VOLUME-8, ISSUE-8, AUGUST-2019 • PRINT ISSN No. 2277 - 8160

Original Research Paper

Surgery

TO DETERMINE VARIOUS CAUSATIVE FACTORS AND EVALUATE SURGICAL TECHNIQUES IN MANAGEMENT OF INCISIONAL HERNIA-A KATURI PERSPECTIVE

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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.

Methods: The study was conducted in KMCH from July 2016 - March 2018. A minimum of 60 patients of Incisional Hernia were included in the study. Factors were tabulated and statistically analyzed to study their contributions

Results: In our study 75% of incisional hernias occurred in infraumbilical midline scar. 75% of the incisional hernias followed operations on the female pelvic organs.Infection in post-operative period did seem to be the commonest predisposing factor (26.6%) 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 shown 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 hernias are very common. They are the second most common type of hernia after inguinal hernias. Approximately 4 million laparotomies are performed in the United States annually, 2-30% of them resulting in incisional hernia. Between 100,000 and 150,000 ventral incisional hernia repairs are performed annually in the United States. . In India incisional hernia occurs in 10 – 20% of the patient subjected to abdominal operations [1]. Incisional hernias after laparotomy are mostly related to failure of the fascia to heal and involve technical and biological factors. Approximately 50% of all incisional hernias develop or present within the first 2 years following surgery, and 74% occur within 3 years. Depending on size, the repair of an incisional hernia varies from simple suturing to major reconstruction of the abdominal wall with creation of muscle flaps and the use of large pieces of mesh. This can be done with an open approach or laparoscopy. Incisional hernia occurs in approximately 5-11 % of patient's subjects to abdominal operations [02]. Many factors are associated with incisional herniation like age, sex, obesity, chest infection, type of suture material used and most important wound infection. All these present a challenging problem to the surgeon. Recent studies have shown that Numbers of operations are employed in the management of Incisional hernia to bring about a complete cure. During the pre-antibiotic era, the recurrence rate was quite high and cure rate was low. After the advent of good and safe anesthesia, antibiotics, closed suction drainage, use of prosthetic mesh, transfusion facilities, better understanding of fluid therapy and proper care during pre-operative and post-operative period, the cure rate is almost cent percent. The recurrence rate has fallen to low figures in most of the incisional hernias .About 2/3'd appear within the first five years and that at least another third appears 5-10 year after operation[03]. In 1993, Le Blanc reported the first case of laparoscopic incisional hernia repair with the use of synthetic mesh. The procedure involves the placement of a mesh inside the abdomen without abdominal wall reconstruction. The mesh is fixed with sutures, staples, or tacks. The recurrence rate of the laparoscopic repair is reported as equal as or less than that done with the open approach. Incisional hernia repair is considered a challenging procedure, especially in recurrent hernias, in which the chances of failure increase with each surgical attempt. Numbers of operations are employed in the management of Incisional hernia to bring about a complete cure. A wide spectrum of surgical techniques have been developed and recommended, ranging from sutured techniques to the use of various types of prosthetic mesh. Laparoscopic repair is a novel approach introduced in 1990s. 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)

has been widely used [4]. When the edges of the fascia are brought together under tension, the sutures may pull through leading to disruption of the wound and a recurrence of hernia. With antibiotic prophylaxis and the development of new synthetic materials, the placement of prosthetic mesh for the repair of Incisional hernia has gained popularity.

2) METHODOLOGY :

This "Clinical Study and Management of Incisional Hernia with Mesh Repair" has been carried out in Department of Surgery, Katuri general Hospital attached to Katuri Medical College, Guntur. This was a prospective study of 60 cases of incisional hernias admitted during the period of one year from July 2016 to March 2018. Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. ,Student t test (two tailed, independent) has been used to find the significance of study parameters on

continuous scale between two groups Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Incisional hernia in adults of both sexes, incisional hernia with or without complications, Recurrent incisional Hernias were included in the study. Incisionalhernia in children.

Incisional hernia in pregnancy, patients at high anaesthetic risk were excluded from the study.

RESULTS

Table 1 : Incidence of various types of hernia

Sl.no.	Type of Hernia	No.of cases	Percentage
1	Inguinal hernia	242	60.5
2	Incisional hernia	60	15
3	Epigastric hernia	42	10.5
4	Umbilical hernia	31	7.8
5	Femoral hernia	2	0.5
6	Others	23	5.7
Total		400	100

Observation: In the present series incisional hernia stands second common next to inguinal hernia. This contributes to an incidence of 15 %.

Table 2 : Age distribution of patients studied

Age in years	Number of patients	%
20-29	8	13.4
30-39	22	36.6
40-49	19	31.6
50-59	6	10
60&above	5	8.4
Total	60	100
Mean+SD	40+11.71	

Observation: In the present study, the youngest patient was 20 yr old and the oldest being 71 yrs. The mean age of the patient presenting with incisional hernia was 41.03 yrs. In the present study, incisional hernia was more common in the third and fourth decade.

Table 3: Sex distribution of patients studied

RATIO	NO.OF PATIENTS
MALE	12
FEMALE	48

Observation: In the present study, there were only 12 males out of 60 patients. The ratio of male to female was 1:5.

Table-4: Occupation of patients studied

Occupation	Number of patients (n=60)	%
Agriculture	8	13.3
House wife	38	63.3
Manual worker	14	23.4

Observation: Majority of female patients were housewives followed by manual workers and agriculturists.

Table-5: Complaints

Complaints	Number of patients (n=60)	%
Swelling	60	100.0
Pain	38	63.3
Vomiting	6	10

Observation: The chief complaints in the study group included swelling, pain and vomiting in combinations. History of swelling was present in all 60 cases; pain was noted in 38 patients and vomiting in 6 patients.

Table 6: Duration of Swelling.

Duration in years	Number of patients (n=60)	%
Up to 2 years	16	26.6
2-4 years	32	53.4
5-10 years	10	16.6
>10 years	2	32.4

Observation : In the study, 16 (26.6%) out of 60 patients complained of swelling for duration of less than 2 years, 32 patients (53.4%) complained of swelling for 2-4 years,10 patients had swelling for 5-10 years, 2 patients (33.4%) had swelling for more than 10 years.

Table-7 Duration of pain

Duration of pain	No. of .cases
<1month	11
1-6 months	19
>6months	8

Observation : Out of 60 cases, 38 patients presented with pain out of which 30 patients presented with pain for less than 6 months duration.

Table 8: Obstetric History

OBSTETRIC HISTORY	Number of patients (n=48)	%
Para 2	17	34.41
Para 3	22	45.84
Para 4& above	9	18.75

Table-09 : : Associated diseases

Associated diseases		Number of patients (n=60)	%
Absent		39	65
Present		21	35
	Hypertension	11	18.4
	Diabetes	7	11.6
	Both	3	5

Table 10 : Previous Surgery

Previous surgery	Number of patients (n=60)	%
LSCS	24	40
HYS	12	20
TUB	9	15
LAPR	8	13.4
CHOLE	4	6.6
OTHERS(INH)	3	5

Observation:75% 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 4 patients (6.7%) had undergone previous incisional hernia repair - 2 following laparotomies, 1 following LSCS and 1 following hysterectomy.

Table-11: Time of occurrence of Hernia

Time of onset following operative procedure	No .of. hernias	%
Less than 6 months	24	40
7-12 months	18	30
1-2 years	5	8
2-5 years	11	18
More than 5 years	2	4

Observation : 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. Of the 70% cases occurred within one year, 40% (24 cases) occurred within 6 months of primary operation and remaining 30% (18 cases)

developed from 6 months to 1 year duration.

Table-12 Post-operative complications in primary operation

Complications	No. of. cases	Percentage
Wound infection	16	26.6
Post- operative cough	4	6.6
Wound gaping & disruption	3	5
Seroma	9	15
Respiratory tract infections	5	8.2
Urinary retention	1	1.6
Nil	22	100

Observation : There were 16 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.

Table-13 Types of operation in wound infection cases

Operations	Total cases	Number with wound infection (16)	Percent
Tubectomy	9	4	44.4
LSCS	24	7	29.1
Laparotomy	8	2	25
Hysterectomy	12	2	8.6
Cholecystectomy	4	1	25

Observation: Wound infection was noted in 16 cases post-operatively following the surgery that lead to the present incisional hernia.

Table 14: Physical examination

Physical examination	Criteria	Number of patients (n=60)	%
Swelling	Absent	-	-
	Present	60	100.0
	Lower midline	45	75
Site of scar	Lower paramedian	1	1.6
	Upper midline	10	16.7
	Right oblique	4	6.7
	Up to 20.sq.cm	33	55
Site of defect	20-40.sq.cm	19	31.6
	>40.sq.cm	8	13.4
Muscle tone	Poor	38	63.4
	Good	22	36.6
Reducibility	Positive	34	56.7
	Negative	26	43.3

Observation: Directly consequent to the type of primary surgery was the incision resulting in herniation. In as many as 45 cases (70%), the site of old scar was lower midline. It was upper midline in 4 cases (6.7%), lower paramedian in 10 cases (16.7%), right oblique incision in 3 cases (5%) and McBurney's incision in 1 case(1.7%). Size of the Defect: 23 Patients(38%) had small defect (less than 4x4 cms) , rest of the patients had bigger defect. Muscle Tone: 33 patients(55%)patients had good muscle tone whereas 27 patients(45%) had poor muscle tone. Reducibility: In 34 patients (56.7%), the hernia was reducible. All the physical examination findings are represented.

Per-operative findings Table-15 Contents of the sac

Contents of the sac	No. of. cases	Percentage
Omentum	43	71.6
Omentum & small bowel	13	21.5
Omentum& colon	4	6.6
Total	60	100

Table-16 Management of contents

Management of contents	No. of. cases	Percentage
Simple reposition	15	25
Release of adhesions	25	41.6
Excision of omentum	18	30
Resection of bowel	2	3.4
Total	60	100

Observation.

Table-17: Procedure

Procedure	Number of patients	%
Preperitoneal mesh repair	26	43.3
Onlay mesh repair	26	43.3
Anotomical repair	4	6.7
Retro muscular space repair	4	6.7

Observation: Out of 60 cases studied, mesh repair was done in 58 cases (96.66%) and anatomical repair was done in the remaining 4 cases (6.7%). In 58 mesh repair cases, onlay mesh was put in 26 cases and 26 cases had preperitoneal mesh repair, 4 (6.7 %) cases had mesh placed in Retro muscular space.. The mesh used was polypropylene mesh.

Table-18: Post-op complications

Post-op complications	Number of patients (n=60)	%
Absent	42	70
Present	18	30
Wound infection	9	15
Post-operative cough	1	1.6
Seroma	3	5
Urinary retention	1	1.6
Wound gaping	2	3.4
Respiratory tract infections	2	3.4

Observation: In this series of 60 cases of incisional hernia repair, 9 cases (15%) had surgical site infection, 1 case (1.6 %) had post-operative cough, 3 cases (5%) had seroma formation and 1 case (1.7%) had urinary retention and 2 cases had wound gaping (2.4) and urinary retention

Table 19: Comparison of Complications, Recurrence, and hospital stay between On Lay (OL) and Pre-peritoneal mesh repair (PP) for incision hernia

Outcome	OL (n=26)		PP (n=26)		P value
	No	%	No	%	
Complications					
Present	12	46.2	3	11.6	0.375
Absent	14	53.8	23	88.4	
Recurrence					
Present	2	7.6	0	0	-
Absent	24	92.4	26	100	
Hospital stay in days	10.57±5.34		8.29±3.54		0.328
1-7 days	12	46.2	14	53.8	0.378
7-14 days	10	38.5	9	34.6	0.369
14-21 days	3	11.5	2	7.6	0.225
>21 days	1	3.8	1	3.8	1

DISCUSSION :

Sixty cases of incisional hernia studied in Katuri medical college and Hospital, Guntur and 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 KMCH, Guntur during the study period of one year from July2016 to March 2018 was 15%. 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% .[4,5,6,7]

In this study, the youngest patient was 20 yr old and the oldest being 71 yrs. The mean age of the patient presenting with incisional hernia was 41.03 yrs. In the present study, most of the cases of incisional hernia had reported in third and fourth decades. This may be because of the frequency with which certain operations are performed at this time of life. Carlson et al [8] found that many patients with incisional hernia were between 25 and 90 years with mean age of 60.3 yrs. Purushothamm Rangaswamy et [9]al found many patients with incisional hernia between 30 and 40 years. According to Dr.Akoju sekhar babu37 and his colleagues the prevalence of incisional hernia was common in age group of 31- 50 years (60 % of the study group) 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, 80 % were females with the sex ratio of males to females being 1:5. The preponderance of females merely indicates the greatest proportion of women in undergoing surgery at KMCH, Guntur. Although the exact male to female ratio varies in literature, This study matches with Regnad et al [10], whose study on incisional hernia found that the sex ratio was same as my study. The female 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, 63.3% complained of pain at the site of hernia during some type of lifting or vigorous activity and 10% complained of vomiting. The bulge could be noticed directly over the scar or in an adjacent area locally related to the incision. This is comparable to the study of Bose who reported that 100% of patient presented with abdominal swelling. According to recent study in 2018 by Dr. Akoju SekharBabu [11] and colleagues 96 % patients of incisional hernia presented with swelling. 3 patients presented only with abdominal pain Out of the studied 60 cases, 24 patients (40%) had undergone lower segment caesarean section , 12 patients (20%) hysterectomy, 9 patients (18.3%)Tubectomy, 8 patients (13.4%) laparotomies, 4 patients(5%) Incisional Hernia and 4 pateints(6.6%) 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's incision also. Types of previous operation responsible for incisional hernia in 146 cases studied by Goel TC, Dubey PC [14] are as follows.

The occurrence of hernia after elective surgery was 72% compared to 28% after emergency operations. Bucknall TE1 et al and Ellis H 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. Bucknall TE_1 et al and Regnad 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. 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[12,13,14,15]. Bucknall TE1 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 4 had 35.85% and Ellis and colleague had 35.85% wound infection rates. Bose[16] reported in his study that 53.63% of patients had wound infection and concluded that it was the commonest precipitating factor.

In latest studies such as Dr Akoju[17] who had 33% wound infection ,IIn studies of Kumar SJG [19]and Sudhir Dnyandeo[20] the wound infection rates in previous incisions are 27% and 30% respectively. 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 this study 40% 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[21] 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 [22] 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 this study, in as many as 45 cases (75%), the site of old scar waslower 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 paramedianincisions. Goel TC and Dubey PC[24] also noted that lower abdominal incisions are the commonest site of incisional hernia.

Latest studies of Akoju sekhar babu 37, Kumar SJG [24], and Sudhir Dnyandeo also show that Lower midline scar is the commonest sites for incisional hernia. The frequency of female pelvic surgeries through the sub umbilical incision where the linea alba is thinner and less well protected compounded by multiparity is probably the reason why lower abdominal incision is often followed by the herniation. Also, it should be noted that the midline incision remains the most versatile and is frequently used in hemorrhage, trauma, and peritonitis. Specific anatomic considerations suggest that vertical midline incisions have more risk of a post-operative incisional hernia. The fascial fibers 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 fibers and also suture cut through them when there is tension. In contrast, a transverse incision opens the fascia along the fibers such that

suture closure places the suture material around the fascial fibers. Another reason is because of the fact that intraperitoneal pressure is hydrostatic and in an 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[20] 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 the development of a hernia.

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 the repair was left to the operating surgeon. The methods of repair employed in this study were 56 cases of mesh repair and 4 cases of Anatomical repair. In 56 mesh repair cases, Onlay mesh was put in 26 cases, 4 cases mesh was placed in retro muscular space and 26 cases had preperitoneal mesh repair. The mesh used was polypropylene mesh. Goel TC and Dubey PC[25] have noted that apart from the inconvenience of swelling and a feeling of partial 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 Gecim IE [27] et 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 [26] 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 anatomical position. So it is best to replace the deficit with synthetic mesh.

In this study, 9 cases (15%) had surgical site infection, 1 case (1.6%) had postoperative cough, 3 cases (5%) had seroma formation and 2 cases (3.4%) showed wound gaping and one case had 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 a few patients came for regular check-up afterward. During the study period, one case of anatomical repairs showed recurrence. However, none of the 56 mesh repair cases showed recurrence. Liakakos and colleagues [28]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 [29] 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 [17] retrospectively compared the results of sutured repair in 70 patients with mesh repair in 26 patients. The recurrence rate after 24months 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 predispose 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 the 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 the choice of surgery for repair.

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