International Surgery Journal
Pattanaik SK et al. Int Surg J. 2019 Apr;6(4):1280-1286
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20191263

Original Research Article

A prospective study on incisional hernia, its incidence, etiology and management in a tertiary care hospital of Odisha

S. K. Pattanaik[1], Afroza Firodous[1]*, Ajax John[2], Harsha Pattnaik[3], Biplab Mishra[1], Biswajit Sahu[4]

[1]Department of General Surgery, S.C.B Medical College, Cuttack, Odisha, India
[2]Department of Neurosurgery, GMC, Kottayam, Kerala, India
[3]Lady Hardinge Medical College, New Delhi, India
[4]Department of Urology, VIMSAR, Burla, Odisha, India

Received: 17 January 2019
Accepted: 28 February 2019

***Correspondence:**
Dr. Afroza Firodous,
E-mail: afrozafirdaus000@gmail.com

ABSTRACT

Background: Incisional hernia (IH) is defined as the hernia protruding through incompletely healed abdominal surgical wound. Management of IH can be preventive (avoidance of infection and suture line tension, proper abdominal wound closure) or operative (anatomical reconstruction or repair with synthetic non-absorbable mesh either by open or laparoscopy method).
Methods: A descriptive prospective observational study on 51 patients with age >15 yrs was conducted in the Department of General Surgery, SCB Medical College and Hospital, Cuttack from August 2015 to August 2017. Diagnosis was made with clinical history, physical examination, X-ray abdomen and USG abdomen. The patients underwent different surgical procedures depending on size of defect, patient's consent and expertise available. Post-operative complications were noted and patients were followed up to 1 year for any recurrence.
Results: 28 males and 23 females were included. The mean age was 42.3 years. Most common cause of IH was post-operative wound infection (47.1%). Maximum cases were following emergency surgery (88.2%). Midline incision contributes maximum number (52.9%) followed by Pfannenstiel incision (25.4%). Open hernioplasty was the most common procedure (58.8%) followed by anatomical repair (19.6%) and laparoscopic hernioplasty (15.6%). Recurrence with suture repair was 10%, open mesh repair 3.3% and no recurrence was observed following laparoscopic repair.
Conclusions: Prevention of IH is to be taken care of, by avoiding infection during index operation with thorough peritoneal toileting, proper surgical techniques and appropriate antibiotics. Although laparoscopic mesh repair needs more operating time and skill, it has lesser blood loss, hospital stay and recurrence rate when compared to other procedures.

Keywords: Incisional hernia, Open hernioplasty, Laparoscopic hernioplasty

INTRODUCTION

A hernia is the protrusion of viscous or a part of viscous through a normal or abnormal opening in the wall of its containing cavity.[1] A ventral hernia is any hernia protruding through the abdominal wall, while Incisional hernia (IH) is a hernia protruding through an operational scar.[2] According to the various studies abdominal surgeries have 11% to 19% chance of developing IH.[3,4] The incidence of IH is dependent on the type of surgery, disease pathology, duration, surgical technique, age and patients characteristics, co-morbidities and post-op

complications. Morbidly obese patients got higher chance of incidence of IH. The use of different imaging modalities like ultrasonography (USG), computerized tomography (CT) and magnetic resonance imaging (MRI) yields higher incidence of IH.[5]

Incision type and length also play a major role in the incidence. Various studies were conducted to compare the incidence of IH in median incision, paramedian incision and transverse incision.[6-8] A number of meta-analysis and studies shows mass closure of abdomen with continuous non-absorbable or slowly absorbable suture material is the best technique for prevention of IH.[9-12] Although there is no strong evidence from randomized controlled trials, various studies emphasize the need for suture length: wound length ratio of at least 4:1when one bite must encompass 1 cm of tissue at 1 cm intervals.[13-14]

Many risk factors are associated with the occurrence of IH, both patients related and surgeon related. Major patient related risk factors are obesity, chronic lung diseases, type 2 DM, male gender, age, smoking, malnutrition, steroids, chemotherapy, anaemia, collagen vascular disorders, wound infections etc, while surgeon related are wound closure methods, suture material selection etc.[15-16]

IH has been clinically defined as "a bulge, visible and palpable when the patient is standing, and often requiring support or repair".[17] This bulge, which is located over or near the scar of a ventral abdominal wall incision and enlarges during standing, is the usual clinical presentation. With time, IH becomes larger. Symptoms will usually be aggravated by coughing or straining. During the pre-antibiotic era, the recurrence rate was quite high and cure rate was low. After the advent of good and safe anaesthesia, antibiotics, closed suction drainage, use of prosthetic mesh, transfusion facilities, better understanding of fluid therapy and proper care during preoperative and postoperative period, the cure rate is almost cent percent. Studies show that pain and increase in the size are the major indications for surgery. And in some cases, obstruction, strangulation and trophic ulcers are also seen.

Management of IH comes under two headings preventive and operative. Preventive aspects include proper choice of incision, avoidance of tension on suture line, preservation of nerves and proper closure of the abdominal wounds. Operative management consists of anatomical reconstruction layer by layer, reconstruction of various layers of the abdominal walls, darning technique, usage of implants, and repair with synthetic non-absorbable mesh. IH repairs can be done using either open or laparoscopic techniques; laparoscopic gaining more popularity. The open technique may consist of a simple hernioplasty, component separation technique or mesh repair. The component separation technique is based on enlargement of the abdominal wall surface by separation and advancement of the muscular layers. The mesh can be placed using on-lay, sub-lay or inlay techniques.

Laparoscopic hernia repair mainly practiced today is intra-peritoneal inlay technique with placement of mesh that is secured with a tagging device or trans-abdominal sutures.[18-21] Totally extra-peritoneal (TEP) repair and extended view TEP are also gaining popularity.

METHODS

A descriptive prospective observational study was conducted in Department of General Surgery, SCB Medical College and Hospital, Cuttack over a period from August 2015 to August 2017 with 51 patients included in the study.

Inclusion criteria

Patients with age >15 years who had herniation at site of previous surgical scar were chosen for the study.

Exclusion criteria

Exclusion criteria were 1. recurrent IH, 2. complicated IH that required emergency surgery, 3. on investigation found not to have IH, 4. those who refused to give consent for study.

Observations were made with regard to duration and ease of operation, wound complications, mesh infections, hospital stay, morbidity and recurrence. Diagnosis was made with clinical examination, USG abdomen and X-ray abdomen. All the patients were assessed preoperatively, intra-operatively and post-operatively, and the findings were recorded in a pre-structured proforma. Patients were evaluated in terms of age, gender, and Body Mass Index (BMI), mean operation time, length of hospital stay, pre-operative investigations, surgical technique, and post-operative complications. The patients underwent different surgical procedures like anatomic reconstruction, open hernioplasty or laparoscopic hernioplasty depending on size of defect, patient's consent and expertise available.Patients were followed up to 1 year and recurrence was observed.

Statistical analysis

Descriptive statistics were expressed as means and standard deviations.

RESULTS

This study was conducted at SCB Medical College and Hospital, Cuttack from the period of Aug 2015 to Aug 2017 and included 51 patients of diagnosed of incisional hernia.

Sex

28 cases affected with IH were males accounting to 54.9% cases. 23 cases out of 51 were females making about 45.1% of cases of IH. Male preponderance i.e.

Male: Female ratio being 1.2:1 was seen in the study (Table 1).

Table 1: Table showing distribution of cases according to sex.

S. no.	Sex	No. of patients (n=51)	%
1.	Male	28	54.9
2.	Female	23	45.1

Age

The mean age of the study was 42.3 years. The youngest patient was 19 years of age and oldest being 73 years of age. Maximum number of patients in the study belonged to age group of 25 to 35 years (25.5%). Most of the study population was between 25 and 55 years (64.6%). Only 7.8% patients are above 65 years (Figure 1).

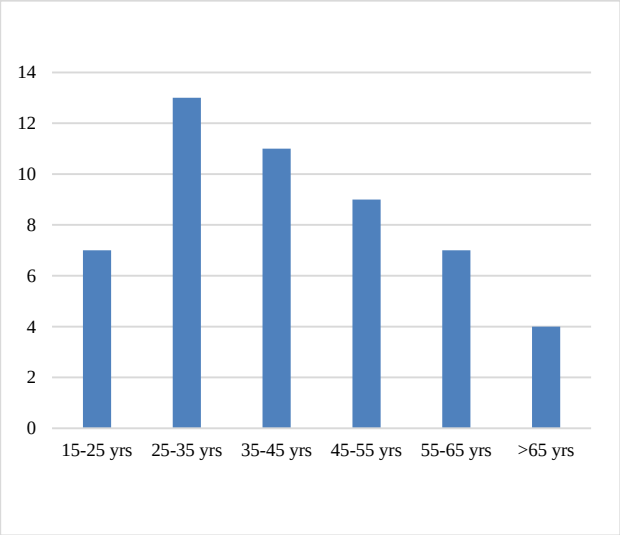

Figure 1: Age distribution among patients with IH.

BMI

Majority of the patients with IH came under overweight group with BMI of 25-29.9 kg/m^2 i.e., 19 out of 51 cases (37.3%). Only 35.3% patients came under normal group with BMI of 18-24.9 kg/m^2. The number of cases with BMI <18 kg/m^2 and >30 kg/m^2 were 4 (7.8%) and 10 (19.6%) respectively. The mean BMI of patients with IH was 25.9 kg/m^2 (Table 2).

Table 2: Distribution of cases according to BMI.

S. no.	BMI	No. of patients (n=51)	%
1.	<18 (underweight)	4	7.8
2.	18-24.9 (normal)	18	35.3
3.	25-29.9 (overweight)	19	37.3
4.	>30 (obese)	10	19.6

Table 3: Distribution of IH according to type of previous incision.

S. no.	Type of incision	No. of cases (n=51)	%
1.	Midline incision	27	52.9
2.	Pfannenstiel incision	13	25.4
3.	Subcostal incision	2	3.9
4.	McBurney's incision	2	3.9
5.	Laparoscopic port site	3	5.9
6.	Other incision	4	7.8

Distribution of IH according to previous incision

Midline incision leads to maximum number of IH (52.9%). Pfannenstiel incision also had a major share with 25.4% of cases while other incisions leading to IH were subcostal incision, Mc Burney's incision, laparoscopic port site, etc. (Table 3). The average period of interval between surgery and appearance of IH was 45 days. And most of IH occurred in between first and second month.

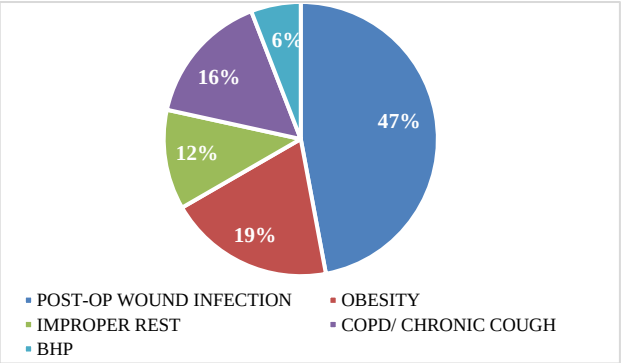

Figure 2: Figure showing distribution of IH according to etiology.

Etiology

The most common cause of IH was post-operative wound infection (47.1%). The other causes were obesity (19.6%), improper rest (11.7%), COPD (15.6%), BHP (5.8%) etc. Some of the cases had got multiple etiological factors, but main causes are depicted in the chart (Figure 2).

Type of previous surgery

Previous emergency surgery lead to 45 out of 51 number of IH cases making share of previous emergency surgery about 88.2% in incidence of IH. Only 6 out of 51 cases occurred after elective surgery which amounted to 11.8% of IH cases (Table 4).

Table 4: Table showing distribution of IH according to type of previous surgery.

S. no.	Type of previous surgery	No. of cases (n=51)	%
1.	Emergency	45	88.2
2.	Elective	6	11.8

Distribution of IH according to pathology

Most common pathology during previous surgery was duodenal perforation (27.4%) followed by Caesarean section for childbirth (25.4%), malignancy (15.6%), volvulus (9.8%), open cholecystectomy (3.9%), open appendectomy (3.9%), laparoscopic cholecystectomy (3.9%), laparoscopic appendectomy (1.9%) etc. (Table 5).

Table 5: Table showing distribution of IH according to type of pathology.

S. no.	Pathology	Incision	No. of patients	%
1.	Duodenal perforation	Midline	14	27.4
2.	Volvulus	Midline	5	9.8
3.	Malignancy	Midline	8	15.6
4.	Caesarean section	Pfannenstiel incision	13	25.4
5.	Open cholecystectomy	Subcostal	2	3.9
6.	Open appendectomy	McBurney's	2	3.9
7.	Lap cholecystectomy	Laparoscopic port site	2	3.9
8.	Lap appendectomy	Laparoscopic port site	1	1.9
9.	Iliopsoas abscess	Posterolateral transverse	2	3.9
10.	Whipple procedure	B/L subcostal	2	3.9

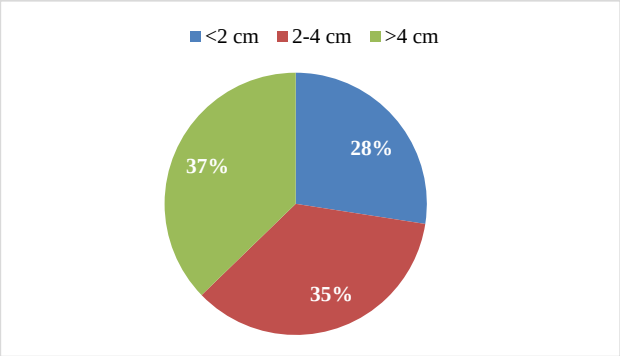

Figure 3: Distribution of IH according to size of defect.

Size of defect

In most of cases size of defect was more than 4 cm i.e. 19 out of 51 cases amounting to 37% cases of IH. About 18 cases out of 51 making about 35% cases of IH had defect of 2-4 cm. About 14 cases out 51 amounting to 28% cases of IH had less than 2 cm size defect (Figure 3).

Management

Most of the cases (58.8%) were managed by open mesh hernioplasty (Figure 4) i.e. 30 cases out of 51. Out of 51 cases, 8 cases i.e. 15.6% cases of IH were managed by inlay laparoscopic mesh hernioplasty (Figure 5). About 10 out of 51 cases i.e. 19.6% of IH cases were managed by suture repair. Rest case i.e. 3 out of 51 cases (5.8%) was only observed (Table 6).

Figure 4: Mesh placement and its fixation to anterior rectus sheath after defect closure during on-lay mesh hernioplasty (open).

Table 6: Distribution of IH according to type of management.

S. no.	Type of management	No. of cases	%
1.	Suture repair	10	19.6
2.	Open Mesh hernioplasty	30	58.8
3.	Laparoscopic mesh hernioplasty	8	15.6
4.	None	3	5.8

Comparison of laparoscopic and open mesh hernioplasty

Laparoscopic mesh repair required average operative time of 130 min compared to 100 min in open mesh

repair. The laparoscopic hernia repair had an average of 40 ml blood loss while open mesh repair had average of 100 ml of blood loss.

Average hospital stay in laparoscopic hernia repair group was 5 days, while in open mesh repair was 8 days (Table 7).

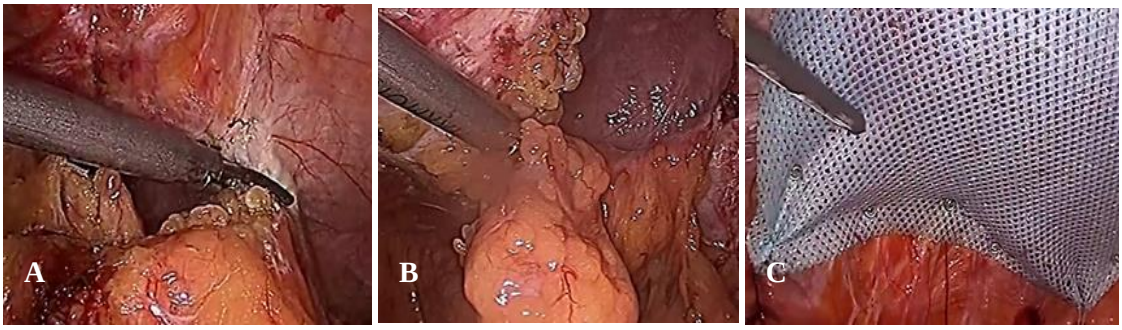

Figure 5: Figure showing steps of laparoscopic mesh hernioplasty [step (A), (B) show removal of adhesion from neck and (C) placement of mesh].

Table 7: Comparison between laparoscopic repair and open mesh repair.

S. no.	Variables	Laparoscopic repair	Open mesh repair
1.	Operating time	130 min	100 min
2.	Blood loss	40 ml	100 ml
3.	Hospital stay	5 days	8 days

Table 8: Recurrence among different type of repairs.

S. no.	Type of repair	No. of recurrence	%
1.	Suture repair	3/10	30
2.	Open mesh hernioplasty	1/30	3.3
3.	Lap mesh hernioplasty	0	0

Recurrence

Recurrence with suture repair was 3 cases out of 10, which accounts to 30% of the cases operated by suture repair. Recurrence in open repair was 1 case out of 3 making it to 3.3% of cases operated by open mesh repair and none case of recurrence was observed in laparoscopy mesh hernioplasty (Table 8).

DISCUSSION

Abdominal incisional hernia is very common clinically with an incidence of 3% to 20.6%. Infection of the incision will increase the rate of hernia up to 23%. Abdominal incisional hernia will lead to splitting the fascia layer and formation of abdominal wall mass for intra-abdominal tissues or organs sticking out from split, which will severely affect patient life. However, different area has different incidence. In our study conducted in a tertiary care hospital of the eastern India, 51 cases of IH in 2 years were found excluding the recurrent cases, complicated cases and those unwilling to be included in study. This study shows male preponderance with 54.9% compared to the other studies Zhang et al.[22] Kurmann et al showed 72.5% males in laparascopic group and 67.5% in open group.[23] The mean age of our study is 42.3 years, 47% being between 25-45 years of age. Only about 7.8%patients were above 65 years of age. In Zhang et al the mean age of the study was 45.5. Kurmann et al showed mean age of study in the laparascopic group is 63 and open group is 63.5 years. Roland et al studied the mean age of patients in the suture repair group is 63 and Mesh repair group is 57 years.[24]

Muscle fibre strength can prevent the occurrence of IH and it is mainly provided by the nutrition and proper exercise. Obesity is said to be one of the causes for IH. In this study 19.6% patients are obese and mostly are men, while 7.8% were underweight. Midline incision leads to maximum number of IH cases (52.9%) in this study and Pfannenstiel incision contributes 25.4% of the cases. Subcostal IH are generally rare, as abdominal muscles can prevent from herniation. But in this study two cases of IH were observed after subcostal incision (open cholecystectomy). Mc Burney's incision accounts for 3.9% of IH in our study and laparoscopic port site IH occurred in 3 cases (5.9%). Purushotham et al showed 80% of IH cases after previous lower midline incision and 11.5% after upper midline incision. Mc Burney's incision also leads to 8.5% IH according to their study.[25]

In this study the most common cause was post-operative infection (47.1%). And obesity was the next possible cause with 19.6% of cases. Other causes are lack of rest, improper exercises, malignancy and co-morbid conditions, COPD, BHP, condition causing increased abdominal pressure and connective tissue disorder. Shaikh et al studied the commonest cause of IH to be post-operative infection accounting for 45.5% of cases, other causes being respiratory tract infections, COPD,

abdominal distension, urinary infection and constipation.[26]

In this study emergency surgery caused the greatest number of IH (88.2%) and elective surgery caused only 11.8% IH. Purushotham et al showed emergency surgery resulted 57% case of IH, while elective surgery in 43% cases.[25] Since emergency surgeries were done without preoperative preparations, it may lead to post-operative complications like wound infections, which is the most common etiology for IH.

Size of the hernia is also important in deciding the treatment. In this study 37% cases having the size of the defect more than 4 cm and 35% cases having size of defect two to four cm, while 28% cases have defect less than two cm. Kurmann et al showed that in laparoscopic group 1.5% cases were in size less than 4 cm, 47.8% cases in 4 to 10 cm and 36.2% cases more than 10 cm, while in open repair group 8.9% were in size less than 4 cm, 30.4% between 4 to 10 cm and 19.6% were more than 10 cm.[23]

Duodenal perforation causing peritonitis during primary surgery was responsible for the greatest number of IH cases (27.4%) followed by obstetric gynae surgery (25.4%), malignancy (15.6%) and volvulus (9.8%). Open cholecystectomy, lap cholecystectomy, open appendectomy, lap appendectomy and others also contributed to causation of IH.

In this study 19.6% cases were managed by suture repair. 58.8% cases were managed by open mesh hernioplasty. Three cases were managed conservatively with control of obesity and using abdominal binder. Kurmann et al studied 125 cases, in which 69 cases were managed laparoscopically and 56 cases via open repair.[23] Roland et al studied 154 cases in which 80 cases were managed with suture repair and 74 were with mesh repair.[24]

On comparing operating time for laparoscopic and open repair, this study had 130 min and 100 min respectively and Blood loss was 40 ml and 100 ml respectively. Kurmann et al observed average operating time for laparoscopic to open was 180 min for both, but blood loss was 50 to 100 ml respectively.[23] Hospital stay in their study was 6 and 7 days for laparoscopic and open repair, while in this study it was 5 and 8 days respectively.

Recurrence is one of the most important complications of IH repair. In this study the recurrence was 4 out of 51 cases after 1 year follow up. Most of the recurrences were after suture repair (30%), in open mesh repair it was 3.3% and no recurrence was observed after laparoscopic mesh repair. Roland et al studied recurrence of mesh repair and suture repair and found to have 43% recurrence in suture repair and 24% in mesh repair group.[24]

Compared to open mesh repair and suture repair, laparoscopic inlay mesh repair got less recurrence, less complication and less morbidity but it needs more technical skill and is less economic. Nowadays laparoscopic mesh repair is getting more popularity as it is cost effective in the long run.

CONCLUSION

Incisional hernia is one of the commonest complications of abdominal surgeries, especially when done in emergency. Most common etiology of IH in this study was previous surgery wound infections with 47.1%. Other causes are obesity, COPD, BPH and improper rest.

On comparing different management techniques for IH, inlay laparoscopic mesh repair needs more operating time and skill compared to open mesh repair and suture repair. But laparoscopic repair had lesser blood loss and hospital stay in this study. Recurrence of IH was more seen in suture repair, while it was nil in laparoscopic repairs after one year of follow up.

Prevention of IH is to be taken care of, by avoiding infection during index operation with thorough peritoneal toileting, proper surgical techniques and appropriate antibiotics.

Laparoscopic mesh repair needs more operating time and skill as compared to open mesh repair and suture repair, but has a lesser blood loss, hospital stay and recurrence rate. Limitations of the study are non-randomization and short follow up.

ACKNOWLEDGEMENTS

Authors acknowledge all their colleagues, juniors and patients for their kind help and cooperation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. MacNalty AS, Critchley M. Butterworths medical dictionary. 2nd ed. London: Butterworths; 1978.
2. Muysoms FE, Miserez M, Berrevoet F, Campanelli G, Champault GG, Chelala E, et al. Classification of primary and incisional abdominal wall hernias. Hernia. 2009;13(4):407-14.
3. Mudge M, Hughes LE. Incisional hernia: a 10 year prospective study of incidence and attitudes. Br J Surg. 1985;72(1):70-1.
4. Sugerman HJ, Kellum JM, Jr., Reines HD, DeMaria EJ, Newsome HH, Lowry JW. Greater risk of incisional hernia with morbidly obese than steroid dependent patients and low recurrence with prefascial polypropylene mesh. Am J Surg. 1996;171(1):80-4.

5. Musella M, Milone F, Chello M, Angelini P, Jovino R. Magnetic resonance imaging and abdominal wall hernias in aortic surgery. J Am Coll Surg. 2001;193(4):392-5.
6. O'Dwyer PJ, Courtney CA. Factors involved in abdominal wall closure and subsequent incisional hernia. Surgeon. 2003;1(1):17-22.
7. Brown SR, Goodfellow PB. Transverse verses midline incisions for abdominal surgery. Cochrane Database Syst Rev. 2005;(4):CD005199.
8. Fassiadis N, Roidl M, Hennig M, South LM, Andrews SM. Randomized clinical trial of vertical or transverse laparotomy for abdominal aortic aneurysm repair. Br J Surg. 2005;92(10):1208-11.
9. Ceydeli A, Rucinski J, Wise L. Finding the best abdominal closure: an evidence-based review of the literature. Curr Surg. 2005;62(2):220-5.
10. Hodgson NC, Malthaner RA, Ostbye T. The search for an ideal method of abdominal fascial closure: a meta-analysis. Ann Surg. 2000;231(3):436-42.
11. O'Dwyer PJ, Courtney CA. Factors involved in abdominal wall closure and subsequent incisional hernia. Surgeon. 2003;1(1):17-22.
12. Van't Riet M., Steyerberg EW, Nellensteyn J, Bonjer HJ, Jeekel J. Meta-analysis of techniques for closure of midline abdominal incisions. Br J Surg. 2002;89(11):1350-6.
13. Israelsson LA, Jonsson T. Suture length to wound length ratio and healing of midline laparotomy incisions. Br J Surg. 1993;80(10):1284-6.
14. Jenkins TP. The burst abdominal wound: a mechanical approach. Br J Surg. 1976;63(11):873-6.
15. Cheng H, Rupprecht F, Jackson D, Berg T, Seelig MH. Decision analysis model of incisional hernia after open abdominal surgery. Hernia. 2007;11(2):129-37.
16. Yahchouchy-Chouillard E, Aura T, Picone O, Etienne JC, Fingerhut A. Incisional hernias- Related risk factors. Dig Surg. 2003;20(1):3-9.
17. Sorensen LT, Hemmingsen UB, Kirkeby LT, Kallehave F, Jorgensen LN. Smoking is a risk factor for incisional hernia. Arch Surg. 2005;140(2):119 23.
18. Greenall MJ, Evans M, Pollock AV. Midline or transverse laparotomy? A random controlled clinical trial. Part I: Influence on healing. Br J Surg. 1980;67(3):188-19.
19. Shell DH, de la Torre J, Andrades P, Vasconez LO. Open repair of ventral incisional hernias. Surg Clin North Am. 2008;88(1):61-83,
20. Nieuwenhuizen J, Kleinrensink GJ, Hop WC, Jeekel J, Lange JF. Indications for incisional hernia repair: an international questionnaire among hernia surgeons. Hernia. 2008;12(3):223-5.
21. Korenkov M, Paul A, Sauerland S, Neugebauer E, Arndt M, Chevrel JP, et al. Classification and surgical treatment of incisional hernia. Results of an experts' meeting. Langenbecks Arch Surg. 2001;386(1):65-73.
22. Zhang L. Incidence of abdominal incisional hernia in developing country: a retrospective cohort study. Int J Clin Exp Med. 2015;8(8):13649-52.
23. Kurmann A, Visth E, Candinas D, Beldi G. Long-term Follow-up of Open and Laparoscopic Repair of Large Incisional Hernias. World J Surg. 2011;35:297–301.
24. Luijendijk RW, Hop WC, van den Tol MP, de Lange DC, Braaksma MM, IJzermans JN, et al. A comparison of suture repair with mesh repair for incisional hernia. N Engl J Med. 2000;343(6):392-8.
25. Purushothaman R, Rubby SA, Emmanuel Stephen J. Clinical study of incidence and surgical management of incisional hernia. Int Surg J 2016;3:1875-8.
26. Shaikh NA, Shaikh NM. Comparative Study of Repair of Incisional Hernia. J Pakistan Med Assoc. 1994;44(2):38-9.

Cite this article as: Pattanaik SK, Firodous A, John A, Pattnaik H, Mishra B, Sahu B. A prospective study on incisional hernia, its incidence, etiology and management in a tertiary care hospital of Odisha. Int Surg J 2019;6:1280-6.