

A PROSPECTIVE STUDY IN THE MANAGEMENT OF INCISIONAL HERNIA

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ABSTRACT

BACKGROUND

Incisional hernia is a protrusion of abdominal viscera through the site of previous operation or traumatic wound of the abdominal wall. There are numerous methods of repair of abdominal incisional hernia. They are simple resuturing, shoe lace darn repair. Cattell's and Maingot's Kael repair, which are associated with recurrence. Since, the prosthetic graft has revolutionised the surgical field, the Prolene mesh is widely used to cover the defects in incisional hernia. This study is to determine wound complications and the length of hospital stay of inserting a wound drain during mesh repair compared with no wound drain.

MATERIALS AND METHODS

A sum of 30 patients with incisional hernia admitted in general surgical wards of Sivagangai Medical College. The clinical features symptomatology, investigations, operative findings, postoperative wound complications and length of hospital stay were analysed. Onlay Prolene mesh of size 15 x 15 cm is kept with Redivac drain in 15 patients and no drain in 15 patients. Parameters like wound seroma, wound infection, reoperation for wound healing complications and postoperative length stay.

RESULTS

From our comparative study, in a case of incisional hernia, during mesh repair, the usage of negative pressure Redivac suction drain helps in reducing wound infection rate, preventing the formation of seroma, reducing the number of secondary suturing, reducing the postoperative length of hospital stay.

CONCLUSION

Over the years, the advantages of the negative pressure therapy have been demonstrated as it improves healing times by increasing blood flow, extracting secreted fluid and maintaining the wound margins and protecting the wound from contamination.

KEYWORDS

Incisional Hernia, Mesh Repair, Prolene Mesh, Redivac Suction, Wound Infection, Seroma, Secondary Suturing, Length of the Hospital Stay.

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BACKGROUND

Incisional hernia is due to the failure of lines of closure of abdominal wall following surgical incision. The approximated tissues get separated and bowel bulges through the gap, which is covered from within out from peritoneum, scar tissue and skin. Repair of this hernia is one of the few instances in surgery in which implants of foreign material were used to bridge the gaps before the use of natural tissues.² The modern era of prosthetic mesh in hernia repair started when usher reported his experience with Prolene mesh in 1958. The surgery for postoperative hernia is revolutionised by these prosthetic materials.

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Principles Governing Abdominal Incisions

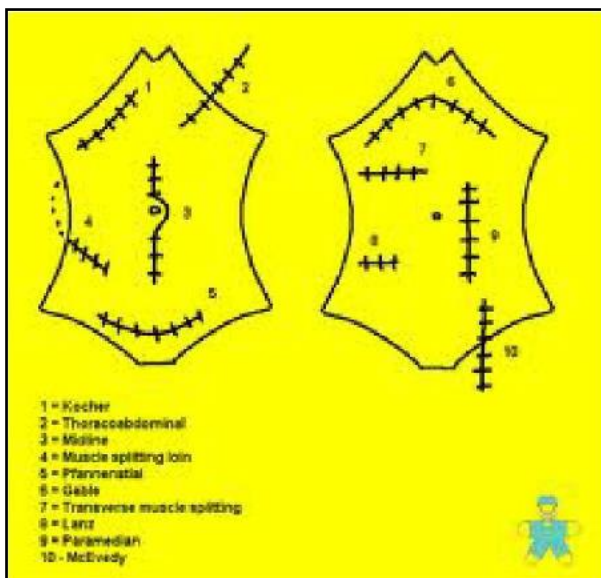
1. Incision must give ready and direct access to the part to be dealt with incision should be extensible in a direction that will allow for any probable enlargement of the scope of operation.
2. Security- The closure of the wound must be reliable and ideally should leave the abdominal wall a strong after the operation as before.
3. As far as possible, muscles must be retracted or split in the direction of the fibres rather than cut across.
4. The incision must traverse the muscle rather than fascia as the scar left in the peritoneum is best protected. Incisions placed across the blood and nerve supply are prone for postoperative complications of dehiscence.
5. Oblique and transverse incision are stronger and less liable for disruption and herniation.
6. The opening made through the different layers of the abdominal wall must as far as possible, not to be superimposed.
7. Reentry into the abdomen should be performed through the previous incision, since the hernia can be repaired at the same time.

- In children, the skin incision should be confined to Langer's lines, otherwise the scar becomes hypertrophic and unsightly with age.

The Principles Governing Abdominal Closure

- The sutures should not be tightened too tightly to avoid the interruption of the circulation resulting in areas of focal necrosis.
- The drainage tube should be inserted through a separate small incision, otherwise it infects the main wound and weakens the scar.
- When wound tension is anticipated, deep tension sutures can be used and if they have been employed, they are left in situ for 14 days.
- Non-absorbable suture materials should be used to suture the fascial layers.
- In order to achieve security of abdominal wall integrity, innervations and vasculature are maintained. So, the muscles must be split in the direction of their fibres rather than cut across. The incision should not divide the nerves as obesity is the enemy of the surgeons, the degree of obesity also modify the incisions. However, it is the discretion of individual surgeons and the experience they count.

Types of Incisions



MATERIALS AND METHODS

Mass closure of the abdominal wall using either interrupted or continuous. Non-absorbable monofilament suture has been shown to be safe and strong as tried by Dudley, 1970 and Jenkins, 1976 and is mandatory in the presence of proteolytic enzymes such as happens in acute pancreatitis. Synthetic absorbable material are currently being used for abdominal closure, but their complete safety is questioned with incidences of delayed incisional hernias, braided sutures harbour bacteria.²

Increased knowledge of polymer chemistry have revolutionised the sutures, polyglycolide, polydioxanone, Vicryl polyglactin, polyvinyl propylene and PTFE have better

tensile strength, more half-life, nontoxic, non-carcinogenic, non-allergic, practically inert and non-disintegrated in presence of infections, now Prolene, PTFE are used more and more for abdominal closure.¹

Wide bites must be taken a minimum of 1 cm from the wound edge and placed that intervals of 1 cm or less. The suture length should measure at least 4 times the wound length to ensure an adequate reserve of suture length in the wound when the suture is placed on tension as it may occur during abdominal distension. Drains and colostomy should be brought through separate stab incisions in order to prevent weakening of the mass laparotomy incision. Now, most of the surgeons prefer non-absorbable synthetic materials like polypropylene and PTFE to suture the rectus sheath.

Adverse Factors of Wound Healing

- Age.
- Malnutrition.
- Vitamin deficiency.
- Trace element deficiency.
- Anaemia.
- Malignant disease.
- Uraemia.
- Jaundice.
- Diabetes.
- Generalised infections.
- Cytotoxic drugs and steroids.

Local Factors

- Tissue tension.¹
- Haematoma formation.
- Necrotic tissue.
- Local infection.
- Foreign body.
- Poor blood supply.
- Recurrent trauma.
- Local irradiation.

Incidence of Incisional Hernia

In the best centers, the incidence of postoperative hernia has been at least 10%, of which 2/3 appear in the first 5 years and that at least around 1/3 appear 5 to 10 years after operation.³

Classifications of Incisional Hernias-

Abel and Clain- (type of incisions)-

Type I - Following vertical incisions.

Type II - Through oblique muscle cutting incisions.

Type III - Transverse incisions.

Burtons Classification

- The parietal wall can be approximated without tension.
- The relieving incisions is needed to approximate the edges.
- Internal separation measures 8 cms or more, which requires mesh for closure.
- Irreducible hernias, which require pneumoperitoneum before repair.

Operative Methods of Repair⁴

Done by Two Methods

- a. Anatomical repair- repair by resuture, Maingot’s keel resuturing, nuttalls operation, Mayo’s repair and shoelace darn repair.
- b. Prosthetic mesh repair like Prolene or Marlex mesh.

Operative Technique⁵

- 1. Refined traumatic dissection.
- 2. Avoiding mass ligation.
- 3. Adequate haemostasis.
- 4. Avoidance of heavy suture material.
- 5. Minimal interference with nerves and vascular supply.
- 6. Gentle retraction.
- 7. Meticulous approximation.

Suture Material

- 1. Available universally.
- 2. Minimum tissue reaction.
- 3. Not favourable bacteria.
- 4. Small caliber.
- 5. High tensile strength.
- 6. Knot should hold well.
- 7. Easy to thread.
- 8. Non-electrolytic, non-allergic and non-carcinogenic.
- 9. Inexpensive.

Drainage Factor

- 1. Unnecessary drain should be avoided.
- 2. Separate stab incision for drain.
- 3. Drain should be removed once purpose is solved.

Types of Mesh Placement

- 1. Onlay - above musculoaponeurotic layer.
- 2. Inlay - subfascial extraperitoneal.
- 3. Underlay - intraperitoneal.
- 4. Combined with underlay and overlay.
- 5. Large underlay.
- 6. Large overlay.
- 7. Combined large underlay.
- 8. Reinforcement.
- 9. Wrap around mesh reinforcement.
- 10. Two piece mesh.

Wound Infection

Box 13-2 Centers for Disease Control and Prevention Criteria for Defining a Surgical Site Infection Superficial Incisional

Infection less than 30 days after surgery involves skin and subcutaneous tissue only, plus one of the following-

- Purulent drainage.
- Diagnosis of superficial surgical site infection by a surgeon.
- Symptoms of erythema, pain and local oedema.

Deep Incisional- Less than 30 days after surgery with no implant and soft tissue involvement.

Infection less than 1 year after surgery with an implant involves deep soft tissues (fascia and muscle) plus one of the following-

- Purulent drainage from the deep space, but no extension into the organ space.
- Abscess found in the deep space on direct or radiologic examination or on reoperation.
- Diagnosis of a deep space surgical site infection by the surgeon.
- Symptoms of fever, pain and tenderness leading to wound dehiscence or opening by a surgeon.

Organ Space

Infection less than 30 days after surgery with no implant infection less than 1 year after surgery with an implant and infection involves any part of the operation opened or manipulated plus one of the following-

- Purulent drainage from a drain placed in the organ space.
- Cultured organisms from material aspirated from the organ space.
- Abscess found on direct or radiologic examination or during reoperation.
- Diagnosis of organ space infection by a surgeon.

Adapted from Mangram AJ., Horan TC., Pearson ML, et al- Guideline for prevention of surgical site infection. Infect control hosp Epidemiol 20:252.1999.

RESULTS AND DISCUSSION

Age Distribution- Age distribution of incisional hernia in our study as follows.

In our study, among 30 cases, most of incisional hernia occurred in the age group of 40-50 years.

Age in Years	Number of Cases	Percentage
40-50	17	56.70%
51-60	11	36.70%
61-70	2	6.7%

Table 1. Age Distribution

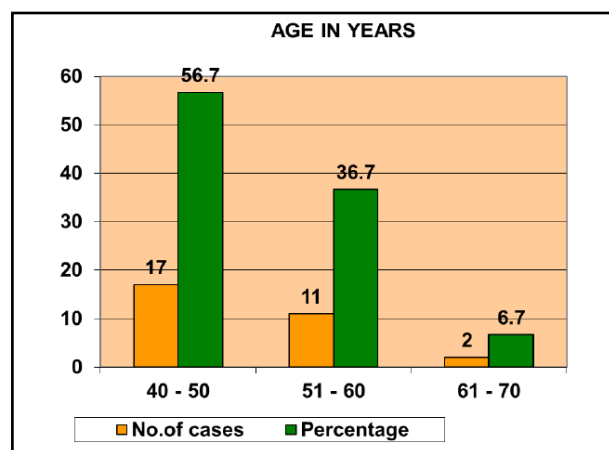


Figure 1. Age in Years

Among 30 patients, 17 patients were in the age group of 40-50 years, which was calculated as 56.7%. 11 patients were in the age group of 51 to 60 years, which was

calculated as 36.7%. The remaining two patients were in the age group of 61-70 years, which was calculated as 6.7%.

Sex Distribution

Sex distribution of incisional hernia in our study is as follows-

Sex	Number of Cases	Percentage
Male	4	13.3%
Female	26	86.7%

Table 2. Sex Distribution

In our study, out of 30 patients, 26 patients were females, which was calculated as 86.7%. The remaining 4 patients were males, which was calculated as 13.3%.

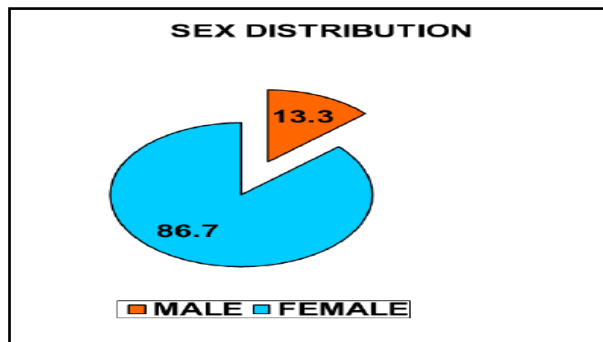


Figure 2. Sex Distribution

Details of previous surgery of our study subjects is as follows-

Previous Surgery	No. of Cases	%
Duodenal perforation	2	6.7%
Hysterectomy	6	20%
Ileal perforation	2	6.7%
LSCS	8	26.6%
Transabdominal tubectomy	12	40%

Table 3. Details of Previous Surgery of Our Study Subjects is as Follows

In our study, out of 30 patients, 12 patients of incisional hernia had previous surgery of transabdominal tubectomy, which was calculated as 40%, 8 patients had previous surgery of lower segment caesarean section, which was calculated as 26.6%.

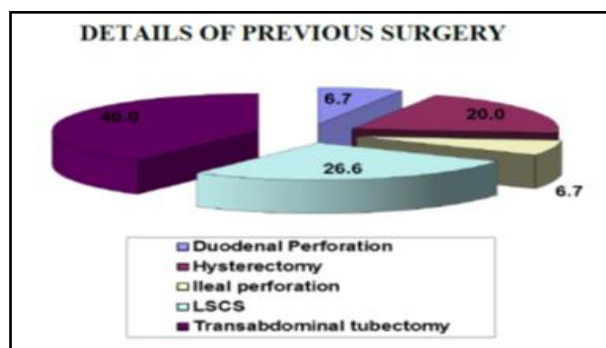


Figure 3. Details of Previous Surgery

Previous Incisions- The details of previous incision of our study population is as follows-

Incision	No. of Cases	Percentage
Infraumbilical midline	14	46.7%
Laparotomy	2	6.7%
Supraumbilical midline	2	6.7%
Transverse infraumbilical	12	40%

Table 4. Previous Incisions

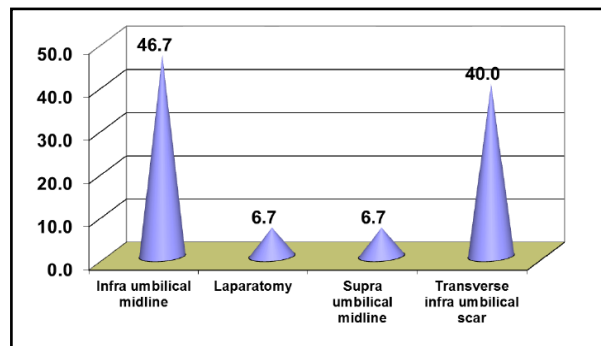


Figure 4. Incision

USG Defect- The ultrasound defect size of our study group is as follows-

USG Defect	Number of Cases	Percentage
3 cm	20	66.7%
4 cm	8	26.7%
5 cm	2	6.7%

Table 5. USG Defect

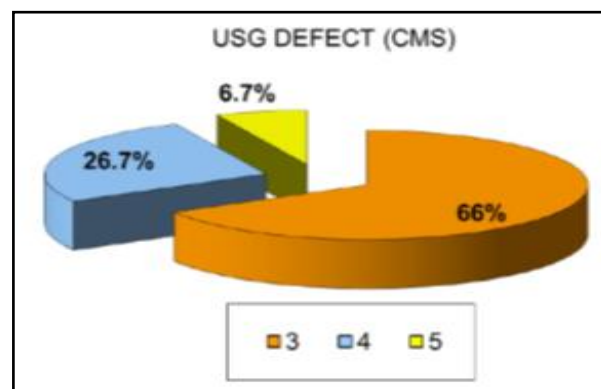


Figure 5. USG Defect (cms)

Wound Drain- In our study population, after Chevrel only mesh repair for all patients, Redivac suction drain was being kept over the mesh in 15 patients and then subcutaneous tissue and skin was closed with 2-0 Vicryl and 1-0 silk, respectively. This was drain arm group. In the remaining 15 patients, no drain was kept and hence after mesh repair the subcutaneous tissue and skin was closed with 2-0 Vicryl and 1-0 silk. This was the no drain arm.

Wound Drain	Number of Cases	Percentage
Yes (drain arm)	15	50%
No (No drain arm)	15	50%

Table 6. Wound Drain

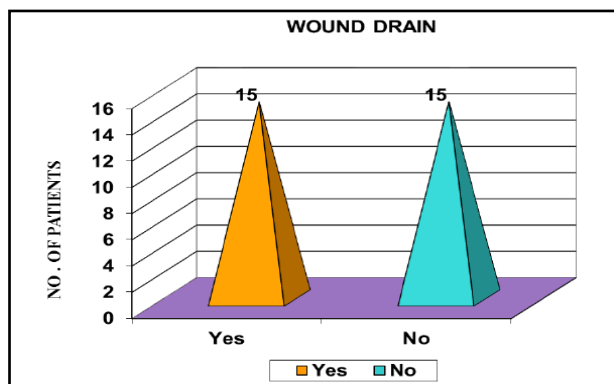


Figure 6. Wound Drain

Wound Infection- The wound infections as defined by CDC recommendations were followed. In our study, all wound infections are superficial incisional only neither deep incisional nor organ space infections. Results were tabulated below.

Wound Infection	Number of Cases	Percentage
Yes	15	50%
No	15	50%

Table 7. Wound Infection

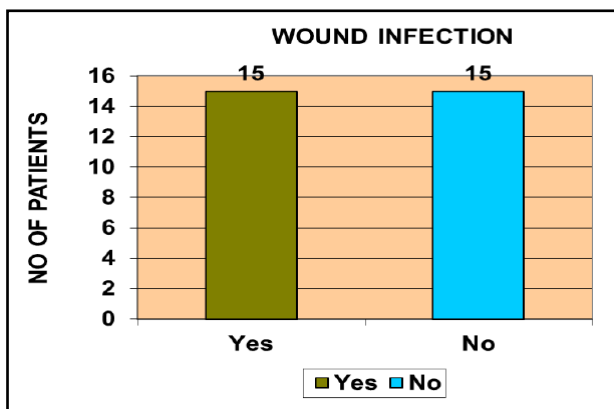


Figure 7. Wound Infection

Wound Drain	Wound Infection	
	Yes	No
Drain (15)	2 (13.3%)	13 (86.7%)
No drain (15)	13 (86.7%)	2 (13.3%)
p' value	0.039 significant	

Table 8. Comparison of Wound Infection

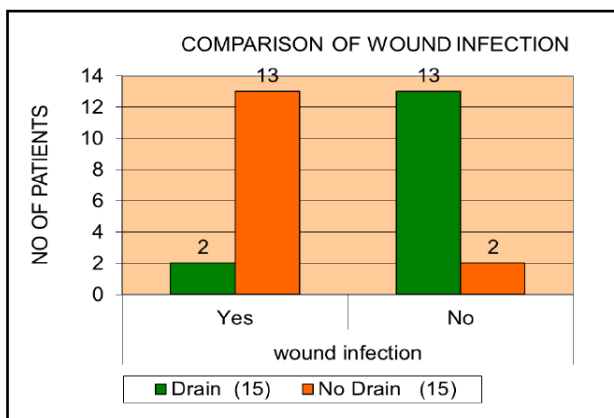


Figure 8. Comparison of Wound Infection

Wound Seroma- Seroma was defined as the collection of any volume of subcutaneous fluid without debris. Wound seroma was assessed clinically in the postoperative period and the results were tabulated below.

Wound Seroma	Number of Cases	Percentage
Yes	15	50%
No	15	50%

Table 9. Wound Seroma

Wound Drain	Wound Seroma	
	Yes	No
Drain (15)	0.0	15
No drain (15)	15	0
p' value	0.003 significant	

Table 10. Comparison of Wound Seroma

Secondary Suturing- Secondary suturing is defined as being done to remove the unhealthy, infected and dead tissue in the primarily sutured wound to close the wound gaping with healthy tissue to freshen the wound edges and to approximate the wound edges in conditions like unhealthy wounds, unapproximated and infected wounds.

Resuturing	Number of Cases	Percentage
Yes	9	30%
No	21	70%

Table 11. Secondary Suturing

Wound Drain	Resuturing	
	Yes	No
Drain (15)	0	15
No drain (15)	9 (60%)	6 (40%)
p' value	0.003 significant	

Table 12. Comparison of Secondary Suturing

Postoperative Length of Hospital Stay

In the preoperative period, patients were evaluated. Routine blood investigations, urinary parameters, ultrasound abdomen, ECG, echocardiogram and cardiology fitness for the patients above 40 years were done. All diabetic patients were switched over from oral hypoglycaemic drugs to insulin and their blood sugar levels were maintained according to the diabetologist opinion. Patients with hypertension were controlled with antihypertensives. Patients having chest infection were treated with antibiotics. Hence, the patients were completely evaluated and assessed and then they were taken up for surgery. Total length of hospital stay was not taken into consideration because of differing health aspects of the patient in the preoperative period and hence the postoperative length of hospital stay was taken into consideration.

Stay	Number of Cases	Percentage
<10 days	7	23.3%
11 to 15 days	8	26.7%
16 to 20 days	10	33.3%
>21 days	5	16.7%

Table 13. Length of Hospital Stay

Length of Hospital stay		
Wound Drain	Mean	SD
Drain (15)	10.6 days	1.55
No drain (15)	19.6 days	2.13
'p' value	<0.001 significant	

Table 14. Comparison of Postop Stay

Across the Globe- There were no RCTs comparing wound drainage after incisional hernia repair. There was only one trial that compared two different types of drains after incisional hernia repair. There was no difference in any of the outcomes measured.

Wound drains after incisional that there was no difference in any of the outcomes measured, however, this trial involved only 24 patients and hernia repair by Gurusamy K.S., Allen V. B., Samraj K et al stated therefore was grossly underpowered to detect clinically important differences in outcome.

It is surprising that we have identified no research evidence relating to this commonly used intervention. RCTs are needed to establish the clinical benefit of inserting wounds drains after repair of incisional hernia.

CONCLUSION

Over the years, the advantages of the negative pressure therapy have been demonstrated as it improves healing times.

- By increasing blood flow.
- Extracting secreted fluid.
- Maintaining the wound margins.
- Protecting the wound contamination.

Hence, from our comparative study, in a case of incisional hernia during mesh repair, the usage of negative pressure Redivac suction drain helps in-

- Reducing the wound infection rate.
- Preventing the formation of seroma.
- Reducing the number of secondary suturing.
- Reducing the postoperative length of hospital stay.

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