

Incisional Hernia in Women: Predisposing Factors and Management Where Mesh is not Readily Available

Agbakwuru EA¹, Olabanji JK¹, Alatise OI¹, Okwerekwu RO¹ and Esimai OA²

¹ Department of Surgery, Obafemi Awolowo and ² Department of Community Health, Obafemi Awolowo University Teaching Hospitals' Complex, Ile-Ife, Nigeria

Abstract

Background / Aim: Incisional hernia is still relatively common in our practice. The aim of the study was to identify risk factors associated with incisional hernia in our region. The setting is the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria during a period when prosthetic mesh was not readily available. **Patients and Methods:** All the women who presented with incisional hernia between 1996 and 2005 were prospectively studied using a standard form to obtain information on pre-hernia (index) operations and possible predisposing factors. They all had open surgical repair and were followed up for 18-60 months. **Results:** Forty-four women were treated during study period. The index surgeries leading to the hernias were emergency caesarian section 26/44 (59.1%), emergency exploratory laparotomy 6/44 (13.6%), and elective surgeries 12/44 (27.3%). Major associated risk factors were the use of wrong suture materials for fascia repair, midline incisions, wound sepsis, and overweight. **Conclusion:** For elective surgeries, reduction of weight should be encouraged when appropriate, and transverse incisions are preferred. Absorbable sutures, especially chromic catgut, should be avoided in fascia closure. Antibiotics should be used for complicated obstetric cases.

Key words: *Incisional hernia, Women, Predisposing factors, Nigeria*

Introduction

Incisional (postoperative ventral) hernia is an iatrogenic abdominal wall defect that occurs at the site of previous incision following breakdown in the continuity of the fascia closure [1]. It has been described as a bulge visible and palpable when the patient is standing and often requiring support and repair [2]. It is a very common complication of abdominal surgeries and is associated with considerable morbidity and mortality [3,4]. As many as 11% of laparotomies are complicated by the development of incisional hernias [5-7]. The figure rises to 26% in those who develop wound infection [8]. Despite increased understanding of abdominal wound closure, it is worrisome that the frequency has not diminished appreciably in the past 75 years [9,10].

An incisional hernia occurs due to biochemical failure of the acute fascial wound early in the healing process when wound tensile strength is very low or absent (days 0-30). It is during this time, when wound strength depends entirely on suture integrity, that recovering patients start returning to increased levels of activity and thereby place increasing loads across their acute wounds [11,12]. However, the hernia may not be obvious for days or even years [13,14]. Various factors have been identified to be responsible for the failure, including obesity and wound infection; other contributory factors include initial closure of fascia with catgut, drainage tube through the index incision, senility, early wound dehiscence, immunosuppressant therapy, anaemia, diabetes mellitus, malnutrition, jaundice, and azotaemia, [15-17]. Suture length and technique [18,19] have also been implicated. Occurrence of incisional hernia has also been attributed to the disturbance of collagen metabolism at the microscopic level [20]. Hence, tension free repairs are recommended. This entails the use of mesh, either open or laparoscopic [15,21], but this material is not available in most poor countries such as ours. This study was carried out to identify the factors associated with incisional hernia in our region as well as factors affecting recurrence.

Methods and patients

Forty-four women who presented with ventral incisional hernia at Obafemi Awolowo University Teaching Hospital (O.A.U.T.H.C), Ile-Ife, Osun State, Nigeria, between January 1996 and December 2005 were included in the study. O.A.U.T.H.C is a tertiary health facility located in southwest Nigeria and serves as the referral hospital for patients from Osun, Ondo, Ekiti and part of Oyo State of Nigeria. People from these areas are mostly farmers and the others are either self-employed or government workers.

A standard form was used during the initial evaluation of the patient to obtain the indication for the pre-hernia operations and the possible predisposing factors. Patients who could not give sufficient information were excluded. Surgeons' skill and level of experience for the pre-hernia surgery were not assessed because most were patients referred from other hospitals. All hernias were in the midline of the abdomen, but they were characterised as being supraumbilical, periumbilical or infraumbilical. Wound infection as a risk factor was arrived at if the patient gave a history of a pussy discharge from the wound after the pre-hernia surgery. This was corroborated by the length of hospital stay and the scar of the pre-hernia operation. Prolonged ileus was defined as delay of return of the bowel sound 72 hours after surgery.

All patients with body mass index of $> 25 \text{ kg/m}^2$ whose weight was the same or greater before the pre-hernia surgery were considered overweight or obese. Scar dimensions were measured with calipers. The longest diameter of the scar was taken as the length of the hernia. Perpendicular to this was the width.

All the patients were operated on by the team headed by the first author. Scars with no sutures in the wound were assumed to have been repaired with absorbable sutures (chromic catgut is a common absorbable suture used in our region). The operation notes of the few patients who were operated on in this hospital were also

reviewed. All the patients had general anaesthesia. Either Mayo's or Keel's repair were offered to the patient; Mayo's repair was used for the smaller defects. A relaxing incision was made on the rectus sheath to relieve tension on the repair [22]. All the patients were placed on cephalosporin for prophylaxis. Recovery from anaesthesia was observed. All the patients were followed up for a minimum of 18 months after repair. Post-operative complications and recurrences were documented. Post-operative complications were classified as superficial or deep wound infection, seroma, or haematoma. Superficial wound infection was defined as the presence of signs or symptoms of inflammation at the wound, which was treated with antibiotics; this may or may not have included the development of systemic evidence of infection or the presence of purulent discharge from the wound. Deep wound infection was defined as the presence of a sub-fascial collection of purulent fluid that may or may not have been associated with systemic or local evidence of inflammation. Seroma was defined as the presence of a symptomatic prefascial collection of sterile fluid requiring drainage. Haematoma was defined as prefascial collection of organized clot requiring operative drainage. Other complications included cough requiring antibiotics and antitussives. Recurrence was defined as the occurrence of the incisional hernia after the repair.

The data were analysed using SPSS package 11.0 version. Categorical data was compared with recurrence using Chi square (Pearson Chi square and Fischer's exact test) where appropriate. Two-tailed student's t-test was used to compare the continuous data with recurrence. Statistical significance was assigned for value of $P < 0.05$.

Table 1 Age distribution and the outcome of surgery in the 44 women with incisional hernia

Variable	Freq	Percentage
Age	<29	9 20.5
	30-39	15 34.1
	40-49	10 22.7
	50-59	6 13.6
	>60	4 9.1
Onset of hernia (months)	0-6	14 31.9
	7-12	20 45.5
	13-18	6 13.6
	19-24	2 4.5
	>25	2 4.5
Method of repair	Mayo's	32 72.7
	Keel	12 27.3
Outcome of surgery	Recurrent	4 9.1
	Not recurrent	40 90.9
Complication	None	36 73.5
	Wound infection	5 11.4
	Haematoma	2 4.5
	Seroma	1 2.3
	Hypertrophic scar	2 4.4
Total	44	100

Results

Forty-four women with incisional hernia were studied. These accounted for 0.23% of all operations done during the period in our hospital. Ages ranged from 25 to 70 years with median of 35 years. Age distribution is shown in Table 1. Most of the patients (56.8%) were in the reproductive age group. About three-quarters of the

incisional hernias (34, 77.4%) occurred within the first year of pre-hernia surgery. Most patients (32, 72.7%) had Mayo's repair and the remainder had Keel's repair. Only four patients (8.2%) had recurrence of the lesion within the study period. Ten patients (22.7%) had other complications, including superficial wound infection (3, 6.8%), deep wound infection (2, 4.5%), haematoma (2, 4.5%), seroma (1, 2.3%), hypertrophic scar (3, 6.8%) and cough (1, 2.3%).

Table 2 Prehernia (index) operations among incisional hernia patients

Procedure	Type	Number	Percentage	Indication
Emergency	Caesarean section	26	59.1	Obstructed labour 18 Fetal distress 4 Eclampsia 4
	Exploratory laparotomy	6	13.6	Typhoid 2 Appendiceal abscess 1 Uterine perforation 3
Elective	Caesarean section	2	4.5	Previous C.S 1 Pregnancy and fibroid 1
	TAH + BSO*	3	6.8	Uterine fibroid 2 Endometrial cancer 1
	Herniorrhaphy	5	11.4	Epigastric hernia 2 Umbilical hernia 1 Recurrent I.H. 2#
	Cholecystectomy	1	2.3	Gallstone 1
	Right hemicolectomy	1	2.3	Caecal mass 1

$P \leq 0.0001$ - The incidence of incisional hernia are more common in patients who had emergency surgeries than elective surgeries. TAH-BSO* = Total abdominal hysterectomy and bilateral salpingoophorectomy Recurrent I.H. # = Recurrent inguinal hernia

The pre-hernia (index) operations of the patients are as shown in table 2. By using the chi square test, we found that the index operation was significantly associated ($P < 0.0001$) with the nature of the surgery: emergency or elective. Twenty-eight patients (63.6%) had caesarean section, 26 of whom were on emergency basis. Obstructed labour (18, 69.2%) was the most common indication for emergency caesarean sections, followed by foetal distress (4, 15.4%) and eclampsia (4, 15.4%). The six emergency exploratory laparotomies were done for two typhoid perforations, one appendiceal abscess, and three uterine perforations from septic abortion. The elective surgeries included total abdominal hysterectomy with bilateral salpingoophorectomy, herniorrhaphies cholecystectomy, bilateral truncal vagotomy with pyloroplasty, and right hemicolectomy. Most hernias were infraumbilical (36, 81.9%). Only six hernias were periumbilical (13.6%) and two (4.5%) were supraumbilical.

Table 3 Anatomical location of hernia defect

Site	Frequency	Percentage
Supraumbilical	2	4.5
Periumbilical	6	13.6
Infraumbilical	36	81.9

The sizes of the hernias ranged from 2.5 to 15 cm long with a median of 10.0 cm, and from 2.5 to 12 cm wide with a median of 6.0 cm. The area of the defect ranged from 6.25 to 180 cm² with a median of 75 cm².

The major predisposing factors included midline incision (44, 100.0%), wound sepsis (35, 71.4%), absorbable suture (34, 69.4%), overweight (12, 24.5%), and prolonged post operative ileus (10, 20.4%) (Table 4). Other factors included multiparity, wound attrition from old age, drain from original wound, cough, haematoma, difficult extubation, diabetes mellitus, cigarette smoking, and cancer.

Patients were followed up for 18 to 60 months. Of the four patients with recurrence, two were overweight and had wound infection, and the other two had difficult extubation associated with wound infection. Recurrence was significantly affected by the pre-hernia surgery ($P=0.012$). Recurrence was seen in the repair of incisional hernia resulting from umbilical hernia and emergency caesarean section. The method used did not affect the recurrence rate.

Table 4 Factors associated with incisional hernia in 44 patients

Factor	No of patients	Percentage
Absorbable sutures	32	72.7
Midline incisions	44	100.0
Wound sepsis	35	79.5
Overweight (body mass index > 25 kg/m ²)	12	27.3
Multiparity (previous multiple caesarean section)	2	4.5
Wound attrition	5	11.4
Post operative ileus	8	18.2
Drain site (outside original wound)	1	2.3
Cough	2	4.5
Haematoma	2	4.5
Difficult extubation	1	2.3
Diabetes mellitus	3	6.8
Cigarette smoking	4	9.1
Cancer	2	4.5

Discussion

We studied forty-four women, most of whom were of reproductive age. Pre-hernia surgeries were pregnancy-related in 28/44 (63.6%) cases. This age group is always subjected to prolonged or repeated stretching and weakness of the abdominal muscular tendinous structure. It is therefore not surprising that incisional hernia was more prevalent in this group.

Twenty-six patients (59.1%) had emergency caesarean section before the incisional hernia. This is in agreement with previous observations [13,23]; the pregnant abdomen, attendant obesity, and emergency nature of surgery can all predispose to incisional hernia.

The major possible predisposing factors identified in this study (Tables 2,3,4) are not much different from those reported elsewhere [13,18,23,24]. It seems that little is being done to reduce these preventable risk factors. Thirty-two patients (72.7%) had emergency operations, where nothing could have been done about the weight of

overweight patients. Hence, obesity as a causative factor was prominent in 12 (27.3%) of our patients. Surgeons' lack of experience and inappropriate surgical technique could also be factors leading to incisional herniation. This could not be ascertained in many of our patients who had presented from various hospitals, without access to their previous operation records.

Wound sepsis has continued to be an important risk factor [24]. It was contributory in 79.5% of our patients. Perhaps the usual reduced immune state of pregnancy and the occasional undetected gestational diabetes [25], combined with the emergency nature of the surgeries could account for this frequent involvement of sepsis. The constant mutations of the contaminating genital microbes and consequent development of antibiotic resistance do not make matters any better.

All our patients had vertical abdominal incisions for the index operations. The least resistance to stress by intra-abdominal forces is offered by vertical incision, which transversely divides the oriented fascia fibers of the anterior abdominal wall [1,13]. This could explain the 100% constancy of this risk factor in our patients. This may account for Pfannestiel incisions recording very low incidence of incisional hernia [25].

Incisional hernia is expected in patients who have absorbable suture for fascia repair [1,26]. Midline abdominal fascia is poorly vascularised and hence is slow to heal, consolidate and regain its tensile strength [1,27,28]. It therefore requires suture materials whose tensile strength will still hold until the fascia heals. As noted by previous workers [24,29], herniation through the lower midline scar was more frequent in our series (81.9%). This is anatomical, due to the thinner anterior sheath with virtually no posterior sheath support of the linea alba. It has also been attributed to the orientation of the incision, which is parallel to the line of forces acting on it [29].

The sizes of our patients' hernial defects allowed re-approximation without significant tension. Hence two main techniques (Mayo's and Keel) were employed [30,31,32]. Monofilament non-absorbable (Nylon 1) sutures were used in these patients. This suture has been used successfully by other workers [8,23,27,33]. Surgical treatment of incisional hernia include suture repair (which may incorporate relaxing incision), internal suture retention techniques, muscle flap rotation, autodermal hernioplasty, and prosthetic implantation using onlay and sublay techniques [5,34]. Korenkov et al. concluded that suture repair was safe for small incisional hernias; both autoplasmic and alloplastic hernia repair yielded comparably low recurrence rates, but led to a high rate of wound infection [35]. Laparoscopic herniorrhaphy is a promising technique with all the advantages of minimally-invasive surgery [5,22,36,37].

Incisional hernia repair is associated with high cumulative rates of re-operative repairs; and important measures of adverse outcomes have not improved [10]. The recurrence rate among the 44 patients was 4/44 (9.1%), after a period of follow-up ranging from 18 to 60 months. This should not be discouraging because two of

the cases are thought to have been due to wound sepsis and overweight.

Therefore, we suggest that whenever possible, reduction of weight should be encouraged before laparotomies and incisional hernia repair in overweight patients [22]. Transverse incisions, unless contraindicated, should be used more frequently. Judicious use of perioperative antibiotics in all emergency laparotomies, particularly caesarean section, with meticulous attention to asepsis at all times should be encouraged. Chromic catgut should not have a place in repair of fascia of midline incisions. There is a need to continue insisting on appropriate nonabsorbable suture materials in closure of abdominal wounds during laparotomy. The well-established surgical principles remain valid: wound closure should be free of excessive tension, the sutures should be placed in healthy tissue, and strong suture material should be used to support the wound through the critical period of healing [5].

Conclusion

Despite the relatively small number of patients, we confidently conclude that the major clinical attributes with possible risk factors for incisional hernia are using the wrong type of sutures, midline incisions, wound sepsis, and overweight. The role of the individual attributes is not clear. A further study of a large population to compare patients with similar attributes but no incisional hernia would be shed light on this.

However, we recommend that whenever possible, reduction of overweight be encouraged before laparotomies and that transverse or oblique incision be used instead of vertical incision when practicable. Prophylactic antibiotics should be used in all emergency laparotomies, especially caesarean sections for obstructed labour. Absorbable sutures (especially chromic catgut) should not have a place in repair of fascia of midline incision. If these suggestions are adhered to, the incidence and morbidity of incisional hernia will definitely diminish.

It is noteworthy that in our centre we started repairing incisional hernias and other defects with mesh. This forms the thrust of an ongoing prospective study on the management of fascial defects.

References

- Sahtora TA, Roslyn JS. Incisional Hernia. *Surg Clin North Am* 1993; 73: 557-70.
- Leeper DJ, Pollock AV, Evan M. Abdominal wound closure: a trial of nylon, polyglycolic acid and steel sutures. *Br J Surg* 1977; 64: 603-6.
- Anthony T, Bergen PC, Kim LT. Factors affecting recurrence following herniorrhaphy. *World J Surg* 2000; 24:95-101
- Niggebrugge AHP, Trimobos JB, Hemans J, et al. Influence on abdominal wound closure technique on complications after surgery: A randomized study. *Lancet* 1999; 353:1563-7.
- Gerald ML. Ventral hernia repair by the laparoscopic approach. *Surg Clin North Am* 2000; 80:1329-39.
- Mudge M, Hughes LE. Incisional hernia: A 10 year prospective study of incidence and attitudes. *Br J Surg* 1985; 72:70-1.
- Anthony T, Bergen PC, Kim LT, et al. Factors affecting recurrence following incisional herniorrhaphy. *World J Surg* 2000; 24:95-101.
- Bucknall TE, Cox PJ, Ellis H. Burst abdomen and Incisional hernia: A prospective study of 1129 major laparotomies. *BMJ* 1982; 284:931-3.
- Carlson MA. Acute wound failure in wound healing. *Surg Clin N Am* 1997; 77:607-36.
- Flum DR, Horvath K, Koepsell T. Have outcomes of Incisional hernia repair improved with time? A population based analysis. *Ann Surg* 2003; 237:129-35.
- Franz MG, Nguyen K, Wang X, et al. Transforming growth factor B2 lowers the incidence of Incisional hernias. *J Surg Reg* 2001; 97:109-116.
- Robson MC, Dubay DA, Wang X, Franz MC. Effect of cytokine growth factors on the prevention of acute wound failure. *Wound Repair Regen* 2004; 12:38-43.
- Dare FO, Lawal OO. Experience with 29 cases of female ventral Incisional hernia in Ile-Ife, Nigeria. *Int J Gynecol Obstet* 1991; 29-32.
- Pollock AV, Evans M. Early prediction of late Incisional hernia. *Br J Surg* 1989; 76:953-4.
- Millikan KW. Incisional hernia repair. *Surg Clin N Am* 2003; 83:1223.
- Makela JT, Kiviniemi H, Laitnew S. Factors influencing wound dehiscence after midline laparotomy. *Am J Surg* 1995; 170:387-90.
- Carlson MA, Ludwig KA, Condon RE. Ventral hernia and other complications of 1000 midline incisions. *South Med. J.* 1995; 88:450-3.
- Isrealsson LA, Jonsson T. Suture length to wound length ratio and healing of midline laparotomy incision. *Br J Surg* 1993; 80:1284-6.
- Rucinski J, Margolis M, Panagopoulos G, Wise L. Closure of abdominal midline fascia: Meta- analysis delineates the optimal technique. *Am Surg* 2001; 67:412-6.
- Si Z, Bhardway R, Rosch R, et al. Impaired balance of type I and type 3 procollagen mRNA in cultured fibroblasts of patients with Incisional hernia. *Surgery* 2002; 131:324-31.
- Cassar K, Munro A. Surgical treatment of Incisional hernia. *Br J Surg* 2002; 89: 534-45.
- Polloak R, Nylus LM. Incisional hernias. In: Schwartz SI, Ellis H, eds. *Maingot's Abdominal operations*. 8th ed. Vol 1. Norwalk, Connecticut: Appleton – Century-Crofts, 1985: 335-50.
- Isrealsson L.A., Jonsson T., Knutsson A. A suture technique and wound healing in midline laparotomy incisions. *European J Surgery* 1996; 162-9.
- Shaikh NA, Shaikh NM. Comparative study of repair of incisional hernia. *Journal of the Pakistan Medical Association* 1994; 44:389.
- Falase AO, Akinkugbe OO. Diabetes mellitus. In: Falase AO and Akinkugbe OO (Eds). *A Compendium of Clinical medicine*. Spectrum Books Ltd Ibadan Nigeria 1999; 376-98.
- Douglas DM. The healing of aponeurotic incisions. *BJS* 1952; 40:79-82.
- Isrealsson A, Jonsson T. Closure of midline laparotomy Incisional with polydioxane and nylon: the importance of suture technique. *BJS* 1994; 81:1606-8.
- Ponka JL. *Hernia of the abdominal wall*. Philadelphia Saunders (1980).
- Douglas D. Wounds: their problem. *JR Coll Surg Edinb* 1975, 20:77-95.
- Akman PC. A study of five hundred incisional hernias. *J Int Coll Surg*. 1962; 37:125-42.
- Devlin HB. *Hernia*. In Russel RCE (Ed) *Recent Advances in Surgery II*. Edinburgh, Churchill Livingstone 1982.
- Obney N. An analysis of 192 consecutive cases of Incisional hernia. *Journal of Canada medical Association* 1957; 77:733-767.
- Targat REB. The suturing of abdominal incisions: A comparison of monofilament nylon and catgut. *BJS* 1967; 54:952-7.
- Korenkov M, Paul A, Sauerland S, et al. Classification and Surgical treatment of Incisional hernia: results of an expert's meeting. *Langenbecks Archives of Surgery*. 2001, 386(1):65-73.
- Korenkov M, Sauerland S, Arndt M, et al. Randomized clinical trial of suture repair, polypropylene mesh, or autodermal hernioplasty for Incisional hernia. *BJS* 2002, 89(1):50-6.
- Bageau S, Blanc P, Breton C, et al. Laparoscopic repair of Incisional: a retrospective study of 159 patients. *Surgical Endoscopy* 2002, 16; 345-8.
- Goodney PP, Birkmeyer CM, Birkmeyer JD. Short term outcomes of laparoscopic and open ventral hernia repair: A meta- analysis. *Arch Surg* 2002;37:1161-5.