A PROSPECTIVE STUDY ON MANAGEMENT OF INCISIONAL HERNIAS
Deepak R. Chavan1, Sanjay Shantappa Namadar2, Poojakiran3

HOW TO CITE THIS ARTICLE:
Deepak R. Chavan, Sanjay Shantappa Namadar, Poojakiran. “A Prospective Study on Management of Incisional Hernias”. Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 22, June 02; Page: 6169-6182, DOI: 10.14260/jemds/2014/2719

ABSTRACT: OBJECTIVE: To study the age and sex incidence, various factors leading to incisional hernia, methods to control them and various types of surgical repair by mesh and their complications.

BACKGROUND DATA: Incisional hernia is a common surgical condition with a reported incidence of 5-11% of patients subjected to abdominal operations. Many factors are associated with incisional hernia like age, sex, obesity, chest infections, type of suture material, type of incision and most important wound infection. All of them present a challenging problem to the surgeon. So this study has been undertaken to assess the magnitude of this condition and different modalities in surgical repair by mesh in our setup.

MATERIALS & METHODS: This is a prospective study of 70 cases of incisional hernia who attended to OPD and emergency department of Sri B. M. Patil medical college Hospital & Research Centre from March 2012 to March 2014. Data were collected from the patients i.e., clinical history, examination and appropriate investigations. Documentations of patients which include identification, history, clinical finding, investigative tests, operation findings, operative procedures and complications during the stay in hospital and during subsequent follow up period, were all recorded in a proforma specially prepared.

RESULTS: In our series of 70 patients, clinical details of 70 patients were available. Females (80%, n=48) outnumbered males (20%, n=12) and the highest incidence was in the age group of 30 to 60 years with mean age of 45 years. Gynecological operation accounted for 73.3% (n=50) of the index operations, with lower midline incision resulting in 53.3%(n=44) of the incisional hernias. The polypropylene mesh placed overlay or inlay method. All patients attended our follow up ranging from 3 months to 2 year. Two recurrences were noticed in inlay mesh repair group.

CONCLUSION: Based on our analysis, we believe that overlay mesh repair is superior to inlay mesh repair for incisional hernia repair. There are however, very few publications covering this technique of repair.

KEYWORDS: Incisional hernia, inlay or overlay mesh repair, mesh repair.

INTRODUCTION: Mankind is posed with the problem of hernia ever since its evolution. The problem of incisional hernia appeared with the development of abdominal surgery.

Harold Ellis1 defines incisional hernia as the one that develops in the scar of surgical incision. It may be a small, even insignificant bulge, through the wound; it may be a large, unsightly and uncomfortable affair too.

Incisional hernia occurs in approximately 5-11% of patient’s subjects to abdominal operations2. 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 about 2/3rd appear within the first five years and that at least another third appears 5-10 year after operation.3 If left unattended they tend to attain large size and cause discomfort to the patient or may lead to strangulation of abdominal contents. Bowel may more
often incarcerate in small hernias, whereas bowel obstruction due to adhesions in the hernial sac or the hernial orifice is more often encountered in large hernias.

The repair of ventral incisional hernia, is a significant operation not to be taken lightly. Careful preoperative planning combined with meticulous surgical technique and experienced judgment is important in order to minimize the risk of complication and hernia recurrence. Almost every surgeon has got own techniques and may modify it to the situation.

This study has been undertaken to assess the magnitude of various factors leading to development of this condition and the different modalities of treatment practiced in our setup.

OBJECTIVES OF THE STUDY:
1. To study age, sex incidence and various risk factors leading to incisional hernia and methods to control them.
2. To evaluate various types of surgical repair by mesh and their complications.

MATERIALS AND METHODS: The study of incisional hernias has been carried out at BLDE University Sri B. M. Patil medical college & RC Bijapur, Karnataka.

A prospective study of 70 cases of incisional hernias treated and data collected consequently during the period from March 2012 to March 2014. No particular criteria were adopted during selecting the patients for the study and cases were studied as per the proforma. Detailed history of the illness was taken as this is very important for the type and cause of hernia. A detailed general and local examination was made.

All the cases were analyzed in various aspects like age, sex, parity, relative incidence, clinical presentation, nature of previous operation, site of previous scar, precipitating factors like obesity, wound infection, abdominal distension. The contributory factors like chronic bronchitis, chronic constipation and enlarged prostate were considered.

While presenting the cases, only relevant and positive findings were recorded in the proforma case sheet and a master chart dealing with all the aspects has been designed and presented. The diagnosis was made clinically in all the cases. Routine investigations were done to obtain fitness for surgery.

RESULTS: A study of 70 cases of incisional hernia admitted to Sri B.M. Patil medical college, Bijapur during the year of March 2012 to March 2014 was made. The following is the analytical results of all the cases and conclusion drawn from it.

Incidence of Incisional Hernia: Out of 450 cases of hernias operated 81.25% constitutes inguinal hernia, 7.5% constitute incisional hernia, 8.75% constitute umbilical and paraumbilical hernias, 0.62% constitute femoral hernia, 1.87% constitute epigastric hernia.
Types of Hernia

| Types of Hernia                          | B.L. Coley series | J.B. Shah Bombay | BLDEU 2012-2014 |
|-----------------------------------------|-------------------|------------------|-----------------|
|                                         | No. of cases      | %                | No. of cases    | %                | No. of cases | %                |
| Inguinal Hernia                         | 2793              | 93               | 880             | 88               | 350          | 79.18            |
| Incisional Hernia                       | 38                | 1.3              | 50              | 5                | 35           | 7.2              |
| Umbilical and paraumbilical Hernia      | 14                | 0.5              | 36              | 3.6              | 45           | 10.18             |
| Femoral Hernia                          | 54                | 1.5              | 22              | 22               | 9            | 1.13             |
| Epigastric Hernia                       | 101               | 3.3              | 12              | 1.2              | 7            | 1.58             |

**INCIDENCE OF INCISIONAL HERNIA**

Sex Incidence: In the study of 30 cases, it has been found that incidence of incisional hernia is more common in females than males and overall males: female ratio is 1:4

| Sex     | No. of cases | % |
|---------|--------------|---|
| Males   | 4            | 11|
| Females | 31           | 89|
| Total   | 35           | 100|

| Series          | Total No. of cases | Males | Females | M:F ratio |
|-----------------|--------------------|-------|---------|-----------|
| J.B.Shah        | 50                 | 23    | 27      | 1:1.7     |
| Goel & Dubey    | 146                | 65    | 81      | 1:1.25    |
| Present study   | 70                 | 8     | 62      | 1:7.8     |
Age Incidence:

| Age group | Goel & Dubey | Anantha Krishnan et al | Present study |
|-----------|--------------|------------------------|--------------|
|           | No. of cases | %                      | No. of cases | %      |
| 11-20     | 6            | 12                     | 3            | 1.4    |
| 21-30     | 35           | 17.0                   | 51           | 23.1   |
| 31-40     | 51           | 34.1                   | 69           | 31.3   |
| 41-50     | 40           | 40.2                   | 67           | 30.5   |
| 51-60     | 14           | 61                     | 23           | 10.5   |
| 61-70     |              |                        | 2            | 0.9    |
| >71       | 5            | 2.3                    | 2            | 2.8    |

Incidence of incisional hernia is more common in 30-60 age groups. This is comparable with that of N. Anantha Krishnan et al\textsuperscript{30} studies and Goel and Dubey studies\textsuperscript{31}. 

![AGE DISTRIBUTION](image)
Occupation: Majority of the patients with incisional hernia were housewives. Agricultural workers were the next common occupants.

Mode of Presentation: 18 patients presented only with swelling and 12 with pain and swelling. Out of 12 patients with swelling and pain, 2 had obstructive features, 3 had appendicitis. 25 patients presented with swelling in the infraumbilical region and 5 patients with the supraumbilical swelling.

| Mode of presentation | No. of patients | Percentage |
|----------------------|-----------------|------------|
| Swelling             | 46              | 65.7       |
| Swelling and Pain    | 24              | 34.2       |

Size of the Defect: 34 patients had hernia defect which measured up to 24sqcms. 20 people had defects between 24-40sqcms. Only 10 patients had defects more than 40sqcms, out of which patients had huge defect was one measuring 56sqcms (7x8).

| Size of the defect | No. of Patients | Percentage |
|-------------------|-----------------|------------|
| Up to 24sqcms     | 34              | 49         |
| Between 24-40sqcms| 26              | 37         |
| >40sqcms          | 10              | 14         |
Previous Surgery: All the patients were enquired about the type of operation they had undergone and complication in the postoperative period. 74% of patients undertook gynecological procedures. The gastrointestinal surgeries accounts up to 26%. This is compared with Ponka studies and Goel and Dubey studies.

| Name of operation                  | Ponka % | Goel & Dubey % | Present Study % |
|-----------------------------------|---------|----------------|-----------------|
| Hysterectomy                      | 34      | -              | 10              |
| LSCS                              | 2       | 28.76          | 10              |
| Tubectomy                         | -       | -              | 54              |
| Appendicectomy                    | 16      | 3.42           | 10              |
| Gastrojejunostomy + Vagotomy      | 11      | 12.32          | -               |
| Cholecystectomy                   | 21      | -              | 3               |
| Closure of peptic ulcer perforation| -      | 15.06          | 13              |
| Colon and colostomy operations    | 9       | -              | -               |
| Suprapubic cystostomy             | -       | 15             | -               |
| Kidney operations                 | -       | 9.58           | -               |
| Miscellaneous                     | 17      | 15.74          | -               |
**Previous Incisions Used:** Midline lower abdominal incisions was used in 53.3%, upper midline abdominal incisions in 13.3%, Paramedian incisions in 3.3%, Mc Burney's in 10%, Transverse (Pfannestial) incision in 20% of patients was used. This is comparable with A.B. Thakore et al studies\(^{32}\) and Goel and Dubey studies.\(^{31}\) Previous incision leading to incisional hernia.

| Incision          | A.B. Thakore et al | Goel – Dubey | Present Study |
|-------------------|--------------------|--------------|---------------|
|                   | No. of cases | %        | No. of cases | %        | No. of cases | %        |
| Lower midline     | 51         | 67.10    | 65           | 44.6     | 34           | 48.5     |
| Upper midline     | 6          | 7.80     | 41           | 28.0     | 8            | 11.4     |
| Paramedian        | 15         | 19.65    | 21           | 14.2     | 2            | 2.8      |
| Mc burney         | 4          | 5.21     | 5            | 3.6      | 10           | 14.2     |
| Transverse        | 16         |          |              | 22.8     |              |          |
| Oblique lumbar    | 14         |          |              | 9.6      | -            | -        |
| **Total**         | **76**     | **100**  | **146**      | **100**  | **70**       | **100**  |

**Previous Incisions Leading to Incisional Hernia:**

- Lower midline: 48.5%
- Upper midline: 22.8%
- Paramedian: 14.2%
- Mcburney: 2.8%
- Transverse: 0%
- Oblique lumbar: 11.4%
Previous pre and post-operative complications leading to Incisional Hernia: Wound infection and wound gaping constituted 30%. Obesity constitutes 20%, Diabetes mellitus constitute 16.6%, postoperative respiratory complication accounted for 16.6%. In 16.6% of patients, no complications were found.

| Risk factors                   | A.B. THAKORE et al | PRESENT STUDY |
|-------------------------------|--------------------|---------------|
|                               | Number             | %             | Number | %   |
| Wound Infection               | 35                 | 46.05         | 8      | 13.3 |
| Wound gaping                   | 10                 | 13.15         | 10     | 16.6 |
| Late enteration                | 1                  | 1.3           | -      | 0    |
| Chest complication             | 10                 | 13.15         | 12     | 17.14|
| Retention of urine             | 2                  | 2.63          | -      | 0    |
| Obesity                        | -                  | -             | 12     | 20   |
| Diabetes mellitus              | -                  | -             | 10     | 16.6 |
| No complications               | 24                 | 31.5          | 18     | 25.7 |
| Not mentioned                  | 14                 | 18.42         | -      | 0    |

Time of onset of hernia after the previous Surgery: In the evaluation of history it revealed that 13% of patients presented with incisional hernia within 6 months of the previous surgery. 23% of patients noticed swelling at the operated site within a year of surgery and 30% within 3yrs after the operation i.e., nearly 53.3% of them had developed incisional hernia within 3years of the operation.
Type of Anaesthesia: 10 patients were operated with general anaesthesia & 20 patients with spinal anaesthesia.

SURGICAL TECHNIQUE:

| Type of repair            | Kingsnorth AN et al34 | Present Study |
|---------------------------|-----------------------|---------------|
|                           | No. of cases | %     | No. of cases | %     |
| Sublay                    | 33          | 63.4  | 0            | 0     |
| Overlay                   | 16          | 30.7  | 41           | 60    |
| Inlay                     | 1           | 1.92  | 29           | 40    |
| Ramirez abdomino plasty   | 2           | 3.84  | 0            | 0     |

Out of 70 patients with incisional hernia, 41 were treated by overlay mesh repair and 29 by inlay repair. Patients were selected random irrespective of size of hernial defect and obesity.

DRAINS: In majority of the patients Redivac drain was used and in all the cases, drain was brought out through separate incision.

Post-operative Complications:

| Complication        | Inlay repair (N = 12) | Overlay repair (N = 18) | IL vs OL P-Value* |
|---------------------|----------------------|-------------------------|-------------------|
| Seroma              | 6 (25%)              | 4 (11.1%)               | 0.364, NS         |
| Wound Dehiscence    | 2 (8.3%)             | -                       | 0.400, NS         |
| Recurrence          | 4 (16.6%)            | -                       | 0.152, NS         |
| **Total**           | **8 (33.3%)**        | **4 (11.1%)**           | **0.184, NS**     |

*Fisher's Exact Test, NS-Not significant

5 patients had postoperative cough, which was treated by Benzyl inhalation, chest physiotherapy and cough syrup. One patient had retention of urine and was treated by Foley's catheterization. 6 patients who underwent inlay mesh repair and 4 patients treated with overlay mesh repair had seroma collection (P = 0.364, NS) in suture line which was treated by drainage and dressing. One patient in of inlay repair had wound dehiscence (P = 0.400, NS), which was treated by secondary suturing.

There was no case of major wound infection. There was no surgery related mortality in this study.

RECURRENCE: No patients with Inlay mesh repair presented with recurrent incisional hernia (p=0.152, NS). No patients treated with Overlay mesh repair showed recurrence. The recurrence rate in my study was zero which was comparable with that of Fenn, Maingot, J. B. Shah series. Both recurrences occurred within a year of the operation. The follow up period was very short to comment up on real recurrence rate.
Recurrence Rate:

| Series                        | Total cases | Recurrence No. | Recurrence % |
|-------------------------------|-------------|----------------|--------------|
| Fenn (1968)                   | 73          | 5              | 7            |
| Maingot (1969)                | 103         | 7              | 7            |
| J.B. Shah (1977)              | 50          | 3              | 6            |
| Kingsnorth A N (2004)         | 52          | 3              | 5.7          |
| Present study (2012-2014)     | 70          | 0              | 0%           |

**DISCUSSION:** In my study out of 450 cases of hernias operated in our hospital, incisional hernia constitutes 7.2%. In Zimmerman and Anson studies, Macvay studies, J. B. Shah studies, B. L. Coley series the incidence is 1.7%, 11.5%, 5%, 1.3% respectively.

Female pre-dominated the picture in my study with 7:1 ratio (88%) with that of males. Though Thomas. A. Santora and Joel. J. Roslyn stated the male gender has propensity to develop incisional hernia. Ellis, Gajraj and C.D.George have obtained a 64.6% of female population in their study of 342 patients. J. B. Shah studies and Goel and Dubey series have 1:1.17 and 1:1.125 ratios respectively.

Incidence of incisional hernia is more common in females in our country. This may be because of multiple child births which leave the abdominal wall weak.

The incidence of incisional hernia is higher in 30-60 years age group with mean age of 45 years in my study. Ellis. H, Gajraj and George in their study noticed a mean age of 49.4 yrs. The youngest patient in my study was 23 years old and oldest was 70 yrs old.

Majority of patients were house wives and agricultural workers were the next common occupants.

In nearly 48.5% of patients, the site of hernia was infraumbilical, of which only three patients had incisional hernia following appendicectomy, the rest of patients underwent gynecological operations, most commonly tubectomy, hysterectomy and caesarian section. This may be due to the frequency of female pelvic surgery through infraumbilical midline approach, where the linea alba is thinner and less well protected compounded by multiparity.

Jack Abrahamson stated that lower abdominal incision apart from other causes is one of the factors with a higher rate of incisional hernia and recurrence after repair. In my study also, incisional hernia is more common after lower midline incisions.

In considering risk factors promoting incisional hernia, chest infection is one of the commonest. It occurred in 30% of patients in my study. This is comparable with that of A. B. Thakore, J. B. Shah and J. N. Parekh studies.

There were six obese patients with incisional hernia out of 35 cases (20%) in my study. Harrold. Ellis noted 30 obese patients who developed incisional hernia out of 200 cases i.e. 15%, though other factors also play a role in causation of incisional hernia.

Ellis group found that obesity was associated with a three-fold increase in herniation and recurrence, but it is difficult to pinpoint the actual cause for this or technical factors involved.

All studies that show that most of the incisional hernia appears within the first year or second year after surgery. In my study, the history reveals 54% of them developed hernia within 3 yrs of
operation. Jack Abrahamson noticed 80% of hernia appearing within first 2 years and Anantha Krishnan et al. studies30 77% developed within 3 years after operation.

Late hernias were not common up to 5 years after operation. Mudge and Hughes37 noticed 35% manifesting after 5 years and in my study they accounted for 46%. The probable cause may be because of aging and weakening of tissues and raised intra-abdominal pressure associated with chronic cough, constipation.

During clinical examination in my study 17 patients (50%) were found to have defect of up to 24 sq.cm and 2 patients had defect up to 60 sq.cm. Irrespective of size of defect, patients were selected randomly for mesh repair i.e. overlay/inlay repair. Thomas. A. Santora et al.34 believes that the size of fascial defect and the appearance of fascia should dictate the selection of most appropriate method of hernia repair.

The range of hernial defect in study was 6-60 sq.cm. Roland et al showed the range of 1-125 sq. cm. of hernial defect. But Roland et al in their study have not considered the size of defect to select the type of repair contrary to the statement of Thomas. A. Santora.35 Jack Abrahamson3 believes that mesh repair is excellent method of repair for large ventral abdominal hernias, but has not specified the size of defect.

In my study, polypropelene mesh and the suture material of same type was used to repair incisional hernias, as it meets the requirements of ideal prosthesis. Now days it is the most commonly used material for repair of all types of hernia. Eighteen out of thirty cases were treated with overlay mesh repair and twelve with inlay repair. Two patients developed post-operative wound seroma collection in suture line in both groups, which were treated with proper drainage and dressing. One patient developed wound dehiscence, which was treated by secondary suturing.

This study showed no recurrence of incisional hernia in patients of inlay mesh repaired group. No patients in overlay mesh repair group noticed recurrence. Roland et al reported a recurrence of 24% among patients who underwent mesh repair. The recurrence rate was significant in Roland et al study (p-value, 0.02). In my study the result was not significant (P value-0.152).

However, the follow up period was variable and short to comment upon the real recurrence rate. In techniques for repair of incisional hernia, in which inlay mesh repair was used, there was greater contact between prosthesis and viscera with consequent wound infection and subsequent wound dehiscence and recurrence. With overlay repair, there was no recurrence as it is a tension free closure and infections are easier to treat. Thus my study establishes the superiority of overlay mesh repair over inlay repair with regards to recurrence of incisional hernia.

BIBLIOGRAPHY:

1. Ellis. H, “Incisions, closure and management of the wound”. Chapter 11. In Maingot’s abdominal operations, 10th Edn. Vol.1, Edt. Michael J. Zinner, Stamford. Appleton and lange, 1997; 395-426.
2. Casser. K and Munro. A. “Surgical treatment of incisional hernia”. Br. J. Surg 2002; 89: 534-545.
3. Abrahamson. J. “Hernias” Chapter-14. In Maingot’s abdominal operations”, 10th Edn. Vol 1, Edt. Micheal. J. Zinner, Stamford. Appleton and lange. 1997; 479-573.
4. Devlin HB. “Incisional hernia”. In Rob & Smith operative surgery. 4th Edn. Vol 1. Edt. Dudley H, Pories W, Carter D. 1983; 428-440.
5. Devlin HB, Kingsmith AN. “Abdominal wall & hernias”. Chapter-35. In New Aird’s companion in surgical studies, 1st Edn, Edt Kevin GB, Lunard, Young AE, Edinburg, and Churchill Livingstone, 1992; 845-875.
6. Abrahamson J “Hernias” Chapter-14. In Maingot’s abdominal operations. Vol. 1, 10th Edn. Edt. Micheal J, Zinner, Stamford, Appleton and Lange. 1997; 479-573
7. De Bord JR, “Prosthesis in hernia surgery”. In abdominal wall hernias. Principles & management. Chapter-3. Edn 1. Edt Bendavid R, Abrahamson J, phillip EH. Springer Verlag, Newyork. 2001; 16-30
8. Gibson CL. “Operation for cure of large ventral hernia” Am. Surg : 1920; 14:214-217
9. Devlin HB. “Incisional hernias”. In Rob & Smith operative surgery, 4th Edn. Vol 1, Edt. Dudley H, Pories W, Carter.D. 1983; 428-440.
10. Abel AL, Clain A. “The surgical treatment of large Incisional hernia using stainless steel wire”. Br. J. Surg 1960; 48: 42-9.
11. Hunter RR. “Anatomical repair of midline incisional hernia”. Br.J.Surg. 1971 ; 58(12) : 888-921
12. Throck Morton TD “Repair of hernia with a tantalum gauze implant” Surgery 1950; 27 (6):888-92
13. Usher FC, Ochsner J, Tuttle LL. “Use of marlex mess in the repair of Incisional hernia” Am.Surg. 1958; 24 (12):969-74.
14. Debord JR. “Prosthesis in hernia surgery” In abdominal wall hernias. Principles & management” Chapter-3 edn1. Edt, Bendavid R, Abrahamson J, Phillip EH. Springer verlag. New york 2001; 16-30
15. Jenkins TP “Incisional hernia repair a mechanical approach”. Br.J.Surg 1980; 67(5):335-6
16. Adloff M, Arnaud JP. “Surgical management of large Incisional hernia by an intraperitoneal Mersilene mesh and aponeurotic graft”.Surg.Gynaeo. Obstet.1987;165(3):335-336
17. Lichtenstein IL, Shulman AG, Amid PK. “Laparoscopic hernioplasty”. Arch.Surg 1991; 126: 1449.
18. Sharma J, Gupta M, Rani R, Kar J. “Prolene meshplasty in hernia repair”. Ind.J.Surg 1980; 67: 289-292.
19. Vrijland W.W, Jeekel, J, Steyerberg EW, Bonjer H. “Intra peritoneal polypropylene mesh repair of incisional hernia is not associated with entero cutaneous fistula” Br.J.Surg. 2000 ; 87 (3) : 348-352.
20. Luijendijk RW, Hop WCJ, Jeekel J etal. “A comparison of suture repair with mesh repair for Incisional hernia”. N. Engl. J. Med 2000; 343:392-397.
21. Riet V, Martyne MD etel “Prevention of adhesion to prosthetic mesh; Comparison of different barriers using with incisional hernia model”. Ann Surg. 2003; 237 (1) : 127-128.
22. Dumamain GA, Denham W. “Comparison of repair technique for major incisional hernias” Am. J. Surg 2003; 185 : 61-65.
23. Snell RS “The abdominal wall” Chapter 4. In Snell RS clinical anatomy for medical students: 6th Edn, Edt. Richard.S.Snell. Lippincott William & wilkins USA : 2000 ; 137-190
24. Boffard KD “Anatomy of abdominal Incision” Chapter 9. In Lee Mc Greger’s synopsis of surgical anatomy. 12th Edn. Edt.GAG Decker. DJ du Plissés. Bombay. KM Varghese publishing House. 1993 ; 113-117.
25. Baker RJ. “Incisional hernia” Chapter 19. In Nyhus & Condon’s hernia, 3rd Edn. Edt. Lloyd M. Nyhus & Robert E. Condon J.B. Lippincott company, Philadelphia, 1989: 321-326.
26. Varshney S, Manek P, Johnson CD. “Six fold suture wound length ratio for abdominal closure”. Ann.R.Coll Surg.Engl. 1999; 81 (5) : 333-336.
27. Debord JR. “Prosthesis in hernia surgery”. A century of evolution”- Chapter-3. In abdominal wall
hernia. Principles & management. Edn. Edt. Bendavid R, Abrahamson J, Phillip EH. Springer verlag. Newyork 2001; 16-30.
28. “Prosthetic repair of abdominal hernia” Chapter-39. In Nyhus & Condon’s hernia, 3rd Edn, Edt. Lloyd M. Nyhus & Robert E Condon. J.B. Lippincott Company. philadelphia, 1989 ; 559-576.
29. Mc Lanahan D, King LT, Gibson K. “Retromuscular prosthetic mesh repair of midline abdominal hernia”. Am. J. Surg 1997;173:445-449.
30. Bhutia WT, Sarath Chandra S, Srinivasan K and Anantha Krishnan N, “Factors predisposing to incisional hernia after laparotomy and factors influencing recurrence rate after different methods of repair-A prospective study of 220 cases” Ind. J. Surg 1993;55(11):534-543
31. Goel TC and Dudey PC “Abdominal incisional hernias, anatomical technique of repair”. Ind. J. Surg, 1981;43:324-327
32. Parekh JN, Shah DB, Thakore AB, “Incisional hernia; A study of 76 cases”. Ind. J. Surg, 1988 ; 49-53
33. Shah JB, “Incisional hernias ; A study of 50 cases”, Ind. J. Surg, 1977;39:353-356
34. Kingsnorth AN, Shivarajasingham N, Warg S, Buttler M, “Open mesh repair of incisional hernia with significant loss of domain”, Ann. R. Coll. Surg. Engl, 2004;86(5):363-366
35. Santora TA, Roslyn JJ, “Incisional hernia”, Surg. Clin. N. Am. 1993 June;73 (3) 557-570
36. Ellis H, George CD and Gajaraj H, “Incisional hernias; when do they occur?”. Br. J. Surg, 1983;70 (5) :290-291.
37. Marjorie Mudge, Hughes LE, “Incisional hernia; A 10 year prospective study of incidence and attitudes.” Br. J. Surg, 1985; 72 (1):70-71.
INCISIONAL HERNIA THROUGH SUPRAUMBILICAL SCAR

OPENED SAC WITH BOWEL AS CONTENT

AUTHORS:
1. Deepak R. Chavan
2. Sanjay Shantappa Namadar
3. Poojakiran

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Surgery, BLDE University, Shri B. M. Patil Medical College, Bijapur, Karnataka, India.
2. Senior Resident, Department of Surgery, BLDE University, Shri B. M. Patil Medical College, Bijapur, Karnataka, India.
3. MBBS Student, Department of Surgery, BLDE University, Shri B. M. Patil Medical College, Bijapur, Karnataka, India.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Deepak R. Chavan,
Pragatinagar, Ashram Road,
Near Water Tank,
Bijapur-586103,
Karnataka.
Email: dipdeepak@yahoo.co.in

Date of Submission: 16/05/2014.
Date of Peer Review: 17/05/2014.
Date of Acceptance: 26/05/2014.
Date of Publishing: 02/06/2014.