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ORIGINAL RESEARCH

Clinical Study and Management of Incisional Hernia with Mesh Repair

Dr. Raghavendra S.[1], Dr. Asha J.[2], Dr. S.D. Mandolkar[3]

[1]Assistant Professor, Department of Plastic Surgery, Rajiv Gandhi Super Speciality Hospital, Raichur Institute of Medical Sciences, Raichur, Karnataka, India
[2]Assistant Professor, [3]Professor, Department of General Surgery, Raichur Institute of Medical Sciences, Raichur, Karnataka, India

Corresponding Author
Dr. Raghavendra S.
Assistant Professor, Department of Plastic Surgery, Rajiv Gandhi Super Speciality Hospital, Raichur Institute of Medical Sciences, Raichur, Karnataka, India

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ABSTRACT

Background & objectives: Incisional hernia is a common surgical problem, an uncommon sequel of surgical interventions. Incisional hernias occur as a result of excessive tension and inadequate healing of a previous incision, which is often associated with surgical site infection. Conditions that increase intra-abdominal pressure are predisposing factors for the development of incisional hernia.

Aims & objectives:

- To study the etiology and risk factors associated with development of incisional hernias.
- To study incidence of incisional hernia with various abdominal incisions and complications of incisional hernias.
- To study management of incisional hernias with mesh repair.

Methods: This retrospective study was conducted in Rajiv Gandhi SuperSpeciality Hospital (RGSSH), Raichur Institute of Medical Sciences (RIMS), Raichurfrom July 2021-March 2024. A minimum of 60 patients of Incisional Hernia were included in the study. Factors were tabulated and statistically analysed to study their contributions. **Results:** In our study 70% of incisional hernias occurred in infraumbilical midline scar.78% of the incisional hernias followed operations on the female pelvic organs. Infection in post-operative period did seem to be the commonest predisposing factor (38%) for weakening of the scar. Incisional hernias were treated by mesh repair either Onlay or Preperitoneal. Preperitoneal mesh repair was found to be significantly better than the Onlay mesh repair. **Conclusion:** Incisional hernia is a common surgical problem as a result of a failure of fascial tissues to heal following surgical interventions. The seeds of incisional hernia are sown at the time of the operation or during convalescence. The choice of operative technique is critical. Preperitoneal mesh repair is better than the Onlay mesh repair.

Keywords: Incisional Hernia, Mesh Repair.

INTRODUCTION

Incisional hernia is a common surgical problem, an uncommon sequel of surgical interventions. It is the result of a failure of fascial tissues to heal and close following laparotomy. Such hernias can occur after any type of abdominal wall incisions, although, the highest incidence is seen with midline and transverse incisions.[1] Post-operative ventral hernias following paramedian, subcostal, Mc Burney, Pfannenstiel and flank incisions have also been described in the literature. Laparoscopic port sites may also develop hernia defects in the abdominal wall fascia. Several studies have shown that Incisional hernias have different etiologies, which are related to the patient,[2] the surgical technique,[3] the suture material[4] and the experience of the surgeon.[5] As the approximated fascial tissue separates, the bowel and omentum herniates through the opening, covered by a peritoneal sac. These hernias can increase in size to enormous proportions and giant ventral hernias can contain a significant amount of small or large bowel. A considerable proportion of patients with incarceration and strangulation require emergency abdominal surgery. Others may need to alter their lifestyle, or change or give up gainful employment. A wide spectrum of surgical techniques have been developed and recommended, ranging from sutured techniques to the use of various types of prosthetic mesh. The operation for Incisional hernia is essentially a good and clean dissection of the anterior abdominal wall and its layers. Primary surgical repair (approximation of the edges of fascial defect by sutures without mesh)

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has been widely used.[6] With antibiotic prophylaxis and the development of new synthetic materials, the placement of prosthetic mesh for the repair of Incisional hernia has gained popularity.

In our study of 60 patients, particular attention has been paid to study the clinical presentation of Incisional hernia i.e. distribution with respect to age and sex, mode of presentation and risk factors associated and the outcomes of different surgical techniques of mesh repair for Incisional hernia. As implied in this introduction, no repair, approach, or material has become the gold standard in regards to this common difficult problem encountered and produced by surgeons.

MATERIALS & METHODS

This retrospective study was conducted in Rajiv Gandhi SuperSpeciality Hospital (RGSSH), Raichur Institute of Medical Sciences (RIMS), Raichur from July 2021-March 2024. A minimum of 60 patients of Incisional Hernia were included in the study. Factors were tabulated and statistically analysed to study their contributions.

Inclusion Criteria

Incisional hernia in adults of both sexes with or without complications including recurrent incisional hernias.

Exclusion Criteria

Incisional hernia in children, in pregnancy and in patients at high anaesthetic risk.

A detailed history was taken, all patients were thoroughly examined. Predisposing factors such as obesity, respiratory diseases, cardiovascular diseases, general nutritional status and presence of other systemic illness were taken into account. Size of the defect in the anterior abdominal wall was noted. The diagnosis was made clinically in all the cases without difficulty. Routine investigations were done to obtain fitness for surgery. Ultrasound abdomen was done in selective cases suspected to be having other abdominal pathology. In cases of medical co morbidities, suitable treatment was given to bring them under control pre-operatively. Factors predisposing to recurrence in post-operative period such as post-operative abdominal distension, wound infection, wound disruption, seroma, persistent cough, vomiting, urinary retention were also documented. All cases were followed up for atleast one year. In the follow-up, examination was done to know the recurrence of hernia. Recurrence was defined as palpable defect larger than 1 cm in close proximity to the scar, through which bulging was either palpable or visible when the patient coughed or raised the legs in recumbent position. A statistical study was made with the available data.

Statistical Methods

Descriptive statistical analysis with significance assessed at 5 % level of significance was performed along with Student t test (two tailed, independent) and Chi-square/ Fisher Exact test.

RESULTS

In the present series incisional hernia (11.34%) stands second common next to inguinal hernia. Incisional hernia was more common in fourth and fifth decade. The ratio of male to female was 1:12. The chief complaints included swelling, pain and vomiting in combinations. Out of 55 female cases 16.4% patients were para 4 or more. 71.7% were without any associated diseases or conditions and 28% had one or more conditions with 13 patients having hypertension, 7 patients Diabetes and 1 patient Non Hodgkin's Lymphoma. 38.3% had undergone lower segment caesarean section (LSCS), 21.7% hysterectomy, 18.3% Tubectomy, 10% laparotomies, 6.7% incisional hernia and 5% cholecystectomy through the right sub coastal incision. 78% of the incisional hernias followed operations on the female pelvic organs. The occurence of hernia after elective surgery was 72% compared to 28% after emergency operations. This should be interpreted with caution because the great majority of operations are elective in nature. It was also noted that 6.7% had undergone previous incisional hernia repair - 2 following laparotomies, 1 following LSCS and 1 following hysterectomy. 70% of incisional hernias appeared within 1 year of previous surgery and 4% occurred more than 5 years after primary operation. Of the 70% cases occurred within one year, 40% occurred within 6 months of primary operation and remaining 30% developed from 6 months to 1 year duration.

There were 20 cases of wound infection following the operation that gave rise to the current incisional hernia. The mean length of previous scar in them was 8 cm and on the other hand the mean length of scar in the case free of post-operative infection was 6 cm. It can be said that longer incisions tend to be associated with infection. Infection can therefore be regarded as the most important risk factor for incisional hernia in this series. In 70%, the site of old scar was lower midline. It was upper midline in 6.7%, lower paramedian in 6.7%, right oblique incision in 5% and McBurney's incision in 1.7%. 38% had small defect (less than 4x4 cms), rest of the patients had bigger defect. In 56.7%, the hernia was reducible. 55% patients had good muscle tone whereas 45% had poor muscle tone.

Mesh repair was done in 96.66% and anatomical repair was done in the remaining 3.3%. In 58 mesh repair cases, onlay mesh was put in 28 cases and 28 cases had preperitoneal mesh repair, 2 cases had mesh placed in Retro muscular space. A polypropylene mesh was used. 13.33% had surgical site infection, 3.3% had post-operative cough, 3.3% had seroma

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formation and 1.7% each had wound gaping and urinary retention.

Out of 60 cases, 9 cases could be followed up only for 8-10 months and the remaining cases were followed for one year. During the follow-up period, 1 case of anatomical repair showed recurrence. However none of the 58 mesh repair cases showed recurrence. Cases need to be followed up for longer periods to be able to meaningfully comment on the problem of recurrence related to the type of incisional hernia repair. Out of 60 cases, 28 cases underwent Onlay Mesh repair and 28 cases had Preperitoneal mesh repair.Complication rate is significantly higher in Onlay group than in Preperitoneal group. No recurrences in both the study groups. Hospital stay is also significantly higher in Onlay group than in Preperitoneal group.

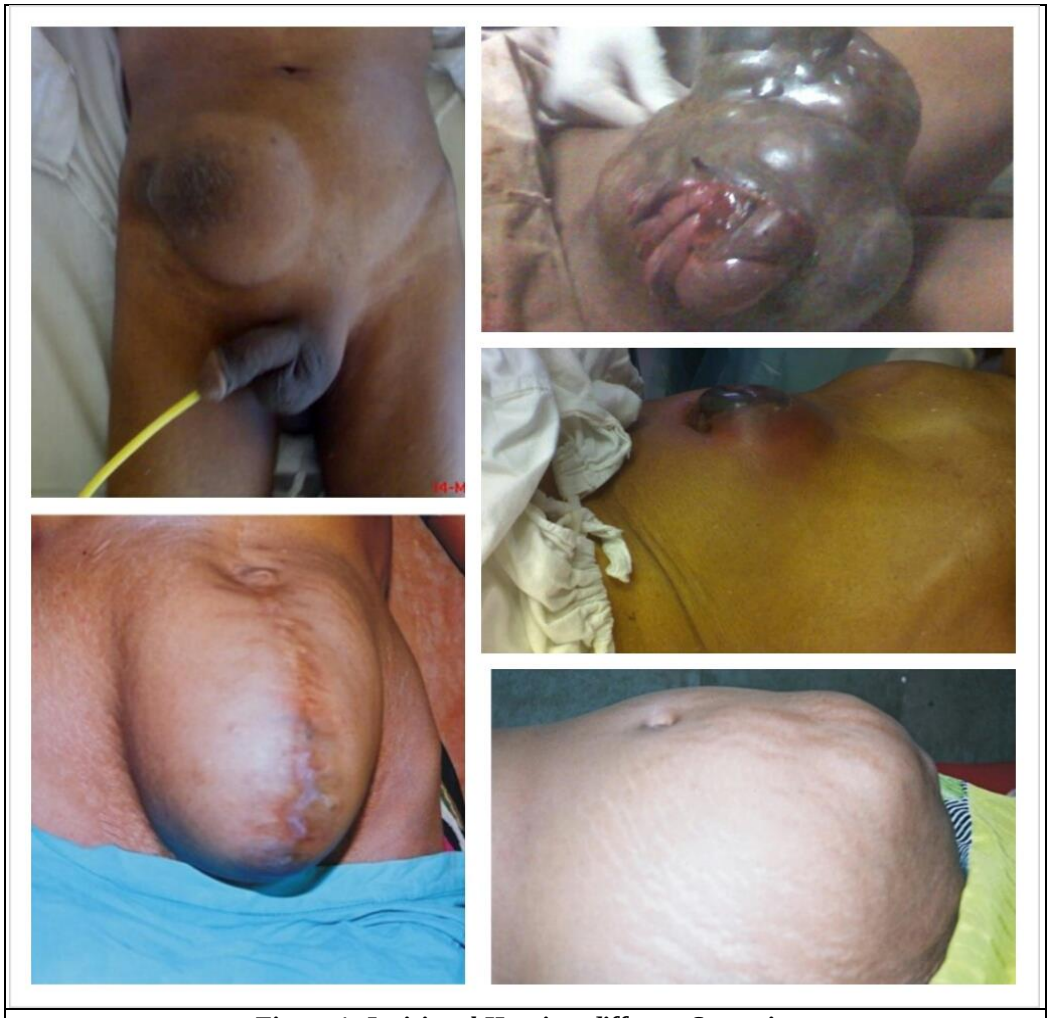

Figure 1: Incisional Hernia – different Scenarios

Clockwise

1. Incisional hernia Post appendicectomy
2. Obstructed incisional hernia
3. Stangulated incisional hernia
4. Incisional hernia posttubectomy
5. Incisional hernia post hysterectomy

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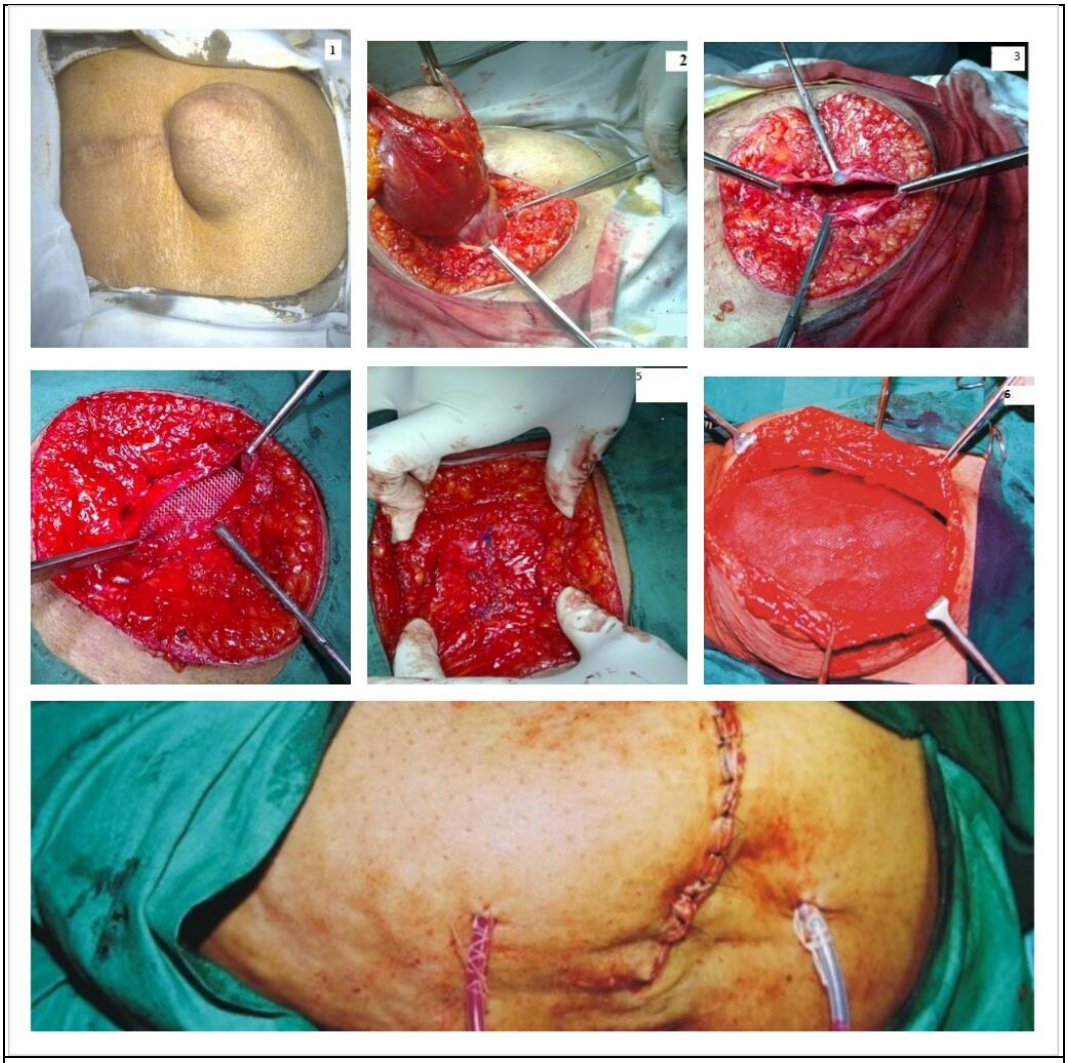

Figure 2: Operative Photographs

DISCUSSION

Sixty cases of incisional hernia studied in RGSSH and RIMSRaichurand presented in this series may not reflect all the aspects of incisional hernia as the series is small and the follow-up has been for short period of time.

The incidence of incisional hernia has been quoted variously. The incidence in RGSSH and RIMS, during the study period of one year from July 2021-March 2024 was 11.34%. The exact incidence of incisional hernia has not been well defined, although a number of reports in the literature suggest that the incidence is probably between 2% and 11%.[6]

In the present study, the youngest patient was 20 yr old and the oldest being 75 yrs. The mean age of the patient presenting with incisional hernia was 41.85 yrs. In the present study, most of the cases of incisional hernia had reported in third, fourth, fifth and sixth decade. This may be because of the frequency with which certain operations are performed at this time of life. Carlson et al[4] found that many patients with incisional hernia were between 25 and 90 years with mean age of 60.3 yrs. Incisional hernia occurred at an early age in this study as compared to westerners, probably because of early marriage and multiple pregnancies in Indian women, which leave the abdominal wall weak. In this study, 91% were females with the sex ratio of males to females being 1:12. The preponderance of females merely indicates the greatest proportion of women in undergoing surgery at RGSSH and RIMS, Raichur. Although the exact male to female ratio varies in literature, Regnad et al,[7] in their study on incisional hernia found that the sex ratio was 1:5. The female preponderance in the occurrence of incisional hernia is probably due to laxity of abdominal wall due to repeated pregnancy and associated obesity which usually is associated with a higher incidence of post-operative infection. Anemia, hypoproteinemia, lack of post-operative rest, early return to work are the other factors which give rise to an increased incidence of incisional hernia in female patients.

In this study, in addition to all patients (100%) presenting with swelling, 68% complained of pain at the site of hernia during some type of lifting or vigorous activity and 15% complained of vomiting. The bulge could be noticed directly over the scar or in an adjacent area locally related to the incision. This is

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comparable to the study of Bosewho reported that 100% of patient presented with abdominal swelling.

Out of the studied 60 cases, 23 patients (38.3%) had undergone lower segment caesarean section, 13 patients (21.7%) hysterectomy, 11 patients (18.3%) Tubectomy, 6 patients (10%) laparotomies, 4 patients (6.7%) Incisional Hernia and 3 pateints (5%) had undergone Cholecystectomy through Right Oblique incision.

It was noted that 4 patients (6.7%) had undergone previous incisional hernia repair - 2 following laparotomies, 1 following LSCS and 1 following hysterectomy. 78% of the incisional hernias followed operations on the female pelvic organs. The increased incidence following lower segment caesarean sections can be attributed to majority of these surgeries being performed on emergency basis, Tubectomies leading to Incisional Hernia can be attributed to the mass campaigns by the National Family Welfare Programme where strict aseptic precautions cannot be taken and meticulous operative details cannot be attended to properly. As a matter of fact, no incision is immune to the development of incisional hernia as it has been seen through right oblique and McBurney'sincisionalso. Types of previous operation responsible for incisional hernia in 146 cases studied by Goel TC, Dubey PC are as follows.

Type of Operation	Goel TC, Dubey	Our Study
Lower segment Caesarean section	42	*23*
Tubectomy	22	11
Gastro-jejunostomy (&vagotomy)	18	-
Closure of peptic ulcer perforation	22	-
Exploratory laparotomy through Right paramedian incision	18	06
Appendicectomy	5	01
Hysterectomy	14	13
Cholecystectomy	5	03

Table 1: Types of previous operation responsible for incisional hernia in 146 cases studied by Goel TC, Dubey PC– Compared to our study

The occurrence of hernia after elective surgery was 72% compared to 28% after emergency operations. BucknallTE[1] et al and Ellis H[8] report no significant difference in the occurrence of incisional hernia between elective and emergency surgery.

In the present study, 10 patients (16%) were noted to be obese. Obesity has been described as one of the risk factors in the causation of incisional hernia. BucknallTE[1] et al and Regnad[7] have reported that obesity was associated in 35% and 29% of patients with incisional hernia and encouraged the patients to reduce weight before undergoing surgery.

Out of 60 cases studied, there were 20 cases of wound infection following the operation that gave rise to the current incisional hernia. The mean length of previous scar in them was 8 cm and on the other hand the mean length of scar in the case free of post-operative infection was 6 cm. It can be said that longer incisions tend to be associated with infection. Infection can therefore be regarded as the most important risk factor for incisional hernia in this series. Wound infection is commonly cited as the most significant independent prognostic factor for incisional hernia BucknallTE[1] et al in his study of 1129 abdominal procedures reported that index operation had been complicated by a post-operative wound infection in 48.80% of the patients who subsequently developed an incisional hernia. Larson et al[6] had 35.85% and Ellis and colleague[8] had 35.85% wound infection rates. Bosereported in his study that 53.63% of patients had wound infection and concluded that it was the commonest precipitating factor. These studies correlates with the present study and it can be concluded that wound infection is a predominant risk factor in the development of incisional hernia. Thus elimination of wound infection may lead to lowering of the incidence of incisional hernia. Also 4 patients (6.7%) had cough in the post-operative period of previous surgery, which increases the intra-abdominal pressure and predisposes to wound gaping.

In the present study 70% of incisional hernias appeared within 1 year of previous surgery and 4% occurred more than 5 years after primary operation and the remaining in- between. In a 10-year prospective trial involving 337 patients, Mudge and Hughes showed that of the 62 patients who developed an incisional hernia 56% did so after the first post-operative year and 35% manifested their hernia after 5 years. Pollock AV and Evans M[9] reported in their prospective experience with 149 patients, the results of which indicated that early fascial separation might be predictive of subsequent incisional hernia.

In the present study, in as many as 42 cases (70%), the site of old scar was lower midline. Carlson found a 10.5% ventral hernia rate in 4129 midline incisions, compared with a 7.5% rate for transverse incisions and a 2.5% rate for paramedian incisions. Goel TC and Dubey PC also noted that lower abdominal incisions are the commonest site of incisional hernia. The frequency of female pelvic surgeries through the subumbilical incision where the linea alba is thinner and less well protected compounded by multiparity is probably the reason why lower abdominal incision are often followed by herniation. Also, it should be noted that the midline incision remains the most versatile and is frequently used in hemorrhage, trauma and

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peritonitis. Specific anatomic considerations suggest that vertical midline incisions have more risk of a post-operative incisional hernia. The fascial fibres of the linea alba lie in a transverse orientation. Therefore a vertical incision would divide them and suture closure of such vertical wounds would in fact place the suture material between the fibres and also suture cut through them when there is tension. In contrast a transverse incision opens the fascia along the fibres such that suture closure places the suture material around the fascial fibres. Another reason is because of the fact that intraperitoneal pressure is hydrostatic and in erect posture, while the upper abdominal pressure remains at 8 cm of water, the pressure in the lower abdomen increases to 20 cm of water with the change in posture from recumbency to standing.

In this study, 6 patients (10%) had undergone laparotomies more than once. Makela[10] et al have reported 25% of patients in their study had undergone more than one operative procedure. He states that repeated wounds in the same region or just parallel to each other will often lead to development of hernia.

Factor	All Patients n=1129	Patients who Developed Hernia n=84
Patients:		
Mean age (years)	46.1	58.2
Men	510	62
Obesity	200	30
Taking steroids	20	1
Jaundiced	45	3
Incision		
Midline	544	48
Paramedian	558	35
Transverse	27	1
Length >18 cm*	155/419	31/36
Suture		
Mass (nylon)	684	49
Mass (polyglycolic acid)	104	12
Two layer (catgut/nylon)	177	9
One layer (nylon)	164	14
Surgeon		
Consultant	424	18
Senior registrar	471	47
Registrar	207	19
Operation		
Local antiseptic	867	63
Drain	548	44
Bowel surgery	378	43
Malignancy	258	13
Emergency	184	14
Postoperative complications		
Chest infection	195	32
Abdominal distension	148	24
Wound infection	179	41

Table 2: Incidence of wound herniation related to some suggested causal factors as studied by Bucknall TE, Cox PJ et.al

* measuring commenced 1978

Out of 60 patients studied 2 cases (3.3%) presented to casualty with features of strangulated hernia who underwent emergency exploration. Both had gangrenous bowel which was resected and anastomosed. The choice of repair was left to the operating surgeon. The methods of repair employed in this study were 58 cases of mesh repair and 2 cases of Anatomical repair. In 58 mesh repair cases, Onlay mesh was put in 28 cases, 2 cases mesh was placed in retro muscular space and 28 cases had preperitoneal mesh repair. The mesh used was polypropylene mesh. Goel TC and Dubey PC have noted that apart from the inconvenience of swelling and a feeling of partial weakness, an incisional hernia can lead to intestinal obstruction and strangulation and hence it requires treatment. In a study on risk factors for recurrence of hernia GecimIEet al has concluded that the basic principles of wound management, closure without undue tension, suturing through healthy tissues, use of non-absorbable suture materials, prevention of hematoma and infection hold good during the repair of incisional hernia. Read RC says that if the defect is large and diffuse it is unlikely that the margins of it can be brought together in anything resembling an

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anatomical position. So it is best to replace the deficit with synthetic mesh.

In this study, 10 cases (16%) had surgical site infection, 2 cases (4%) had post-operative cough, 2 cases (4%) had seroma formation and 1 case (2%) each had wound gaping and urinary retention. Wound infections were treated by suitable antibiotics after culture and sensitivity. Post-operative cough and seroma were treated conservatively. Wound gaping had secondary suturing done after 4 weeks.

Most of the cases were followed-up for one year. Only few patients came for regular check-up afterwards. During the study period, one case of anatomical repairs showed recurrence. However none of the 58 mesh repair cases showed recurrence. Liakakos and Colleagues found that the recurrence rate with mesh repair was only 8% compared with 25% after suture repair after 90 months of follow-up. Similarly, in a larger comparative study of 272 hernias, Schumpelick et al found a recurrence rate of 7% for mesh repair and 33% for suture repair after a mean follow-up period of 64 months. Koller and colleagues retrospectively compared the results of sutured repair in 70 patients with mesh repair in 26 patients. The recurrence rate after 24 months was 63% for the sutured group and 13% for the mesh group. The recurrence rate for sutured repair is the highest rate reported in the literature. Cases need to be followed up for longer periods to be able to meaningfully comment on the problem of recurrence related to the type of incisional hernia repair.

CONCLUSION

Incisional hernia is a common surgical problem as a result of a failure of fascial tissues to heal and close following surgical interventions. Such hernias can occur after any type of abdominal wall incisions and can be small, even insignificant bulge through the wound; it may be a large, unsightly and uncomfortable affair too. A large number of factors pre-dispose to the formation of incisional hernia. The seeds of incisional hernia are sown at the time of the operation or during convalescence. Most of the incisional hernias are early occurring type which occurs soon after the original laparotomy closure, a result of technical failure. When a hernia develops, it invariably enlarges with the passage of time and further, it can incarcerate, strangulate or cause skin necrosis and perforation. Care is therefore required in optimally timing the surgery, minimizing the predisposing factors and also in choice of surgery for repair.

The choice of operative technique is critical. For the repair of many years, incisional hernia was associated with a high recurrence rate and the use of synthetic prosthetic materials has provided the opportunity to perform a tension free repair thereby reducing the rate of recurrence.

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