I and III and reduces the incidence of IH in rats. In addition, the administration of transforming growth factor beta 2, basic fibroblast growth factor, and interleukin 1 beta reduces the incidence of IH in rats **(12, 13).**
- Treating abdominal wall incisions with sustainedrelease of basic fibroblast growth factor reduced the incidence of IH and its recurrence in a rat model (**8**).

Table (1): Some the procedures and interventions used for prevention of IH **(8):**

Procedure or intervention	Results	Author and date
Polygalactin mesh insertion for high risk patients	Does not decreases incidence of IH	**Pans 1995**
Using alloplastic mesh for reinforcement of abdominal closure	Reduces the rate of IH	**Klinge 1997**
Rectus banding	Good result and effective in long-term	**Sham 2009**
Rectus sheath relaxation incisions	Safe, reduces rate of wound dehiscence and IH	**Maruahs 2005**
Using a bio absorbable plug for prevention of trocar site IH	Simple feasible and effective	**Moreno 2008**
Sub fascial nonabsorbable mesh for midline incisions in high risk patient	Safe, effective and provide strengthening of wound	**Elkhadrawy 2009**
Using biologic mesh placement in high risk patients	Safe effective and reducing incidence from 17.7% to 2.3%	**Liaguna 2011**
Preperitoneal proline mesh placement in high risk patients	Safe and effective in preventing IH	**Hidalgo 2011**
Placement of proline mesh preperitoneal in high risk patients	Effective for reducing the rate of IH	**Aborayia 2013**

- Continuous sutures are found to result in lower incisional hernia rates **(14)**

Suggested prophylactic mesh to risk patient like abdominal aortic aneurysm,

obesity surgery seems too low to recommend prophylactic appears effective and safe **(15)**.

- Midline laparotomy is associated with a higher risk of incisional hernia than is transverse laparotomy. Paramedian incision leads to considerably lower incisional hernia rates. Therefore, non-midline incisions should be used whenever possible **(15)**
- Several studies have compared layered closures with mass closures. Meta-analyses on this topic have shown favorable results when using mass closure **(16)**.

Evaluation of Outcome of Incisional Hernia Repair:

Patient-reported outcome measurement and quality of life: The time that the success of abdominal wall repair was solely measured by the rate of recurrence has gone. Different standardized methods for measurement of quality of life (QoL**)** after incisional hernia repair are available, but there is no consensus on the optimal method, timing, or length of follow-up exist **(17).**

Generic Quality of Life Scores:

Although the Short-Form 36 (SF-36) is a frequently used QoL score in studies on abdominal wall surgery, it is considered too generic to use for evaluation of QoL after abdominal wall repair **(18).**

Laparoscopic inguinal hernia repair is associated with initial decline s in QOL in the postoperative period. Improvements appear in the long term **(19)**.

Nevertheless, some studies have used SF-36 successfully to demonstrate benefits on QoL by performing hernia repair in incisional hernia repair **(20).**

Visual Analogues Scale (VAS) for Pain:

The VAS score is often used routinely in hospitals to measure postoperative pain and manage pain medications. The VAS **(Fig 1)** was recorded by asking the patient to mark the amount of pain experienced on a calibrated line of 10 cm long. The left side of the line is referred to as "No pain" and the right side as "The worst imaginable pain." It is a good measurement in the immediate postoperative period, but less valuable for assessing late chronic pain **(21).**

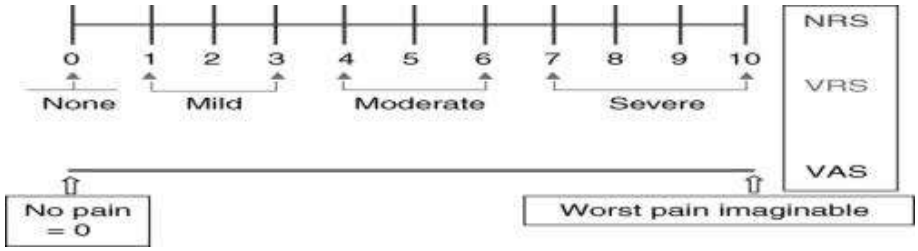

Figure (1): Visual analog scale **(22)**

Verbal Rating Scale (VRS):

The patient was asked to grade the level of pain experienced at four levels defined by **(23)**: "No pain" = no discomfort experienced; "Mild pain" = occasional pain or discomfort that did not limit activity, with a return to pre-hernia lifestyle; "Moderate pain" = pain preventing return to normal preoperative activities, or "Severe pain" = pain that incapacitated the patient at frequent intervals or interfered with activities of daily living. For assessing chronic pain, the VRS

seems to be a better tool than the VAS for pain for assessment **(21).**

Carolina Comfort Scale™ (CCS):

The CCS™ was developed as a questionnaire to assess the QoL of patients who underwent hernia repair using a prosthetic material **(18)**

The questionnaire contains 23 questions with a 6-point scale from 0 to 5 that report the sensation of the mesh, pain, or movement limitation for eight different activities. The numerical scale is a descriptive scale:0= no symptoms, 1 = mild but not bothersome symptoms, 2= mild but bothersome symptoms, 3 = moderate and/or daily symptoms, 4 = severe symptoms, and 5 = disabling symptoms. The total score ranged from 0 to 115. in 3 sub-scales:

Movement" (range, 0–35). Sensation" (range 0–40), "Pain" (range 0–40), and The CCS™ were used successfully to demonstrate QoL improvement after hernia repair **(24).**

European Registry for Abdominal Wall Hernias QoL Score (EuraHS-QoL Score):

The EuraHS-QoL score is a short hernia-specific questionnaire with nine questions that can be scored by the patient on an 11-point scale from 0 to 10. The questions were chosen in consensus between the 14 members of the EuraHS working group from nine different countries trying to ask questions that seemed most relevant for QoL before and after hernia repair **(25)** shown in **Table (2).**

Table (2): Eura HS-Quality of Life Scale **(25)**

EuraHS

EuraHS QoL

version: English

EuraHS Quality Of Life scale **Pre-operative**

1. Pain at the site of the hernia												
	0 = no pain										**10 = worst pain imaginable**	
Pain in rest (lying down)	0	1	2	3	4	5	6	7	8	9	10	
Pain during activities (walking, biking, sports)	0	1	2	3	4	5	6	7	8	9	10	
Pain felt during the last week	0	1	2	3	4	5	6	7	8	9	10	
2. Restrictions of activities because of pain or discomfort at the site of the hernia												
	0 = no restriction										**10 = completely restricted**	
Restriction from daily activities (inside the house)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction outside the house (walking, biking, driving)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during sports	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during heavy labour	0	1	2	3	4	5	6	7	8	9	10	X
	X = If you do not perform this activity											
3. Cosmetic discomfort												
	0 = very beautiful										**10 = extremely ugly**	
Shape of your abdomen	0	1	2	3	4	5	6	7	8	9	10	
Site of the hernia	0	1	2	3	4	5	6	7	8	9	10	

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